An Advanced Treatise In

SUBSPACE and QUANTUM ASPECTS of BIOLOGY

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DEDICATION

Much of the work that has gone into writing this manuscript has been previously done by Dr. James Pershing Isaacs. This author has attempted to capture an expounding of Jim's book, "The Complimentarity of Biology", in two different directions: one with the *Quantum Workbook*, on the higher science of quantum physics in the 1990's; and also with the *Quantum Biology*, to try to expand into a layperson's explanation for a quantum biology, and how it disproves allopathic medicine, and proves the use of naturopathy and homeopathy.

I would like to further acknowledge my parents, for instilling in me the dogged determination, the against-the-odds philosophy that allowed for the production of this book.

I would also like to acknowledge my high school science teacher, Professor Cramer, and my high school English teacher, Professor Shelley, for giving me skills that allowed for the production of this manuscript.

Now let me follow in the lines of Dr. Isaacs by acknowledging the person who helped me the most in the production of this book. That is my wife, Laureen, whose intuitive understanding of very complex things allowed for a reduction of the pain in the developing of the book.

An Advanced Treatise in QUANTUM BIOLOGY

PREFACE

It is the treatise of this book to try to outline some biological mathematical laws, rather than just having the observational phenomenology that occurs in biology today.

Many years ago mathematics was not an exact science, and mathematical relationships were just raw estimates made visually and mentally by various people participating in society. Then they discovered that there was such a thing as a mathematical law in which a mental construct of mathematics was not an *approximation* of reality, but had direct absolute *impingement* on reality.

Then chemistry was basically an estimate, or pseudo-science, because then they just made estimates. With the discovery of the different valent structures and the quantumness of reality, chemistry became a mathematical science of exactitude, where different elements react in distinct mathematical ways of interaction. Biology is an estimate science today. This estimate science has fostered the synthetic pharmacology business, which uses approximations or estimates of reality. These synthetic estimates are insults to biology and bring more harm than good.

As we develop quantum physics into our biology, it is the treatise of this book that we will be able to find mathematical laws that exactly apply to biology. In developing these quantum laws, the analogy of quantum physics and biology will be further developed through this five-part series of books. These books, *Subspace and Quantum Biology*, *Bio-Quantum Matrix*, *Quantum Vibrational Medicine*, *Quantum Subspace Bio-Physics*, and the *Energetic Medicine Dictionary* will allow us to more deeply entertain the quantum biology link. By combining these books we can offer a reference book for the field of Quantum Biology and Subspace theory.

Many researchers have worked with radionics and other occult energies without having any understanding of the nature of the forces they dealt with. They use vague energy terms and incomplete theories to describe the effects. We can now offer a more scientific theory for this phenomena in our subspace postulates offered in this text. As the text expands we can see that the subspace effect is pervasive and explanative of biology

This quantum biology link will have several challenges for modern medicine, as it will not come to destroy the laws of medicine, but will come to fulfill them. We will start to understand that there are different systems of medicine that evolve from our more exact system of biology. The implications of this will tend toward naturopathy, homeopathy and energetic medicine techniques. These will be developed in our five-part series, as well.

We welcome the reader to an exciting psychological challenge to develop the mind and to reach beyond the paradigms of a synthetic, pharmacological, chemical society into a more deeply-based, reverent, and exact system of quantum biology and quantum medicine.

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An Advanced Treatise in QUANTUM BIOLOGY

INTRODUCTION

It is the purpose of this book to offer a more modern description for biology using quantum physics, electron dynamics, virtual photons, and fractal mathematics. This book is organized in two parts; one is the Quantum Biology, which outlines in lay language some of the philosophy needed for this new perception uniting biology with our contemporary physics. Accompanying this is *Towards a Bio-Quantum Matrix*, which contains more scientific and mathematical language. The other book presents evidence of the more scientific nature needed to understand these phenomena for the expert scientist.

As science seeks to know more about the environment that surrounds us, we develop many different theories and correlate more observations to allow us to understand and predict occurrences. In the field of medicine and biology mankind has often been stuck without a true science; more of an observation phenomenology. This book will bring up some severe challenges for a system of medicine that has been based on a Newtonian (thus archaic) system of physics. This book will challenge modern society and the medical rites performed within it.

Many heretics such as Harvey, Galileo, Newton and Pasteur have challenged society's morays and socially-accepted theories. At first this book will seem heretical; we hope that this book, like those that have gone before, will be gradually accepted into the mainstream.

One of the great medical thinkers of the modern age was Harvey. Harvey was one of the first people in the west to realize that blood circulated through the body. In his time, people were unaware of that. They knew that there was blood in the body (that when you cut yourself blood came out) and they knew that everyone has a heart, but they did not realize that blood continuously flows through the body in a circular fashion.

Harvey saw that there were veins and arteries, and that they seemed to carry blood toward the heart and then away from the heart, respectively. Eventually he realized that there had to be some sort of exchange, peripherally, from one to the other. At this point he postulated the existence of capillaries.

He never saw capillaries. He never had the benefit of a microscope. He realized intuitively, however, that there had to be some structures allowing the blood to move as it did without accumulating somewhere.

Many keen thinkers have recognized repeating cycles in nature -- which are, after all, at the core of most natural phenomena. Harvey is in company with Galileo, Euclid, Einstein, Pasteur, Hippocrates and others in this respect. All of them were misunderstood by their peers and by the prevailing social powers. Fortunately, their ideas were eventually accepted. The discussion to follow deals with some newer energetic repeating cycles, which also will be misunderstood by many. The author believes that these new ideas will gain ascendancy in due course, and will eventually form the basis for all biomedical science.

In some contexts conservatism is a virtue; but it can be taken too far. Western medicine has become enamored of its own models of bodily function and narrow-minded in its view of alternative models -- even when it can be demonstrated that those "alternative" models are more congruent with basic scientific knowledge than the ones it clings to. It is vital to maintain an open mind in the face of new ideas.

Let's take an example: E. coli bacteria. E. coli goes through a cycle of G1, synthesis, G2, and mitosis. It goes through this cycle every twenty minutes. Each cycle ending in mitosis results in another E. coli organism. What's happening in these steps that allows life? What is it that allows this E. coli to reproduce, to literally guarantee new life?

The answer given by conventional western medicine is based on mechanistic analysis of events at the cytologic and molecular levels. Such analysis has become very sophisticated, and has provided many insights into the specific biochemical changes associated with reproduction. As we shall see, however, these analyses are based on but one reality model-- a model that is useful for explanation of certain phenomena, but that cannot ultimately account for the open-ended systems of life. It cannot explain many facets of life.

There must be a cycle of subatomic enregy and vibration shifts that repeat with incredible stability. There appears to be an imposition of order on these quantic events. We suppose that there is a subspace polymorphic or shape set imposed on the entities of a cell or organism. This subspace effect pervades the entire universe and permeates the particles of all life. This theory is explored in the context of medicine and biology within this treatise.

Models are, by definition, theoretical or hypothetical structures which account tentatively for observed phenomena. When well developed, they are useful maps. The model on which modern western medicine is based, mechanism, has been useful and has allowed many advances. Unfortunately, mechanism has become a canonized doctrine that now obstructs real progress.

It would shock most people to know that conventional western medicine is at least fifty years behind the times with respect to scientific thought. J. Robert Oppenheimer, the developer of the atomic bomb and one of the great physicists of our age, remarked that he felt pity for conventional western physicians since they had taken to

heart the assumptions of Newtonian physics, a model which physicists had "laid to rest fifty years ago." The English physician Glin Bennet described this problem pointedly:

> "...many of the contemporary clinical approaches which so alarm the medical establishment are closer to present-day scientific thinking than the utterances of the high priests of medicine. Physicists can now talk quite easily to psychologists and to complementary and holistic practitioners, because they are grappling with many of the same kinds of issue and live with uncertainty as a central part of their theories. By contrast, doctors who pride themselves on being scientists have allowed themselves to become imprisoned in an immutable cartesian-newtonian system, by closing their minds to anything which demands more than a simple mechanical explanation.
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> "These unfortunate people have long since parted company with the current streams of scientific thought, and they would be regarded as little more than a joke but for the fact that they have such power over their patients and influence in training the doctors of the future."[1]

Mechanistic analysis can get us only so far. If we did a chemical analysis of a television set, for example, we would find so much tin, silicon, lead, etc. Obviously, we wouldn't get any information about what a TV set really is or does, because the real function of the TV has to do with subtler energies (the reception of photons (EMR) which is transformed into pictures and sound). If we restrict ourselves to mechanistic analysis, we will consistently miss the really important phenomena.

Mechanism relies heavily on statistical analysis, wherein are described means, standard deviations, etc. These analyses are useful in thermodynamics, where entropy or randomness prevails. Living systems are non-random and negentropic, and statistical analysis is inadequate for them.

Determinism depends on a discrete, continuous concept of reality. Our senses have developed to operate in a macro setting of Newtonian dynamics where determinism fits the logic of our senses. Now, with deeper investigation into the true nature of the universe of energy and matter, we find this interpretation of things weak, inadequate, incomplete and deceiving. The universe in the micro world appears nondeterministic or quantum; that is, noncontinuous and indiscrete. New thought dictates new concepts of biology and thus medicine. It is the major thesis of this document that life processes are indeterminate, relying on quantum dynamics for interpretations.

What we are talking about is the description of a physics that can be used to describe every element of our universe from the beginning of time. The search for this type of universality of principle has been the search of physics itself. Other cultures have developed philosophies of thought, as they tried to analyze this same dogma.

The ancient Hindu culture has a unique explanation for the universe in terms of its physical laws. The Hindus believe in the god Brahman. Brahman wakes up at one time, and this is the start of the universe. He goes through an entire day, which is the day of Brahman, and is the existence of the universe. Then he goes to sleep, which starts the entire night of the universe, or the night of Brahman. The next day he awakens again, and thus starts a whole new universe.

The day of Brahman is thought by the Hindus to be approximately 150 billion years. The age of our universe now is 15 billion years, or roughly one tenth of the day of Brahman. At this point in time, when Brahman falls asleep, the processes are reversed, and the occurrences of the day of Brahman are recycled through the night of Brahman. Each time Brahman awakens and a day starts, a whole new universe starts, with a whole new set of laws and dynamics. Within the first instants of waking up Brahman decides the laws of the universe that will be in existence through the day and night.

Modern physics has found that there might be enough matter in the universe, where a similar type of approach might be described to parallel that of the Hindu belief. If there is enough matter in the universe, the universe now is expanding. What seems to be entropy, as everything races away from each other, might not be so

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1 Lancet 1983; ii: 971 (letter).

entropic. If there is enough mass, the gravitational pull of this mass will slow down the process, and at one time stop it, and thus reverse the process. The expansion of the universe might be the day of Brahman, and scientists estimate that 150 billion years might be the age of the universe. At that point it would turn around and go back, and all the matter would start to pull on itself and condense the universe, which would perhaps make the night of Brahman.

At this point some scientists have speculated that the day of Brahman might be a cause-and-effect universe, and that the night might be an effect-and-cause universe. The end-all occurrence would be the final compilation of all the matter into one ball, condensed down into the gravity. No longer would there be electrons, protons, neutrons; but all one ball of mass. This one ball of mass would be all there is; the universe would be no more. Then this entire collection of gravitational pull would not explode, but implode into a new universe, and thus start a new day of Brahman. Modern science might one day agree with the Hindus.

This book is dedicated to finding an analysis of the quantum principles that exist in every piece of matter in this universe that allow it to play a part in biology. Within the first seconds of the birth of this universe a type of order was set down into the basics of the matter itself. A proton is 1,836 times the mass of every electron. This type of order was imparted at the first instants of the universe. Every bit of matter, thus, was programmed into some type of law, so that it could take part in the universe, and also take part in biology.

In this book we will analyze some of these laws and the mathematical relationships through our contemporary physics. Not in the antiquated physics of modern medicine, but in the new physics of a new medicine; that of a quantum biology.

The basic proposition of this quantum explanation of biology brings with it the problem of indeterminancy. For events below a certain size or grouping will be quantic. And quantic events have indeterminancy. We will show that Biology is intregally dependent on quantic events. But if indeterminant , is biology random? The answer is indeed not. In fact biology is not at all random. The indeterminant events are under some control that defies thermodynamic understanding. The effect must pervade some subspace dimensions, to be able to effect systems at a large distance. So we must explain subspace connectivity to fullfill our quantum biology. The stage is set so now let the play begin.

The New Physics and the New Biology

In subatomic physics, statistical analysis is not valid. Quantum physics dictates that events happen in discrete jumps-- not half or partial steps. This analysis is measured in systems shifts and hermitian matrix dynamics. A quantum dynamics dictate action in an indeterminate but controlled manner-- statistical mechanics is incomplete for biology. The key to this quantum order is the energy dynamics.

Our discussion is going to focus on *energy*-- subtler forms of energy than those to which attention is usually paid. The photon and virtual photon will be expanded as a key in understanding biology.

What is the difference between a living being and an inorganic object? One important difference is the entropy equilibrium into which inorganic objects fall. A glass, for example, will assume whatever temperature prevails around it. When an object is dead it obeys the laws of thermodynamics, when a living organism dies it returns to the world of thermodynamics. The laws of thermodynamics are the laws of death.

A drinking glass is governed by the second law of thermodynamics, which states that everything is becoming less and less organized or concentrated-- that everything is becoming homogenized. The glass may be very cold to begin with (e.g., 35 degrees F), but put it into a warm room and the coolness soon dissipates and becomes less concentrated, becoming distributed evenly in the surrounding environment.

The human body, on the other hand, will resist (to an extent) the prevailing temperature by remaining at 98.6 degrees F even if it is very cold or very hot around me. My body is now struggling to maintain a precise core temperature of 98.6 in the face of the cool (70 degrees) temperature of this room.

Brownian Motion prevails in the molecules of an inanimate object. This means that they are constantly vibrating in a random pattern. They are entropic (randomly moving), and fall under the purview of mechanistic analysis.

The molecules making up a living organism, however, are not subject to Brownian Motion, and are under quantum order. When a cell dies (due to radiation, toxins, or trauma) the molecules of the cell shift to Brownian Motion as they switch from quantum control to entropic deterioration.

Mechanism, thermodynamics and entropy are thus most relevant to inanimate objects, while quantum dynamics are most relevant to living systems. The quantum dynamics rest on factors of energetic, photonic, magnetic and vibrational elements-- in addition to the chemical ones. For every shift in quantum levels photons (light) must be absorbed or released. Photon control is dictated by electromagnetic fields which become critical to life.

If we compare a cell from my toe to a cell from my cheekbone, we'll find on gross analysis that they're completely different cells. Yet, if we look deeper, we'll find that the DNA of the two cells is the same. The DNA of one cell is identical with that of another cell.

Further, if we implant the toe cell into the cheekbone and wait awhile, we'll find that it is no longer a toe cell. It enters a new bio-quantic field and slowly becomes a cheekbone cell.

When a plastic surgeon rebuilds a face he/she will borrow tissue from other parts of the body and incorporate it into the forms under construction. In order to rebuild the lips, for example, tissue is selected that has some resemblance to lip cells -- say, cells from the cervix. Cervix cells, when sewn into the lips, will start becoming like lip epithelial cells. If the patient is healthy and the energy field is right, within six months to a year they'll become lip cells.

The DNA of each cell has the information necessary for that cell to have the characteristics of any cell in the body. Then how does the DNA instruct a certain type of cell to have the *specific* structural and functional characteristics it has? The answer given by biochemists is that genetic information is selectively expressed; whereas in the toenail cell, all the information that would allow that cell to be a cheekbone cell, a brain cell, etc., has been repressed. The only instructions that are allowed to get through are those that cause the cell to be a toe cell-- even though it has the potential to become many different types of cell.

Biochemists believe that the key to genetics and DNA function lies in the base pairings and the chemical reality of the double helix. The idea that unseen or invisible fields affect life is difficult for conventional scientists to understand. For example, the average biologist would contend that anything that exists has weight and therefore, if a television set is weighed when it is on vs. when it is off-- since there is no change in weight-- that nothing has been added to the television by being on. That biologist would have a difficult time accepting the wave or field interaction of electromagnetic waves or photons. Few biologists understand photon and information dynamics.

Marconi invented the radio in 1895. Many people refused to use it -- or even to believe that it worked. They could not accept the idea of invisible waves. With general technological development came a gradual acceptance of such ideas in most areas of study. Unfortunately, though, the scientific community has been sluggish in accepting the reality of wave and field interactions as critical affecters of biological phenomena. Nonhertzian or scalar waves penetrating subspace is just as threatening today as the radio wasves of yesteryear.

Embryologists have direct experience with life fields. After fertilization tissue growth in the embryo proceeds in a specific direction. If the embryo is cut and chemicals removed it can regenerate back to its old direction. If we cut a magnet in half we have half the chemistry but two *whole* fields. Fields cannot be cut or dissected. If the embryo field is altered or destroyed by radiation or magnetism the embryo will grow in inappropriate directions. Thus the embryo is developed not under chemical law but energetic dynamics, where energetic fields dictate growth.

Earlier in this century a French researcher named Gurwitsch, detected radiation emanating from living tissue. He called this mitogenic radiation ,because of its effects on mitosis.

In the 1930s the Gurwitschs found that cells could influence each other through glass-- without chemical interactions. A type of electromagnetic radiation that was like light or was light was discovered.

James Isaacs and this author have duplicated this work: onion cells were placed in one sealed test tube, and onion *tip* cells (cells undergoing rapid mitosis) were placed in another. The two test tubes were placed 3/4 of an inch apart. The onion cells closest to the tip cells were found to be stimulated into mitosis. If the mitosis of the tip cells is altered via DNA mutation-producing substances or radiation, the mutated pattern will be reflected in the onion cells. Thus DNA could produce mitogenic rays which could influence other cells (see Chapter 8).

The mitogenic radiation was determined to have frequencies of 10^{12} Hz. to 10^{15} Hz., covering infrared through visible rays-- bordering on ultraviolet. Cancer cells gave frequencies of below 10^{10} Hz.

As we study this phenomenon we will show in our books that modern medicine has not been based on a true biology. Modern medicine has been based on a chemical perspective of Newtonian forces. Biology is a quantum event that demands a new medicine to be developed. This new medicine is already researched, studied, taught, legal, and has hundreds of thousands of practitioners. This book is but a small part of the writings on this

subject. Our quantum biology series is a five-part treatise, which includes *Subspace Quantum Biology*, *Bio-Quantum Matrix*, *Quantum Vibrational Medicine*, *Quantumand Subspace Biophysics* and the *Quantum Energetic Medicine Dictionary*. Now these texts are combined for easy reference. Our other books validate the legal experimental nature of this new medicine, and the "how to" of this medicine. The International Journal of the Medical Science of Homeopathy offers scientific evidence of the scientific and clinical proof of homeopathy.

Light, Radiation, and the Nature of Physical Existence

The light that issues from light bulbs is incoherent light. That means it's going off in every direction. The sun is also an incoherent light source: it emits light in every direction.

A laser, on the other hand, emits coherent light. It has organized the radiation, so to say, into a concentrated, focused beam-- a demonstration of coherent light.

We can take non-coherent light and put a diffraction grating onto it. That means that we take a piece of paper with a couple slits in it and hold it up to the light; or, we can take a prism and hold it up the light. The diffraction grating separates the light into different bands, and you get a rainbow effect.

To study the radiation issuing from DNA, diffraction gratings were used. A Princeton researcher named Harvey also performed an experiment with onion cells, similar to the one described above. He removed the diffraction grating and achieved the same results. He thought that light needed focusing: since the focuser-- the grating-- was removed, light (electromotive radiation) could not be responsible for the results. His conclusion-- unfortunately for students of the New Biology-- was that mitogenic radiation was unimportant.

The laser had not been developed at that time. The existence of coherent light was not known. As it turned out, the electromagnetic radiation energy issuing from DNA is coherent. It's not scattered. Being coherent, a diffraction grating was not necessary. Coherent mitogenic radiation needs no focusing. DNA is a receiver and transmitter of laser light.

Let's examine now one of the key equations of life: the oxidation of glucose. Glucose is six carbons, twelve hydrogens, and six oxygens: C6H12O6. Animals take in oxygen, with which the glucose is oxidized. The product is carbon dioxide, water, and electromagnetic energy-- or, light. Here's how it looks as an equation:

$$\text{Light} + C_6H_{12}O_6 + 6(O_2) \iff 6(CO_2) + 6(H_2O) + \text{light}$$

(See *Bio-Quantum Matrix* on Chemiluminescence).

The chemistry of this has been studied and understood for a long time, but the last item on the right-- the *light*-- has not. It is well known that plants take in light during photosynthesis, but that light which is given off by animal bodies (all of us!) has received little attention. Chemiluminescence is studied as a small part of biology. It has not received the attention it deserves.

The satellites that transmit TV pictures run on 10^{-17} watts. Our brains transmit at 10^{-9}. Therefore, our brains' transmissions are much stronger than those of satellites. Satellites, however, do not emit coherent radiation. They send out a beam that widens, and anything that widens is incoherent radiation.

Gerwich found that brain tissue sends out more electromagnetic radiation than any other cell he could isolate.

A Review of this work is more thourough in future chapters.

The nucleus of an atom is made up of protons and neutrons and other particles. If we took the nucleus of an atom and expanded it to the size of a marble, the electrons around it would be orbiting anywhere from 300 yards to a mile away. That gives you an idea of how much empty space there is in seemingly "solid" material objects-- including our bodies. If we compressed my body to get rid of *all* the vacant space at the atomic level, my total mass would be much smaller than a bacterium. This empty space abounds with virtual particles and photons as theorized in QED.

To study only the chemistry of the body (the physical "stuff") while ignoring the "empty" (field) part may give us a very distorted view, since it is in the "empty" parts that all the subtle energy fields are working-- affecting the physical "stuff". The invisible quality of life, the interactions of electromagnetic and static electrical fields, must become the focus of biology.

A new perspective on physics that must be brought up here in our analysis of biology is that of quantum dynamics. This new quantum perspective, which has displaced Newtonian physics in its analysis of subatomic

particles brings with it several different postulates that must be analyzed and understood for us to use a quantum mechanics in biology.

In 1899 a German physicist, Max Planck, presented his views on quantum physics. He called it "quantum" because of the idea of a distinct quantity of the subatomic particles. Thus the photon in its effect on electrons has a distinct *quanta* reaction. In dealing with our quantum biology we will need to understand some of the basic postulates of this new form of physics. The idea of a discontinuous universe is the first thing we must understand. This will later be utilized in the mathematical relations, and will show us why statistical dynamics and thermodynamics are incomplete in their understanding of biology. They cannot account for some of the *quanta* of small dynamics, such as what can happen in the small, controlled environment of the cell.

Another criterion of our quantum world is that of the wave function vs. particle dynamics. This is explained in the Schrödinger equation. There is a time-dependence relationship of a wave function that exists in the movement of absolutely anything in the universe. In the macro world this wave type movement is extremely small, whereas in the micro world of subatomic physics, and that within the cell, this wave function is indeed important.

Another basic postulate in quantum mechanics is that of the dynamics of the things that can be measured. In a Hilbert space vector position and momentum can be charted via a hermitian operation. Angular momentum and energy are other factors that can be measured within the field of quantum dynamics. Time, ortho-normality, and probability distributions will also come into our analysis and play a large part in our quantum dynamics.

Another very important part in this dynamics is that of uncertainty, or indeterminacy. This is to say that in the things that we can measure through the dynamics of Quantum Theory we are uncertain as to what totally is happening. This uncertainty is not just a limitation to our theory, but is locked into the heart of it, in that we cannot know all of the factors of a situation that we are measuring.

Another basic postulate that goes hand in hand with this is that if we measure anything within a quantum set, we affect other parts of the dynamics. Measurement of an observable item will generally cause a drastic and uncontrolled change in some other part of the system.

Also what must be dealt with is that of the relativistic components of the system, following Einstein's theories of relativity. We will also find that this quantic action is photon-dependent, as a photon makes up the basic quanta of energy that allows anything to happen. The virtual photon can come into existence and affect things at a distance.

We make it a basic treatise of this book that the factors of biology follow a quantum dynamics, and thus cannot be determined and analyzed in a Newtonian, thermodynamic or statistical way (see *Bio-Quantum Matrix*).

This indeterminacy is very threatening to some scientists, mostly those with psychological disturbances of over-accentuated self worth. Indeterminacy is a threat to the power-driven ego. Indeterminacy fosters humility and reverence. This will pervade biology, and later, medicine.

Ions, Ionization Potentials, and a New Definition of Organicity

An ion is some atom,molecule, or particle that has a charge. Let's take a hydrogen atom, which has one electron and one proton. If we dissociate it-- pull the electron away from the proton-- we'll be left with a positively-charged proton and a negatively-charged electron. The proton and electron are then ions. Even a large stable molecule can lose an electron and then become an ion.

The electron is negative and the proton is positive. There is a fine balance between the forces holding the electron in and forcing it out. The centrifugal force (throwing the electron away from the proton) is equal to the sum of the gravitational and electrostatic forces of the proton (holding the electron in).

Ionization potential is the amount of energy it takes to pull an electron away from an atom. If we start applying energy that pulls the electron toward the proton we would upset the balance. Likewise, if we applied energy that pulled the electron away from the proton, the electron would eventually dissociate or fly off. This energy that shifts electrons could only be energy from photons.

There are many quantum levels an electron can occupy as it orbits the nucleus of an atom. At the ground state the electron is as close as it can be. If it gets any closer, or tries to release a photon and go to a lower level, it will become unstable and the electron will be absorbed by the nucleus. If an electron is at the highest quantum level; if another photon is absorbed, the electron will be freed and spin off-- rendering the atom an ion. Between the preionization level and the ground state are the quantum electron shifts of life.

Charged particles, such as electrons, create magnetic and static fields around themselves as they travel. This magnetic and static field production expends energy, and the electron path and velocity succumbs to the drain

of magnetic field production. However, an electron in its quantum orbit around the nucleus of an atom expends no energy. Electrons seek out these "safe" orbits-- those that do not demand energy expenditure.

Different compounds have different quantic potentials which they can absorb and release (see *Bio-Quantum Matrix*). Life processes seek to line up these compounds to take the "hot" electrons of glucose and use their energy in minute, quantic steps for needed energy.

The easiest quantic level to measure is the last one-- the preionization level. This is the ionization potential of a molecule. We can make a graph of ionization potentials. At the top of the graph would be a number of substances that are very easy to ionize, like hydrogen. Lower down on the list would be H2O-- water-- which is a relatively stable molecule. Below that are molecules that are even more stable: nucleic s, plastics, xenobiotics, and others. Some of these compounds are extremely stable, and to ionize them requires tremendous amounts of energy.

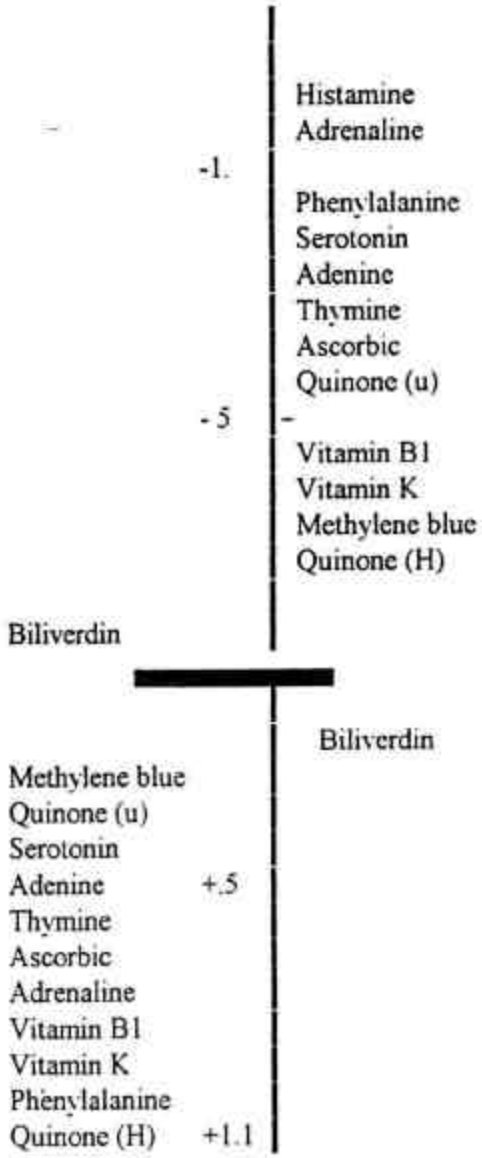

Figure 1. Ionization potentials. (K Scale)[from Szent Georgi's book on Bioelectronics.

This K Scale is a measure of the ease of ionization potential that an item can have. Many items, as we can see, will fall into this schedule twice, possibly even three times. This is to say that there are outer electrons with different ionization potentials. This charts the electron transport of many different items, as they share and transfer ionization along different lines (see *Bio-Quantum Matrix*). So in electron transport the electrons can be exchanged by compounds with close K-scale potentials and end in distinct locations.

Every compound in the living organism has to fall within a short range. The diagram above illustrates some ionization potentials. So chemical in biology are within a set of K scale extremes. An item too acid or alkaline is incompatible for biology. The chemicals in bioelectron transport will have to be lined up correctly for transport to occur.

Pure, 100% acetic acid is a poison. On our ionization potential graph it would be near the top (very readily ionizable). Now, although pure acetic is technically an organic compound (contains carbon), and is found in natural foods (such as vinegar), it is poisonous unless we dilute it. The dilution with water will bring down the ionization potential to a level that is again compatible with life and health. (Fortunately, in its naturally-occurring forms such as vinegar, it is already diluted). Many compounds are only poisons at certain dilutions and nutrients at others. Some compounds are slightly outside the acceptable range but can be buffered by the system and stabilized for use. The buffer system of the body is intricate and very sophisticated.

Hydrochloric acid is an inorganic acid, and in its pure form is also high on the ionization potential graph--and incompatible with life. However, if we dilute this sufficiently, it will resemble our gastric juice, a substance that enhances digestion and thus favors life. The job of a chemical and its position in biology is critical.

The important question is not whether a substance is technically "organic" or "inorganic", but where it falls on the ionization graph, into or out of that small segment of the graph that represents substances that can be ingested and used by living things. When life forms have too much contact with substances that fall outside this segment they are injured, fall sick, and eventually perish.

The word *organic* has been selected by chemists to designate all substances containing carbon, including deadly poisons and many substances profoundly incompatible with life. This nomenclature has created some confusion, since the primary definition of the adjective *organic*-- of, pertaining to, derived from, or having the properties of living organisms -- is much broader than the criterion of the chemists (presence or absence of carbon). Although the latter has been a useful definition for some types of research (organic chemists have made fabulous contributions to our knowledge), the value of a substance on the ionization potential graph reflects more of the original spirit of the word *organic*.

Since it is not likely that the chemists (and, for that matter, all scientists) will defer *en masse* to our wishes, abandoning their peculiar appropriation of the word *organic*, perhaps we could coin two derivations of it: organic/I and organic/II. The first would refer to the first and primary definition of organic (or qualities, attributes, and indices relatively close to it-- such as the ionization potential), and the second would refer to the organic chemists' definition of organic. Scientists have lost perspective on chemistry because of the teaching analogies used in chemistry. The Chemistry classes use hard balls and rods to demonstrate the chemistry of atoms and molecules. These objects are hard and of substance, so the student sometimes sees chemistry as an exchange of hard matter.

We now know that instead of hard object interaction there is actually an energetic field interaction of particles and the quasi field of partner particles that interact in a many body interaction. When bio molecules interact as in nutrition or reproduction etc., what actualy happens is that a field of quasi particles of the nutrient interacts with the quasi particles of the cell and a very mathematical quantic interactiuon ensues. If the chemical quasi quantic field of the nutrient is compatible with the quasi quantic field of the cell nutrient processing occurs in precise mathematicl ways. If the fields are mathematically incompatible or prohibitive, then non absorption can occur. If the incompatibility is extreme then poisening can occur. If we look past the chemical ball and rod demonstration and study quantum dynamics we can arrive at a new biology of quantic mathematical preciseness. To this end this book is a starting step.

This is a treatise on a new type of biology and a new type of medicine. Within this document we outline some of the different guidelines and rules for a new thought process. This process lays the philosophy of analysis in understanding biology, and thus in understanding medicine. It is not the purpose of this document to offer absolute medical criteria. It is the purpose of this document to offer a philosophy of medicine that shall be echoed through the philosophy of biology. To understand more about medical ramifications that can result from this document we would like to point the reader to the "New Biology", "Natural Repertory of Dr. Nelson", "Physical Diagnosis", and "The Natural Compendium,and Materia Medica". Most important is the articles collected by The International Journal of the Medical Science of Homeopathy, that review the ever increasing scientific work in this field. This will allow us to develop and analyze a new medicine in these other documents. For as we study the

field compatibility of biology we see that only nature can make things compatible with nature. The limitations of the chemical dominated past of rods and balls must be transcended.

But now let us return to analyzing the philosophy and giving medicine more tools of energetic analysis.

Electron Poising; the Simplest Units of Life

If we analyze oxygen chemically, we will find that all oxygen atoms are, by "chemical" definition, exactly alike. However, because of these varying combinations and qualities of electromagnetic fields, each oxygen atom is actually energetically unique. Although this is well-known, most chemists still find it convenient (and it *is* convenient, for some purposes) to consider all oxygen atoms identical. As yet, there is no excellent system for classifying these different oxygens.

If we take an electron off the oxygen it is then ionized. Life depends on this ionization shift and quantum interaction. All life processes thus become quantum-dependent, accounting for the reproducibility of biological experiments.

In the nucleus of the oxygen atom there are eight neutrons and eight protons. There are two electrons in the first shell of oxygen; their orbits are circular. The next group of electrons form the other shell; their orbits are elliptic.

Elliptic orbitals have a major access and a minor access. These will generate different fields. A vast increase in quantum potentials is possible, depending on the position of the electron in the ellipsis.

Each of these electrons has a spin[2] about it which creates a different electromagnetic field. Even a relatively simple atom, such as the oxygen (eight electrons), has an astronomical number of possible electromagnetic field configurations. The atom thus becomes a sort of microcomputer system with an incredibly powerful main memory in its quantic levels.

Nature poises electrons and protons in specific quantic areas, according to information-storage needs. In the process of photosynthesis plants take in photons from the sun and convert mineral elements to higher quantic states -- specific states relevant to information-storage needs.

Calcium, in the context of inorganic materials such as dolomite, cannot be properly used by humans. On the other hand, the calcium found in an organic context -- say, celery -- is primed and suitable for absorption and use by the animal body. The quantic pattern needed for perfect absorption and use is terrifically complex. Dr. Isaacs's hermitian matrix[3] illustrates the pattern; the probability of achieving it at random is over 100 trillion to one (see *Bio-Quantum Matrix*).

It can be seen, then, that synthetic substances for internal use (if an accounting has not been made for the quantic patterns that ensure biological compatibility) can be useless or worse. Although the matrix could, theoretically, allow for appropriate quantic placement in the production of synthetics, the actual process would be laborious and exorbitantly expensive. Thankfully, these patterns *have* already been accounted for-- precisely and elegantly -- by nature! This, ultimately, is the rationale for the use of natural foods and food extracts.

There seems to be about 600 different activities involving proteins going on in the E. coli. In the vion there are about 10^7 different compounds. The E. coli is one of the simplest forms of life on the planet. It is a vion.

In Dr. Isaacs's landmark book on the subject of quantum biology, known as the "Complementarity of Biology", he refers to the "bion" as the basic living unit. This is the minimal amount of mass needed to actually be a living thing. To be a living thing it must qualify by being able to reproduce and metabolize on its own, independent of other help.

Since the term "bion" was taken by other researchers, including Reich, Isaacs suggested adapting another term. For the purpose of this book, we use the term "vion", and from now on we will use the word "vion", which will mean the same thing as Dr. Isaacs indicated with "bion" in his book.

There are two fundamental characteristics of living things. The first is reproduction: the ability to reproduce in kind with less than one mutation per billion generations. The second is metabolism: ingestion of foodstuff and the transformation of it into energy for necessary functions. A vion is the smallest collection of compounds in energetic communication which exhibit these fundamental characteristics of life. Rickettsia, for

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2 "Spin", in physics, refers to the momentum of subatomic particles.

3 The hermitian matrix, an exciting and unique way of conceptualizing biological phenomena, will be described and discussed fully in *Towards a Bio-Quantum Matrix*.

example, fulfill these requirements: they are the smallest particles of matter that can still metabolize and reproduce without external aid.

The vion can be likened to the chemical elements of chemistry. Elements can be joined to form molecules of great size and complex function. Likewise, vions can unite to amplify the range and variety of biological function. Isaacs' matrix-- a table of biological interactions-- can be likened to Mendeleyev's periodic table of the elements. The introduction of the matrix into biology will open new realms of predictability and reproducibility in research (see *Bio-Quantum Matrix*).

The basic problem comes from a misguided concept taught by the balls and rod chemistry. The concept of this system misleads one to see the chemical interchnges as hard unyeilding objects like billard balls, when in fact the subatomic particles are indeed quasi energetic fields of vibration , angular, spin, orbital etc. energy. The interaction of a substance with the cell wall of an organism is an encounter of enrgy probability fields incountering each other. The billard ball concept was good for instruction but decieved the thought from truth. The concept of the quasi particle is introduced in the book ' A guide to Feynman Diagrams in the Many -Body Problem' by Richard Mattuck (Dover Press).

The internal processing of the collective matter inside a cell is a mathematical non thermodynamic , nonlinear, quantic accounting and processing system. Here one enzyme in a large space is not randomly bounced around but is energetically directed for function to a specific area. At this area the quasi field of the enzyme interacts in mathematical ways with the proper substrate. Thus the cell must have a precise mathematical processing system of field management. The substance interacting with it must then have a specofic range of energy field requirements for the cell to use it as nutrition. The proper way to describe these quasi enrgetic fields of the cell and the interaction substance is to analyse the quantic probability of the spin, orbital size, orbital type, quantum levels, temperature or molecular movement, voltammetry characteristics, resistance and conductance characteristics(trivector field), and a host of other energetic analysis. This would be best designed in a matrix for cataloging all of the criteria. The matrix of a cell would be descriptive of the cells processing of intercellular compounds. The boundary layer at the cell determines the interaction of the cell with outside substances. Thus figuring out this matrix is the ultimate goal of biology.

The ionized hydrogen atom (one proton without an electron) is the simplest unit of study in chemistry. Every other element is built on that, with varying numbers of protons, electrons and neutrons. Likewise, the vion is the simplest biological unit we can study, and every larger and more complex living thing is made up of varying quantities and qualities of vions. After moving to Budapest to work on my research I realized that two of my most important teachers were Hungarian. Having worked with both Selye and Szent Gyorgi I could now appreciate better their genius.

Albert Szent-Gyorgyi won the Nobel Prize for discovering vitamin C in 1937. In April of 1967 Dr. Szent-Gyorgyi, in the foreword to Hahn Selye's book, "In Vivo", wrote this:

"When I was a medical student, there was no Bohr atom, no orbitals, no quanta, no nucleus, no electrons, no electron microscope, and no x-ray crystallography. We only knew that there were about twenty amino acids and a similar number of sugars, and could classify roughly the main ingredients of a cell. Then these were wonderful achievements. Judged from our present outlook, then, we knew practically nothing. All the same we felt obliged to explain life, and he who said that our knowledge was insufficient to understand life was called a `vitalist', or `mysticist'.

"Now we know much more, and again try to explain life, molecular biology being the password. But we do not know, as we did not know in my student days, how many more sciences wait still to be discovered. Again, today we call him a `mysticist' or `vitalist' who ventures to say that our present knowledge may still be insufficient to understand life, and molecular biology may not be the last word.

"I do not mean to say that achievements of molecular biology do not deserve admiration. We have to know and to find out all that we can about molecules, quanta, and electrons to approach an understanding of life. But we must not forget that the molecular level is but one of many levels on the gambit of organization, and what we call life is an integral of all functions and all reactions."

As Szent-Györgyi points out, people who assume that present science is incomplete are labeled `mysticists' or `vitalists'. It is always an attack on the present-day ego, whatever the level of science, that the present-day medical establishment does not know enough about medicine to fashion its wares and design synthetic pharmacology.

After writing this book and developing a quantum idea of biology, we are brushed by the indeterminacy and uncertainty principles of Heisenberg. This gives us proof that whatever level our technology is, it will always be insufficient to absolutely know the factors of biology. Thus for the rest of time, anybody who studies biology

must accept himself as a vitalist and mysticist, and thus realize, in a reverent fashion, the completeness of biology and the incompleteness of their own philosophical and intellectual pursuits.

With this book we welcome to the ranks of mysticism and vitalism all the present-day biologists and molecular biologists.

As science progresses our guesses about biology become better and better, but we must always realize that they will always will be guesses. As Selye said in his book, "In Vivo", "Perfect knowledge of biology is unattainable by the human mind."

It is the purpose of this book to prove such a concept, which now puts naturopathy, or natural medicine as the only true choice of development of medicine for the future.

SUMMARY OF INTRODUCTION

1. MODERN MEDICINE NEEDS TO LOOK AT MORE ENERGETIC PHILOSOPHIES OF BIOLOGY.

2. BIOLOGY IS BY NECESSITY ELECTRICAL, MAGNETIC, STATIC (TRIVECTOR) PHOTONIC, AND CHARGE-RELATED AS WELL AS CHEMICAL.

3. MODERN MEDICINE IS RESISTANT TO NEW THOUGHTS IN BIOLOGY.

4. ALLOPATHY IS AN ANTIQUATED FORM OF MEDICINE. HOMEOPATHY CAN DO MUCH MORE WITHOUT THE RISKS OF DEVASTATING SIDE EFFECTS.

5. THE BALLS AND RODS CONCEPT OF CHEMISTRY THAT HAS BEEN TAUGHT FOR DECADES IN SCHOOLS HAS ACTUALLY DONE HARM, BECAUSE IT HAS PRODUCED THOUGHT PATTERNS THAT ARE UNWILLING TO ADAPT TO THE QUANTUM QUASI FIELD CONCEPTS OF MODERN PHYSICS. THIS ROBS THE INSIGHT NEEDED TO TRULY UNDERSTAND THE BIOPHYSICS OF THE CELL AND OF MEDICINE. WHILE IT SELLS MORE SYNTHETIC MEDICINE IT MAKES FOR MORE IATROGENIC PHARMACEUTICAL DISEASE.

Chapter 1

QUANTUM BIOLOGY

Chapter 1

QUANTUM BIOLOGY

Throughout the years philosophers have debated the idea of determinism. Scientists such as Newton, Fahrenheit, and Democrates argued over the proposition that there was a deterministic universe consisting of small determinable atomic bits whose pathways could be calculated. Other philosophers argued for a more indeterminate universe in which free will and happenstance were more likely the rule. Many psychologists such as Carl Jung have argued on the idea of synchronicity as a force allowing for the idea of *indeterminacy*. Scientists such as Heisenberg and Planck developed an idea of physics based on an indeterminate reality. This has led to the sophistication of quantum theory in physics, which dictates that in the world of the extremely small there is an indeterminate process, and nothing can be fully predicted.

The science of this indeterminacy is known as quantum physics. The exactness of Planck's constant and the Heisenberg uncertainty principle have led to the development of electronic theory and quantum dynamics; explaining the fields of chemistry, electrodynamics, transistors, and many other scientific processes.

At the time of this writing it is apparent that the Heisenberg uncertainty principle is a tenet of physics. Other scientists maintain that there will be a method of determinism discovered in this small interval at a later date, when we learn more about the physical processes of the universe. However, it should be pointed out that even if such determinism should be found, there would still be an effective indeterminism due to the limitations of our science to calculate all of the variables.

This book is dedicated to the proposition that indeterminacy, via the Heisenberg uncertainty principle and other quantic processes, is integral to the field of biology. We will compare the thermodynamic entropy science of modern pharmaceuticals to the quantum controlled process of electrodynamics, to show that biology exists because of its quantic *control*-like nature, and resists the thermodynamics of random entropy. The mechanism of this control is conveyed over subspace dimensions and is energetic and polymorphic in nature.

The laws of thermodynamics are the laws of death, as we will find in our exploration of biophysics. The laws of life depend on a controlled nonrandom set of processes. The development of quantic biology will go a lot further toward unravelling the mystery of the living process.

Morowitz states: "Thus, in the ideal case, one should be able to start out with a quantum mechanical description of the atoms making up a cell, and by application of the principles of quantum mechanics, predict the cell's behavior." Such a description of a living cell is far from that realizable at the present state of knowledge.

Detailed atomic descriptions of the structure of a living cell consist of giving the position of each atom and the bonds between neighboring atoms. The functional description of the living cell thus consists of following the time dependence of the detailed atomic description. In view of the complexity in the living cell; that is, the number of atoms, no one can hope to give us as
detailed a description as this. Rather, one assumes that laws governing aggregates of atoms will simplify the description and provide the laws of cellular biology.

Heisenberg's uncertainty principle states that the uncertainty of a particle is greater than or equal to the possible position times the possible momentum times Planck's constant.

$$) P \,) Q \geq h/4\pi$$

$$h = 6.67 \times 10^{-27} \text{ erg sec.}$$

A fact in biology that has been overlooked is that this is an inequality, meaning that the uncertainty can be greater than or equal to. Many physicists have related to this as an equality, not an *in*equality.

In physics we talk about the transition period from subatomic quantum laws to the macro world of Newtonian dynamics, hinging on thermodynamic Gaussian principles. This transition state is usually thought to happen in the world of subatomic phenomena. It is one precept of this book that due to the inequality of the Heisenberg uncertainty principle and the peculiar photodynamics of biology, the same indeterminate and quantic principles continue beyond the atomic and the molecular level to the cellular and organic processes of biology. This quantic pressure does not happen in inorganic or nonliving substances, but does happen in the dynamics of

biological tissue. If this biological tissue should lose its life force (die), then the tissue would fall back into thermodynamic and Gaussian principles.

In this book we will introduce such concepts as the bio virtual photon principle of life, allowing for the changing of electron states; the hermitian matrices, giving us the predictability of the pattern of such intermolecular and subatomic processes; long-range forces, mitogenic radiation, the vion,subspace polymorphic transfer, and other quantic processes.

Dr. Isaacs brings up an analogy with Laplace's calculating demon. The concept of the demon was that we could satisfy the following steps of: first, giving this calculating demon the necessary mechanical laws and subsequent initial values relating to the atoms and molecules of the universe; second, giving an abstract ability and some biological knowledge; third, giving the Laplace's calculating demon an ability to allow for statistical averaging in terms of physical and chemical generalizations, as with Born and Brillouin, the initial ties of position and momentum of a purely mechanical system having an inherent spread that increases with both time and observation; and fourth, adding that the demon must be further humanized by limiting his power of statistical averaging and inference.

Laplace postulated that his calculating demon would then know every action of every thing in the universe. Isaacs makes the treatise that Heisenberg, who allowed for indeterminacy, brought up the idea of a quantum theory which would destroy the feasibility of Laplace's calculating demon. Heisenberg said, "It may well be that a description of the living organism that could be called complete from the standpoint of the physicist cannot be given, since it would require experiments that interfere too strongly with the biological functions."

One of the precepts of quantum physics is that as we go into smaller and smaller measurements, our techniques of measurement interfere with what is being measured. According to Bohr's correspondence rule, there are definite limits to what we *can* measure and what we can *fully* know.

Isaacs postulates that in living biological units the uncertainty product of the conjugate variables of molecular motion is increased at ordinary temperatures and pressures. Molecular motion in these biological processes is thus mechanistically indeterminate. This molecular indeterminacy engenders new laws for living processes. Indeterminacy must be considered in a new classification of living beings. This is to say that the description of biological processes cannot be reduced to statistical averaging and cannot be approached through thermodynamic or entropic modes of calculation. Only with Quantum dynamics and the uncertainty product can we analyze the forces of biology. To understand the interaction of the organized compounds in a cell we must chart the quasi energetic nature of these compounds. This evolves throughout this text.

What happens *in vitro* (in the test tube) falls under the laws of thermodynamics, and must obey Boyle's gas laws for the interaction and colliding of different molecules. This is a statistically determinate process, which accounts for Brownian motion and other such effects. Inside living tissues we do not find Brownian motion; we find that there is a different effect, a more controlled process, a passage of the molecules *not* in a random process, but a controlled process. There are no continuous steps, but *discrete jumps* of energy states. Quantum theory seems to apply.

Thus the biological process within the cell is similar to the quantic process within the atom. Life exists by quantic rule and behavior.

Dr. Isaacs makes a point for the *vion*, which is a discrete living unit but not always a cell. Vions are more fundamental than cells. A vion might be a simple cell such as rickettsia or E. coli. Most cells are composed of different vions, the vion being the smallest amount of matter that an organism can be made up of and still have the processes necessary for life (reproduction and metabolism). Reproduction means information conservation dependent on genes, chromosomes, and other genetic processes, and metabolism controls such processes as mass and energy transport, relying on hormones, enzymes and coenzymes.

We point out the need for long-range additive electromagnetic forces dependent on the exchange of virtual photons, crucial for the exchange of energy and the exchange of information at long ranges, depending on photon transport, rather than electron.

Development of computers depending on photon transport will open the door for a much deeper understanding of the biological process. To date, the biological process has been looked on as an electron transport and chemical process. Until we can open the door to the electromotive exchange of light (photons) in the cells and the exchange of mitogenic radiation, biology will be locked in archaic misunderstanding. The understanding and development of biology will come from the description of mitogenic radiation, the electromotive force of light and its dictates in plant and animal physiology (see Chapter 8). Feynman makes the account for a quantic system to develop these virtual photons; such a system is definitely accountable for biology.

Changes in the states of living units (vions) are predicted and controlled via the radiation of virtual photons. This radiation has been measured and calculated, and is found to be coherent within a quarter wavelength, so that mitogenic radiation also is similar to coherent laser beam technology. The transformations employed in cybernetics will be used in quantum selection rules to allow for the understanding of the mechanical and energetic interchanges, which allow for the existence of vions. We will make the treatise that biology, through quantum interchanges of the conjunctive variables and transformations, can allow for control of energy, mass, heat, charge, electromotive force, virtual photons, and so on through the continuum of time and space, in the dimensions of our perception and beyond.

We also will make the treatise that the quantum biological process is similar to the biological process, and that the actions within atoms and subatomic units are very similar to the quantic interaction of exchanges within the biological units. Transformation theory will be discussed in terms of a hermitian matrix for the exchange of energy states within these quantic interactions, predicting the discrete energy jumps that are accounted for in biology.

Homeopathy will be introduced through an electronic analogy of the law of initial values vs. the Arndt-Schultz law, to show the double-knee effect of how homeopathic therapeutic action can influence this virtual photon flood of the body. The trivector effect of resistance, voltage, and amperage will be reviewed of homeopathy and compatibility with patients. Homeopathy will be shown, along with electro-diagnostic techniques, to be the new advent of modern medicine.

We will counter Brownian motion in *in vitro* vs. *in vivo* testing. We will study the pH criteria of not only proton pressure but also electron pressure in a biological system. We will point out the need for statistical dynamics in large situations, and the invalidity of such dynamics in small cellular processes.

These profound revolutions in biology were introduced by Dr. Isaacs in the 1950s, in his book, "Complementarity of Medicine", a book that has been discovered and retranslated in this monograph to account for, explain, and open the door for deeper understanding of this largely ignored book.

Finally, we wish in this treatise to bridge the gap between biology and philosophy and to deepen our respect and reverence for the biological process and the grand factors of living in God's natural world.

Another thing that should be pointed out at this juncture is the inappropriate philosophies behind modern allopathic medicine. Modern allopathic medicine has been brought up with the idea of working against the body; therefore the word "allopathy", from the Greek "allo", meaning *against*. If there is a histamine reaction in the body, then an allopath would use an anti-histamine or similar agent. The entire field of allopathic pharmacology is one of using mostly synthetic compounds to block or artificially stimulate processes within the body. The philosophy of the allopath is that the body is stupid, and the physician, smart. Modern allopathy and pharmacology have their basis in the statistical theories of thermodynamics. The theories in the development of the processes behind this allopathic philosophy all can be attributed to reductionistic, allopathic and synthetic development.

It is part of the treatise of this book that this type of medicine is not only severely flawed but also extremely archaic. The development of a new type of biology, a quantum biology, would dictate in force the development of a new type of medicine, a quantum medicine.

As we expound on the precepts of this book we will find that other forms of medicine that are legal in the United States, such as homeopathy, naturopathy, chiropractic, acupuncture and others work with balancing human energy and subtly changing different factors so that the body can heal itself, increasing the dynamics; not working against, but working for and with the body. These types of medicine will become more prolific as Americans realize that they truly do have the freedom to choose these legal maneuvers, even though strong forces try to prevent this freedom of choice. In light of our new science allopathic medicine will have difficulty in justifying its reductionistic phenomenological observations and statistical background. Reductionism is more the problem than the solution.

SUMMARY

1. THE LAWS OF STATISTICAL THERMODYNAMICS ARE THE LAWS OF DEATH. THEY ARE INAPPROPRIATE TO EXPLAIN INTRACELLULAR LIFE.

2. QUANTUM THEORY IS MORE DESCRIPTIVE OF LIFE.

3. THE INDETERMINACY PRINCIPLE OF QUANTUM THEORY IS AN INTEGRAL PART OF BIOLOGY.

4. PHOTONS AND VIRTUAL PHOTONS ARE CONNECTIVE TO ALL QUANTIC CHANGES AND THUS ARE ESSENTIAL TO BIOLOGY.

Chapter 2

INDETERMINISM VS. DETERMINISM

Chapter 2

INDETERMINISM VS. DETERMINISM (towards a SUBSPACE connection)

Was Democritos right?

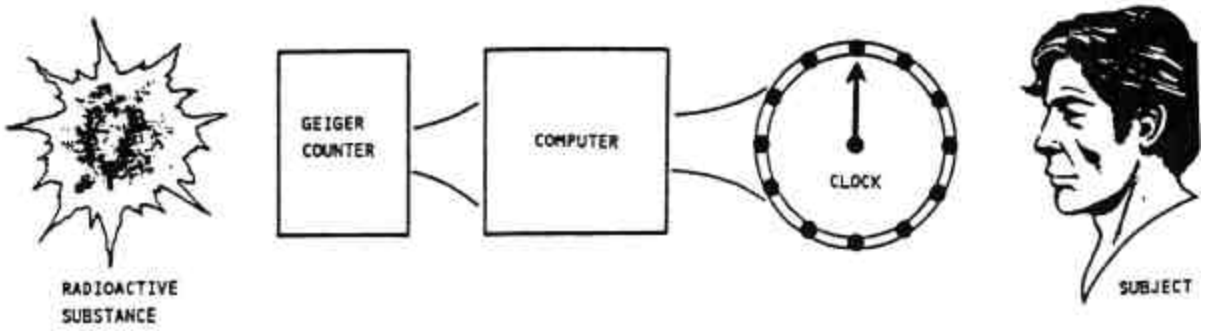
Years ago on a PBS *NOVA* special, an investigation was performed to study the phenomenon of psychic perception. During their account of the research and various experiences in psychic phenomena they explored many different research models, and came up with skeptical viewpoints on the validity of these findings.

There was one experiment, however, that even *NOVA* and the team of researchers found impossible to dismiss. This experiment was duplicated by the engineering departments of nineteen major universities, not by the psychology or parapsychology departments. The experiment proceeded as such:

A piece of radioactive material was placed next to a Geiger counter, which would count the emission rate of various particles. It is known that the emission rate of particles from the radioactive material are at an indeterminate rate, falling under the indeterminacy equation. This means that the material is decaying, and when the next ray will be emitted is indeterminate. We only have a construct of probability. We have no technology or ability to calculate exactly when the next ray will be emitted.

First they would determine statistically the probability of the time the next ray would be emitted. This probability was then calculated by a machine. A computer was hooked up to the Geiger counter, which in turn was hooked up to a clock in another room. If the ray coming out of the radioactive material came out at the same probability that was statistically measured, then the clock would not move. If the ray came out of the radioactive material in *under* this amount of time, then the clock would move one second counterclockwise. If the ray came out in *over* this amount of time, then the ray would cause the computer to move one second clockwise. Thus if the ray came out as predicted statistically, it would produce no movement on the clock; if it took longer, it would produce a clockwise movement; if it took less time, it would produce a counterclockwise movement. When the clock was allowed to run without the presence of human subjects, the movement of the clock would statistically hover, by moving sometimes forward, sometimes back, but usually around the mean.

Experimenters then had subjects step into the room with the clock, unaware of the other processes of the Geiger counter or the radioactive material which were hidden in another room. The subjects in the room with the clock were asked to make the clock move clockwise with their minds; the only instruction given to them.



To the mystification of these engineering departments, as well as *NOVA*, most could move the clock clockwise with their minds. Others, as hard as they would try to move the clock clockwise, would move it counterclockwise. But almost everybody had an effect on the clock beyond just chance. The experimenters found a gender variance in the study, with males causing more counterclockwise than females. Some how the human mind could effect indeterminancy of a specified operation without conscious knowledge of the process.

In the gross world of thermodynamic physics objects have predictable outcomes. To build a set of brake pads for a car experiments cna be developed with consistent outcomes. There is no need for double blind experiments on the thermodynamic brake pads. certain materials pass certain don't and thinking dos'nt change the results. But when scientist started smaller and smaller experiments there came a size where suddenly the thoughts of the observer effect the outcome. Quantic experiments of any size were effected by the observer and 'the observer effect' was born.

Many scientists struggled with the observer effect and try to rationalize it away. But suddenly physics had to design double blind experiments to counter the effects. Biology was faced with the same dilema. There was definite experimenter effects in living systems experimnets. So the double blind experiment was designed. The thought was that experimenter bias and shifting of data was the reason, this is indeed true. But what if there was a more significant reason? What if the conscious mind could effect the outcome of an indeterminant situation under quantic rules?

What if Biology was under quantic rules and as such responded to thought?

We hold as a treatise that biology exists because of its indeterminacy, and we further expound that indeterminacy can be shaped by the human brain.[1] This shapeing or effect of one quantic system on another at an indeterminant level, could be happening through some subspace dimension. Topology defines subspace as an infinite set of spaces existing inside,beneath awareness, and enclosing other space sets. Thus our thought and mind is aware of a 4 dimensional space of our conscious mind but there are definitely subspace dimensions existing beneath our awareness. There are parts of the brain that appear to act as transmitters and recievers for subspace transfer. This is referred to as the psychic abilities of man and animals, or the radionic capacites. The dynamics of this principle are threatening to many scientist.

Every culture known to man has developed indeterminate methods of analyzing its future. The ancient Norse would throw antler horns into the fire and watch the cracks that might appear, to determine where they might find the best hunting. Some cultures used tea leaves. The Chinese used the Yarrow sticks, as well as the coins to throw the I Ching. The Celts developed the Tarot cards. There are many other examples. The human mind has found that it can shape indeterminacy, and that indeterminate events can provide intriguing consultations to the human experience.

The indeterminacy of an atom was explored in this experiment, but there is a greater indeterminacy in biology, which accounts for the possibility of human beings to interact and experience their environment.

Mathematicians and scientists agree on the existance of other dimensions often refered to as subspace. These subspace dimensions are not apparant to the verbal conscious mind but might be accessible to the dream state. In the dream state events can occur out of time cause and effect relations and the laws of time and space are more variable. There are at least 10 subspace dimensions existing beneath our awareness. These dimensions are connected with the overall consciousness of the unified field of the universe. Intercommunications between dimensions is a basic postulate of our subspace biology. Much later in this book we discuss the subspace in more intimate detail. But now we must accept the postulate as a possible explanation of the ability of a conscious system to influence an indeterminant state at a distance.

Since the effect is on the indeterminancy of a system the effect would be subtle, irreproduceable, and complex. Modern reductionistic and reproducable science would have trouble with such a system. But modern matematics could embrace such a system.

So there is a constant struggle between indeterminate science and determinate science. Indeterminate sciences have been looked on as metaphysical sciences; whereas the determinate sciences have led to discoveries of engineering, physics and chemistry. Each one, through its own fallacy of philosophy has thought that it is superior to the others, but a true look at biology in the human experience and the development of science will tell us that some culmination or blending of these two mediums is important.

Many researchers have developed ways of looking at determinate events, such as Boyle, who developed gas laws for analysis of the determinate events within a gas. This led to the discovery of the laws of thermodynamics.

The zeroeth law of thermodynamics is that temperature exists.

The first law of thermodynamics is that energy cannot be created or destroyed.

The second law of thermodynamics is that heat must pass from a hot body to a cold body; a cup of hot coffee in a room gives temperature to the cold room, both being non-alive (the definition of life for an object being that it must be able to metabolize and reproduce on its own). Eventually the two will come to equilibrium, as the process of thermodynamics dictates in the second law. Yet, a human being sitting in the same room will give heat to the room but will not lose temperature; he will maintain 98.6E.

As the third law of thermodynamics encounters, we can maneuver things through steps. Brown was a researcher who long ago found that when he put pollen cells under a microscope, he could detect subtle movement; this was then labeled *Brownian motion*. This Brownian motion was later found to be the entropic shifting of the molecules that happens in gasses, solids and liquids. Entropic shifting is like millions of billiard balls in a box; if one knew the position of the billiard balls and their mass and momentum, one would substantially know the system. This is determinism. Thus, a hotter molecule, when striking a colder molecule, transmits an amount of momentum. Conservation of momentum is maintained.

The oxygen in the room's air is thermodynamic, moving back and forth, obeying the gas laws, being bombarded. But as it is taken into the human nostril and crosses the alveoli barrier of the lungs, it loses its randomness. Once inside the red blood cell, it now becomes indeterminate, nonthermodynamic, and quantic(controlled) in its action as it obeys a bio-quantic control within the cell. Within the cell we do not find Brownian motion; we find a controlled process. So random entropy is not a factor of life; it is a factor of death. The laws of thermodynamics are the laws of death. Life cannot exist by random thermodynamics. Some type of molecular control is essential for life to exist. Life must have some mathematical process control over the system.

We are alive because of our fight against the laws of thermodynamics. If the cell should die; as we watched the molecules within, we would see that they would start to slip into Brownian motion. They would start to obey the laws of thermodynamics more fully and would lose their fight against the temperature of the room and gravitate to equilibrium. In the words of the Washington Posts editor when a person dies he loses his fight against room temperature.

Thus, the testing of any type of biological entity *in vitro* (inside the test tube) is vastly different from the results one might attain when looking at it *in vivo*. As Heisenberg speculated, even if we tried to do *in vivo* testing by measuring something so small, we would interfere with the process, and thereby not *know* the process. We have a medicine built around tracer elements that basically tells us very little about true biology. What happens to radioactive iodine in the body is that it apparently gravitates toward the thyroid. All that we know from this experiment is that radioactive iodine goes to the thyroid. We do not know where real iodine goes, because we have interfered with the process by using radioactive iodine, just as if we were to take a student in a room and cover him with a tracer such as horse manure, we would be able to find him with our noses whenever we needed him. We would have a tracer. We would observe that during the day this person would go to bath houses and perfume shops, and we would think that those were the natural events of his day. A radioactive molecule such as iodine is recognized by the cells; cells are able to see this radioactive molecule shooting out rays, and radioactive tracers are treated differently by the cells. So we do not know where real iodine goes, or real sodium. To really know the process of biology will always be indeterminately impossible, because we can only measure what we have interfered with. Only nature can know biology.

This leads one to further believe and acknowledge that the natural process knows; the sinthetic process (intentionally spelled this way throughout the book, from here on) does not know, and that one can never arrive at biology through sinthetics. Thus, in the development of a medicine we must look at the natural process and the naturally occurring parts of the plants. The Bible tells us that "healing shall come from the leaves of the field". With this type of observation we can develop a superior medicine.

Such a superior medicine is exemplified in naturopathy and homeopathy, which offer to mankind tremendous healing opportunities. But sinthetic chemicals have always made more money, and have been rationalized by the amount of science that goes on within the test tube. Yet now, with this quantum physics of biology, perhaps we can see that our test tube technology has left us high and dry, and sinthetics will produce many side effects and iatrogenic dis eases. We have already seen this in our society, as iatrogenic disease has escalated more than any other.

In the sinthetic world of surgery and pharmaceuticals there are approximately four hundred billion dollars a year sought in malpractice suits; people who became hurt through the concepts of sinthetic medicine. Yet, with homeopathy and naturopathy, which are legal entities in the United States and the world, there are less than one thousand dollars in reward suits made every *five* years. This drastic difference is concealed by modern medicine in a cover-up like no other. This type of cover-up makes Watergate seem trivial.

Rupert Sheldrake postulated on this indeterminism. Carl Jung discovered the principle of synchronicity: human existence is full of different types of unexplained indeterminate events, which point to a new concept of reality. This transfer of consciousness or synchronicity would be through some subspace dimension and obey quantic rules of observer effect. The shared consciousness of all things in this single universe could communicate on some level of shape transfer across these subspace channels. This would make them independent of the space and time restrictions of our current limited space. The effect of consciousness transfer through subspace channels to effect quantic systems at a distance has been called the 'Nelson effect'.

Sheldrake, who wrote the book on "Morphic Resonance", postulated that this indeterminacy could be shaped by a large indeterminate series of events. Such an event, he thought, was the group of synapses within the human brain, and that if a large series of indeterminate events could capture the same numbers as the indeterminacy of the human brain, this would allow for that process to duplicate in some manner the thought process of the human brain. The number of synapses in the human brain has been postulated as 10^{13}. The amount of possible interactions is 10 to the 23rd. If a machine could be made to do indeterminacy at 10^{23}, that indeterminate event could be shaped by the human brain. The subspace reception of the human brain could be duplicated.

Such a machine has been developed by the *Eclosion* Corporation and is known as the Xrroid. By generating 10^{23} random numbers, these events can be used to generate speech quality and to generate artificial intelligence through an indeterminate process rather than a determinate one. Most computers work on a binary system; On/Off, 0 or 1. *This* computer system works on the trinary logic of On, Off, or Indeterminate. This indeterminacy is shaped by 10^{23}, allowing for a computer to much better approximate the human brain. This trinary logic system has been used to develop medical protocols and artificial thought processes. A quatery system has even been proposed of on off indeterminant and don't care.

Development of the trinary logic system represents a tremendous achievement, going beyond the binary system to a more human, trinary, indeterminate system; yet, this step must be taken with great caution. If we truly had a computer that did think like a human, the threat to our society could be awesome. Thus these discoveries and technologies should be left in the hands of scientists who are not looking for profit motivation, but are rather looking to help mankind to grow in awareness, and through a reverence of nature, rather than a sinthetic demise of it.

Plato developed a concept of the world of 'FORMS' . He proposed that there was a world of ideal forms that existed and effected everything. There was in this world an ideal dog, cat, persons, rocks and all things as ideal or perfect forms. Then in the real world there was imperfect attempts of these forms. This is understandable in our new physics as a subspace dimension existing beneath this dimension, effecting all things. This subspace dimension can also explain our polymorphic shape transfer of Morphic Resonance. Reviewing Plato's world of forms in the light of our new physics demonstrates his vision and genius. This shows how even long ago another dimension of shapes was anticipated. In light of our subspace theory, philosophy and science hold hands again.

Another exciting concept that further validates our concept of morphic subspace is the healing power of prayer. Over 270 studies on prayer in a clinical setting have dramatically shown that patients who are prayed for have significant improvements in health compared with those that do not. Larry Dossey's book 'Healing Words' by Harpers 1993, covers this phenomena from a Medical Clinical perspective.

The minds of the people praying can effect the bodies of those needing healing in a fashion that defies time and space rules of a 4 dimensional physics. The prayers are a communication through the god consciousness which is partially our subspace morphic resonance. This allows for a polymorphic influence over the indeterminacy of the targeted system. This scientific description of a religious process is not meant in any fashion to be demeaning instead it is meant to be fulfilling. As we stated in the preface and introduction, science must join with mysticism and religion. A new science should result without the anal retentive cling to reproducability. Quantum physics has a least taught us that.

So in summary, there is a subspace set or sets pervading and connecting the universe
There appears to be a unified field uniting all space sets. At least one level of this field is an .

The precept of quantum physics allows for a particle to be in two positions or places at the same time. This is a dramatic shift from the idea of classical physics.

The phenomenon of **tunnelling** also occurs in quantum physics, wherein a proceeding particle can suddenly skip through time and space, or through other barriers, and appear on the other side. This type of phenomenon is impossible according to classical physics. Some people have labelled this tunnelling through barriers phenomenon as **leapfrogging**, or an insertion of extra energy within the Heisenberg uncertainty principle, and its ability to leap over the energetic barrier. In classic physics if a particle of a certain potential is proceeding and incurs a barrier of lesser potential, the particle can cross the barrier. The motion of the particle becomes slower during the crossing of the barrier because of the involvement of the different energies.

This phenomenon, known as the **Nelson effect**, also applies to the human brain, and may be a major factor in NOVA's clock experiment.

expression of universal consciousness. There is a pathway to interaction of directed thought consciousness possible through this subspace connection. Thus a conscious quantic system can effect another through interaction via subspace. This phenomena follows quantic rules and is thus non reproducable, non reductionistic, subtle effecting indeterminant systems by shifting probabilities, among others that we will investigate.

SUMMARY

1. **INDETERMINACY IS A BASIC FACT OF BIOLOGY.**

2. **THE HUMAN MIND CAN INFLUENCE THE INDETERMINACY OF THE CELL OR OF OTHER QUANTIC SYSTEMS.**

3. **THE NELSON EFFECT IS THE TERM WE USE TO CLASSIFY THE EFFECT ON THE INDETERMINACY OF THE MIND. THIS MIGHT BE EXPLAINED THROUGH THE EXTENSION OF THE TUNNELLING PHENOMENON OF QUANTUM PHYSICS.**

4. **EVERY CULTURE HAS KNOWN AND USED THIS UNCERTAINTY FOR ADVICE AND KNOWLEDGE. AND EVERY CULTURE HAS OBSERVED AND USED DIRECTED THOUGHT AS PRAYER OR RITUAL.**

5. **THIS SUBSPACE EFFECT IS NON REPRODUCABLE, NON REPEATABLE, NON LINEAR, SUBTLE EFFECTING SHIFTS IN PROBABILITY, OF CONSCIOUSNESS, INTENSIFIED WITH DIRECTED THOUGHT, INTENSIFIED WITH POSITIVE THOUGHT, AND LEARNABLE.**

6. **ATTEMPTS TO EXPLAIN THESE INDETERMINATE METHODS AS COINCIDENCE HAVE COME UP SHORT, SCIENTIFIC REJECTION OF QUANTUM THEORY AND OF THE OBSERVER EFFECTS HAVE STAGNATED BIOLOGY AND MEDICINE. SEE REF OF THE NELSON EFFECT EXPLAINED IN THE INTERNATIONAL JOURNAL OF THE MEDICAL SCIENCE OF HOMEOPATHY, ISSUE 6, 1996.**

Chapter 3

MOLECULAR INDETERMINACY

Chapter 3

MOLECULAR INDETERMINACY (SUBSPACE CONNECTIVITY)

The complementarity principle of Bohr (1961) states that our knowledge of a physical system or process is always complementary to the measurements of its state. Bohr said that the word "experiment" refers to a situation in which what was done and learned can be told to others. The results of an experiment and the observations generated by the experiment must be expressed in straight-forward language through terminology of the physics of space-time concepts, utilizing the laws of momentum and energy.

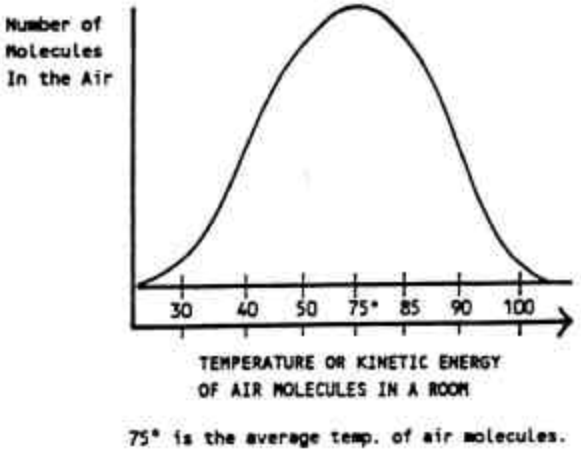
Thus this combination of kinematical concepts involving space-time conservation and conservation of momentum and energy are the suitable terminology to express the results of our experiment. Any measurement or experiment performed will interfere with the knowledge attained by the experiment and make predicting future events somewhat fuzzy.

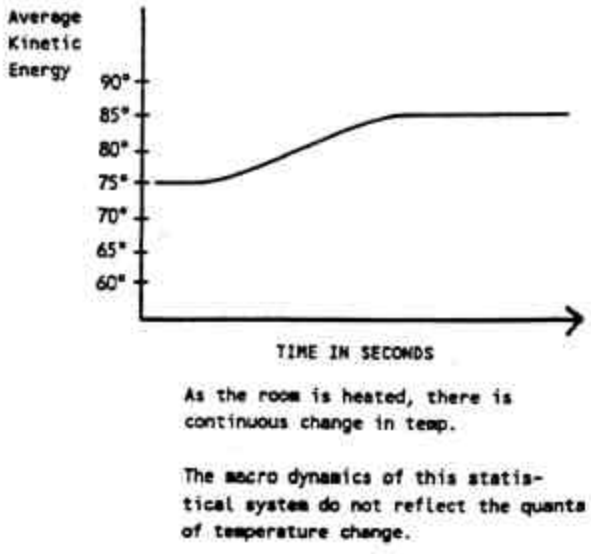
In the principle of complementarity a limit is set on the extent of knowledge obtainable by any measurement or experiment, and the interpretation of any such measurement or experiment must be taken with a grain of salt, because we have interfered by doing the experiment.

The principle of complementarity does not interfere with the classical physical systems of measurement, but the measurement of such systems affects our knowledge of the physical system we are dealing with.

This should not be confused with the uncertainty principle, which tells us that measurement of momentum or energy of a physical system cannot be known completely by the observer. This is a law of subatomic physics that sets boundaries on our ability to know. In Bohr's principle of complementarity we can see that our interference with the process of experimentation restricts our ability to know and to predict further events.

Thus we can see from the principle of complementarity that our ability to do experimental intervention and reach conclusions or postulates from such intervention is never perfect. The complementarity principle goes hand in hand with the uncertainty principle, which outlays a basic postulate that even the system itself, not interfered with through experimentation, will be uncertain in the momentum or energy that precisely relates to it. In other words, the uncertainty principle restricts the ability of a system knowing what would happen within it. The uncertainty principle does not need an outside observer to be uncertain. Within the guidelines of the Heisenberg uncertainty principle, what happens in a system beneath the measurable constant of Planck (known as the quantum constant, or Planck's constant) is a surprise to the system itself. The indeterminacy of a system is built into the system itself. As experimenters accumulate statistical data of our observations of biology, we are forced to realize the incompleteness or the inability we have to completely know any system. In fact we can't ever really know.





Statistical accumulation of events in the development of the bell curve allows us some idea of the processes involved. So statistical mechanics can allow us to catalog observations, but cannot account for the process of life.

Gross World of Thermodynamics
Determinism of physics

Transition into Quantic world of uncertainty
Determinism with subspace universal consciousness control

We are taught in statistics classes about the randomness of the population sampling and the randomness of the population flow. If the population we are sampling is not of randomness, statistical mechanics will not be the primary choice of endeavor to understand that process.

Statistical mechanics does pose a good way to analyze the temperature of a room. The temperature that would be displayed on a thermometer is the average of the collective kinetic energy of the molecules in that room. Thus we can see from the bell curve that the collective kinetic energy of the molecules of the room are not always precisely at 75E. Some of the molecules are at higher energies, some at lower energies, but the average is at 75E.

As heat is imposed into the room the change in temperature goes from 75E to 76E (for example) through a continuous curve that can be displayed on an X and Y axis. This criterion fits the idea of statistical mechanics because there are a large number of subatomic entities, and each entity must obey some processing rules, such as Boyle's gas laws.

Thus statistical mechanics (Gaussian distribution) is a good process for analyzing the temperature of the room, but if the process we are going to analyze does not fit the statistical mechanics, and the number of events is very small, a new type of dynamics would be used in the analysis.

The complementarity principle does not allow for the statistical Gaussian distribution of conjugate variables in the molecular movement of living processes. Statistical mechanics is not appropriate in the explanation of the essential biological processes. Statistical mechanics concerns behavior of the subatomic entities in large numbers. Thus statistical mechanics describes many situations, and through Gaussian distribution, approaches a central limit theorem of probability. These are the dynamics of thermodynamics and entropy, and the statistical events must be in a random structure. However, this is not accountable for the functions of biology.

Biology is not a random event; if it were, the nose might occur in one spot or another on the face; yet, we all have noses in the same spot. We all have ears in the same spot. Biology needs to be controlled, not random. Even the organization of its behavior at the subatomic level must echo the control. The *quantic* control of cellular function dictates life, not the statistical randomness described in thermodynamics. A restriction of the degrees of freedom of the molecules of life occurs in biology through an electrical process. A volt , amp, and resistance field or a trivector field is imposed by the bio electric capacities of the cells of an organism that control the molecular movement and restrict the molecular degrees of freedom. This allows for the control or organisation needed by life over the chemicals that make it. Since this field is of a quantic nature and is thus susceptible to the Nelson effect. The subspace field is the key to the field strenght and nature. Subspace allows for transfer of information and shape , and for shape restriction of the motion of the biological molecules. So morphic resonance is a subspace Phenomena. Since subspace is not restricted by time and space, 4 dimensional thinking will not apply. Much of the factors of life are not expained well by such limited thinking.

In fact the size of the complexity of life, the response of life to insurmountable challange, the quantic nature with its indeterminancy, and the abilities of life to transcend existance bring us to the most outstanding hypothesis of all ' How can some scientists still see life in such reductionistic and limiting terms'. When a man points at the moon some scientists just see the finger. To work with the coil of life and not see it's indeterminancy side or it's magic is sad.

Under the complementarity principle the uncertainty relation may be employed to establish the mechanistic indeterminacy for molecules, in view of the conditions for which biology occurs. Quantum theory is open-ended, and can accommodate a mechanics for quantization of molecular motion. This will allow for a non-deterministic, unexpected quantum explanation for large molecular actions as the basis of the necessary processes in living units.

Of course, the Bohr correspondence rule, under generalized complementarity, places a boundary upon the broader quantum descriptions precisely by limiting conditions in which statistical mechanics are appropriate. First we must understand fundamental theory.

Physical theory is concerned most fundamentally with the motions of bodies and interactions of the motions of bodies. This is to say that descriptions of physical processes are concerned with, or can be reduced to, a description of mechanical action of mass or energy transport in space and time in correspondence with the laws of motion.

Newton, in the development of calculus, laid out an interaction for understanding larger real world events in terms of breaking them down through calculus into very small units. He then approximated the integral of the acceleration, or by reversal, calculated the differential of the equation. Thus Newton saw the need for breaking into small parts the movement of different items in the real world. His approximation of the calculus was indeed a step in the direction of quantic theory, because it now allows for the idea of a noncontinuous process, the idea of a specific jump or collection of different readings that would make the calculations function.

It should be pointed out that Newton's observation was of statistical events, following classical physics and outlines. He interpolated the connections in developing calculus. This is a phenomenal achievement in mathematics and science that has allowed for tremendous understandings. However, applying calculus to biological events inside the cell or the organism has always come up on shaky ground.

In the events that Newton observed and measured, watching falling and moving objects and developing calculus, he was looking at a determinate, statistical process of dead interaction; he didn't look inside the cellular metabolism, where he probably would have found a different type of organization.

In dealing with the laws of motion, Newton had the luxury of dealing in the macro world, where he could measure his conjugate variables, such as mass and motion. Accordingly, he would be able to calculate momentum. As we move down into smaller and smaller events, eventually we bump into the Heisenberg uncertainty principle, which tells us that we can no longer know both of these conjugate variables at the same time. We will be unsure of position, or unsure of movement, but we will not *know* all of these variables, because of uncertainty.

O2 in room air can be charted via closed statistical dynamics. It obeys Boyle's gas laws.
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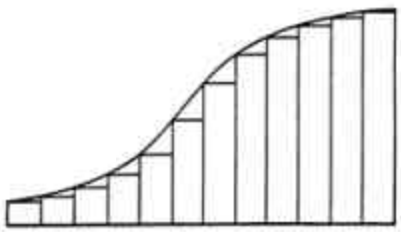
NEWTON'S CALCULUS

Change in Velocity
Equal Acceleration



Several approximations of increasingly smaller steps led to the calculus.

Uncertainty of Position
X
Uncertainty of Momentum
=
Planck's Constant

The Bohr correspondence rule dictates a place where these events will change from a macro ability to a subatomic process, where we will lose the ability to accurately measure. This is also set out in the Heisenberg uncertainty principle. When measurement *does* interfere significantly with the measurement of the conjugate variables, then we are at the point where the process becomes indeterminate. This happens in the values of life, because to truly measure and observe intercellular phenomena would be to severely interfere with the process, and thereby lose our ability to know the details needed to make a predictive system. At the quanta of Planck's constant there is a shift from macro dynamics (statistical grouping) to micro dynamics (indeterminacy).

Another step in the formulation of our fundamental physical theory for biology is to establish a minimum number of general necessary classes of living processes. To call a thing a living unit we must see two criteria: one, that it is able to metabolize on its own; and two, that it is able to reproduce on its own. Thus most viruses are not true living units by our definition, because they cannot reproduce on their own. Some viruses *do* have DNA, such as the adeno virus. Still, they need help in their reproduction cycles.

Life needs to independently:

1. Metabolize-- widely responsive to environment
2. Reproduce-- restricted for small numbers of variance.

Metabolic processes are radically open or asymmetric regarding mass and energy transport in space and time. Mass, momentum, charge and photons go in and out of the living unit. Reproduction processes are radically recurrent or cyclic. This generates limitations of the number of large molecules of the living units in time and space. Thus metabolism must be open to be able to take advantage of the variety of foods, nutrients, and environmental conditions a living organism needs to provide life. This establishes the need to have different mechanisms of detoxification or excretion of the unused and other excreted units. However, reproduction must be very cyclic. If there is more than one genetic variation for every million potential offspring, then the biological unit will lose control of its environment. The species will be unable to respond and will have difficulty in interacting with its environment. Reproduction will need to be radically closed.

The third step in the formulation of the fundamental physical theory for biology is to establish a description of the mechanical action of this metabolic and reproductive process in living units. To truly know the biological action, we must deal with electrons, protons, photons and other particles in their interactions. We must know and outline procedures of measurement of both healthy and sick photon electromotive radiation, as well as electron EH pH pressures, electron transport chains, and the flow of nutrients as they come in and out of the body.

Thus in describing this process, which we assume to be indeterminate, we must use a complementarity principle, since the energy and momenta of our mechanisms must be quantized. The quantum explanation will then be non-dualistic with respect to the classic mechanism.

Thus classic measurements of time, space, length, width and energy can be used to describe some of these phenomena, as long as we realize the quantic probability through the indeterminacy principle, which allows us to describe them but not totally predict them.

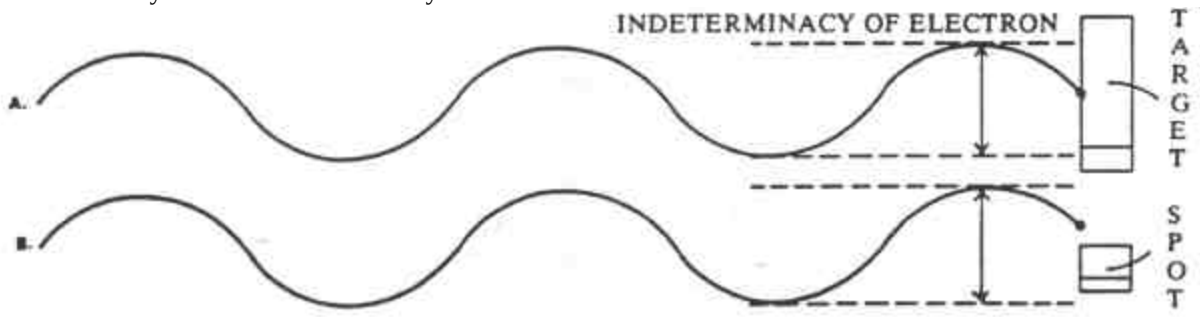
Our new biology, the quantum biology, will be one very similar to the new electronics regarding transistor behavior and other electrical quantic processes and electrical currents. Just as in the development of a transistor, we cannot know exactly what is happening in the transistor, but we can use it in a predictive probability state. We can use our new science of quantum biology to develop and hone the theories of life, medicine and biology, knowing full well that any time we try to measure or interfere with this system, we are dealing with an indeterminate system. This means that there will always be probability. Yet, just as in electrical theory, when we know the rules, we can better play the game. As we learn more about the rules of biology in terms of electronic theory, we will learn more

about medicine. In terms of a quantum theory, we will learn better control and improve the probability of our interaction or medical intervention.

As long as modern medicine mires in the Newtonian dynamics of thermodynamics and entropy, it will be unaware of biology's rules. So-called modern medicine will not know the interaction, and it will be further mired in trying to relate *in vitro* to *in vivo*.

The development of medicine has largely been an observation process where phenomenological observations are made of what happens in a certain event. What a compound does to a certain organism at a certain time is cataloged. It is not from any predictive science, where we try to say that "this will happen", but largely through observational phenomena. Without a true idea of the rules of biology, modern medicine and biology can only catalog observations.

In a television set an electron beam is fired at small dots on the back of the image ortecons tube. When the electron strikes such a spot, it illuminates the phosphorescent spot and provides the pattern of dots that will convey the picture to the eye. There is indeterminacy in the electron as it flows.



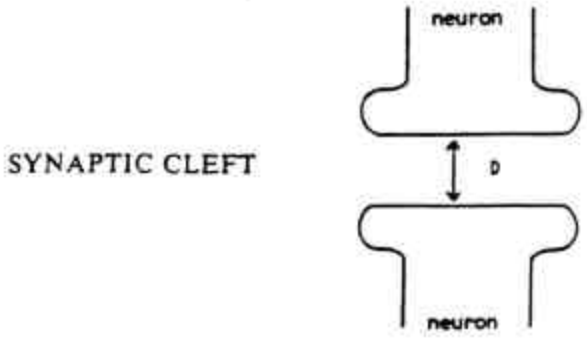
So if the spot at which we are aiming the electron is bigger than the indeterminacy, we can hit it, and thereby the electron is following a principle much akin to statistical mechanics. If, however, the size of the spot gets smaller and smaller, until at one point it is smaller than the indeterminacy of the electron, then it would be indeterminate whether the electron could hit the spot needed, and thus would this be an indeterminate process.

Heisenberg laid down an equation for the understanding of this law. Change in mass times change in position is equal to or greater than Planck's constant.

$$)P\,)Q \geq h/2B$$

In our biological process of the synaptic cleft of the neural process, we can see that the distance involved is one angstrom (D). The mass is the molecular weight of the neural transmitter. In this case, let us take acetyl choline, with a molecular weight of 200. Knowing the position and mass of these units, we can see that the function of neuronal transport in the synaptic cleft is indeterminate, and falls under indeterminacy (see *Bio-Quantum Matrix* for full mathematical treatise).

D = 100 Angstrom = 10^{-6} cm
M = Mass of Neurotransmitter
V = Velocity of Neurotransmitter



So if we tried to make a television set with the dots very small, we would be under the laws of indeterminacy, and not statistical mechanics. Thus the same thing is happening at the synaptic cleft. Since this synaptic cleft is an indeterminate process, it would appear to the viewer that synaptic phenomena makes it a random event. It is the theory and the thesis of this book that the human brain, with some type of natural force, a God-consciousness if you would, has control on this indeterminate process and allows for life and biology.(This is reviewed in deeper detail in the chapter on Biology must Walk Plank's Constant), [many of the neurotransmitters are released in amounts that exceed thermodynamics, the best example of our quantic indeterminant transfer is the exchange of GABA. This mollecule covers vast distances guided by an unknown energy.]

MICRO-WORLD OF SUBATOMIC PARTICLES

	Biological Organos of Life	Nonbiological Inorganic of Death
Organization	Guided Indeterminacy	Unguided Indeterminacy
Governed by	Life Principle Organized Indeterminacy	Uncertainty Principle
When Observed	Responds to Observation	Responds to Observation (Mind of Observer)

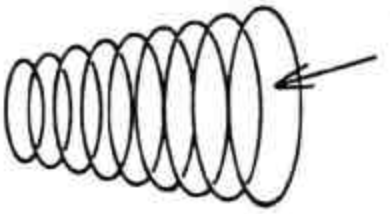
So the process of the synaptic cleft is not a random thermodynamic process, and thus cannot be understood by a strict chemical analysis. Biological photons, long-range forces, vionic energy transfer and other energetic means will be used in the future to interpret the synaptic transfer. This indeterminacy is a *shaped* indeterminacy. So we can agree with Albert Einstein's belief that God does not play dice with the universe.

Some type of vionic energy can shape this indeterminacy. Perhaps even through the endorphin transmitters of the brain, there might be some interdimensional shift, allowing some type of wormhole path photons or electrons to pass through. This type of interdimensional wormhole has been proposed by modern physicists, but the smallness of it would perhaps only allow for the transmission of a photon or electron. As we have presented, photons and electrons can interfere or enhance the process of biology.

It is the viewpoint that such a wormhole in and through subspace might be transferable from the endorphin receptors of the brain, as it seems that the endorphin receptors, if blocked, sorely inhibit the ability of the human to

enhance other subspace dimensions. Radionic phenomena, which can be seen as existing outside the dimensions of time and space, seem to be blocked by the existence of narcan, an endorphin receptor blocker. Thus the placebo response, radionic phenomena, and other psychic events that exceed time and space might perhaps be explained through the function of the endorphin receptors. By blocking these receptors, we find that there is an impingerant on the function. Perhaps the endorphin receptors allow for this other-dimensional transfer of energy through other-dimensional wormholes that can break through time and space.

As we develop these abilities, we might be able to master our influence on indeterminacy.



Minuscule Wormhole Through Subspace

Made in Endorphin Receptor Area of Brain,
Allowing Passage of Single Electron or Photon

Thus one human brain might communicate with another by shaping the indeterminacy, accounting for the probability that psychic phenomena do have some basis in fact.

The field of psychic interaction has been shown to go beyond statistics and have some degree of probable certainty; not enough for reliability, but enough to disprove a simple Gaussian relationship. So psychic transmission is present, but just enough to tantalize, not enough to rely on. This accounts for the indeterminacy process and the share of morphic resonance.

Scale of Known Distances

10^{27}	Distance to Pulsar Q. 172
10^{24}	
10^{20}	Distance to the Andromeda Galaxy
10^{18}	Distance to Crab Pulsar
10^{12}	
10^{10}	Radius of the Sun
10^{8}	
10^{6}	Radius of Earth
10^{4}	
10^{3}	
10^{2}	
1	
1 Meter	Height of Normal Man 1.8 meters
10^{-5}	Wavelength of Visible Light
10^{-10}	Bohr Radius
10^{-15}	Charge Radius of Proton
10^{-20}	Old Proposed
10^{-23}	Quantum Theory
10^{-27}	New Quantum Action
10^{-42}	Quantum of Magnetic Action

Perhaps the virtual photon effect will explain how this is still a possible but not extremely probable event.

To further analyze the application of quantum theory in biology, we will need to look at complementarity through three different principles: one, the principle of indeterminacy or uncertainty via Heisenberg; two, the principle of anomaly laid out by Reichenbach; and three, the Bohr correspondence rule.

Complementarity implies that if a dynamic variable of action is known, its partner or conjugate kinetic variable is reciprocally imprecisely known, and vice versa; and that the product of those variables is equal to or greater than the universal law of quantum action, which is Planck's constant, or *h*. This is a statement of Heisenberg's uncertainty principle, which is not due to a lack of our ability to formulate knowledge or to know, but due to an actual physical boundary, limiting the knowledge we can attain.

h = Planck's Constant = 6.60 x 10^{-27} erg sec = 6.6 x 10^{-22} MeVs
c = Speed of Light = 2.998 x 10^{10} cm/sec = 2.99 x 10^{23} fm/sec
h x c = 197.3 MeVfm = .1973 GeVfm

Planck's constant was derived from the speed of light.

Reichenbach has pointed out in the principle of anomaly that such a supplementation in the world of phenomena cannot be constructed free from anomalies. As we quote from Reichenbach, "The causal anomalies cannot be removed, because they are inherent in the nature of the physical world. The principle of indeterminacy formulates only one part of this nature. It states that it is impossible to verify certain statements about inner phenomena. To this is added, by the system of quantum theory, another principle we have called the principle of anomaly. It states that no definition of inner phenomena can be given which satisfies the requirement of a normal causality. It therefore maintains the impossibility of a normal supplementation of the world of phenomena by interpolation."

The correspondence rule of Bohr expresses the fact that as the physical process becomes sufficiently large, a limit is reached at which simultaneous measurement of the conjugate variables can be made with sufficient accuracy for the components to be described by classical mechanics. Thus, the flow of larger quantities of material can fall under macro or Newtonian dynamics, but (as pointed out before) within the vion and the synaptic cleft; and much of the process of biology is happening via quantic or indeterminate action. It satisfies our criteria for indeterminacy. This is definitely happening in the world of RNA and DNA, where the micro-sized material is in the realm of indeterminacy.

Bohr developed the principle of complementarity, which states that our knowledge of a physical system or process is always complementary to the measurement of its state. Bohr said that the word "experiment" refers to a situation in which what has been done and learned can be told to others. He stressed that the account of an experimental arrangement, and the results of the observations, must be expressed in unambiguous language with suitable application of the terminology of classical physics. In classical physics, space-time concepts and the conservation laws of momentum and energy must be utilized simultaneously to make a complete predictive or postdictive description of the course of the physical system.

Many would say that a process which is indeterminate is random, and thus cannot be accountable in biology. This is a grave error. It shows an incomplete appreciation or understanding of quantic philosophy. It is the treatise of this discussion (as we will point out in every chapter) that this indeterminacy seems to obey some type of force, some God-consciousness, some natural process, some inherent wisdom in its own ability to control and regulate the process of biology. The randomness of entropy and thermodynamics is the law of death. There seems to be some misunderstood, not fully recognized force of life that has not been accounted for in physics to date. It is the treatise of this discussion to open the door for a possible understanding of this phenomenon. Subspace transfer of universal consciousness can explain the control life has on its elements. Again, God does not play dice with the universe.

God could best be described as this universal consciousness that shares its' consciousness with all things. This universal consciousness expresses itself in many different shapes of its' field. The overall factors of its' shape require a multitude of shapes. The Morphic capacities of these shapes are entertwined through the overal subspace and morphic subspace of the universe.

The overall effect of this field is felt by all an interpreted in a host of different ways.

God does not play dice with the universe, God is the dice.

Time is just one expression of the nature of this field, and its relative nature is expansive.

Scale of Known Time Measurement

	Life of Hindu Universe
10^{23}	1 day of Brahman
10^{20}	
10^{18}	
10^{12}	
10^{10}	
10^{8}	1 Century
10^{7}	1 Year
10^{6}	
10^{5}	
10^{4}	1 Day
10^{2}	
10^{1}	1 Hour
1	
10^{-3}	
10^{-6}	
10^{-9}	
10^{-12}	
10^{-15}	Time of 1 Beat of Visible Light
10^{-18}	
10^{-20}	
10^{-23}	Proposed Quanta of Time
10^{-27}	Quanta of Consciousness
10^{-42}	Quanta of Magnetic Action
10^{-61}	Quanta of Time Vibrational Construct of Photon

The field intervenes constantly at quantic levels to affect change through indeterminacy and impose order on the shapes of its members. Much of this shape restriction is thru the Trivector principle. This is an imposition of an electrical field of varying resistance, votage, and amperage.
More on this in the International Journal of the Medical Science of Homeopathy, issue 4.

As Isaacs points out, it cannot be over-stressed that this indeterminacy involves the trajectory of large molecules, whereas indeterminacy then involves phenomenological conditions under which statistically adequate ensembles of particles may be assumed and are usually restricted to the trajectory of electrons and atoms. Bohr's correspondence rule can be stretched under certain circumstances within a quantic system such as biology, which depends on the photodynamics of the electron interchanges.

In nonliving systems, which are not capable of metabolizing or reproducing, the criteria for Newtonian dynamics is fulfilled, because one may measure the conjugate variables of their mechanical action. There are a sufficient number of particles to warrant the Gaussian or statistical dynamics, and there is sufficient or closed transport of mass energy in space and time with respect to the environment.

Predictive perfection was originally expected from statistical dynamics. Fractal dynamics now shows us that nature follows a different set of laws. There is an inborn tendency in matter to follow certain fractal or chaos dynamics. This tendency of matter to follow the fractal patterns then becomes exaggerated, and under quantic conditions life ensues with the ability to metabolize and reproduce.

So we can make a Gaussian statistical distribution from the unequivicable assignability of the events to disjoint classes of equi-probable events. If there is a sufficient number of events to allow for the calculation, there is sufficiency of the independence of the events relating to the central limit theorem. So if there are a lot of molecules (independent but mutually interactive), and if the system is thermodynamic and follows continuous mathematical relations, these phenomena can be reduced to equation form.

$$\text{Probability} = \frac{1}{\sqrt{2\pi}}\, e^{-x^2/2}$$

X is measured in standard deviations from the mean.

The indeterminacy equation of) position @) momentum = Planck's constant (h) over 4 @ B. h is 6.6 @ 10^{-27} ergs per second. This expression is an inequality, meaning that it is greater than or equal to. The uncertainty product must be multiplied by a factor, F, that would depend on the decision-making process; in nonliving systems F will approximate 1; in living systems, because of the quantum dynamics, F will be greater.

$$P = \frac{1}{\sqrt{2\pi}}\, e^{-x^2/2} \qquad \text{Log both sides}$$

$$1 \qquad x^2$$

$$L_nP = L_n \frac{}{\sqrt{2\pi}} - \frac{}{2}$$

$$L_nP$$

$$L_n \frac{1}{\sqrt{2\pi}}$$

$$2L_n \frac{1}{\sqrt{2\pi}} x^2$$

$$\frac{1}{n}$$ Standard Deviation = B = a/n

$$\Delta(1/n) = \frac{1}{n_2} - \frac{1}{n_1} = \frac{n_1 - n_2}{n_2 n_1} = \frac{\Delta n}{n_2 n_1}$$

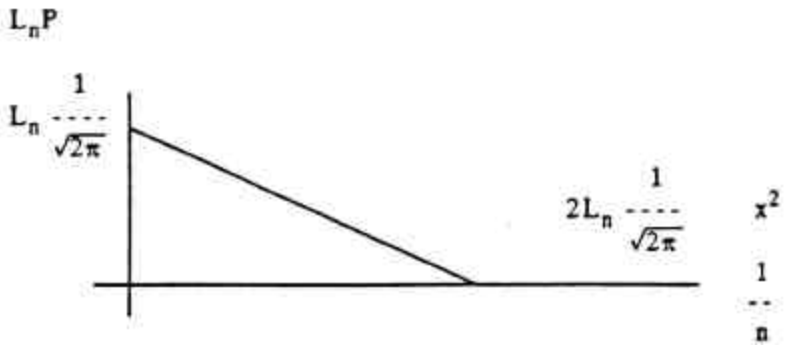
$$\Delta(1/n) = \tau \Delta n$$

Processes in which the physical conditions force values of F greater than 1 in our formula have actions approximately equal to F times *h* over 4B. These will have indeterminate bases of operation. The processes that have indeterminate bases must have a quantic feature of their description. This is based on the principle of anomaly developed by Reichenbach. If conditions are right, indeterminacy (thus quantic dynamics) will come into effect. Because of fractal dynamics and chaos theory, we will find that indeterminacy can be satisfied by a number of conditions.

The indeterminacy can be enlarged by virtue of three different phenomenological processes:

A, the number of the molecules can be smaller
B, the size of the molecules can be larger
C, the motion of the molecules can be slower

In C, with the motion of the molecules at living temperatures of 98.6E, we find that the molecules are slow enough to be under quantic action, remaining with the temperature of living processes. Room temperature offers a photon (infrared radiation) bath which allows for the virtual photon cascade.



Imposed Limitations on Vion Size

1. Interaction of thermal vibrations of external environment vs. the pull of long-range forces.

2. Reception effect for mitogenic radiation of 2×10^{15} Hz sets low end of size.

3. Limitation of causality vs. indeterminacy by keeping low number of molecules.

4. Interference of multiple systems sets limits for systems that become too complicated.

This photon bath makes life possible. If there are too many or too few photons, as when the temperature is too high or too low, then life cannot continue. There are either too many photons, such as high temperatures (110 degrees F. and beyond) or too little (0 degrees Celsius and below). Biology has developed many large molecules to perform its action, and thereby satisfy B. A is satisfied at the cell level by limiting the amount of material that it takes to make a living cell. There is a limit to vion size.

$$3x > 10^{-5} \text{ cm}$$

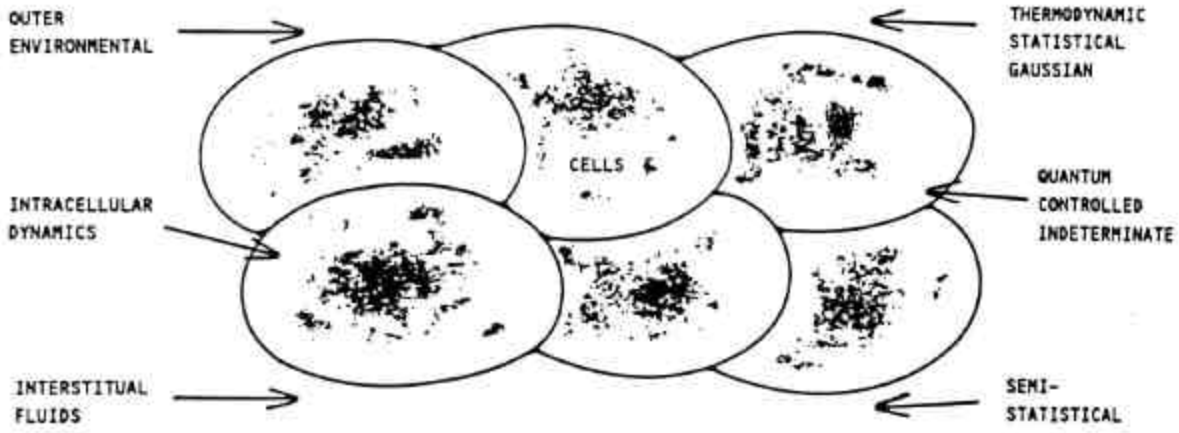
It must be pointed out that there are may processes within the body that fall under statistical mechanics and not quantic action. As Isaacs points out, the quantic action takes place within the cell walls. External to the cell walls and the interstitial fluids, as well as the interchanges of gasses and liquids through the body, there are more statistical dynamics following the Henderson-Hasselbach formula, which dictates the pH condition of the body (see Chapter 12).

Thus the management of electron and proton pressure can be statistically thermodynamic in its process, although the regulatory hormonal action of the various cells that regulate this process will fall under quantic control. However, the manipulations of the body to regulate the pH through the pH buffers can be of statistical dynamics. At the cell membrane and surface receptor sites the correspondence rule allows for a quantic dynamics. Via Bohr's correspondence rule, when we leave the cell we leave quantum dynamics and go into statistical Newtonian dynamics. The human body contains two sets of laws for existence that must cooperate: statistical for extra-cellular, and quantic for intercellular.

Medicine has developed because of an appreciation for the statistical or mechanical aspects of the body, such as the movement and the mass, momentum and energy. As science developed thermodynamic relationships to explain external phenomena in engineering and chemistry, these relationships were supposed to be true of biology, even though these laws could not account for much of the phenomenology of biology. The problem came when medicine tried to take Newtonian and thermodynamic principles of the macro world and body and apply them to intracellular phenomena. The force of it doesn't work.

In a nutshell, we are saying that we should not throw out the advances of modern medicine in regulation of body functions, but that we need to open a door to a deeper understanding involving quantum physics and electronic dynamics, to understand the intercellular phenomena, and to increase our knowledge.

So we have not come to *change* the laws of medicine, but to *fulfill* them.



SUMMARY

1. THE COMPLEMENTARITY PRINCIPLE STATES THAT BIOLOGICAL LIVING FUNCTIONS FALL UNDER QUANTUM RULE.

2. MASS, MOMENTUM, PHOTONS, VISCOSITY, SUBSPACE MORPHIC TRANSFER, AND CHARGE ARE THE BASIC TRANSFER MEDIA OF FORCES THAT NEED TO BE ACCOUNTED FOR.

3. THESE FORCES ARE ADDITIVE.

4. THESE FORCES CAN TRANSFER INFORMATION, PHYSICAL OR OTHERWISE.

5. THE SYNAPTIC CLEFT IS AN INDETERMINATE PHOTON PROCESS, NOT MERELY A CHEMICAL ONE AND AS SUCH IS EFFECTED BY SUBSPACE MORPHIC TRANSFER.

6. THUS ALL OF SINTHETIC PHARMACOLOGY IS AN UNNATURAL DEMAND OF ACTION BY OVERLOADING THE SYNAPTIC CLEFT.

7. INDETERMINACY IS AFFECTED BY SOME OTHER UNEXPLAINED POWER. THIS POWER SEEMS TO BE CORRELATED WITH PSI, AND EXPLAINS PSYCHIC PHENOMENA. (NELSON EFFECT, AS SUBSPACE TRANSFER OF CONSCIOUSNESS.)

8. HUMAN BEINGS MIGHT HAVE POWER BEYOND TIME AND SPACE BY DEVELOPING WORMHOLES IN THE ENDORPHIN AREA OF THE BRAIN. THIS OCCURS THROUGH A SUBSPACE CONNECTIVITY OVER THE SUBTLE QUANTIC NATURE OF ALL THINGS. THERE IS A SHAPE CONSTRICTION OVER THE DEGREES OF FREEDOM OF SYSTEMS, PRODUCING A PATTERN OR SHAPE ENHANCING EFFECT. WE REFER TO THIS AS THE NELSON EFFECT.

9. INDETERMINACY METHODS OF MEDICINE HAVE SOME DEGREE OF EFFICACY ABOVE CHANCE.

Chapter 4

FRACTALS (DISPROVING REDUCTIONISM)

Chapter 4

FRACTALS (DISPROVING REDUCTIONISM)

How does chaos theory affect biology?
Complex situations deserve complex descriptions.
Reductionism is an inappropriate response to over-simplification of not knowing.

As we have shown in this book, the development of the laws of thermodynamics, entropy and reductionism were a needed step in the evolution of scientific thought. However, they have outlived their usefulness. Over the last fifty years science has found those reductionistic theorems and postulates to be sophomorphic and outdated. It was the belief in the Laplace demon or the existence of one simple equation that would predict all phenomena that led to this reductionistic type of theory.

Modern-day physicists, electronic theorists and scientists in all fields have found the severe limitations and disturbing consequences of belief in this thermodynamic mode. In every scientific field except those of pharmacology, medicine, and biology this type of theory collapsed; yet, biology is probably the area in which the theory fits least. Modern science has been able to almost completely disprove and challenge the idea of reductionistic entropy through chaos theory, or fractal geometry theory.

Newton found that certain relationships could be predicted via the physical effect one object had on another. This developed into a utilization of a two-body theory presenting linear approximations, which became linear equations. These equations predicted accurately the effects of one object on another. The development of these linear equations propagated and kept alive the idea of reductionistic theory.

Henri Poincare made a step into a new type of mathematics when he found that Newtonian equations of the linear type could very well predict two-body reactions; therefore, the effect of the Earth-moon system. However, when there were three bodies, such as the sun, Earth and moon, Poincare found a different type of activity; the three-body equation could not be worked out exactly. A three-body equation will require series of approximation to home in on the relationship in question. This developed into perturbation theory, which allowed for the prediction of the infinitely small effects subtle bodies could have on each other, allowing for not precise results, but probability theory.

Linear equations of all types of phenomena were found to work very well on paper, but in real life were drastically short of describing real situations. The more complicated the situation, the more complex the interaction. Thus several mathematicians and scientists felt that the limitation was in not having the extent of equations to be able to predict it. Poincare and others had created the idea of fractal geometry, and were able to show mathematically that complex situations could not be predicted exactly.

Thus the three-body equation became the infinite-body equation, where all the factors of the universe seem to apply forces that cannot be calculated in linear-type equations. Extremely complex situations could be approximated by calculus and reductionistic thought, but they could not account for the super predictability; they could not refine. The more complex the situation, the larger the number of variables, the more severe the limitations of reductionistic thought. Biology is the most complex of all situations, and this complexity of biology cannot be reduced to simple phenomena. These complex situations need complex solutions.

Small effects of almost minuscule reality could have large dynamic interactions in gross systems. As John Briggs and David Peat say in "The Turbulent Mirror": "Perhaps the batting of a butterfly's wings in Singapore might affect the weather in Kansas."

The mathematical problem of complex systems is caused by their being locked in feedback loops. In nonlinear equations, feedback and the idea of subtle limitations shape our new quantum mechanics to allow us to understand the idea of the fractal dimensions of our quantum biology.

Thus as we examine the natural process and the astounding complexity of the interaction of plant and animal in a natural environment, we can appreciate a look at the naturopathic process of medicines that animals can derive from plants and other natural entities. The use of glandulars is a perfect example in this case where the glandular will contain fatty acid compounds, minerals, and an astoundingly complex number of compounds that can be used naturally to treat many conditions. The reductionistic, sinthetic chemical companies sought to find ways to patent the key ingredient. Not all support structures allow for the shift in our history, where sinthetic chemicals

wove themselves so tightly into our medicine. With our new fractal quantum biology we can see that complex situations need complex solutions, and a reawakening of the process of glandular research, herbalism, naturopathy and homeopathy is needed to face the challenges of an increasingly toxic world.

Julian James writes in his book, "The Bicameral Mind and its Origins in Consciousness", that mankind has evolved thought patterns; that the actual physical structure of the brain and its ability to interact with the environment is an evolving system. Each new generation might have a different way of seeing things, perhaps in a superior way to the generation before.

In the writings of the early nineteenth century, people discussed the linear systems and interactions of mathematics. Even in the economic systems, direct reactivity and predictability were the dominant theme. However, in the late thirties and forties, a shift was made in thinking, where suddenly the idea of feedback loops, cybernetics, and system-imposed limitations started to appear. This was a revolutionary new thought pattern that opened the door for a different understanding from the one linear pseudo-predictability could provide.

System analysis patterns were developed in complex ways that needed much education and resources to learn. The idea of electronic modulation and feedback systems became the theme in the electronic industry. Cybernetic control mechanisms and circuit interplay were absolute necessities in designing electric circuits. Medicine, however, failed to keep up with feedback analysis, and many medications were designed for their short-term consequences, not for their long-term effects on feedback utilization.

Now, in our view of a quantum fractal light, let us look at various feedback circuits.

There are five basic kinds of feedback:

1) negative
2) positive
3) inner-limiting
4) self-limiting
5) outer-limiting

Negative feedback can be thought of using an analogy of the relationship between the furnace and thermostat; the furnace works until the thermostat turns it off. As the room cools, the thermostat relaxes to another temperature at which it turns the heater back on. This is an example of negative feedback. Negative feedback means that one type of function regulates another. *Pathologic* negative feedback occurs in certain kidney function diseases, CO_2 and O_2 regulation, and desire control problems.

Positive feedback can be seen this way: a speaker with an amplifier system and microphone starts to produce feedback. The subtle sounds made by the speaker are picked up by the microphone and amplified back to the speaker, which are then amplified back to the microphone. This type of feedback loop is called positive feedback, and provides amplification. Amplification occurs through maximization of potential. Positive feedback occurs in hyperactivity, anxiety states and tachycardia, among a host of others.

Another type of feedback is the special attractor or inner limiting of the actual entities existing in the universe. Some type of inherent mathematical relationship was infused into every electron, proton, neutron, molecule, atom and cell at the beginning of the universe. This led to the Feigenbaum numbers, which allows for each item to perform in chaos to a certain type of limiting feedback loop. This is basically the special attractor of the universe. God provides a pattern for reality.

The next type of feedback is the self-limiting cycle, in which a growing system starts to impose self limitations on its own biology. Thus an organism would know how cold it must become before it would need shelter, how warm it must become before it would need shade, how thirsty it must be before it needs water. Or a society might impose limitations on what its people can and cannot do. Society's laws are an excellent example of self-limiting circuits. Examples of pathologic, self-limiting cycles are hyper- or hypothyroidism, gonatrodin or other

Another type of feedback loop can be established from outer limitation cycles, where an external body, such as the government of the United States, might pose limitations on a smal er dy, as it tells cities or villages how much they can grow or how populated they may be. This is an example of outer limitation feedback. If the state of Massachusetts has laws about how arge a village can be, and the village of Neschwitz starts to grow too large, then the state will feed back and tell the city to take appropriate action. Examples of this dysfunction in medicine iatrogenic; doctors intervene externally and inappropriately to the organism. It is possible that any sinthetic intervention is inappropriate.

INTERNAL SYSTEM FUNCTIONS ON A COMPLEX INTERTWINED SET OF SOPHISTICATED FEEDBACK AND SELF-LIMITING CYCLES	External Intervention from Unsophisticated Sinthetic Source Results can only be derogatory.

In the case of positive feedback we can see why Poincare postulated that in some places the smallest effects could be magnified through feedback, and have disturbing or stabilizing effects on the total complexity.

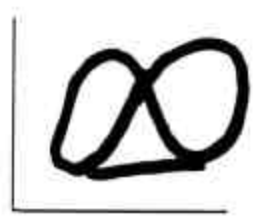
Without knowing all the situations of feedback mechanisms inherent in any cell, let alone the complexity of the human body, one would be appalled by the idea of external intervention. If you had superficial knowledge of a television set and were asked to fix it when it was broken, without knowing the complexity of the feedback loops within, your interventions would be weak and befuddled. Attempts to reduce the functions of certain circuits to simply one type of wave form would be ludicrous; whereas many different circuits have vast quantities of wave forms coursing through them. The same analogy is seen in modern medicine, which tries to intervene on the human body. The first thing that would probably happen if we intervened on a TV set is that we would void our guarantee. Our sinthetic pharmacology and chemistry might have voided our biological warranty. Also our dabbling in the TV set without full knowledge of its function will have startling effects, as we upset feedback loops within the set. We might fix the temporary dysfunction in the short term, but in the long term, it would be highly likely that we would inappropriately intervene, and thus cause problems.

This is what is happening in our sinthetic pharmacological intervention of the human body, since we are voiding the guarantee. Of course, armed with our productionistic, reductionistic minds, we would try to over-simplify this reaction, and not have an appreciation of the complexity of the system we are working with. Thus our attempts would be superficial juggling until we could learn more about the intricacies of the circuit. We will never be privy to the intricacies of the human cells or body; its secret is locked in its nature, and our knowledge is always intertwined with probability, never in surety. Complementarity and indeterminacy have sealed that. So that we don't void our guarantee, our medicine should try to revise and adapt a natural modality, a behavioral intent, and a homeopathic pharmacology. We must develop a softer, more natural medicine more closely attuned to the laws of quantum theory and the natural process. We must challenge sinthetic technology, and also provide choice to the people in our society.

Poincare developed a many-body problem, and mathematically proposed it as nonlinear. To the ideal analytical system he added feedback, a nonlinear complexity. This corresponded to a very small third-body effect. Mathematically he was shocked to find that the small third-body effect could possibly produce vast differences. Even in the orbits of the planets, this third-body effect could cause chaotic orbits, which would cause the whole solar system to be unstable. Poincare told us that chaos is the essence of a nonlinear system, and that even completely determined systems such as our solar system can have indeterminate effects. He found mathematically that these effects, however small, could have an effect on the whole.

Two of our forms of feedback are the *attractor* and the *strange attractor.* These are functions that can be understood and exemplified in *phase space*. Phase space combines dimensions in a nonlinear system to demonstrate a unity function resulting from two or more dimensions, thus producing a shape different from the perception supplied by our senses. Such an example of phase space has been supplied in "Scientific American", where heartbeat and brain wave are shown to have irregularities in their phase space. To calculate and project this phase space, the dimensions of time and intensity of heartbeat are combined. A distinct time limit of one second was applied to the heartbeat to determine its regularity vs. time. It was found that the more regular the heartbeat became to time (in other words, the closer its phase space), the sicker the person was. The normal heartbeat seemed to follow some type of strange attractor, as shown.

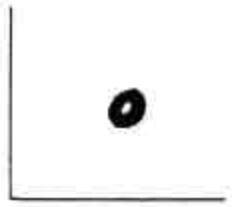
HEALTHY HEART BEAT IN PHASE SPACE



Cyclic Irregularity
of Healthy Beat

Heartbeat after one second

UNHEALTHY HEAT BEAT



Regularity in

Time Phase

Heartbeat after one second

An attractor is an aspect within a system that applies pull or push to a certain area, just as a pendulum has its attractor (gravity) at the lowest point. As the pendulum oscillates back and forth, to and fro, it is pulled to a one-point system. This is a *single-point attractor.* In all systems, even chaotic ones, there are attractors that seem to pull the participants or the cybernetic organism to certain levels. A complex system of interaction in feedback loops might result in a *torus attractor*, such as the one in the "Scientific American" article on heartbeat.

Complicated feedback systems such as cellular biology and microbiology will have torus attractors that set asymtopic limits that can never be achieved, and as an item pushes into one area, it is pulled to another to maintain this type of stability.

The attractors of life could include the 7.4 tendency of pH in blood, which has to be balanced through buffer systems, oxygen cycles, and phosphate chemistry. Blood sugar hovers in a broader band, oscillating from 10 to 300, but the torus of healthy blood sugar would oscillate between 80 and 120. As it started to approach the 80 range it would stimulate functions of pituitary, liver, and adrenal glands, to stabilize blood sugar by one of the three processes of: eating, glycogenolysis, or neoglucogenesis. Thus as blood sugar starts to climb, other feedback and regulatory processes will be invoked, and will bring it back down through insulin release, activity management, and caloric activity. This would be extremely complex, having thousands if not millions or billions of variables that would have to be regulated. Talk about a multi-body problem!

If we combined all the various toruses and all the various shapes in this vastly complex strange attractor, it might indeed look like the double-helix structure of the DNA. This would become not only a three-body problem, but a *billion and three*-body problem or larger, and once again the limitations of our Newtonian dynamics, or two-body linear equations, would not even come close to fitting this type of analysis. Here again we have seen dramatic proof of how Newtonian, reductionistic, thermodynamic philosophy has little to do with biology or medicine. This type of reductionistic theory then isolates into simple, sinthetic compounds and their simplistic interactions of the body. It is indeed an insult to the complexity of feedback loops. The reductionistic components of sinthetic technology are not sensitive to the feedback systems in biology. Nature has many very subtle, intricate control compounds and energetic safeguards. Only nature knows.

It has been proven that as little as 10^{-9} of a gram of thyroid hormone can have effects on the human body; yet, multi-milligram dosages are given daily in the form of thyroid hormone, synthroid (sinthetic thyroxin). This large amount would demand chemical action, yet upset subtle feedback loops, and cause further atrophy of the thyroid tissue. The "use it or lose it" law dictates this (see Registered Wellness Consultant Book).

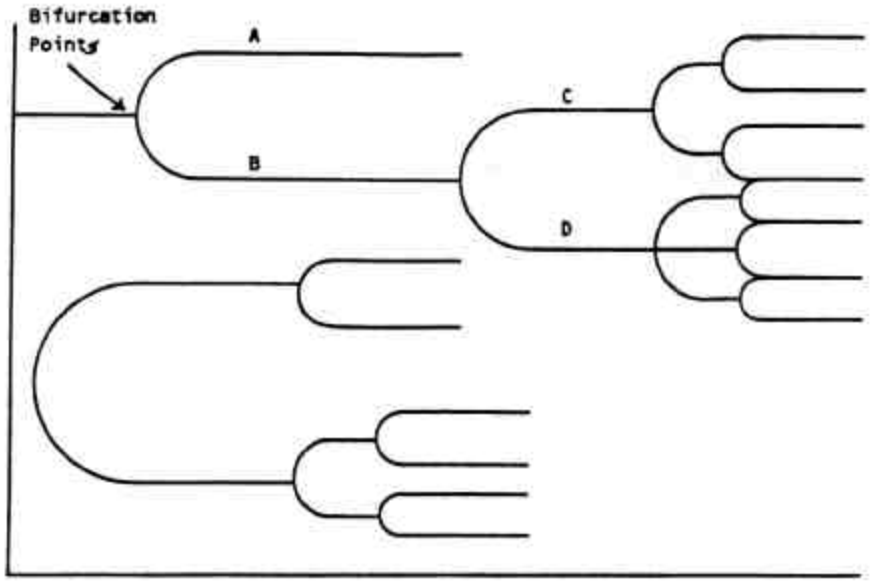
To supply an item that is supplied by the body (whether naturally or sinthetically) for long periods of time can cause the tissue to atrophy and lose potency. Such intervention should be reserved for short-term use, or in the case of tissue destruction, which is irreversible. Examples of such destruction might be surgery, irradiation, or possibly even genetic damage that has prohibited a certain area of tissues to produce needed enzymes, hormones, or whatever. In this case such hormones would have to be used in the long term.

The entire field of pharmacology is dedicated to the idea of blocking, stimulating, or interfering with cellular microbiology. This demanding of action interferes with the subtleties of the loops and causes vast differences in the structures and the activity of the cells.

The development of the torus of life, as complicated as it might be, is set up by DNA. The locking of the mathematical relationships, as we have indicated in our mathematics chapter, can flow from the Isaacsonian hermitian matrices. This would explain the Fibernaci link in development of the bronchial tree, and the capillaries and vein actions of the body.

Osborne Reynolds found that flow through different sizes of pipe would result in turbulence. As the flow of a liquid through a pipe reaches a certain speed in a certain sized pipe, turbulence results, and the engineer comes out with what is called "Reynolds's numbers". The body, in developing its flow of blood through the arteries and veins, has taken Reynolds's numbers to that barrier where there is almost turbulence, and thus maximum flow, below the levels of chaotic interruption.

A Russian physicist named Levlandau was one of the first modern scientists to try to pin down the steps for turbulent development. Like Leonardo Divinci, he realized that turbulence appeared after a huge number of bifurcations had occurred. A bifurcation is a trauma point in the path of an item at which it could choose a different path; so an object in path A that would have a bifurcation might choose to go around it to the left or right, resulting in a bifurcation point. Existence is full of bifurcation choices in which we choose to go left or right. If an item has an attractor, and items coming into this analysis mostly choose A, that type of attractor would set up a probability that, for example, 80% of an item flowing in path A would choose path B. But if there are more items put into it at some critical point, a situation might be set up in which the attractors would jump from path B to path C, or choose another attractor. A point of instability has been mathematically related, being called the *Hopf Instability* (see *Bio-Quantum matrix*).



VERHULST NUMBER (FEIGENBAUM)

Hopf proposed a wealth of further instabilities. One such instability involves a jump from point attractor to limit cycle. This is the changing of a torus attractor, such as a three-dimensional system of a torus going to a six-dimensional system torus. A second jump might be a limit cycle transforming onto the surface of a torus. The third type bifurcation might happen if instead of jumping from a two-dimensional surface or torus onto a three-dimensional surface in a four-dimensional space, the torus itself breaks apart, and the surface enters into a fractional dimension. Thus the surface of the torus attractor is actually caught between the dimensions of a plane; two- and three-dimensional.

Thus as the *Eclosion* medical instrument analyzes the many-dimensional system (in this case, a twelve-dimensional responses), it is used to analyze an extremely complex set of situations, providing data to the medical practitioner.

This type of analogy can be seen in trauma cases, in which a patient has an attractor of a healthy torus after a trauma, which is a bifurcation point. The body now chooses to return to the previous torus or to develop an adaptation torus. An adaptation torus is a new attractor developed in response to a trauma case, in which a patient would reject the natural strange attractor. After a trauma the body might choose this adaptation attractor, rather than returning to the original healthy attractor. The adaptation torus is a compensation type of attractor, in which the body, rather than returning to its original phase space torus, might choose another torus, an adaptation torus, as Selye discussed.

As Hopf bifurcations occur, the torus of the biology of the organism can choose different responses, and thus biofeedback loops. The sum total history is the response of society changing tauruses in response to bifurcations. As various challenges occur; wars, natural disasters, or just ideas, these act as bifurcations, where society now must choose a response. Possibly the response of the old strange attractor might be reacted to. A society in response to a natural disaster might choose to return to its old sense of balances, and continue as if the natural disaster hadn't happened; or, as a result of the bifurcation of that disaster, a society might choose to find another set of morays, some way to help prevent the natural disaster, or perhaps a way to prepare for it. Or it might not have anything to do with a natural disaster at all; it might just be a result of a bifurcation producing the intent or the probability of change, or if nothing else, the chance for it.

So a society that witnesses a volcano erupting might have noticed that the first person it took was a young virgin, and then the volcano calmed down. So the society might adapt a process of sacrificing such a virgin. This might become the moray of the society, and once every year or so, the young virgin will be sacrificed. This would have drastic effects on the rest of the society.

In response to different bifurcation points in society, social changes can be marked. We often also find that certain accidental cases can be sparked, such as the malaria epidemic that sparked the doctor to develop air conditioning. It was his theory that by cooling the patient he could cure malaria. His medical theory was untrue; however, his craftiness in supplying the world with air conditioning greatly changed society and the places where man could live and operate productively.

So our responses to bifurcations are often accidental, and sometimes intentional.

In 1975 Feigenbaum made a very significant discovery. Working on chaos theory, using a hand calculator, he tested equations and found universal types of period doubling similarities and their transformations. He explored equations in learning, population, solid state devices, optical systems, electrical circuitry, sound feedback, and so on. He supposed that the fine details did not really matter in these systems, and that the period doubling was the common factor that predicted the chaos entering into the system. He presented universal numbers, which he calculated with his hand calculator. These numbers correspond to the ways that a system goes into chaos, and then finds itself in order.

When a system works on itself through feedback, it will change in precisely the same way according to universal dynamics. The ratios that Mitchell Feigenbaum discovered will be known throughout the rest of time as the *Feigenbaum numbers*. These Feigenbaum numbers fall out of the hermitian matrices of Dr. Isaacs, showing how this system reverts chaos back onto itself, back to order. Our biology was able to do that through the determinate values of feedback started from the beginning process of the galaxy.

Regularity of the heartbeat was a key as to when there was going to be certain spasmodic or arrhythmic behavior. By changing the refractory time on different heart muscles, he could discover when to produce out-of-sync rhythms by period doubling. This produces the arrhythmia of tachycardia, often bradycardia, and definitely many other cardiac dysfunctions. These can often be the result of inappropriate negative feedback or positive feedback in the circuits, as well as external or internal limiting cycles. Many of these can cause problems in the

cardiac rhythms. McGill University, Leon Gloss and their group found that by giving regular periodical stimulations to chicken heart cells, they could cause period doubling, and eventually chaos.

Walter Franceschini confirmed Feigenbaum's numbers. He analyzed various equations' modeling fluids in turbulence; thus the link between chaos/order and order/chaos was found to enter through the Feigenbaum numbers, which were predicted in the Isaacsonian hermitian matrix. Thus all of life is an iteration feedback through absorption, unfolding, processing toward chaos, approximating tauruses and new needs for DNA, and approaching new needs for order as we fight our battle against entropy.

Iteration defines that normalcy and alteration are not opposites; neither are change and stability. The body remains stable; yet it is in a constant state of flux. This constant state of flux stays the same. This is a flip-flop on the Janusian concept of psychology.

Janus, the great god of Rome whose face looked through the door both ways, in and out, shows us the power of Janusian psychology; the genius. The genius is able to see that something can be in a state of flux, and yet in a state of stability. Einstein saw that an object that is falling is actually at rest at the same time.

In O'Neil's play, "The Iceman Cometh", the Iceman represents both life and death. The truest pattern of genius in our science is the pattern of realizing that something can be both in yin and yang at the same time, and that opposites sometimes can be truly equal. This is the idea of iteration in fractal geometry, or chaos theory.

In 1960 an MIT weatherman, Edward Lorenz, was using computerized simulations to solve nonlinear equations of the Earth's atmosphere for weather conditions. As he ran one value, rounding off his figures to six places, he came up with a pattern of weather. Then, rounding off the figures to three decimal places, he set the computer into motion, went out to lunch, and when he returned, he had a tremendous realization; not only was his second forecast different, it was *radically* different. The small three-decimal place discrepancy of the two solutions grossly magnified the chaotic process. As Poincare would have pointed out, the small indeed can affect the large.

What would it take to really round off a computer for better results? Perhaps our pocket calculators are not enough; perhaps we need computers that can work at 10^{23}, such as the triphasic computer system in the *Eclosion* system. Perhaps by working at 1023 we can establish how even the smallest intervention can have effects on the large. Joseph Ford called this the "round-off error", the missing information, and we need to exceed seventeen, twenty-three, thirty-first iterations, to drastically improve our predictive capabilities. Through iterations alone, even the smallest type of fluctuation can have large-scale effects.

As indicated in *Bio-Quantum Matrix*, synchronicity in the generation of random number series can be affected by the indeterminacy principle of the human mind. Thus the development of a synchronicity random number generator that could match the amount of synaptic clefts in the human brain could perhaps be accessible to the vibrations and the morphic resonance, and bring meaningful data to bear.

As we have pointed out in this book several times, indeterminacy is the key to our quantum biology. This indeterminacy, as it plays in large number series, takes on fractal dimensions, where large-scale chaos and entropy become a predictability and a factor in biology.

For hundreds of years scientists have sought to reduce the many mathematical variables to their meaningful components. This has been done through a quantifying mathematics. This type of quantifying mathematics reduces the complex imposing network of small forces and tries to calculate the large forces. So a bridge engineer would be concerned about force and structure, and would calculate toward one variable of force and resistance, letting the subtle iterations go as indeterminacy or experimental error.

Quantification in mathematics has been very powerful in the development of engineering, which has put a man on the moon and built large aircraft, automobiles and bridges. But our reductionistic quantification in mathematics has failed miserably to explain the phenomenon of biology, and especially the phenomenon of life itself, at the cellular level.

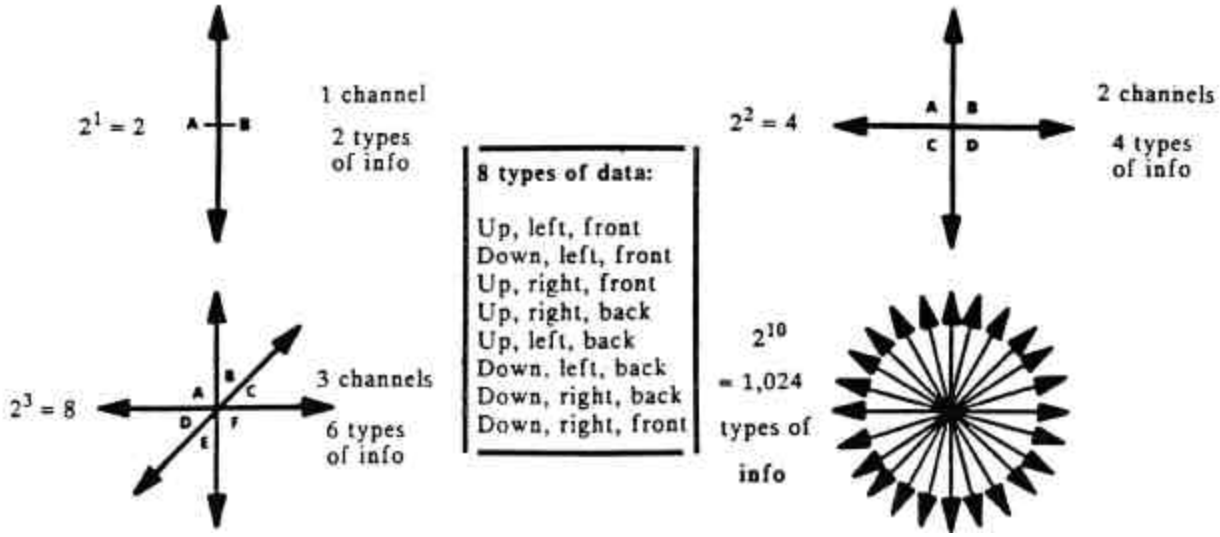
To this end, scientists recently have turned toward *qualitative* mathematics. In qualitative mathematics we don't look at the parts or reduce to simplistic forces; we look at the whole of the system, the Gestalt of the dynamic. We discover how the whole changes in response to even the smallest stimuli. Scientists are seeking to develop nonlinear, qualitative modes of analysis.

To date, the development of biofeedback has been quantitative; in other words, involving one simple variable of response to certain stimuli, thought patterns, or behavioral conditions. Thus we might look at blood pressure in response to ideations about family, fatherhood, motherhood, and so on. Or perhaps GSR could be compared to conditions of fear or apprehension. In developing a qualitative type of biofeedback, the researcher takes a complete look by comparing eight or more variables at a time in response to various stimuli.

In looking at different brain wave responses; amperage, voltage, resistance, temperature, pressure, and oscillations at several different parts of the body, we can look at a qualitative, systemic change in response to

different items. This type of change would result in vast amounts of data. If we had simply a one-dimensional variable such as skin resistance, we might get a high or low skin resistance oscillating around some type of a norm.

Such systems are the Dermatron, Interro and Computron. These systems will generate 2^1 amounts of data. 2^1 equals two, so we know that the response of skin resistance is high or low. If we generate 2^2, we will have not just high or low, but left or right, generating four quadrants, allowing for four different types of data that can be upper left, upper right, lower left, lower right. So having two channels will allow us 2^2 in data. If we add a third channel, for example, skin resistance, voltage and amperage, then we find that we can get 2^3, or eight bits of data, eight quadrants where the problem could be. The Xrroid developed by this researcher generates ten different channels, or 2^{10} bits of data, which comes to 1,024 variables.



Up, left, back
Down, left, back
Down, right, back
Down, right, front

Thus by taking a qualitative look at the body through ten different dimensions, giving us 2^{10}, we can look at 5,000 items, such as amino acids, minerals, vitamins, sarcodes, isodes, nosodes and allersodes, and do it all in minutes, with the computer calculating the various reactions. By processing this through a trinary logic system, a system that is either on, off, or indeterminate, we now arrive at a qualitative indeterminate trinary logic system, which we have called the *Xrroid.* The Xrroid will allow a computerized machine to look at 5,000 entities; homeopathics, nosodes, sarcodes, and others, see ten different reactions of the body's response to them, and thus generate 1,024 x 5,000, or over 1,300,000 bits of data. This data is then processed with a trinary logic system matching the indeterminacy of the human brain. This process in the machine, generating 10^{23} random events and calculating the results, is known as the Xrroid.

By comparing the phase space dimension of the Xrroid results, we can find the strange attractor of the human body. This device enters a new dimension of biology, allowing us to utilize more natural modalities of mathematics to intervene on a biological system. This device has been sold for years, and used to help thousands of people to naturally regain their health.

It is another basic hypothesis of this book that since the beginning of the universe, wherever that might be, there has been an ingrained reactivity to chaos and large systems built into the basic matter of the universe. Every electron, proton, and other particle has a programmed ability to react. This type of reaction is set by quantic terms, and is espoused in fractal demonstrations of chaos theory.

As we have seen from chaos theory, as systems approach chaos a type of fractal processing guides them through bifurcation points into set patterns, which defy the old type of entropy random processing. But there seems to be an extra dimension to the processing of biological systems. Here, a more imposing cyclic transformation allows for metabolism and reproduction, a sort of super attractor which guides and processes material biologically, thus allowing for life.

Any strange attractor, even a super attractor, is a fractal curve. All fractal shapes are similar at descending scales, just as biology has similarity built into the small in relation to the whole. The part reflects the whole, as in reflexology, palm reading, or DNA research.

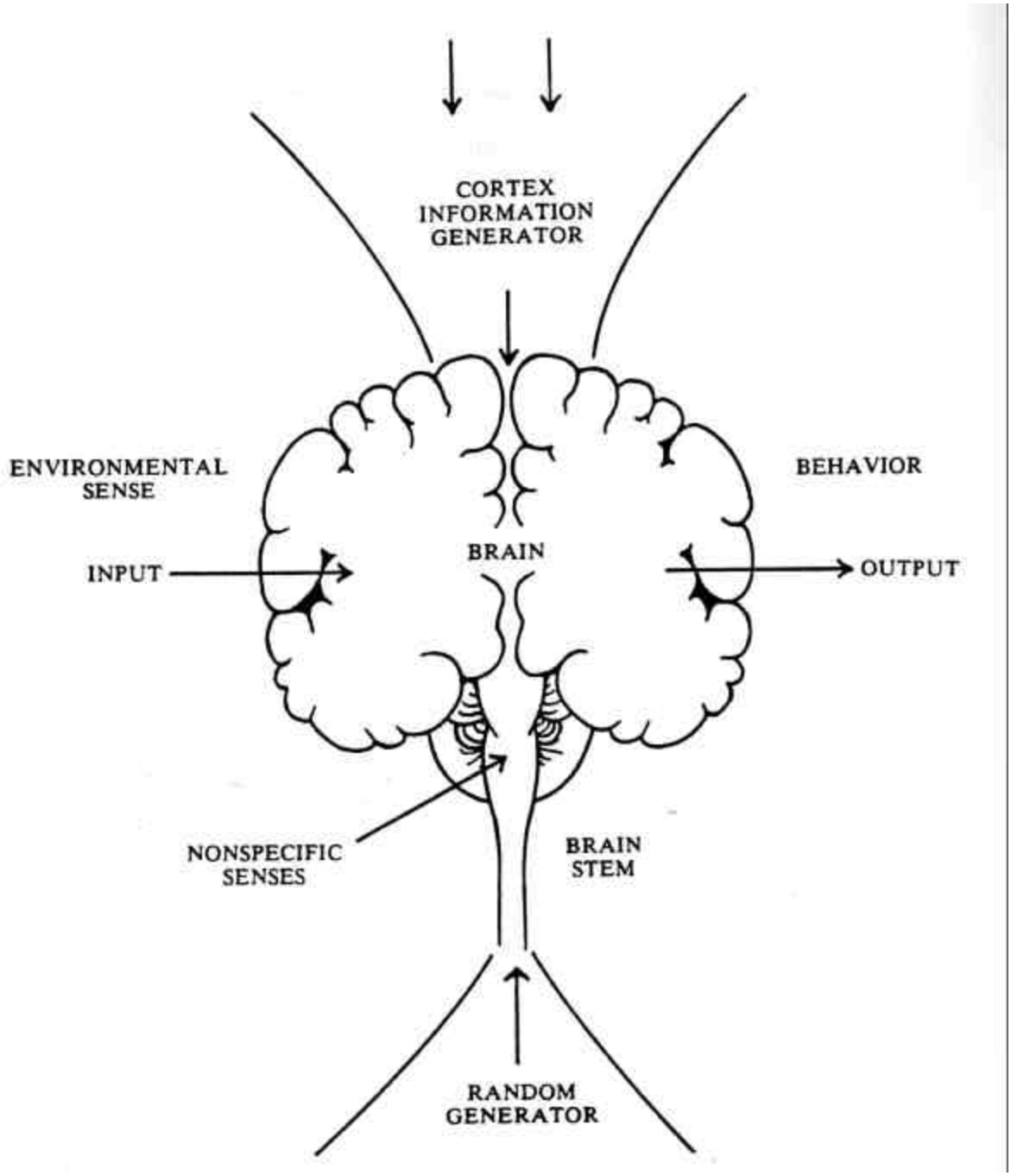
Medicine has always known that the ear might resemble the body and that various dysfunctions can tell us about problems in parts of the body. The foot, through zone therapy, reflects different parts of the body. The hand, or the palm, reflects life. Modern scientists now know that DNA inside every cell reflects the shape of the whole. Fractal shapes are always similar at different harmonic points in the building of the small into the large.

The phase space system of the human body bends and folds through fractal shapes. Fractals become organic when at each bifurcation point there is an indeterminate choice between several forms of iteration. An organic system would have an indeterminate reaction to equally possible systems of reaction. Cellular systems cannot work on one dynamic system alone; they must have back-ups.

As Briggs and Peat state in their book, "The Turbulent Mirror": "The human circulatory system is an amazing piece of engineering, consisting of a supply system, arteries carrying oxygen-rich blood; and the exhaust system veins carrying away the waste products. These two systems of branching pipes come to a central pumping area, the heart. It must be arranged in such a way that no part of the body, organ, or piece of tissue is far from both systems. These severe constraints dictate a fractal branching structure for the veins and arteries. However, blood itself is a very expensive commodity in terms of the body's resources. Consequently blood has a volume of only three percent of the body; the problem is how to get the circulatory system infinitely close to each body part and keep the total volume low. Nature's solution is more rapid branching than mere scaling would suggest. The blood supply bifurcates between eight and thirty times before reaching each particular location of the body, and has an over-all fractal dimension of three."

The longest particular illuminating fractal structure tells us something about the meaning of scaling. The ancient Greeks divined history's most famous scale, the golden mean, or golden section. Draw a line and divide it so the two segments, A and B, are in the same ratio to each other as the long segment is to the whole line. The proportion of A to B is an irrational number, 1.618... This proportion can also be found in a series of numbers beginning with 1, where each number is the sum of the two proceeding it; 1,1,2,3,5,8,13,21. The ratio of each number to its predecessor approximates the golden mean. This series is called the *Fibernaci numbers*, named after the thirteenth-century Italian mathematician, Fibernaci, who made it famous.

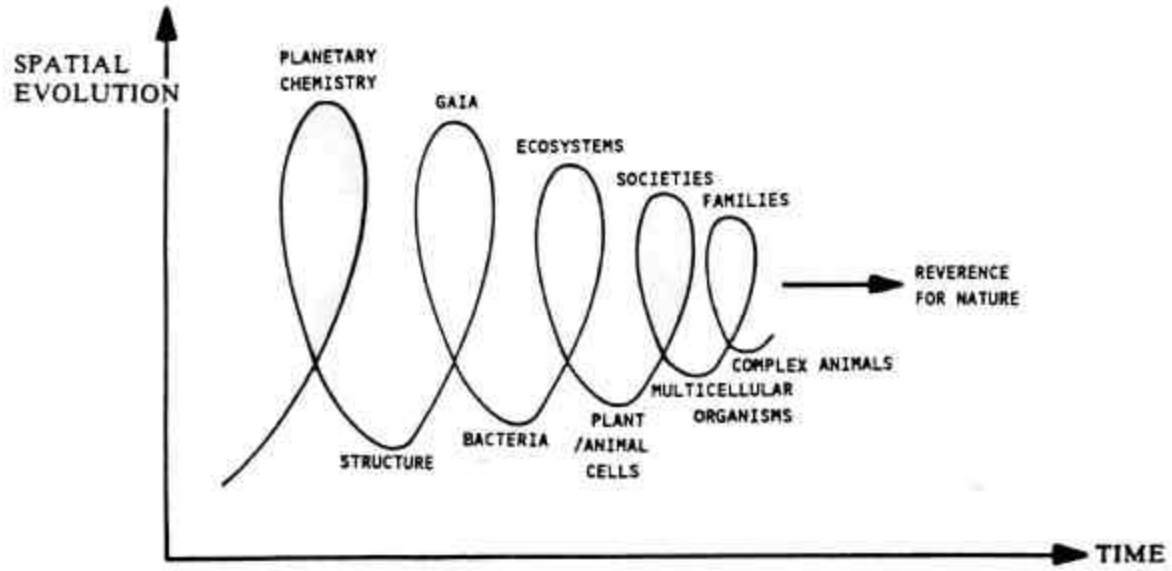
Studies have shown that the ratio of the lengths of the first seven generations of the human lung bronchial tubes follow the Fibernaci scale. The diameters of the tubes are classical; that is, Fibernaci up to ten generations. But after these initial generations, the scales change markedly.



Bruce West and Arnie Goldburger have demonstrated that the lung incorporates a variety of fractal scales; shifting to scales allows the lung greater efficiency. West and Goldburger say: "The final product, which we have dubbed `fractional Fibernaci lung tree' provides a remarkable balance between physiological order and chaos..."

We will always be able to explore, because we will never know. With the indeterminacy principle, we will never be absolutely sure. Our grandchildren and our great grandchildren will always have more to explore in biology, medicine and science. Everywhere we look we see more complexity; this is not a reductionistic universe. It is not a linear dynamics, it does not yield to thermodynamics and entropy. Biology, by fate of existence, is the severe antithesis of linear, entropic, thermodynamic Newtonian dynamics.

Thus we can see that there is a nonlinear organization to the universe, and that the ideas of reductionism are totally inadequate to describe our present-day world. This pinnacles in biology, where the ideas of statistical distribution, reductionistic thought and even thermodynamics do not fit the system needed to explain the phenomenon of biology. A new system will be needed involving some new techniques to understand our biology. The implications and the effects on medicine will be most profound.



Hahn Selye writes in his classic book, "In Vivo (The Case for Supra-Molecular Biology)", that the reductionistic form of thought in medicine appalled him in as early as the 1930s. He saw in his medical education teachers and professors who would try to reduce complex sets of symptoms in their patients to one or two entities of disease, primarily trying to find some type of pathogen that was causing the disease.

Selye reported that he discovered "the syndrome of just being sick", where many of the diseases just seemed to be a result of being sick. Surely it was important to find remedies for one disease or another. It would be ever so much more necessary to learn something about the mechanism of being sick and the means of treating the general syndrome of sickness, which is apparently superimposed upon all diseases. Selye later coined the word "stress", and used it to direct his theories of the GA S (General Adaptation Syndrome). In developing this, he found that stress could create problems in four major areas:

1. Adrenal-cortical stimulation
2. Thymaco-lymphatic degeneration or atrophy
3. Gastro-intestinal ulcers
4. Heart and circulatory system

As a response to the stress, there was a three-part system of response:

1. The alarm reaction, initial reaction to stress
2. Stage of resistance and adaptation
3. Stage of exhaustion and system failure

Dr. Selye thus was able to resist the temptation of reductionism and linear thought and look for a more general pattern of disease that was very much parallel to the resistance of reductionism found in most modern mathematics; looking for fractals and complex dynamics as they affect biology.

Modern medicine is starting to accept some of Selye's work as looking for a syndrome of sickness and stress-related connection. There has also been much research and work on the psycho-immune system's function, relating to the well-being of the psychology of the patient's system and his ability to fortify and direct a proper immune system response. Even so, reductionism proliferates medicine.

Process of Disease:

1. Primary Cause of Disease, Stressors, etc.
2. Secondary Step Functional Disease
3. Third Step Organic Disturbance
4. Death

SUMMARY

1. REDUCTIONISM WAS THE PROBLEM IN MEDICINE, NOT THE SOLUTION.

2. MODERN SCIENCE, MATHEMATICS, AND PHYSICS HAVE RECOGNIZED THE FALLACY OF LINEAR REDUCTIONISM. WHY HAVEN'T MEDICINE AND BIOLOGY?

3. THE EVOLUTION OF MODERN THOUGHT HAS OUTGROWN REDUCTIONISM.

4. FEEDBACK HAS MANY FORMS, AND IS INTEGRAL TO LIFE.

5. THE ATTRACTOR OF LIFE IS SET BY THE TORUS OF APPROPRIATE CONDITIONS FOR BIOLOGY.

6. CRISIS BIFURCATION POINTS OCCUR AS A RESULT OF TRAUMA. THE PATIENT'S BODY CAN CHOOSE TO RETURN TO HEALTH OR ADAPT TO THE TRAUMA. MEDICINE SHOULD ATTEMPT TO RETURN THE PATIENT TO THE HEALTHFUL PATTERN.

7. BIOLOGY HAS AN IRREGULAR PHASE SPACE ATTRACTOR.

8. SMALL CHANGES CAN HAVE LARGE EFFECTS ON A SYSTEM.

9. HOMEOPATHY IS PROVEN SCIENTIFICALLY AND MATHEMATICALLY TO BE AN EFFECTIVE MEDICAL SYSTEM.

Chapter 5

TRANSFORMATION

An Advanced Treatise in QUANTUM BIOLOGY

Chapter 5

TRANSFORMATION

How does a cell transfer mass into information and back into mass?

As we saw in Chapter 4, there is an inherent process in all matter that tends toward an organization state. Thus all matter tends to fall toward certain fractals. Thus a system under total entropy, or chaos, will start to produce some organization, as shown in chaos theory. This will require us to establish new definitions of entropy, thermodynamics and statistical dynamics. In light of subspace dimensions of control over the indeterminancy of subtle items(the Nelson effect), entropy might only be a situational observation. Just because a set of data appears entropic from one vantage point it might not appear so from another. One person's entropy might be meaningfull to another. It is possible that nothing is really noise and that noise is really just unpercieved transmission. Biology produces much percieved noise, such as the infared or heat by product. Perhaps this is just another form of information transfer awaiting discovery. Perhaps there is no wasted functions in biology and the system uses every bit of possible exchange. The total list of possible energies needed to be analyzed would however be so vast and complicatedly intertwined that only fractals could describe it.

It is the point of this book that even this fractal organization of chaos is not enough to account for the phenomena of life. We define life as being able to metabolize and reproduce independently. Thus we have separated two general classes of physical processes. As we have said in this book, life has an indeterminate basis of operation, by virtue of the phenomenological conditions of the molecular motions, which are not dependent on Gaussian distribution or statistical mechanics. The second is a condition of statistical mechanics in which the values of large numbers or Gaussian distribution can account for nonliving systems dependent on entropy, thermodynamics, or statistics. Some subspace control over the shape and paths of molecules must be imposed for life to exist. This morphic resonance control we have labeled the Nelson effect.

Within the class of living units known as *vions* (labeled by Dr. James Isaacs), there are two essential processes which are subtly interwoven. Isaacs has called these "emergent" processes, and these processes must be quantic and have discrete features. They cannot act in continuous terms. Isaacs points out that in a quantic description of these emergent processes, we must value them as being non-dualistic and operative under the correspondence rule. This is to point out that the two processes of metabolism and reproduction are mutually exclusive and operate somewhat independently.

In a system of evaluating the statistical mechanics of a nonliving system, we will find that the values theory of large numbers generating Gaussian distributions will hold true. This gives us a way of analyzing nonliving systems. Thus in analyzing the air in a room, we find that it obeys Boyle's gas laws. Temperature variables, volume variables and pressure variables are all making continuous changes through different equation states. Thus an equation of these variables can be used to describe this system under the given conditions. As one variable changes, other variables will change, either in proportion or inverse proportion. Thus we can see how an equation can be used to study and to reflect an entropic, thermodynamic state, where continuity of variables is an underlying assumption.

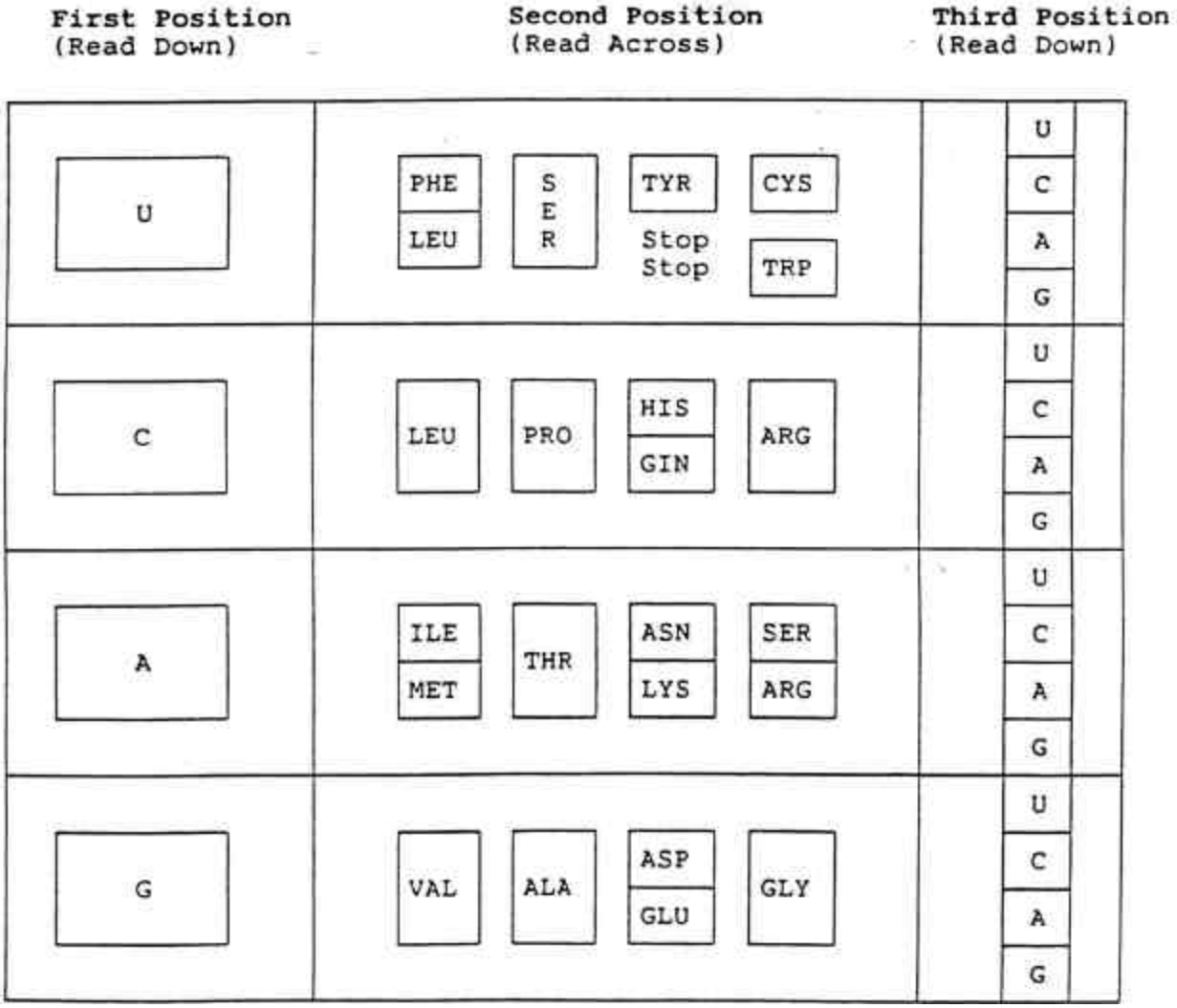
A graph of the two variables is another way of looking at a thermodynamic or nonliving system. If we have a graph in two dimensions, X and Y axes, the X axis changes. If we know the equation of how X affects Y, we can see that the changes in X will provoke distinct changes in Y through a continuous flow on the graph. These graphs can be taken into other dimensional states; three, four, five and six dimensions, depending on how many variables we wish to attune our mathematical theory to. This can be done in a nonliving state. However, in a living, quantic state, the idea of continuous flow must be put on a shelf. We will see in quantum theory that discontinuous steps will hallmark the process. We will need to develop a system that is discontinuous to catalog and analyze these steps.

The quantic theory means that the processes will jump in quantic terms, and the process jumps in indeterminate ways. In the subatomic process, physicists have resorted to matrices such as the hermitian matrices. Changes in the energy state of the quantic particles in the process can be charted in a matrix, We can see the effects through matrix algebra that allow for changes in the various states.

Thus to understand the interchanges of energies within a quantic system, a matrix system would have to be developed. To this end Dr. Isaacs developed the hermitian matrices, allowing for the process and changing of energy states, accounting for the transfers of energy.

GENETIC CODING

PERFECT EXAMPLE OF A QUANTIC (NON-RANDOM) BIOLOGICAL EVENT



As we have stated before the interaction of molecular entities is not a bals and rod phenomena. There is instead an extremely complicated intricate encounter of quasi energetic particles. The vibrational rates of these compounds, orbital size, orbital nature, probability nature, spin momentum,angular momentum, etc. all effect the actual interaction. There must extremely complicated mathematicl events processed for energy and information transfer. The mathematical nature of this process can be best approximated with a matrix.

Isaacs has calculated how 600 different energy state transfers must be done in a cyclic way to bring life metabolism into process. In developing a matrix sophisticated enough to handle the various emergent processes of life, we must also realize that since these fall under quantic rule, there is a certain amount of indeterminacy that cannot be overcome in the system. Thus in developing a truly organized mathematical pathway to understand the emergent processes of biology, we must use a matrix system with a triphasic logic system, going past the computerized form of logic. In a normal computer logic is assumed through binary, meaning on/off states of the variable. This works in the statistical world of the mechanical computer: the value is on or off. However, in a quantic world we find that indeterminacy helps to shape this as the variable is on, off, or indeterminate; some state of probability of being on or off.

We know that rays come out of the molecules of decaying uranium. At a certain probability state we know that there is a quantic relationship, and the indeterminacy tells us the probability of the time the next ray will come. We can never know with absolute certainty, because of the indeterminacy built within the system. Thus, to understand the emergent processes of biology, our hermitian matrix will need a triphasic logic system with a subspace interlink.

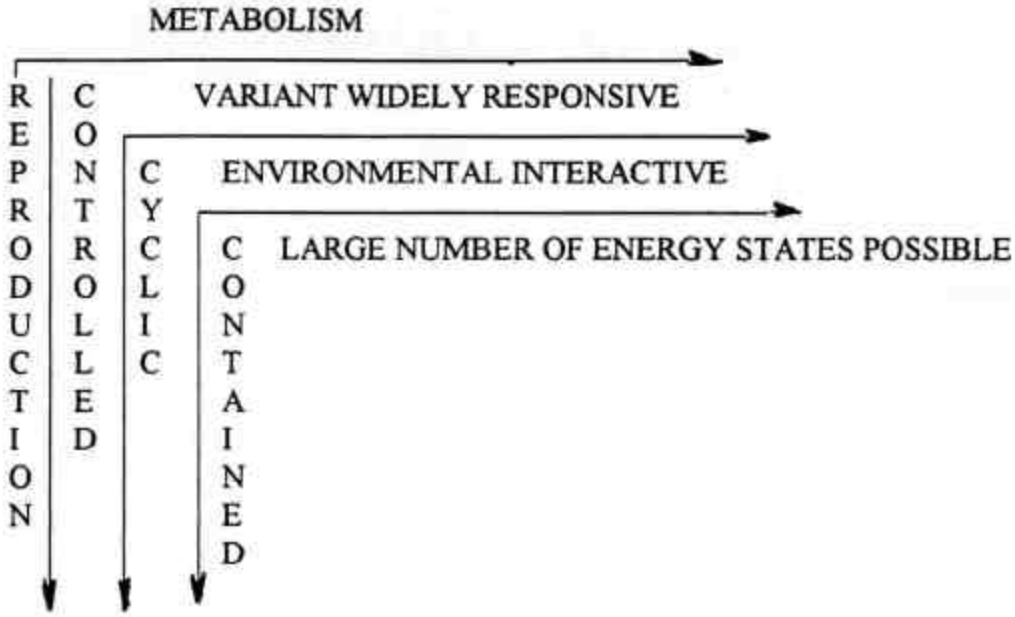
So our choice of mathematical blends will bring us to choosing a new type of abstract algebra. This will also point out the fact that we can make abstract claims or projections of thought that actually knowing the values within a quantic system such as biology will become impossible, since we are locked out of knowing by the indeterminacy principle (not being able to calculate momentum or position accurately). We also cannot know both time and energy distinctly.

Thus in setting up our "head"(Gedanken) experiment, we will use certain mathematical relationships for our hermitian matrices that might be able to produce the various energy states in a cyclic way, accounting for the processes of life. We will not be able to calculate magnitude through our system, but we will know terms of relationships possible in the light of our emergent processes of reproductive and metabolic functioning in living units.

Thus transformations or matrix algebra can be used to properly describe the various solutions of the energy exchanges in relationships, and these transformations will follow quantum rules that will be just as useful in biology as they are in chemistry.

Our transformations will need to have discreteness of action, the knowledge that a radically limited number of occupied energy states happens in the reproductive process, and a radically large number of energy states is accessible for occupancy in the metabolic process. Thus the reproductive process must be firmly defined and precise in its action, as we cannot allow any type of mutation to occur over once in every 10^9 trial. If this should happen, it could open the door for species variation, which would get out of control and produce havoc in the ecological response system.

So the energy states through the reproductive process must be limited in number, precise in activity, requiring strong drives and ease of access. In contrast, the energy states needed for metabolic process must have a rather large possible number of energy states, since metabolically we must respond to many different ecological terrains, or a wide range of variables in our meetings with the environment. We must to have strong responses to temperature, pressure, food access, air content, and so on. The extremely large amount of variance in our environment will also dictate a rather large number of energy states needed for transfer of the metabolic processes, as we will need to intake all types of foods, air, liquids, etc. The process will also have to be cyclic in nature, accounting for the need for preciseness; they must be very, very cyclic.

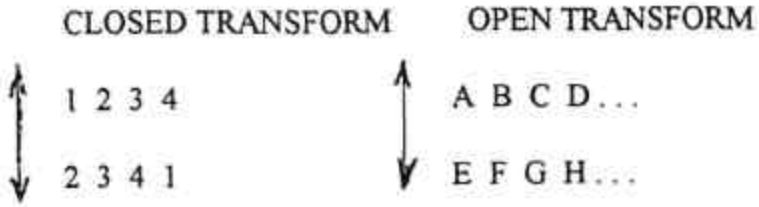


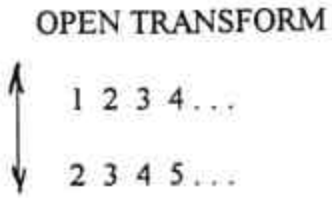
Exchanges of molecules through time and space in different energy states, for reproduction, must have truly cyclic transforms. The metabolic process, however, due to its large number of energy states, will need to be radically open for handling molecular mass and energy through the transforms in interaction with the ecological environment. Therefore the metabolic process will have to be asymmetric; non-equilibrium and irreversible in many cases.

Thus we can see the need for these two emergent processes to occur through handling the different flows of material needed for reproduction and metabolism. We will need to have a cyclic, precise, closed transform and also an unclosed transform of many different energy states for metabolism.

If one is to two, two to three, three to four, and four to one, we have an example of a closed transform in which the beginning and the end are similar. This is the type of transformation needed for reproductive utilization, and this will also have to have a limited number of states.

States that are controled or restricted in the degrees of freedom by a subspace morphic influence and a voltammetric resistance or trivector impingement in our normal space. (see the International Journal of the Medical Science of Homeopathy, issue 4)





The second transformation will need to have an unclosed transform. An example would be: one is to two, two is to three, three is to four, four is to five; where the system does not end up where it starts. This type of irreversible system can be very useful at handling a variety of environmental variance.

Here Isaacs makes the analogy of the transformations needed to handle cybernetics. Cybernetics is not what a machine *is*; it is what a machine *does*. In other words, machines can be programmed to work against the laws of normal physics, and to handle fluctuations from one value into another; thus they can make transformations. The thermostat in a room can sense when the temperature is too low and turn on a heater. The natural tendency of physics is for the room to go to a cooler temperature. The thermostat would thus act *against* the normal laws by turning on a heater. We can program the thermostat to lock into a certain temperature for a certain amount of time, and to change, as in the case of some of the thermostats we use to regulate temperature in the house at different times for energy savings.

Thus we can see that machine transforms in cybernetics can be used to design functions and variables to control environmental states. Such a sophisticated machine has been designed in biology, in which the body and the living cells actually fight against the entropy and thermodynamics of the environment, and take in certain energy states, matter, vibration, etc., and mold them against their wishes through machine-designed transforms, to accomplish metabolism and reproduction.

It is the attempt of this book to outline one of the first feeble attempts to try to understand this phenomenon. We have made many points in this book that this phenomenon is quantic, and thus must be dealt with concerning the matrices. It is also indeterminate, because of its quantic energy, and must have a triphasic system of logic.

The reader is also challenged not to be intimidated by the word "indeterminacy". Many readers of this book and other books are turned off by the idea of not knowing. It is also the precept of this book that we know *through* indeterminacy that life somehow has a spark to be able to control the indeterminacy of this triphasic logic system. This is another way to open doors of understanding, and perhaps we will someday understand memory and life a little better by some of the doors that we can open in our thinking.

Thus DNA, RNA and other key transform molecules position themselves and other molecules within the cell to act as machine-like transformation complexes. Thus the intricacies of life follow a machine-type dictum, so they can take molecules, atoms, energy, vibrations, and convert them against the entropic flow of thermodynamics into a cyclic flow of reproduction and an open-ended, many-leveled flow of metabolism.

Development of a simple transformation complex idea would be ludicrous. We must resist the lure of reductionism. The vast complexity of life would dictate that this transformation be many-faceted, and thus, very complex. Yet, what would it take to satisfy the minimum requirements of life? As we have already dictated, the smallest living organism that does metabolize and reproduce on its own is only of a given size: 10^{-5} cm. To pack a transformation material into such a small package, it would have to be very intricate, but yet of a limited size, set under the guise of *Avogadro's molecular number*.

So Isaacs developed the hermitian matrix, which was a guesstimate of the transformation needed for living material. This minimum number of interchanges, the minimum ability of life to set up a transformation material to accomplish metabolism and reproduction, has been labeled by Dr. Isaacs as the "*vion*". This is a series of transformations allowing for metabolism and reproduction in its base unit. As we understand more about the vion, we realize that many larger cell materials can contain many vions. A mitochondria can be a vion, operating on its own within a cell. So larger cells will be made up of different vionic concepts.

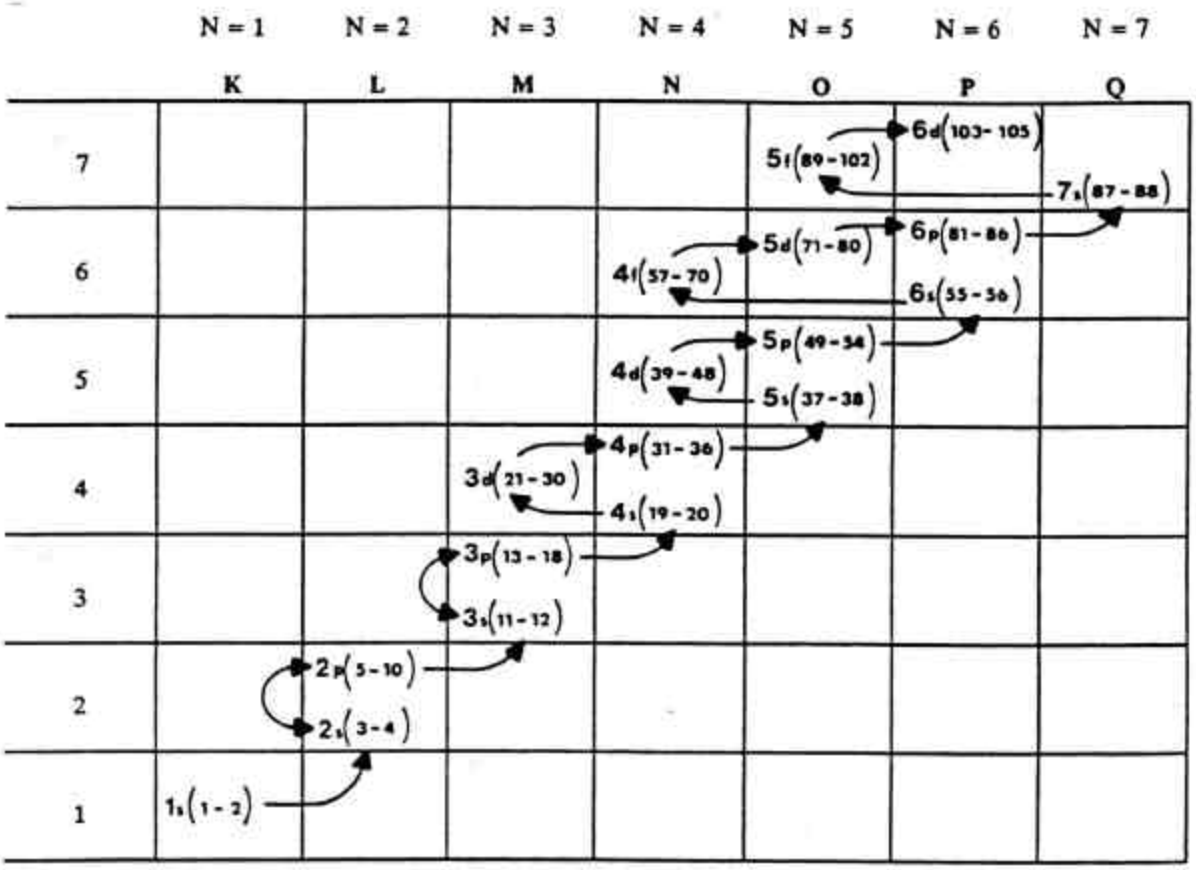
In the periodic table the simplest element is hydrogen, satisfying that which is needed of an element, having a nucleus and one or more electrons revolving around it. Thus other atoms are quantic variations or assemblies of something similar to hydrogen. Through quantic law, we developed the periodic table, based on the amount of protons, neutrons and other subatomic particles, which are in the nucleus or revolving around it in the form of electrons.

S - ELECTRON: 1 = 0 SUBSHELL HOLDS 2 ELECTRONS
P - ELECTRONS: 1 = 1 SUBSHELL HOLDS 6 ELECTRONS
D - ELECTRONS: 1 = 2 SUBSHELL HOLDS 10 ELECTRONS
F - ELECTRONS: 1 = 3 SUBSHELL HOLDS 14 ELECTRONS

	N = 1	N = 2	N = 3	N = 4	N = 5	N = 6	N = 7
	K	**L**	**M**	**N**	**O**	**P**	**Q**
7							
6							
5							
4							
3							
2							
1							

QUALITATIVE DIAGRAM OF ATOMIC ENERGY LEVELS AFFECTED BY N AND L

Quantic law sets the determination for this material, and thus chemistry becomes a very precise science, as we start to understand more about the quantum mathematics that make it up.



The development of biology has resisted this type of scientific examination because of the inability to adapt a quantic principle to it. Thus as we see the vion (the basic unit of life) we will understand the simplest form of metabolism and reproduction, and thus be able to assemble out of it the more complex organisms.

Isaacs outlines a transformation in which an operator acts on sets of operandi undergoing a transition in a set of transforms. In a computer or machine, when a certain input is arrived at via a certain number, it can transform another number in a certain way, as designed by the creator of the machine.

An identical transform is one in which we have no change from operator to operand; thus we have one to one, two to two, three to three, four to four, etc. This is an example of an open identical transform. Transformations of single values may have one to one additions, which is an example displayed in the Archimedean spiral, in which N corresponds to N plus one; thus one is to two, two to three, three to four, four to five, indefinitely.

$$N \rightarrow N + 1 \quad (N = 1, 2, 3, 4 \ldots)$$

8
| 1 2 3 4 . . .
|
9 2 3 4 5 . . .

This is one of the simplest types of transforms, and is used by Isaacs to set up the first column of transformations. Another column used by Isaacs is the logarithmic spiral, in which 2 x N is to 2 x 2 x N; thus two is to four, four is to eight, eight to sixteen, sixteen to thirty-two, thirty-two to sixty-four, etc. This is another open transformation of a logarithmic nature.

A Fibernaci series can be used in which N is added to the N previous. Thus we make a transform of one/two, two/three, three/five, five/eight, eight/thirteen, thirteen/twenty-one, and so on. Isaacs found that adding a linear series to the Fibernaci series can produce a harmonic series, or at least a variation of a harmonic series.

Another transformation series used in the Isaacsonian matrix is that of 2^n; 2^0 being 1, 2^1 being 2, 2^2 being 4, 2^3 being 8, 2^4 being 16, 2^5 being 32, setting up a series.

$$2N \rightarrow \quad 2(2N) \quad N = 1, 2, 3, 4 \ldots$$

2 4 8 16 32 . . .

4 8 16 32 64 . . .

Thus in setting up these transformation series into a twelve-by-twelve matrix, Isaacs was able to make a guesstimate of the transformations needed to control the process of metabolism and reproduction, the base unit of transformations needed to account for life in its simplest form (see *Bio-Quantum Matrix*).

Here, as in other parts of this book, we must make the point that we must vary from linear causality thinking (that of mathematical equations and continuous flow), and shift to utilizing more of a nonlinear qualitative thinking, when we evaluate the whole and the transformations that are capable of happening in each step.

Thus as we see the unfolding of these large and complex transformations, this matrix will need to have reproductive levels, have a cyclic dimension, and thus have a radically recurrent dimension.

As Isaacs points out through our fractal dimension, this cyclic nature must happen through a phase space dependence on time; that is to say that the temporal constraint of the reproductivity of the cycle happens under a consistent time envelope. Thus the emergent process of reproduction would need to happen in a near-timely manner, such as with fuzzy logic, utilizing a reproductivity on a certain guideline; yet, allowing for an indeterminacy. Thus the phase space of the strange attractor of life would come into play. We will find that the very nature of life itself is the paramount example of the strange attractor.

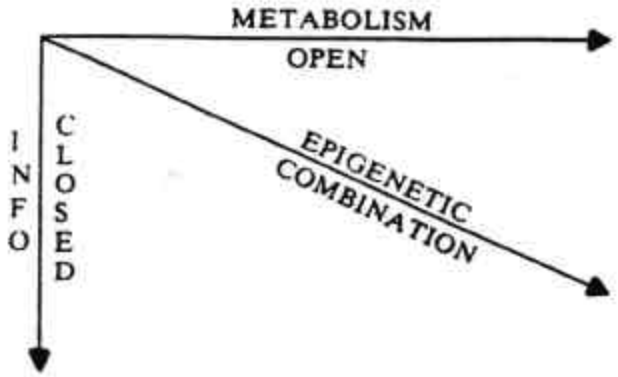
As Isaacs points out, "It seems that information conservation, such as that in the epigenetic and genetic processes, may exhibit time-space and space-time regularities, which do insure a larger indeterminacy of molecular motion. However, the converse need not be true. Every temporal rhythm or spatial periodical does not necessarily exist phenomenologically in order to insure larger indeterminacy, which includes molecular motion. This is to say that the needed quantic indeterminacy for life to ensue is a product of the time-space irregularities, and thus indeterminacy insures the time-space phase shift, where the time-space phase shift does not insure indeterminacy."

In some series positive integers will remain the same through the transformations. These types of series can represent the cyclic nature of the reproductive class of emergent processes. These types of duplicating series with identical intervals can be accomplished by addition of linear and equidistant interval transformations. Thus the points of intersection of the Archamenian spiral with the line are equidistant.

Part of our matrix will have equidistant intervals, such as the equidistant intersection points of the Archamenian spiral of the line. A logarithmic transformation will have predictable logarithmic, but they will be duplicating or irregular in distances with the intersection of the line.

Positive integer series can be composed of limited states, where the integers will stay outside the classical limits imposed by the correspondence rule. These single value transformations will make one-to-one changes and fine closure through their one-to-one correspondence and through their time-phase space relationship, via the strange attractor.

Thus our logic leads us to the continuity and predictability of biological information transport, referred to as reproduction, via the indeterminate basis of discrete cyclic transforms. This is satisfied by the insufficient number of occupied energy states with an uncertainty product in the uncertainty relationship, so that the emergent process is indeterminate, thus discrete quantized, and can be cyclic and understood through the matrix algebra. We can understand this by the quantum rules, understanding the duplicated integer series, single value transformations, and the cyclic nature to restrict the number of molecules in the time-space phase system.



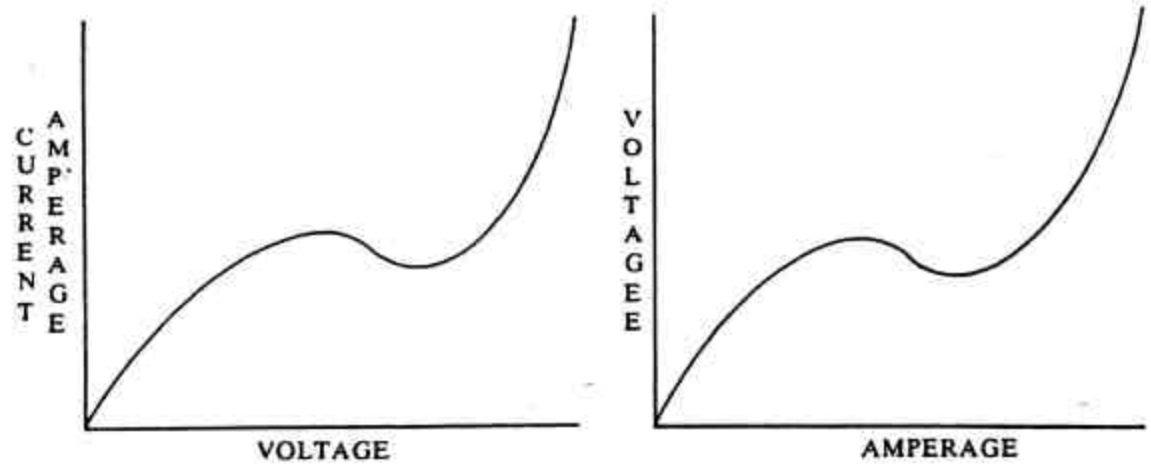
Information processing for reproduction is thus closed, and does not exchange mass and energy with the environment in any radical way, as does metabolism. If we look at what is known about cellular division, and how a cell changes from single to double though the process of mitosis, we can see that a closed principle is needed; the cells will not need to intake any more mass, matter or energy to accomplish this task. At a certain time they go into reproduction, and this is the closed side of the reproductive state. There is a regularity of this replication process as it happens around the time-space variance. There is a predictability about the time involved, and many other correlates can be seen to further validate our hypothesis for explanation of the variables of reproduction.

At this point (as noted throughout the book) we can see the need for a whole new type of thought pattern to understand biology. Our old types of thought patterns, of linear thinking through Newtonian dynamics and reductionistic thought processes, will not give us the needed cranial material and modalities to comprehend the material of this book. We must evolve to a new type of thought pattern, where reductionistic logic will be seen as a fallacy, unable to explain biology. We will need to evaluate the entire qualitative system to understand biology. We will need to have more of a quantic matrix allowing for indeterminacy, allowing for the basic principle that we can only obtain knowledge within certain limitations. This whole new type of thought pattern is called for in this book. It is a challenge in the evolution of thought to try to comprehend these values.

In our society we can always find that some foremost razor technology thinkers who are always looking ahead and conceiving some of the different ideas that are in this book. We realize that the majority of society will not be able to accept them for another ten to twenty years; but hopefully, this will start the ball rolling, and at the least, maybe offer a bifurcation point in the thought process of human society, the results of which I hope will be positive.

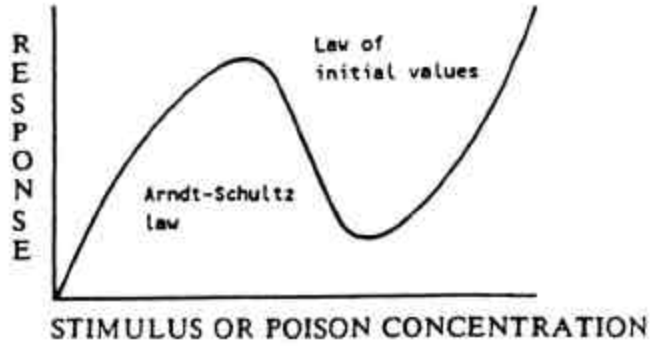
As we have pointed out, our metabolism transformation will need to be asymmetric, open, and have a radically large number of energy states accessible for occupancy. If the process has an enlarged uncertainty product, and is thus indeterminate and quantic, the metabolic process may be represented in quantum rules for positive integers in our matrices, duplicating the type of transformations needed to reflect the asymmetry that is needed to keep open the transport of mass and energy with the environment.

Isaacs relates two biological laws to offer some explanations in the metabolic class of processes: A, the law of initial values of physiology, and B, the Arndt-Schultz law of pharmacology. These laws refer to metabolic processes, and by their discrete limitation in the quantity, fall under the three qualifications of the quantum rules. These two laws of pharmacology involve dose response and intensity of response involving small stimuli. The machine of life supplies the needed power source to respond to these small stimuli. Thus we can see that the small stimuli of a poison or of any other input (chemical or otherwise) into the system will provoke some type of response via the organism operating with a threshold energy or trigger reaction. This involves the double-knee curve of the incremental negative resistance of the electrical nature of the cell.

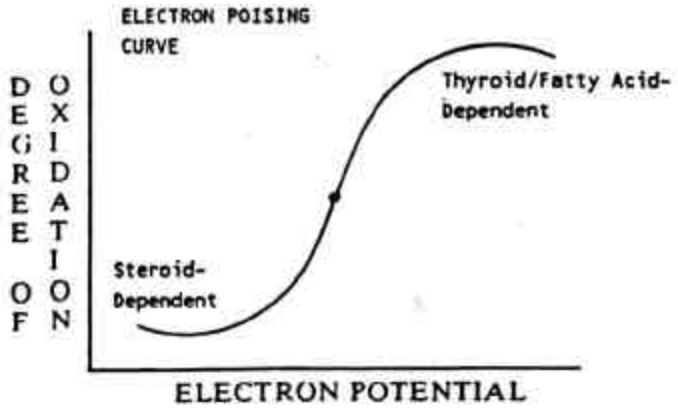


A new set of biological laws for metabolism is thus unfolded, to understand the dose response or the intensity sensations of living organisms.

In Fechner's law, a logarithmic function in linear relationships can be found over short segments of a curve representing dose response, or intensity sensation relations in neurological testing. When administering small doses of anesthetics, stimulating effects will happen to the organism. Starling's law of the heart shows us that the contractile action of a heart muscle is related to the stretch of that muscle at the commencement of contraction.



As we evaluate the curve of the dose response in the Arndt-Schultz law of pharmacology, there are particular reasons why reversal of response happens. Isaacs has related this paradoxical response to the operational characteristics of incremental negative resistance. Irritability, contractility, homeostasis, temporal rhythms, and spatial patterns of metabolism are all explained with a new type of thought pattern through the idea of incremental negative resistance.



As we can see, if a steadily-increasing voltage is applied to certain electrical circuits, the current will be seen to increase rather than decrease. It will increase through a fluctuating fashion with respect to the voltage. Certain other circuits, when applied with a steadily-increasing voltage, will increase at a small amount, then jump to a higher level, followed by a steady rise.

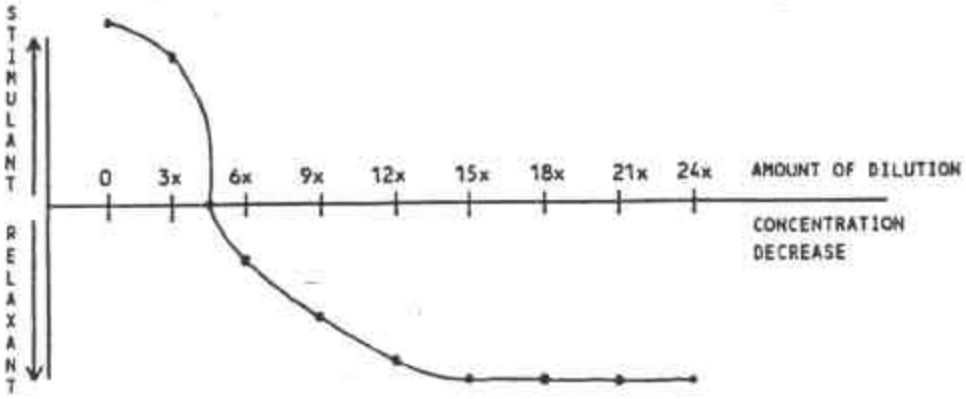
As we can see from Ohm's law, in which Volts = Amps x Resistance, there is a distinct relationship between the voltage, amperage and resistance of any circuit. Fluctuations of voltage and amperage will have certain effects on electrical circuits, and each will definitely affect the others.

As we can see in *New Biology*, the new study of voltametry in biology allows for the analysis of voltage and amperage in the electrical system of cellular metabolism and reproduction. Voltage has a correlate with the catecholamines, such as adrenaline and its ability to spark voltage surges through a circuit of biology. Amperage, however, has its correlate in the indolamines, such as serotonin, dopamine, melatonin; and amperage has its correlate in life force. Changes in each can affect the other in the hermitian matrices of life.

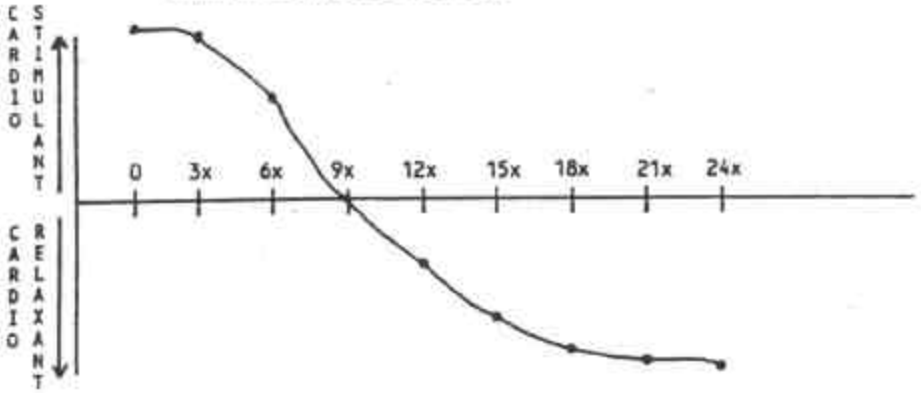
In realizing the electrical nature of our cells, we will find that our incremental negative resistance will range to a variety of stimuli given to the cell; not only electrical in nature, but also of photons, chemicals, vibrations, and any of our other classes of stimuli.

COFFEE PROFILE

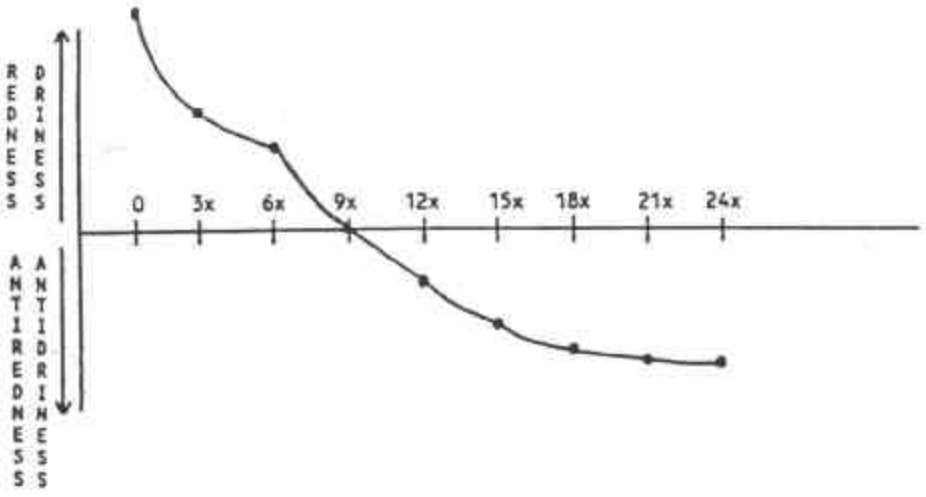
(Effects on patients vary)



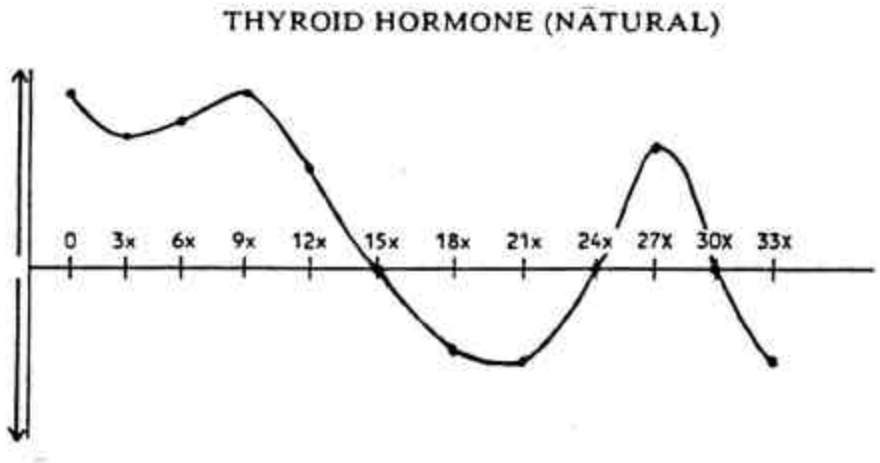
RATTLESNAKE VENOM



BELLADONNA



Our double-knee curve shows that metabolic processes operate as opposites of an energy curve, with changes in the incremental negative resistance. If an increasing physiological stimulus is applied to the energy input of a metabolic process, the physiological response will be seen to increase, decrease, then increase again. This is the law of initial values. As we take increasingly smaller amounts of an item, we can see that sometimes there is a paradoxical shift; what the item does in a large amount might have reverse values, and sometimes there might be a spike at certain smaller values. Or a very small trace amount of an item can have similar results to a larger quantity.



We must simply point out that the process of biology (the process of life) is not one that is geared on a simple linear curve. More is not better, as pointed out in the Benedictine drug fiasco, where sinthetic companies were given the license to sell Benedictine as a morning sickness pill. The smaller amounts that the women took had the more grave reactions to their children, producing a variety of learning disabilities, and often other more severe dysfunctions. The women who took larger quantities of Benedictine did not appear to have the same results, even though some did, accounting for the unpredictability of some of the reactions of people to such sinthetic toxic poisons.

As we leave our linear idea of the mathematical flow of biology, we will see that we must reconsider some of the things we have been doing in medicine and in pharmacology, and how we might apply a quantic evaluation to biology. If a decreasing amount of pharmacological poison begins just above the minimal amount of poisoning, in the energy input of a metabolic process, the pharmacological response may be seen to decrease, increase, and then decrease.

DOUBLE-KNEE CURVE

This multi-value behavior is described through the Arndt-Schultz law, which must be taught to anesthesiologists. Small amounts of poisons can have paradoxical reversal effects.

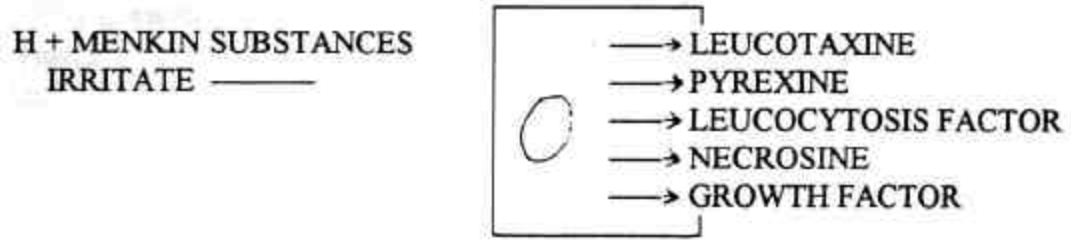
Modern science and pharmacology have often tried to shovel underneath the carpet some of the baffling ideas of research done on certain hormones, antigens, hypersensitizing agents and allergies. Micro stimulant research provoked such a conflict, in which people couldn't understand the type of thinking that homeopathy demanded.

The fallacy that more is better is so entrenched into the American way of thinking that even studies that indicate that more is *not* better in biology seem baffling to the intellect. Originally, when they started to develop chlorination for water to purify it of bacteria, they found that smaller amounts of chlorine seemed to work better than larger amounts, but this was baffling to the minds of the developers of the chlorination process. Thus they rejected this precept and put in larger amounts of chlorine to manage water. Even though the chlorine or fluorine might have had detrimental risks, the fact was that that was not their goal; their goal was to reduce the amount of bacteria in the water.

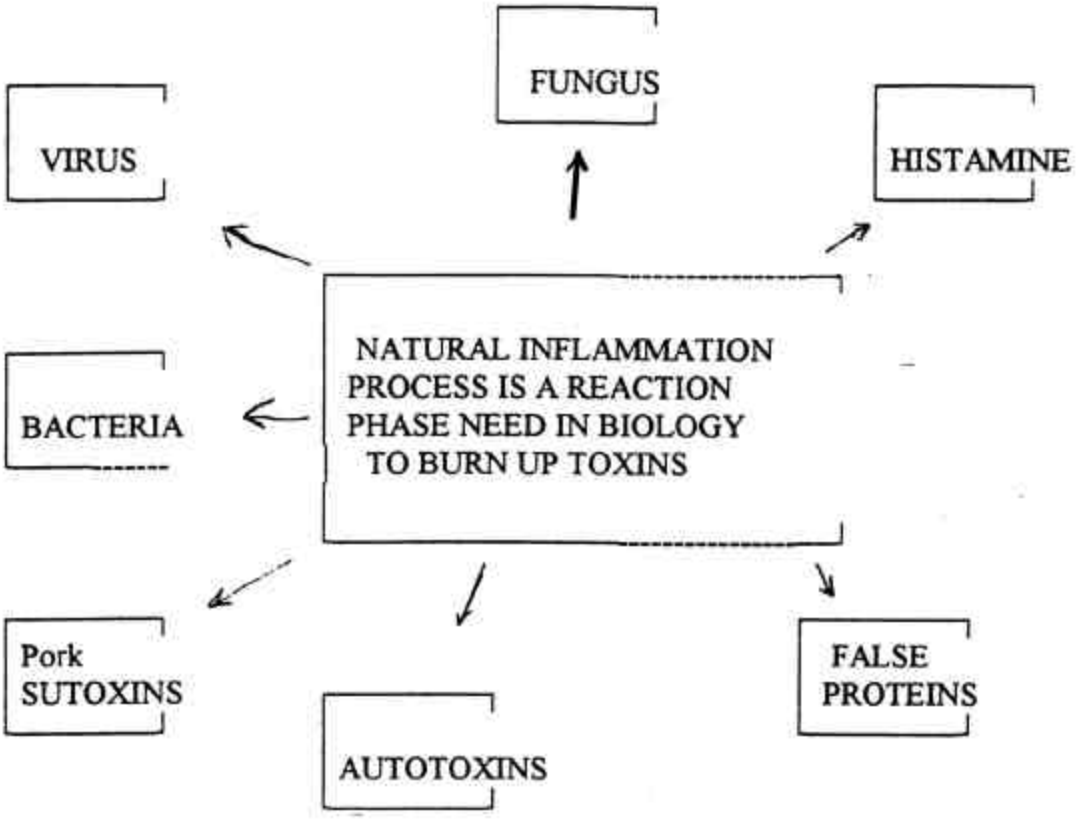
Other hormone research has shown how factors of thyroid hormone can have dramatic effects on biology, even at concentrations below 10^{-10}. Sometimes just one molecule per cell can have profound effects to prevent blood clotting, change muscle contraction, control urinary secretion, control liver functioning, make or break hyper-immune reactions, and control the polarization and depolarization of cell membranes. Some of the more important research has shown that hormones have been found in different percentages to have profoundly different effects.

As Isaacs pointed out, the difference between an alpha and beta receptor is not a profound difference in the hormone, but a difference in the concentration. The new science of hormesis has given us explanations for understanding some of the processes of the Arndt-Schultz law of pharmacology and Wilder's law of initial values.

Just as various pH detectors are sensitive to various pH and might turn a different color, we can also see that concentrations of hormones could have varying effects on receptor sites. Grape juice has a certain pH factor characterized by its color. As we bring it more toward neutrality by adding water, there is a subtle change as it approaches more of the neutral pH. This change in color is shown as a much softer blue. This is a pH factor, not related directly to dilution.



Stimulation of leucocyte production provokes cellular destruction.



Subduing inflammation, fever, swelling, etc. too early, without a chance to do its job, can have serious effects on the patient as it robs the patient of his ability to detox and lets toxins build up to cause problems later. Inflammation is not always our enemy; often it is our friend.

There are many dyes in the plant and animal kingdom that are pH-sensitive, and they sense the amount of negative or positive ions in a concentration. Many receptor sites are also hormonal concentration-sensitive. Thus the alpha and beta receptors are not sparked by different hormones, but by the concentration of those hormones.

As we understand more about biology, seeing it through a new nonlinear system in which more is not better, we must cultivate an understanding of how biology can respond to very, very small stimuli, including polymorphic shapes, quantic energy patterns, liquid crystal functions, and perhaps even other dimensional states. We can understand more of the effects that homeopathy and vibrational medicine can have on the human being.

A thorough review of the literature regarding hormesis is recommended at this point.

In the field of hormesis, recent studies have found that small amounts of toxic elements can have stimulatory and profoundly positive effects on various organisms. At the University of Wyoming studies have shown how small amounts of radiation and other toxins can have positive effects on enhancing the life span of insects and small mammals. Hormesis has been found to have very positive effects and ramifications for biology. Hormesis is a pinnacle example of the Arndt-Schultz law, and how small amounts of toxic elements can have the reverse effect on biology.

We can see that the classical homeopaths, stretching back two hundred years, have described a very profound modality of medicine that screams for more understanding, provided that the practitioner has the tools for understanding needed to evolve the thought process beyond the linear, reductionistic mode.

For a complete study on some of the effects of homeopathy and proof of its existence as a medical modality, we wish to point the reader at this time to *The Natural Repertory* of Dr. Nelson, which will describe

scientific research, pointing out not only the efficacy, but also some theories of philosophy regarding the use of allersodes, nosodes, isodes, sarcodes, and combinations.

IATROGENIC AUTO-AGGRESSION DISEASE
AUTO-IMMUNE DYSFUNCTION
ANTI-BODY FORMATION

AUTO SYSTEM	DISEASE LIKELY TO BE CAUSED BY IATROGENIC
Nervous System	Encephalomyelitis, neuritis, polyneuritis, multiple sclerosis, optical neuritis, ophthalmia.
Articulations	Arthritis, polyarthritis, coxitis, paraheumatic illness
Lungs	Eosinophilic infiltration, TBC caverns
Bone Marrow	Agranulozytosis, leukemia, osteomyelosclerosis, thrombophenia, idiopathic leucopenia, hemolytic anemia
Vessels	Hemorrhagic gangrene, peri-arteritis nodosa, vasculitis, thrombocytopenic purpura
Heart	Endomyocarditis rheumatica, angina pectoris
Liver	Fatty liver, frosted liver, indurated liver, lardaceous liver, saffron liver, yellow liver, chronic hepatitis, cirrhosis, dysprotein anemia, para protein anemia,
Kidneys	Albuminuria, acute glomerulo-nephritis, nephrosis, nephro slerosis, amyloidosis
Connective Tissue	Collagenosis, sclerodermy, fibrosis, sclerodermy, erythematodes, dermatomyosis, amyloidosis, hyalin-ization, fibroplasy

Hormesis is an application of the Arndt-Schultz law. Other fields of homeopathy have shown us applications of the law of initial values. Both of these are used to determine the laws of metabolism. The laws of reproduction utilize a different type of procedure.

In our reproductive emergent class of processes we have certain laws known as the first and second Mendelian laws of inheritance, the laws of cellular and tissue differentiation, and epigenesis. As an example, ontogeny recapitulates phylogeny. Gene duplicating operations to replication and information transfer happen through operations vs. operandi that can duplicate themselves with identical linear intervals.

Modern science has made phenomenological observations of the process of reproduction, and chemical attempts to explain this process have fallen tremendously short. The process of entropic thermodynamic chemistry could not possibly explain the reproductive process. Organized quantic control through some type of electrodynamic process, capitalizing on a computer-like precision and utilizing the long-range forces and virtual photon harmonic, is the only conceivable way to explain such a dynamic process as reproduction. This represents a very powerful threat to the entire chemical structure of sinthetic pharmacology, and yet future generations will know and research this energetic connection.

In 1945 Schrödinger emphasized the importance of molecular stability and negative entropy in genetics. Negative entropy is information conservation. Expressed in rules given by Schrödinger, the quantum rule will produce a concept that like will produce like cycles, and that genetic information is thus conserved through the cyclic nature of the periodical movement of the transformations. This can happen through the restriction of the number of molecules in space and time, needed in the process of reproduction, and holding the reproduction process closed through its cycle.

Schrödinger has given us the idea that like will produce like through the reproductive cycle; Hahneman laid out the idea that like will *treat* like through the metabolic process. This is the Arndt-Schultz law of pharmacology; the law of initial values of Wilder, and a point taken by other researchers of physiology and pharmacology.

In the closed process of reproduction we can see how like will produce like. In the open process of metabolism we can see how like might *treat* like. So a minute amount of an element could have a paradoxical reversal to a larger amount of it. This accounts for the phenomena of hormesis and homeopathy.

A proving in homeopathy is accomplished when a homeopath gives a substance to a group of people for a period of time, and then sits down and reports all of the symptoms they present. Then the homeopath will evaluate what commonalities are presented by the patients involved in this proving. It is then assumed by classical homeopaths that whatever this proving accomplishes, a minute amount of this homeopathic will reverse. This antiquated form of homeopathy has now proven to be incorrect. A more recent evaluation finds that there is more complexity, and that this paradoxical reversal happens in some items, but not in all. A new type of homeopathy is presented in this document, supported by a much higher degree of science.

Homeopathy

1. Allersodes
2. Sarcodes
3. Isodes
4. Nosodes
5. Combinations
6. Classical

In the open metabolism matrix, with a radically large number of shells, we can see that a rule would form in which like would treat like. The metabolic process of physiology, being open and sensitive to stimuli due to its radically large nature, would thus respond to a homeopathic. If an organism had a symptom that was going the wrong way and in in a disease state, a very small amount of something causing a similar state might help to trigger the metabolic cycle for change. It might open a door for homeopathics of various chromosomes to allow for changes in genetic states, as the metabolic state can be responsive to a homeopathic of the chromosome, which might help to change the polymorphic structure of the improper chromosome.

More and more is made of chromosome activity and its link to genes. As we banter about the "nature vs. nurture" argument of modality, the realization is that we cannot reduce all disease or medicine to one or the other; we must have an open door and evaluate both. This is the Janusian concept of true intelligence: realizing that the world is not a linear, reductionistic system. In doing so, and realizing what we have outlined in this book; that perhaps small amounts of material can have profound effects in changing biology, we might now open the door to an understanding of how homeopathy might offer true changes, where gene splicing, tissue transfer, surgical intervention, and other profoundly disturbing directions chromosome research has taken us will not hold up in the long run. Perhaps vibrational medicine and homeopathy might have the answers for metabolic disease and variations in DNA.

At the time of this writing there is only one company in the world that provides homeopathics of these proper DNA chromosomes; that is New Vistas (Pharmaceuticals), located in Denver, Colorado. Not enough practitioners have used these chromosomal materials to date in any controlled fashion to accumulate any type of theory. But according to the theories of biology outlined in this book, the answers lie in these holistic methods of

homeopathy, vibrational medicine, photon control, and naturopathy, not in the more disturbing works of surgery, gene splicing, or allopathy.

Isaacs breaks down three generalizations about the transformations needed for biology:

One, the transport of genetic information will need to follow single-value transformations, reflecting the cyclic nature of the emergent processes of reproduction, undergoing a type of closure that will have a time-phase space cyclic nature, have one-to-one addition of linear intervals, fall under the idea of quantum interaction, where genetic information will be conserved through cyclic time-space variables.

Two, epigenetic information transport will need to also follow single-value transformations, reflecting the cyclic nature of these processes, have a degree of closure, have one-to-one relations, with the addition of a logarithmic interval, or a combination of logarithmic and linear intervals. Thus epigenetic information will not be *conserved* through time and space, as with genetic information; epigenetic information will be *expressed* cyclicly through time and space.

Three, metabolic processes involving mass and energy transport will follow *non*-single value transformations, which will reflect an asymmetrical, irreversible, non-equilibrium, and be open in nature. Thus the exchange processes of living units with the environment will be exchanged asymmetrically and irreversibly.

CHOH = Generalized Carbohydrate

A = Oxygen or Sulphur

$CO_2 + 2H2A + Light$

$CHOH + 2A + H_2O$

Thus existence on the planet dictated that we needed at least two major types of living units; one being plants that could take in carbon dioxide, sunshine and water, and give off oxygen and energy materials, known as carbohydrates, sugars, etc.; and animals, which could take in these carbohydrates and oxygen and give off light, carbon dioxide, water, and fertilizer.

$$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{LIGHT}} 6(CO_2) + 6(H_2O)+$$

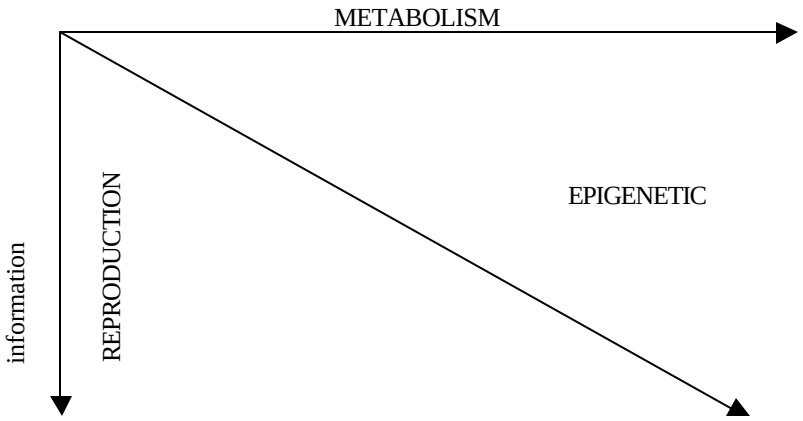
Since the metabolic nature of life is open and responsive to environmental concerns, to stabilize the ecological system we needed to have these two units. Keeping these two units in balance across the world has been the goal of living things since their beginning on the planet. Now this balance has been put in jeopardy by reductionistic minds; the people who have tried to reduce pharmacological sinthetic variables to one component in an over-simplified biology, and have made, through profiteering motives, large amounts of chemical products, which have been dumped into the atmosphere and ecological system and have jeopardized the balance. They reduced farming to one variable of productivity. Whatever enhances productivity was fair regardless of consequences.

Destruction of large amounts of plants have put into jeopardy the oxygenation balance. The evolution of human thought has finally realized some of the dangers we have caused by our system of over-reductionistic linear thinking. It remains to be seen if we can save it. This is the challenge of generations present and to come; to undo the damages done by sinthetic, chemical, reductionistic thinking.

There are other ways to profit, including self-satisfaction, the joy of ecological safety, communion with the environment; the idea of knowing that your children will have a clean environment to grow and prosper in. Some of these profiteering motives will need to take the place of over-simple economical profit motives. Thus the evolution of human thought offers another challenge: to be able to profit without having to profit financially; not that profiting financially is bad, but to profit *only* financially at the expense of the environment or any living creature shows a primitive type of thought pattern. Another type of evolution of thought is needed in generations to come.

Epigenesis, or epigenetic phenomena, is the class of transformations that are not quite genetic and not quite metabolic. There are certain external interactions with the environment from a living unit that involve internal information transport beyond the genetic variety. Thus as we develop more complex situations, where there are

many vions within a cell, there must be a development of various types of information transport between these vions. So epigenesis does not develop until more complex biological organisms appear. Thus the transformations of



epigenesis fall between the genetic and reproductive states. Such are the systems of hormones, which in very complex multi-cellular organisms were needed to handle information transfer. Hormonal information transfer accounts for the chemical part of the epigenetic factors of a multi-cellular organisms. There are photon epigenetic phenomena in which there is certain energy transfer of photons in multi-cellular organisms, which can stimulate response, and they have their chemical backup in hormones.

Thus, in the Isaacsonian matrix, when metabolism moves from left to right, reproduction moves from top to bottom. The cross of the vector, showing the diagonal from upper left to lower right, shows the epigenetic phenomenon, which is where the hormones lie across that diagonal. Mass, momentum, energy, charge, information, storage retrieval, all happening through a ten-dimensional system in a trinary logic system present a rather strange and much more highly-evolved system of biology vs. what has gone before.

Biology is much more complicated than we ever imagined; in fact, biology might be more complicated than we ever *can* imagine.

Work	**Intensity Factor**	**Capacity Factor**
Gravitation Mass	Height Distance	Mass
Electricity Charge	Voltage Amperage	Charge
Momentum Expansion	Pressure	Viscosity Momentum
Heat Photon	Temperature	Q/T
Subspace Polymorphic Influence	morphic resonance	influence over subtle

---

It is the purpose of this book to recount some of this phenomena that Isaacs outlined in his 1960s book, "The Complementarity of Biology".

SUMMARY

1. THERE IS A SOPHISTICATED NON-RANDOM TRANSFORMATION PROCESS FOR BIOLOGY.

2. AN INDETERMINATE MATRIX SYSTEM MUST BE USED IN BIOLOGY RATHER THAN CONTINUOUS FORMULAS SUCH AS GRAPHS. SUBSPACE POLYMORPHIC CONTROL MAINTAINS A SUBTLE PATTERN CONTROL OF THE MATRIX.

3. THERE ARE THREE BASIC KINDS OF SYSTEM MASS TRANSFORMS:

   A. METABOLISM-- OPEN RESPONSIVE, ADAPTIVE
   B. EPIGENETIC-- SOMEWHAT METABOLIC, SOMEWHAT REPRODUCTIVE
   C. REPRODUCTION-- CLOSED, RESTRICTIVE, REPETITIVE

4. THE DOUBLE-KNEE CURVE OF INCREMENTAL RESISTANCE MAKES THE ELECTRON POISING CURVE OF DR. ISAACS.

5. VOLTAGE, AMPERAGE, AND RESISTANCE ARE THE BASIC VARIABLES NEEDED TO UNDERSTAND SIMPLE ELECTRO-BIOLOGY. WITHOUT THESE THREE VARIABLES ENERGETIC MEDICINE IS INCOMPLETE.

6. VOLTAMETRY IS INDICATIVE OF LIFE FORCE AND WILL POWER.

7. HORMESIS IS EXPLAINABLE WITH THE ARNDT-SCHULTZ LAW FORMAT.

8. WE EAT TO MAINTAIN NON-ENTROPY.

9. THERE ARE THREE TYPES OF INFORMATION TRANSFORMATION:

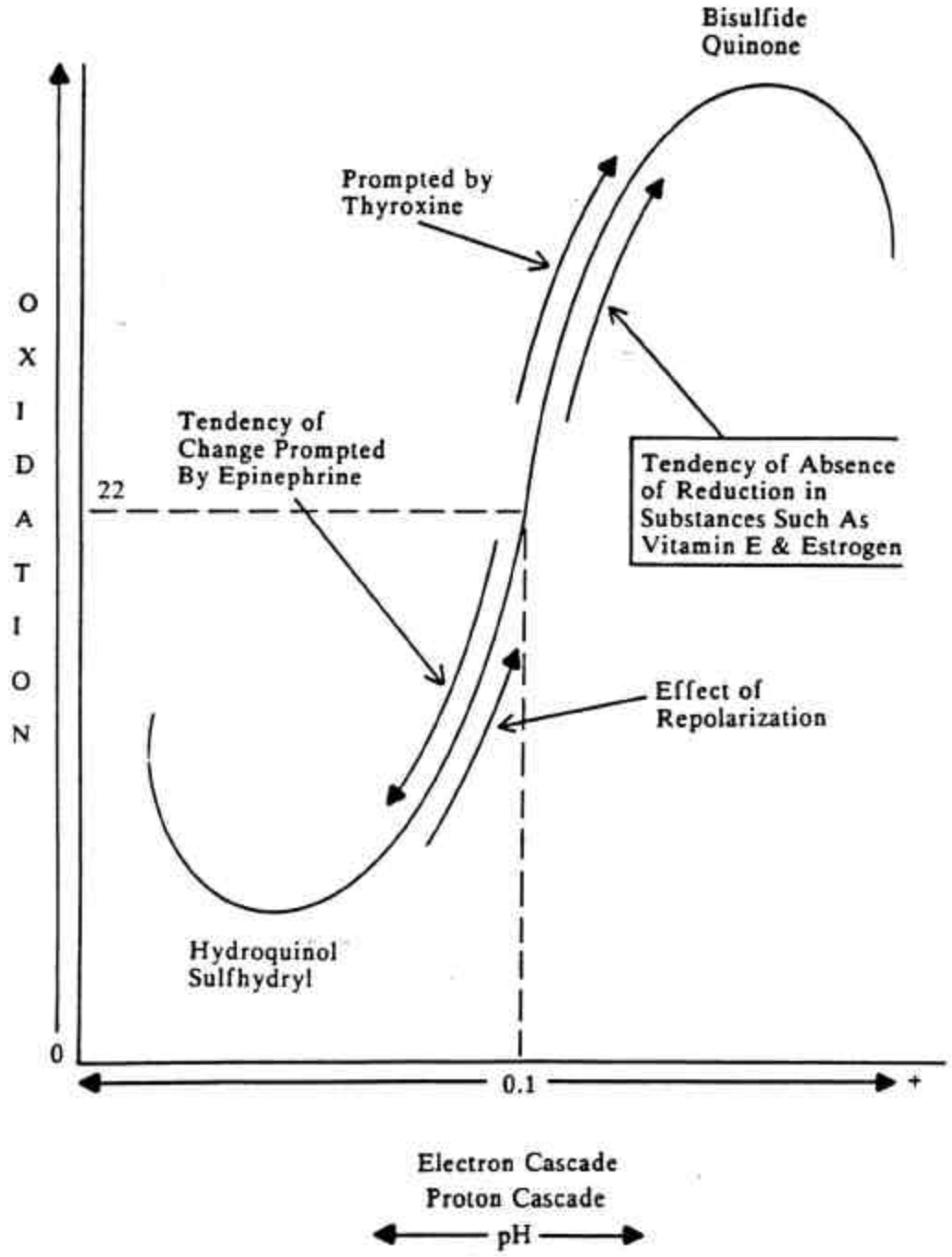
   A. GENETIC-- CYCLIC, PRECISE, SMALL
   B. EPIGENETIC-- CONNECTIVE BETWEEN A & B
   C. METABOLIC-- LARGE, ADAPTIVE.

10. ENERGETIC MEDICINE IS NOW PROVEN BY SCIENTIFIC AND MATHEMATICAL CONSTRUCTS.

Chapter 6

VIRTUAL PHOTONS

ELECTRON POISING CURVE



Chapter 6

VIRTUAL PHOTONS

Modern physics has encountered many particles other than electrons, protons and neutrons. Modern quantum physicists have come up with some bizarre ideas of the nature of subatomic reality.

There are many radically different ideas of the nature of subatomic reality, but all seem to parallel the idea that the human mind and the human intervention are a deep part of the construct of any type of physics. Isaacs pointed out that the human being might be the solution for quantum physics, and the human brain's potential of understanding the situation might be because of its solution of the events.

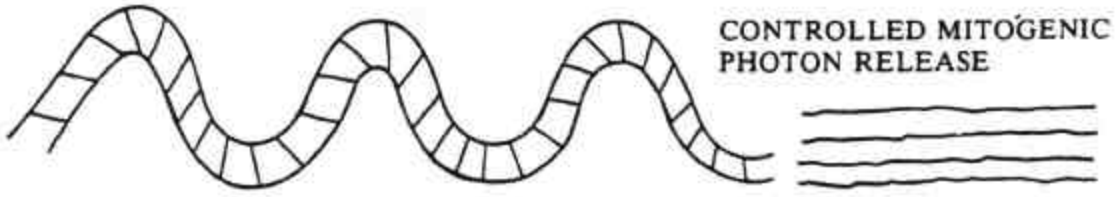
These subatomic particles do not just sit around being subatomic particles; they are very active, with electrons releasing virtual photons and then reabsorbing virtual photons; protons releasing pions and neuons, and neutrons releasing the same. All of these virtual paricles comming in and out of subspace. This constant release and absorption of what are known as *virtual particles* is happening at very great speeds within all matter. So a traveling electron, as it releases and reabsorbs its virtual photons, forms around it a virtual photon cloud as part of its' quasi particle nature. This allows for one electron to repel another, because of the virtual photon cloud. These virtual photons also account for the *attraction* between electrons and protons, so that the electrostatic force is contained, and happens because of virtual photons. This work is the basis of QED theory, which appears to be the King of the Hill of physics theories today.

Many researchers have used the virtual photon to explain the electromagnetic forces. Several have speculated that all forces might be explained through some type of photon. The known forces are: the weak force of the nucleus, strong force of the nucleus, gravitation, and electromagnetic force. The existence of these virtual photons cannot be doubted any more by modern physicists. This has become a tenet of modern-day physics. $E^2 = (MASS)^2 (C)^4 + (MOMENTUM)^2 (C)^2$.

Virtual photons differ from actual photons in that the rest mass of a virtual photon is not zero; only zero-rest-mass photons cannot escape and become actual photons. Real photons have energy equal to momentum times velocity of light (C). Virtual photons are photons whose energy is not equal to momentum times C.

REAL	VIRTUAL
	Like Variance of Light
E = (Momentum) (c) Speed of Light	E > (Momentum) (c) \ Time
	---------- \
	E > (Momentum) (c) \ Space

In the second Feynman perturbation theory energy momentum can be conserved, because virtual photons do not have physical mass. As an electron is proceeding through its path, and releases a virtual photon; first there is an electron, then an electron plus a proton, then an electron again as the electron reabsorbs the proton. This situation is a violation of the conservation law of mass and energy. The conservation law of mass and energy states that you can't get something for nothing, or that energy cannot be created or destroyed; yet, the electron has created a photon out of seemingly nothing. This violation of the first law of thermodynamics (energy cannot be created or destroyed) can be violated beneath the Heisenberg uncertainty principle, meaning that in a small event, such as an electron, if the time is very short (10^{-15} seconds, for example), then the laws of mass and energy conservation can be violated due to the Heisenberg uncertainty principle. If this virtual photon from one electron is absorbed by another electron, and therefore, `his' photon is then absorbed by another, long-range forces can interact, as informational photons can account and be transmitted through large quantic systems. Such a system initiates with DNA.



In an effective bath of photons, the mix of virtual photons that escape becomes greater. Such a bath is supplied by the infrared photon in temperatures from 20E C to 40E C. This room temperature bath will supply the photon bath needed to kick the virtual photons free. Thus these free photons will produce a photon field around any substance (see Stefan Boltzmann law in *Bio-Quantum Matrix*).

Our photon field work complies to all of the Feynman rules.

RULES FOR CONSTRUCTION
AND INTERPRETATION OF FEYNMAN DIAGRAM:

1. Energy and momentum are conserved at a vertex.

2. Electric charge is conserved.

3. Solid straight lines with arrows pointing in the direction of increasing time are used to represent fermions (any particle which obeys the fermi-dirac statistics, particles with half odd integers spin) propagating forward in time. Reverse arrows represent anti-fermions going forward in time.

4. Broken or wavy lines represent bosons (which are particles that obey Bose-Einstein statistics and have an integer spin).

5. Lines having one end at the boundary of the diagram represent free particles approaching or leaving a reaction.

6. Lines that join vertices normally represent virtual photons.

7. The time ordering of the vertices connected by an internal line is not determined, so that two diagrams having an internal line apparently oriented differently with respect to time are not different diagrams.

8. Every particle at the boundary should be labeled with a momentum. However, we do not include momentum labels unless necessary.

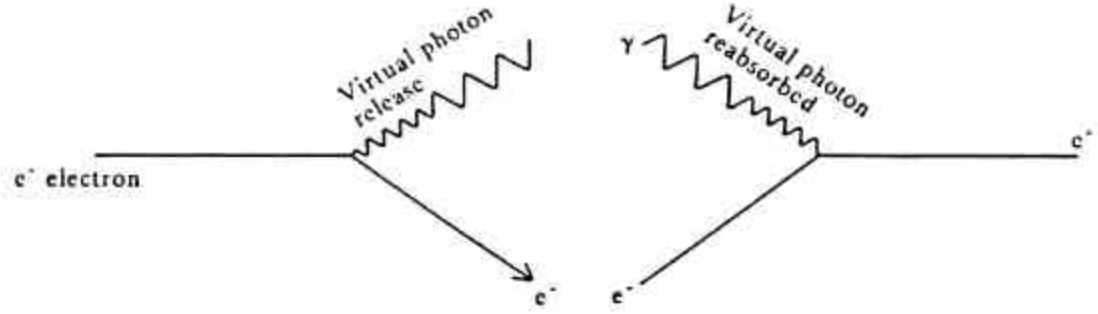
9. Time increases from left to right.

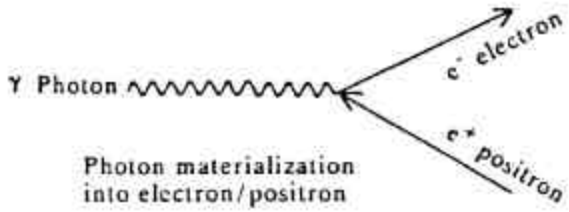
REAL PARTICLE

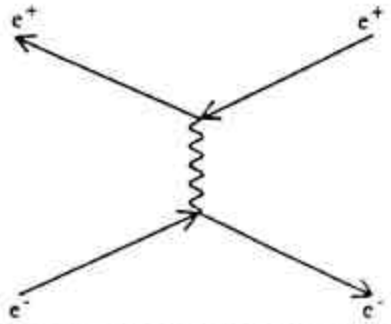
$$E = + \sqrt{(Mass)^2(C)^4 + (Momentum)^2 + (c)^2}$$

VIRTUAL

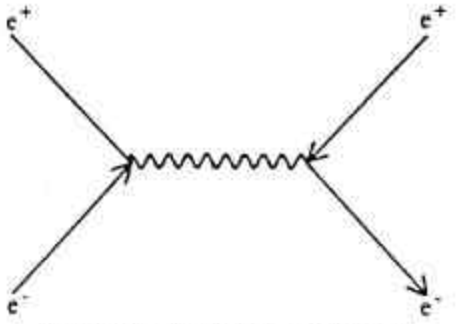
$$E + \sqrt{(Mass)^2(C)^4 + (Momentum)^2 + (c)^2}$$



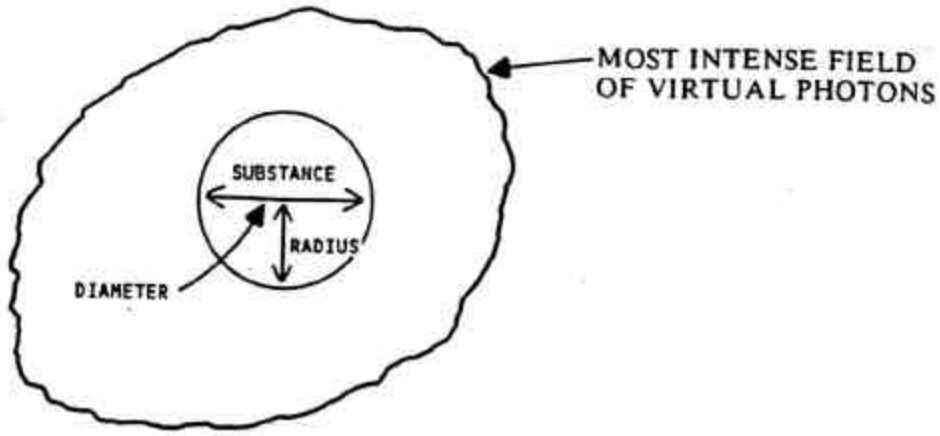




SINGLE-PHOTON EXCHANGE



ANNIHILATION DIAGRAM



Using a photon multiplier and a photon counter, we can find that at room temperature of approximately 30E C there could be as many as 15,000 or more free photons in the infrared spectrum per cubic centimeter. We had to set the photon counter at a base minimum for the temperature. Then in doing the experiments we used the counter to count the excess photons that were supplied by living tissue. Our experiments included beans, plants, seeds, tissue cultures, human participants, glandulars, and even homeopathics; all of which are found to put out a photon field of *excess* photons beyond that of the virtual photon bath supplied by the temperature. This photon field will be unique for any substance, as the field will reflect the subtle energy states of the electrons in the substance. This explains the medication testing phenomena in electro-acupuncture as in Kenyon's literature. A review of Kenyon's material is suggested at this time.

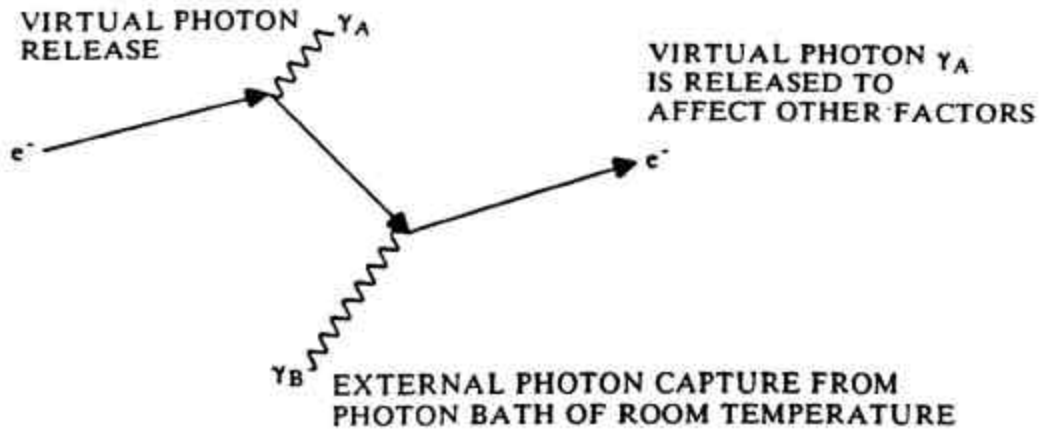
These free photons could be absorbed and radiated by a close antenna, just as EMR photons are absorbed by your TV or radio antennae. The sophistication is in the receiver, not the antennae. Here the receiver is human biology. Life reacts to this free virtual photon field by making electrical responses of resistance and potential changes.

The reason why we would suppose the need for a close antenna is because of the difference in wavelength. Thus the length of span that such a photon can be transmitted and then absorbed can be quite large. We find that the extremely long wavelength of television and radio allows for long transmission. Short wave broadcast has much longer types of transmission. We find that transmission in the area of infrared (or the virtual photons of life that are infrared and visible) and a touch of the UV, running from 10^{12} Hz through 10^{16} Hz might have very *short* distances, and thereby need a close antenna, such as by resting the appropriate object on an antenna.

In the case of our medication testing phenomenon, this field might only be detectable at ranges of only a few feet to possibly even a few inches. It is this experimenter's opinion that this field extends at high intensity, no more than three eighths of an inch for three eighths of an inch of mass, in a circular field. Smaller drops have been found to have smaller fields.

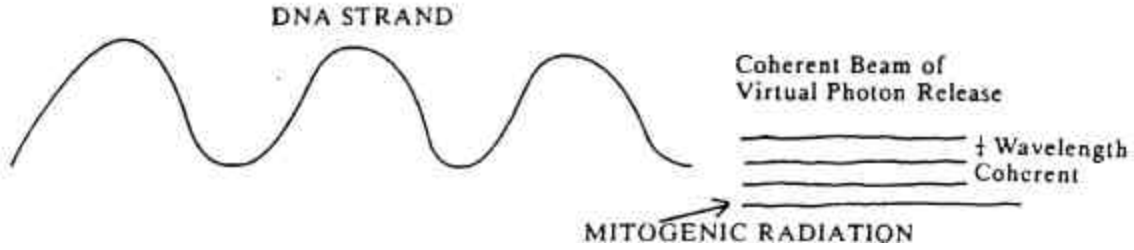
This experimenter has found that the field extends equal to the distance of the diameter of the drop used. Thus if we have a one-inch diameter bottle, the field would extend for an inch around. If we have a one-millimeter circular bottle, it would extend one millimeter around. This is an experiential observation, which has been documented with some of the research done by this experimenter.

FEYNMAN DIAGRAM



As we have said that the uncertainty of position and momentum is the Heisenberg uncertainty principle, there also is an uncertainty about time and energy. The more we know about the time of an event, the less we know of its energy; the more we know of the energy, the less we know of the time.

Thus the Heisenberg uncertainty principle describes another set of conjugate variables, which are important for our knowledge of biology.



It has been found that the electromagnetic and electrostatic forces are dependent on the mutual change of virtual photons. Physicists will definitely say that the electromagnetic force is mediated by these photons. In fact, the electromagnetic force is made up of photons.

In 1935 Hideki Yukawa discovered the virtual particles of protons. This led to the discovery and quantic explanation of the strong force within the nucleus; the strongest force known in the universe, which binds together protons within the nucleus, particles of like charge, which are pushed within 10^{-13} cm of each other. The strong force overcomes the weak repulsion force, and at one hundred times the force, sucks the proton into the other proton to form the nucleus. Even protons are emitting their virtual particles; yet, one law of physics is that the stronger the force, the shorter its action. Gravity, which is a weak force, has long-range effects and holds together solar systems, galaxies and universes; whereas the strong force of the nucleus exists at 10^{-13} meters. The interactions happening in this strong force are so fast that they happen at 10^{-23} seconds, which many physicists have speculated to be the quanta of time; the amount of time that it takes light to pass by a helium atom. By quanta of time it is speculated that no smaller unit of time could exist.

PREVIOUSLY SPECULATED: QUANTA OF TIME = 10^{-23}
QUANTA OF DISTANCE = 10^{-23} meters
AVAGADROS NUMBER = 6.02 X 10^{23}

In *Quantum Biophysics* and *Quantum Vibrational Medicine* we set new standards.

The four forces of the universe known to date are the strong nuclear force, the electromagnetic force, the weak force, and gravity. Modern physicists have tried to explain all these forces through the dynamics of the virtual photon or other virtual particles.

Perhaps with this writing a new force can be added. We have seen that biology exists because of its indeterminacy. This indeterminacy can be influenced. This influence on indeterminacy could truly be the life force principle that biology, medicine and religion have sought for ages. Could the simple vion be a sender and receiver of this force? Could this new force be particulate? Could there be vionic particulates? Let's look at this vion force more closely. We see that this shaping of indeterminacy by and for biology is independent of time and space. It is not voltage- or amperage-dependent but wattage-dependent. It can influence indeterminacy but seldom control it. In Chapter 9 we can see more clearly why this force influences the other forces but is not of them. This vionic force is contained in the uncertainty principle. Possibly we can speculate about the dream of physicists in discovering the unified field as possible from this vionic force. But now let us return to the photon.

YUKAWA'S HYPOTHESIS

A boson of Energy E, Momentum P and Mass M

$$E^2 - P_1 Pc^2 = m^2c^4$$

Replace: $E = + ih\ 2/MJ$ and $P = -ih$ Ï

Make equation and operator of wavefunction (

$$-h^2\ M^2(\over MT^2 + h^2c^{22}(= m^2Ï^4($$

If M = O

$$E = - \text{Grad}\ (- {MA \over MT}$$

Grad is the electrofield strenght

(is a scalar electrostatic potential

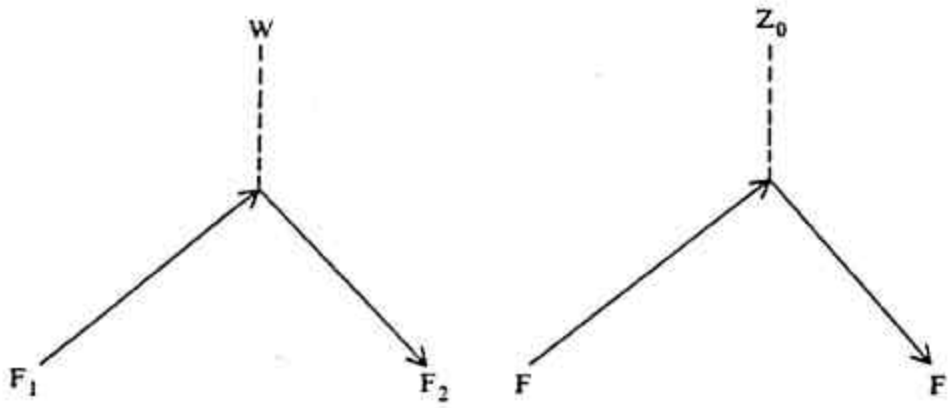
A is a quantity of four vector transforms of gauge invariance and relativistic compliance

If M O, the static equation is:

$$(= {mc^{\ 2}(\over h}$$ Solution

$$(= {1 \over R} \exp {-R \over a} \quad a = {h \over mc} = \text{Range}$$

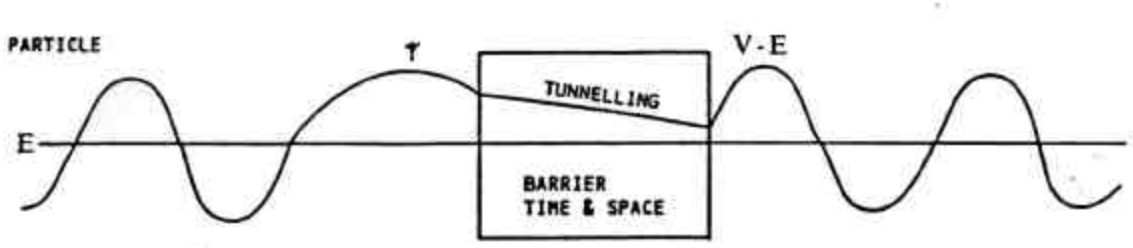
The bosonic potential of a point nucleon source will vary with distance from source.



WEAK INTERACTION FORCE FERMION YIELDS BOSON
EFFECT OF THE WEAK FORCE OF THE NUCLEUS.

Feynman, who won the Nobel Prize for analyzing the virtual photon, describes the difference between the virtual and the real state of photons by "what looks like a real process from one point of view may appear as a virtual process occurring over a more extended time. For example, if we wish to study a given real process, such as the scattering of light, we can, if we wish, include in principle the source, scatterer, and eventual absorber of the scattered light in our analysis. We may imagine that no photon is present initially, and that the source then emits light. The light is then scattered and eventually absorbed. From this point of view the process is virtual; that is, we start with no photons and end up with none. Thus we can analyze the process by means of our formulas for real process by attempting to break the analysis into parts corresponding to emission, scattering, and absorption."

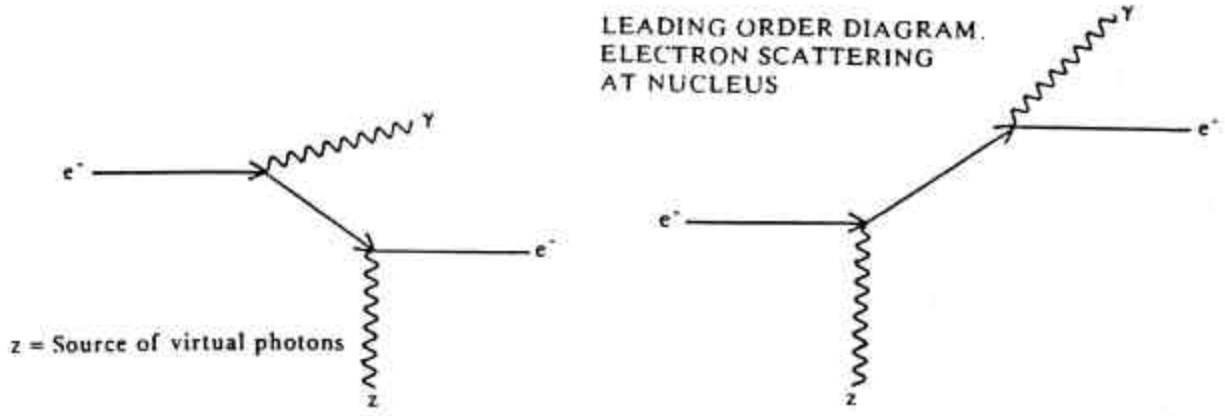
In other words, we do not seem to find any real difference between virtual and real photons. If virtual photons are made with no rest mass, then these virtual photons could have the range as other electromagnetic forces, and that is infinity. Thus the only real difference between a real and a virtual photon is that the real photon does not violate the conservation law of mass and energy, where a virtual photon, when created, avoids the law, via the Heisenberg uncertainty principle. But once created, if a virtual photon has no rest mass, it will have the appearance, feel and range of a real photon; thus infinity. So the human being, a virtual photon producer and absorber, is capable of reaching out to the stars and other planets via this virtual photon production. The effect reaches in and out of subspace with the effect of polymorphic resonance.



E = TOTAL ENERGY V = POTENTIAL

The detection of particular body-made photons has become another paramount science in the utilization of magnetic resonance imagery (MRI). In MRI, when the body is exposed to a large magnetic field, the protons of the hydrogen inside the water molecule, the two protons next to the oxygen, will move with their magnetic moment, to parallel the magnetic field. When the magnetic field is removed these protons will jump back to their original state, and in so doing, will release a photon. The photon that is released is vibrating at 64 megahertz, and has a wavelength of approximately 3.8 meters. The magnetic resonance machines will then intake this photon and, through sophisticated computerized processes, be able to describe the amount of water and the location of the water via the triangulation theory used within the computerized software.

Other molecules that are able to be detected by MRI include some fats. In the hydroxyl part of fats there is a proton of hydrogen that can be maneuvered. The protons bound to the carbon via hydrogen carbon bonds constitute such a firm bonding that they do not respond to magnetic field techniques.



Sophistication with MRI and the billions of dollars spent on research and technology show how photon detection and utilization in the body can be developed to a high degree, and this information can be utilized to tell us about the body internal.

This radical development of photon utilization, with its massive amounts of research and technology, will open the door for an understanding of mitogenic radiation, and how photons that come off the body *can* be detected, utilized and analyzed. In mitogenic radiation we do not need to have any type of magnetic field or any other inductor for the body; these virtual photons of mitogenic radiation are coming off the body on their own all the time. The reason that this phenomenon has escaped modern science is because it has been confused; that infrared radiation coming from the body is just a useless byproduct of the temperature of metabolic forces. But now we will know, in this document, that this information coming through the infrared, visible and ultraviolet has meaningful ramifications for biology.

The bath of infrared photons required for life provides the backdrop for biology to exist.

This backdrop in the bath of infrared radiation has masked the analysis of the mitogenic radiation. Only with 1992 technology are we able to actually interpret these photons in any meaningful type of way. Now we can cut through the mask and get to the heart of the mitogenic problem.

Sophisticated photo-multipliers and other photon-detection equipment are used to isolate different problems in the body via their frequency and the photon distribution. So quickly and easily, doctors with equipment in the field are able to isolate and detect various infective cases and other metabolic disorders. Then these doctors are able to treat these conditions via natural homeopathic and naturopathic techniques, because the true answer for medicine (as we detect our photons and electrons and move into an energetic concept) is that we need an energetic intervention, such as homeopathy, acupuncture, chiropractic, or another energetic intervention that allow the doctor to intervene on the body energetic.

Progress in energetic medicine occurs slowly, largely because of the inability of the sinthetic chemical companies to accept these theories and to fund them. These energetic medicine techniques, through analysis of the photons, electrons, protons, wave forms, frequencies, and other transducing elements will take medicine far beyond its current state of technology and allow for development of a true biology, and thus, a true medicine.

SUMMARY

1. SUBATOMIC PARTICLES TRANSMIT AND RECEIVE VIRTUAL PHOTONS.

2. IN A PHOTON BATH SUPPLIED BY TEMPERATURES OF 0E C TO 40E C CAN CHANGE PLACES WITH THESE VIRTUAL PHOTONS.

3. THIS ACCOUNTS FOR PART OF THE MEDICATION TESTING PHENOMENON.

4. CELLS CAN RECEIVE AND REACT TO THESE PHOTONS.

5. MRI UNITS USE BIO-PHOTON RECEPTORS.

6. NEW BIO-PHOTON RECEPTORS CAN BE DEVELOPED TO ANALYZE NATURAL PHENOMENA. VOLTAMMETRIC OR TRIVECTOR READINGS WILL REFLECT THE BIOPHOTON EXCHANGE SO AS TO LET US VALIDATE ELECTRODIAGNOSTICS.

7. THE CHALLENGE FOR MEDICINE IS TO ACCEPT ITS MISTAKE (SINTHETIC PHARMACOLOGY) AND EMBRACE THE NEW PHYSICS OF QUANTUM BIOLOGY.

8. THIS SUBSPACE EFFECT IS NON-REPRODUCABLE, NON-REPEATABLE, NON-LINEAR, SUBTLE EFFECTING SHIFTS IN PROBABILITY, OF CONSCIOUSNESS, INTENSIFIED WITH DIRECTED THOUGHT, INTENSIFIED WITH POSITIVE THOUGHT, AND LEARNABLE.

Chapter 7

PHOTODYNAMICS

Chapter 7

PHOTODYNAMICS

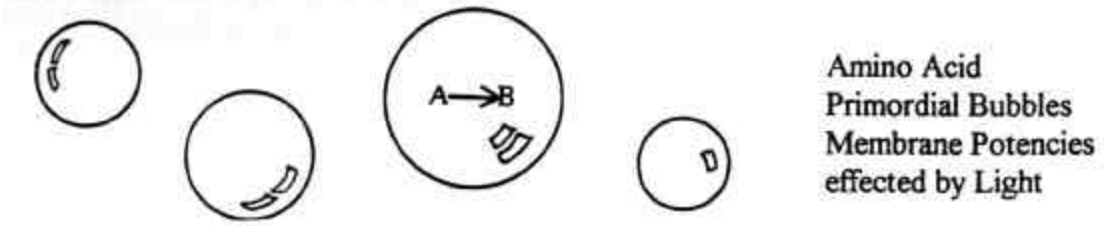
What are the photon effects of biology?

In the beginning God created the heavens and the earth. Later he created light. After creating light, then life was possible, because life could not exist without light; the existence of the photon allows for the existence of life. New evidence from physics relates all electrodynamic processes to the photon.

The electron transport chain of both the plant and the animal is a photodynamic process. As the electrons change quantic states in the transport of energy in any process, they emit or receive a photon with each quantic change, and it takes a photon to initiate another electron to do another quantic change. This is why life must produce infrared radiation, as Chapter 8 points out that the mitogenic radiation of life is in the infrared, the UV, and also the visible light spectrum (from 300 to 1200 NM). This is also why a measure of heat or a background infrared photon bath is needed for biology.

At room temperature of 70E F there are approximately 20,000 photons per cubic centimeter. This photon bath was absolutely essential for the formation of biology, as it provides an interchange to help free the virtual photons that are developing within the electrons of the various chemicals. One of these infrared photons can be interchanged, and sets free the virtual photons. As we can see from the photomultiplier studies of Nelson, et al, this photon bath is absolutely essential, and provides the backdrop for the photodynamics of biology and cellular metabolism.

A group of scientists recently sought to understand the processes of shaping life on this planet. They took matter that supposedly existed pre-life, such as salt water, various minerals, and compounds, which they then exposed by rolling them over heated rock, approximating what could have happened if these compounds were rolled over a heated piece of magma. We know that the Earth was in much more volcanic turmoil than it is today, and that these substances, when passed over these heated rocks, formed amino acid-type compounds, and much to the scientists' surprise, these amino acid compounds engulfed to make bubbles; small (10^{-5} cm) bubbles, much akin to a single membrane. Then, to the scientists' further surprise, they found that these bubbles were *photodynamic*, and that when exposed to light they would generate a sixty to ninety millivolt electro-tension between the inside and the outside, and that when exposed to darkness, this electric force diminished.



Thus this meager existence of life used light as an electrical force. As the photons came in, it allowed for the creation of an electric potential that would later allow for metabolism and reproduction.

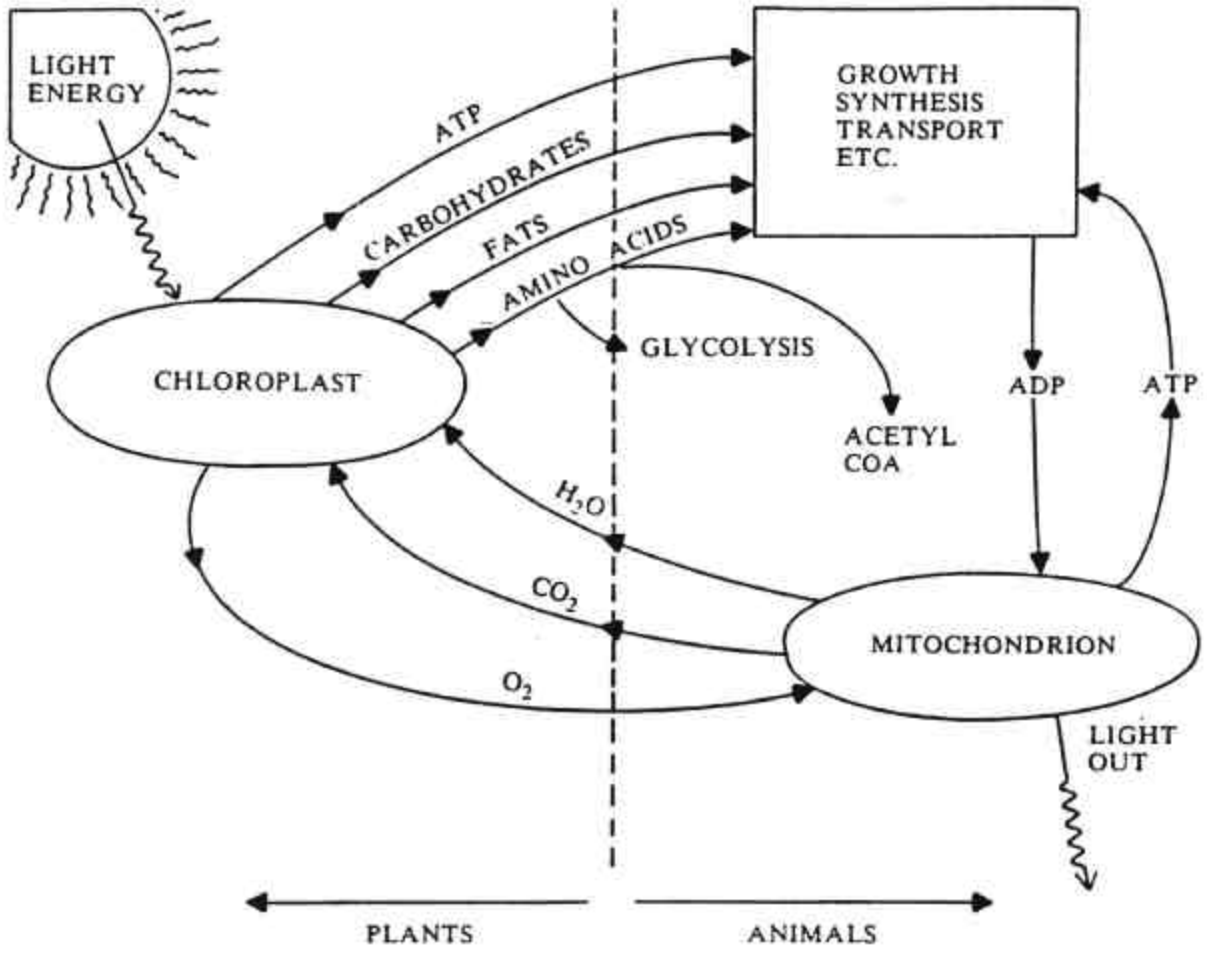
All biological material is photosensitive. This electrical potential in the long-range forces of the molecules would shape the molecules into various structures. Thus cells started as electrical photodynamic units. These units would need to be developed to handle mass, momentum, heat, charge, and the full range of other cyclic, energetic events. But the type of infrared radiation produced by heat is not the only type of photon that biology would have to deal with. Biology would also have to deal with the *visible* light spectrum and the wavelength material coming from the sun.

Existence on this planet was never constantly exposed to visible light. Thus another compound would need to enter to allow for the regulation and storage of photons during the day and the emission and control of these photons during the night. Many scientists have speculated that one such compound was melanin. There are over 256 known forms of melanin in existence; all forms of the same compound, and yet different in structure. Melanin has the fantastic ability to regulate photons and then remember or replicate this process in the dark.

The pineal gland of the human body secretes melanin in darkness. Many researchers have found the ability of the melanin to relax the body during the evening, and with the light, as the pineal gland makes less of it, it starts the day process of activation. The pineal gland is in control of our circadian (daily) rhythms. It was a structure that needed to be developed in a multi-cellular organism to regulate the needed response to various types of daily events dictated by the photons of the day. As the heat of visible light and infrared radiation builds during the day, at night, when we have the difference of a cooling-down process, our bodies would need a quantic regulator, which would be the pineal gland.

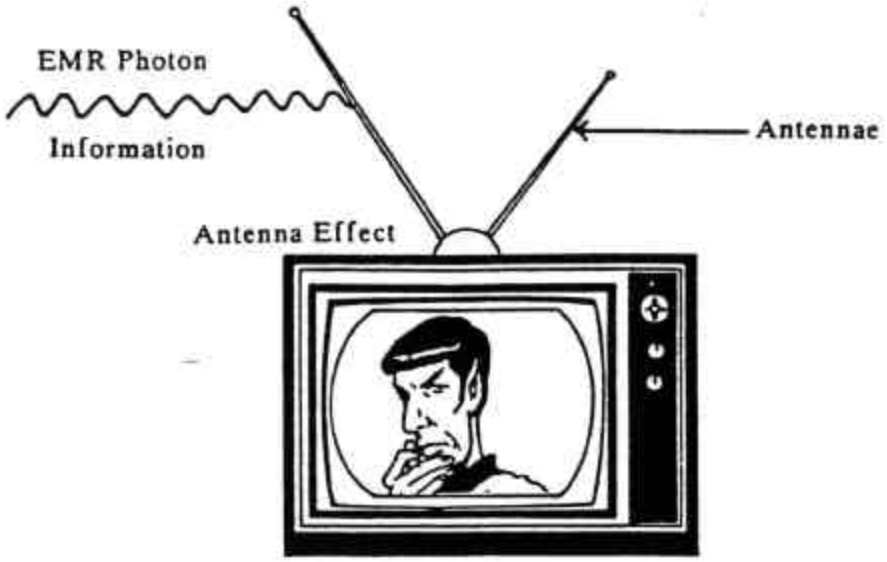
Melanin later gave rise to more precise compounds able to control this photon and electron process, leading to RNA and DNA compounds. So these helix structures culminate in an ability to not only receive instructions through photons, but also to transmit photons in a precise way, to relay other information through long-range forces of these virtual photons. RNA and DNA thus create the quantic state necessary for the electron-positron pairs, to allow for the virtual photon release and reception.

It is wrong to think of RNA and DNA as simple chemical machinery; if that were the case, how would one cell in the toe know what to do vs. one cell in the eye, when the RNA and DNA are exactly chemically the same? The precept of plastic surgery is that a piece of tissue can be transported from one part of the body to another. The dependency of this process has two parts: one, that the volume of tissue that is transported weakens the process; and two, that the health of the receptive organism is also a factor. Thus, the more tissue we move from one spot to another, the harder it is for the body to reprogram the new tissue. Also, the healthier the body is that receives this transplant from one part to another dictates how quickly the recovery process will ensue. When these cells arrive at their new location, the body now gives them a different virtual photon pattern, allowing for the RNA and the DNA to adapt to the new circumstances.

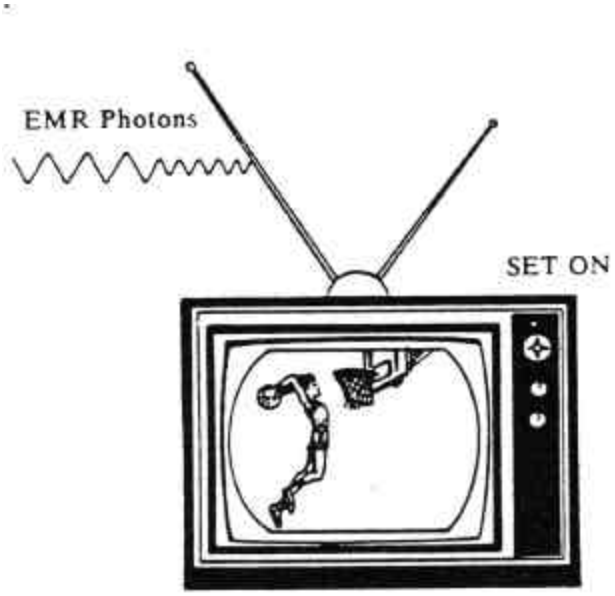


Thus mitogenic radiation needed to be developed to allow RNA and DNA to communicate with other RNA and DNA through the process of vibratory photons. These photons would, through an electronic process, allow for intricate and immediate transformation of information to help set the electronic dynamics of intercommunication of the cells. This type of process would go a long way toward explaining many of the unexplainable events in biology and cellular phenomena.

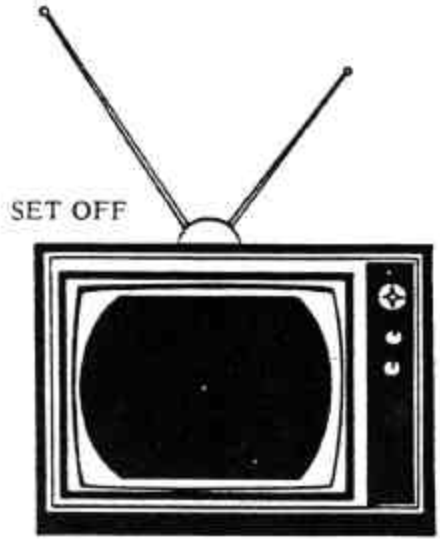
Looking into the chemistry of RNA and DNA would be like a scientist looking into the chemistry of a TV set. He would not know if the TV set were on or off, because all he knows is mass. He would not understand photons. By looking at the mass, he is only looking at the chemistry. If he wanted to know where Willard Scott was on the TV set, he would tear apart the picture tube and the rectifier circuit looking for the mass, not realizing that his small child could tell him that the TV set is receiving electromagnetic radiation (photons) and converting this information into a signal which produces photons.



Electromagnetic radiation was discovered and utilized one hundred years ago by Marconi, and was found to be a way of transmitting information via photons at great distances. These photons cannot be seen or felt consciously by the human body.



Michael Jordan on TV



The TV sets have the same weight. So Michael Jordon must have no mass (conclusion of modern molecular biologists).

The true secrets of DNA will be unlocked as we start to understand the virtual photon and the photodynamics of its electron transport chain and enzyme patterns. We will not unlock this through chemical analysis. We will be able to proceed with a genotype project, and understand which of these chromosomes and genes are involved with which diseases. This is a highly recommendable and highly ***com***mendable process. The true understanding of life will be increased by a quantum leap when we look at the photon dynamics.

$$6\,CO_2 + CH_2O \rightarrow C_6H_{12}O_6 + 6\,O_2$$
$$\Delta G = +686 \text{ kcal/mole of glucose}$$

In 1985 the New York Academy of Sciences printed Volume 453 of "The Medical and Biological Effects of Light". In this brief discussion the photobiology of vitamin D was discussed, as well as calcium, metabolism, light-induced changes in plasma, tryptophan and cysteine. The light effects on transport excretion of bilirubin, total reaction of UV light on DNA in the human skin, comparison of sinthetic Sorolyn derivatives and 8 MOP in the inhibition of lymphocyte proliferation, dietary carotene one Sorolyn-induced phototoxicity, the effects of different types of lighting on eye and other worker-related conditions, the effects of light on depressed patients in seasonal-affective disorders, circadian rhythm and melatonin reaction, pineal gland effects, jet lag, therapeutic uses of lighting, health effects of interior lighting, pyrimidine dimmers in DNA by incandescent spot lamps, photo-activation of urokinase in pseudomonas by a biochemically-generated excited state, and the effects of electric lighting on human muscle strength were brought up.

Many other topics were discussed. We can see that science has long been fascinated by the effects of light on biology. It is a treatise of this book that the effects of light are integral and synonymous with biology and life itself.

To date, as we have indicated, the experiments of the analysis of light and its interaction with biology has been very much a sideline, a side issue of how biology has adapted in some small way to the process of life. As we point out in this treatise, the photon bath provided by electromagnetic radiation in the infrared range and the visible light of the sun have generated a type of biology dependent on a mitogenic radiation, in which now light becomes extremely important in both its intake into biology and its output. The biologic cells must intake light to live; they also will output light to communicate and control cellular phenomena. Body heat is indeed not a useless byproduct of metabolism. It could be a communication structure, as well as a participant in the virtual photon bath. This is why the body would have to try to fight to maintain body heat, so that it could maintain this photon bath and allow for metabolism reproduction and life.

The study of chemiluminescence and the other lights coming from the body in the visible spectrum are also bound to not be a useless byproduct, but indeed the foundation of life itself. Life is an electrodynamic process, and all electrodynamic processes are photon-dependent.

Here we would like to point out that some of the first photon multipliers used in analyzing the human body have been developed by this author. Patents are currently being sought for devices that can measure the photon production of the body; the wavelength, perhaps even the carrier wave signal coming off these biological processes. This book is not meant to be an extreme digression into the exactitude of the research, but merely a point of bifurcation for society, to point out the need for biology and medicine to digress into electronic and energetic modalities. It is the purpose of this book to lay out these theories. We can look to *New Biology I, II* and *III* to find more exacting practical information.

SUMMARY

1. **LIGHT IS THE MISSING FACTOR IN *ALL* BIOLOGY.**

2. **PHOTONS AND VIRTUAL PHOTONS ARE NOT ONLY NEEDED TO EXPLAIN QUANTUM THEORY BUT BIOLOGY AND MEDICINE AS WELL.**

3. **HEAT SUPPLIES THE PHOTON BATH NEEDED FOR VIRTUAL PHOTON TRANSFER (ACCORDING TO THE STEFAN BOLTZMANN LAW).**
   (SEE *BIO-QUANTUM MATRIX*.)

4. **ALL ELECTRON TRANSPORT IS DEPENDENT AND CORRELATIVE TO PHOTON RELEASE AND ABSORPTION.**

5. **SUBTLE PHOTONS WILL BE THE NEW AREA OF BIOLOGICAL STUDY.**

6. **LIVING CELLS USE A VARIETY OF EMR (PHOTON) TRANSMISSION AND RECEPTION TO CONTROL PROCESSES, TRANSFER REACTION NEEDS, AND COMMUNICATE WITH OTHER CELLS.**

7. **THUS QUANTUM ELECTRODYNAMIC THEORY ALLOWS FOR THE PHILOSOPHY OF ENERGETIC MEDICINE AND MEDICATION TESTING.**

Chapter 8

MITOGENIC RADIATION

Chapter 8

MITOGENIC RADIATION

Can DNA and other cell structures communicate via photons or electromagnetic radiation?

Chemical companies have proposed a chemical view of biology, and have fostered funding in analysis of the chemistry and interaction of the products that make life. This chemical philosophy and control of funding have blind-sided their research to be biased toward the chemical interaction. Many other researchers who have come from fringe element technology, without the benefit of the chemical brainwash, have come to the conclusion that life involves more than just chemistry. It involves energetic, electrical, magnetic and other processes.

It is the purpose of this article to explore one such phenomenon, known as *mitogenic radiation*. This article hopes to expound on some of the research done and some of the research that has been duplicated by this author. This article hopes to expound on some of the research that has been done, some of the research that has been duplicated by this author, in the research of a life electromagnetic radiation that comes from the cells, allowing communication to the other cells.

This type of radiation was pronounced in Nancy, France by the Gerwiches in their work. Their classic experiment in mitogenic radiation will now be outlined as it was duplicated by this experimenter.

First, we took some cells from the side of an onion. Having looked under the microscope at other cells, we found that approximately 1% of the cells taken from the sides of these onions were in mitosis. That is, the rest of the cells were simple cells that were not in the process of splitting in the nucleus. 1% of these cells were showing stages of splitting inside the nucleus. This section of cells was then put into a clear glass non-leaded test tube and sealed tightly. In another room a section of the onion tip (which goes into the ground) was taken, and a subsection of this was taken. Under microscopic analysis we found that approximately 50% of the cells were in mitosis, as the onion tip grew into the ground. This section of onion tip was then put into a sealed test tube just like the test tube used for the size of the onion.

In Fig. 1 we see a demonstration of the various test tubes used.

The onion cell test tubes are labeled OC, and the onion tip test tubes are labeled OT. The three conditions outlined were: A) the onion cell test tube was left alone; B) the onion cell test tube was placed next to the onion tip test tube, within three quarters of an inch, but a piece of black, opaque construction paper was placed between the onion cell and onion tip test tubes; and C) the test tube of onion cells was separated by three quarters of an inch from the onion tip test tube without interference between the two.

The test tubes were left in this position for eighteen hours. After this time, the onion cell test tubes were opened and examined under the microscope to find the percentage of cells that were in *mitosis*. Test tube A had 1% mitosis, test tube B, 1.5% cells in mitosis, and test tube C had 18% of the cells in mitosis. The Gerwiches, in their original experiment, found this
phenomenon and labeled it "mitogenic radiation", meaning the radiation that they supposed the different cells would have to influence other cells.

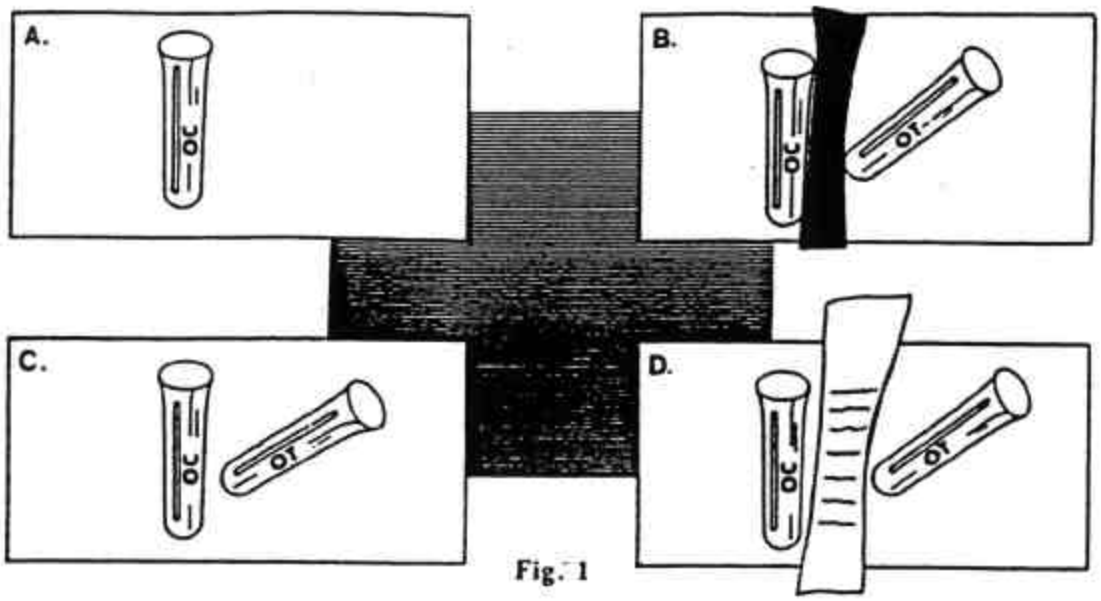


Fig. 1

The Gerwiches' work was done in the 1930s in France. In their experiment they found that an opaque intermediary, such as the construction paper used in our experiment, would block the effect of the mitogenic radiation. If they made a diffraction grading by making razor slits through the construction paper, then the effect of the mitogenic radiation would occur.

From Princeton University a man named Malowitz came to France, duplicated the research, and found that with the razor slits it did its work. At the same time, he found that it would work without the construction paper and without the razor slits, as we have shown in our study. Malowitz's conclusion was that if there was any effect from light structure or electromagnetic radiation released from these cells, it would have to be focused, meaning that it would need a diffraction grading or a lens to focus the light to do work. This was known at the time of light. Incoherent light does not do work, as far as its preciseness. What Malowitz did not know is that there is a thing called "coherent" light, that *can* do work without the benefit of a lens or diffraction grading.

In his book, "Complementarity of Medicine", Dr. James Isaacs outlined that mitogenic radiation is coherent within one quarter of a wavelength. Thus this life radiation can do its work without the benefit of a lens. Dr. Isaacs supposes that this mitogenic radiation comes from DNA, and is just another factor that allows cells to communicate with other cells. This factor of light released from the DNA comes from the nucleus.

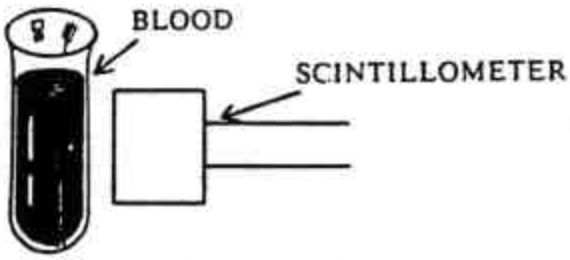


Fig. 2

The phenomenon of *chemiluminescence* is known to modern science; cells emit electromagnetic radiation in certain wave bands including physical light. Many organisms on the planet are very adept at this, such as the lightning bug or other protozoa and algae. The minute release from organisms other than these is very small; almost undetectable.

The white blood cell of the human body has a very interesting form of chemiluminescence. When the white blood cell surrounds an intruder through phagocytosis, it releases a light ray that can be detected.

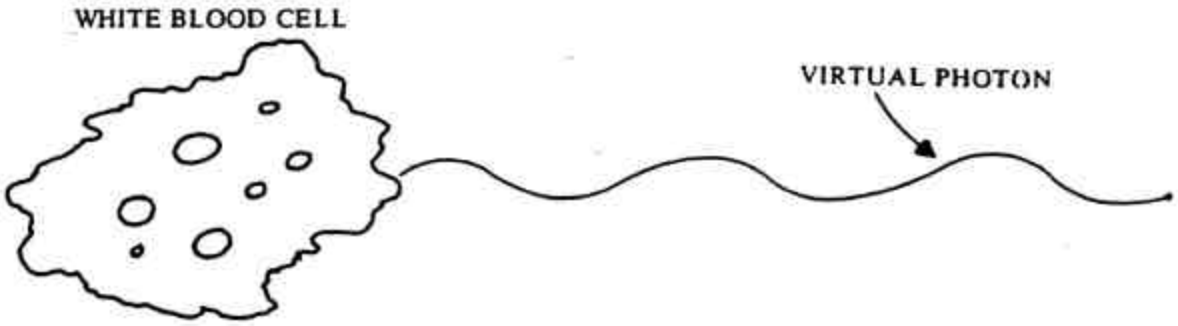


Fig. 3

In the medical world a device exists that is used to detect this light release. This is a variation of a *scintillometer*, which counts the scintillations (the light) coming off the white blood cell. A sample of the patient's blood is put into a test tube with a sample of bacteria, yeast, or whatever. As the white blood cell surrounds it through phagocytosis for destruction, it releases a beam of light. The scintillometer will count the amount of beams of light, and thus know, when compared to norms, how well the blood of the patient responds to the intruder.

This is thought by mo dern medicine to be a useless byproduct of the process of phagocytosis. Since blood is largely opaque, might this not be a way for the white blood cell to send off a heavy beam to hopefully call for help from its brethren in lymphatic system. Might this also be an understanding, since the red blood cell lives in the blood which is opaque, of why it does not need DNA? The red blood cell in the body does not have DNA. It couldn't use it, because it lives in the bloodstream 100% of the time and could not get mitogenic radiation consistently. The white blood cells, many of which are polynuclear (having more than one nucleus) live their lives in the lymphatics and go into the bloodstream to patrol, perform their function, and leave. They would need extra abilities for chemiluminescence; not only to see the intruder, but also to call for help once they go into the process of phagocytosis.

As we have seen in the initial experiment (Fig. 1), there seems to be some accountable radiation. By using a series of filters, the Gerwiches and this experimenter were able to isolate the frequency ranges that occur from the release of this electromagnetic radiation. It was found that the band was from 10^{12} Hz through 10^{15} Hz, as shown in Fig. 4.

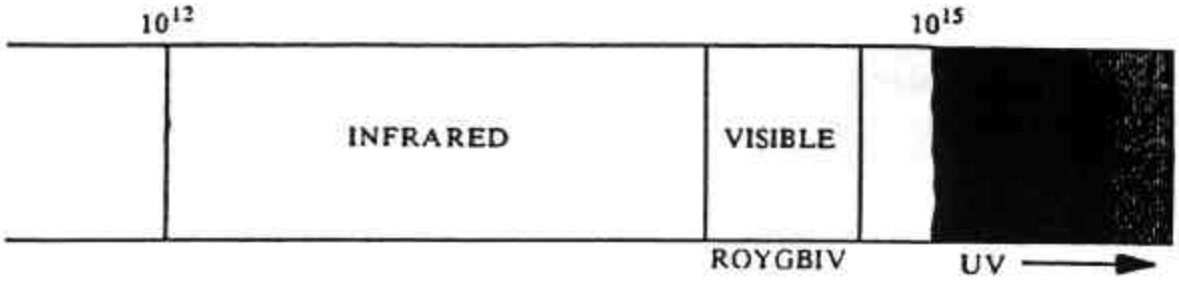


Fig. 4

Thus this mitogenic radiation goes from 10^{12} Hz through 10^{15} Hz, which includes infrared radiation, visible light, and a touch of ultraviolet (UV) radiation. *Hz* means beats per second. If we take the speed of light to be 3×10^{10} cm per second, and divide it by the beats per second, we will see that the wavelength is 3×10^{-2} cm per beat through 3×10^{-5} cm per beat. This is the wavelength of mitogenic radiation.

If this mitogenic radiation is to be received by another cell, then on this wave the cell needs to calculate information that is carried on this wave, much like a radio would calculate the carrier wave and signal from the radio wave that comes into it. Something inside the radio must tune itself to the distance of the wave, so it can get the carrier wave signal on that wave. Thus the cells of biology must have a wave to tune itself to the wavelength.

3×10^{-5} cm is the size of the smallest cell in biology. No cell in biology that has the characteristics of life (metabolizing and reproducing on its own) exists below the size of 3×10^{-5} cm. Any cell that would try to exist beneath that could not do so, because it would not be able to receive the wavelength signal. 3×10^{-5} cm is relative to

the largest cell in the human body. Larger cells are either in meiosis or in a state of hyperplasia. So we can see that this mitogenic radiation may indeed set the parameters for the size of biology.

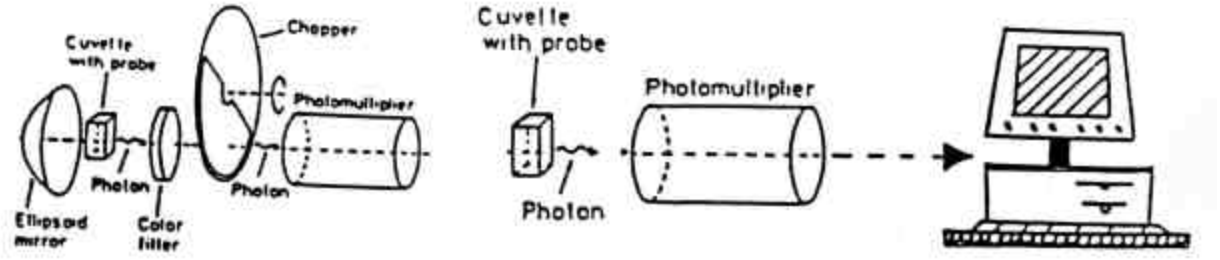


Fig. 5

In his book, "Complementarity of Medicine", Dr. Isaacs has a longer explanation of the factors of mitogenic radiation.

A second study was done on mitogenic radiation using a photomultiplier. This study was designed to show the effects of how homeopathic solutions, especially combination formulas, might have an effect on living tissue at an energetic level. Modern pharmacology is based on the effect that the actual chemical might have on various biological processes. Homeopathy, however, does not have direct stimulation at times, but sometimes stimulates the body energetically to do a certain function.

Since we have seen that plants can also communicate with each other by emitting absorbent light in small quantities, this type of release might be an actual or virtual photon. We have increasing reason to expect that this emission of light has very definite factors and processes that it can accomplish in the cell. For our study we chose a suspension of soybean and seedlings of cucumbers. The living matter is kept contained in a dark chamber in front of a photomultiplier. Fig. 5 shows the principal parts of the instrumentation.

The intake of light particles are then counted within the photomultiplier, and the calculations are carried out by an interfaced computer.

Fig. 6 shows conditions A, B, and C, as they vary in the amount of radiation detected by the photomultiplier. A shows the emission rate of the empty chamber, without any biological material; B shows the emission rate of ten cucumber seedlings, and C shows the emission rate of twenty cucumber seedlings. This type of data is reproducible, and has led us to the conclusion that the emissions are caused by the living material.

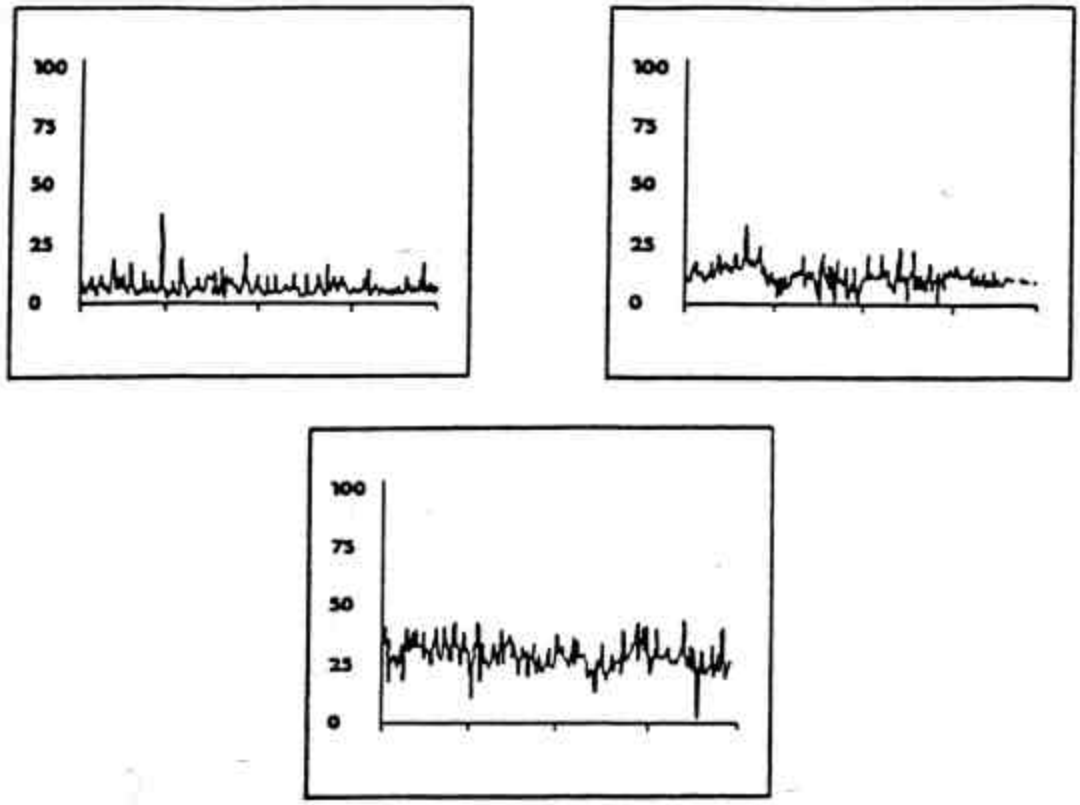


Fig. 6

In the next criteria we wish to find out if we can affect the emission rate via homeopathic drugs. Fig. 7 shows examples of a 1,500-second long emission curve.

After one hundred seconds of dark chamber adaption, spartium scoparicum is used in a tincture of 3x, 6x, 8x, and 12x, dissolved in 31% alcohol. A is our control, with just alcohol 31%, B shows what the tincture did to the emission rate, C shows 3x effect, D, the 6x effect; E, the 8x effect; and F, the 12x effect.

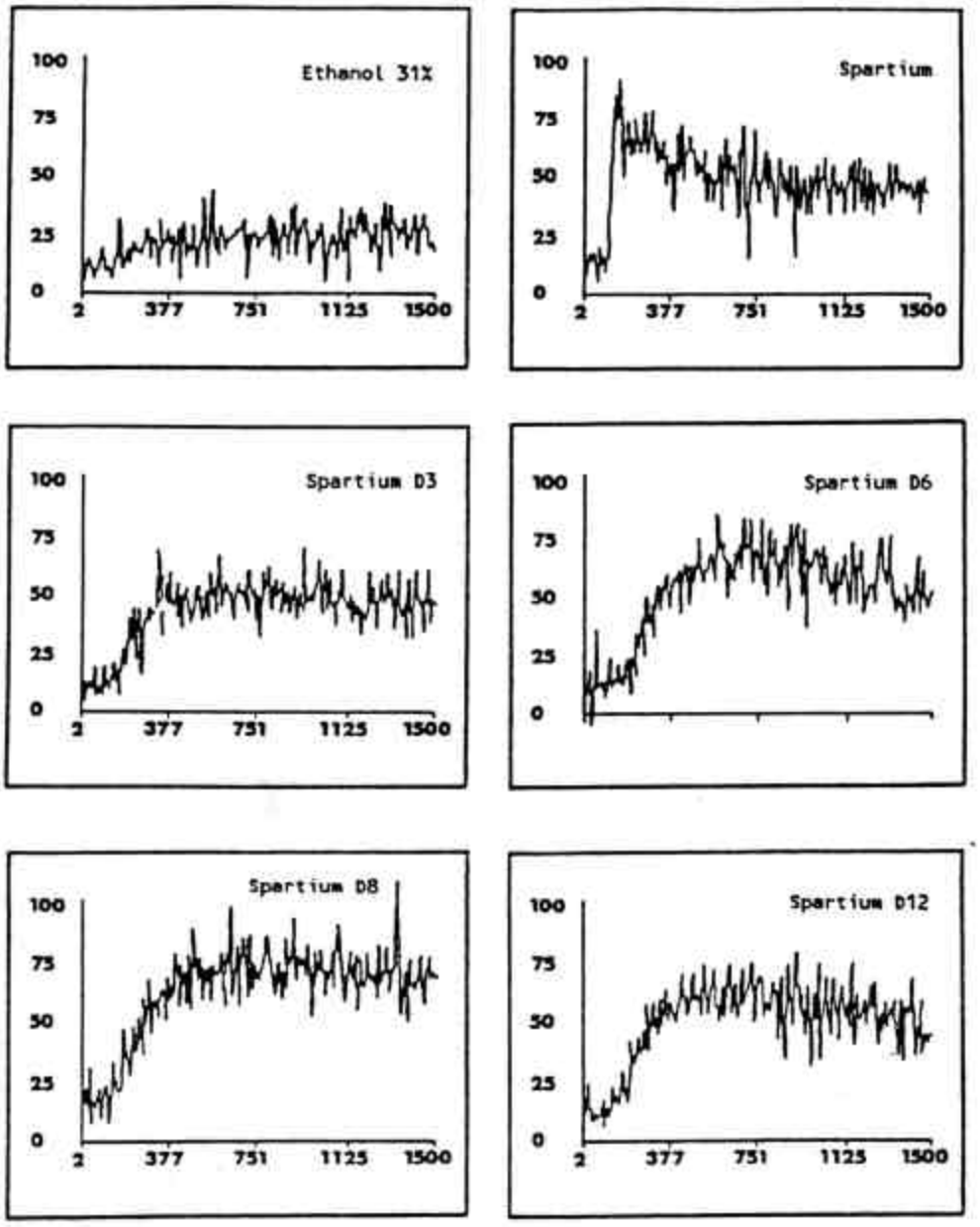


Fig. 7

Fig. 8 shows the effect the various potencies had, as laid out in the test.

We can see that the various concentrations are able to affect the emission rate differently. Thus various potencies affect biology differently in the ability to inhibit or enhance the photon emission.

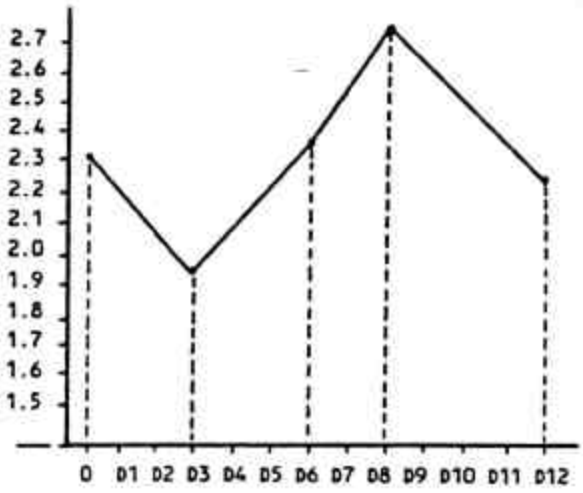
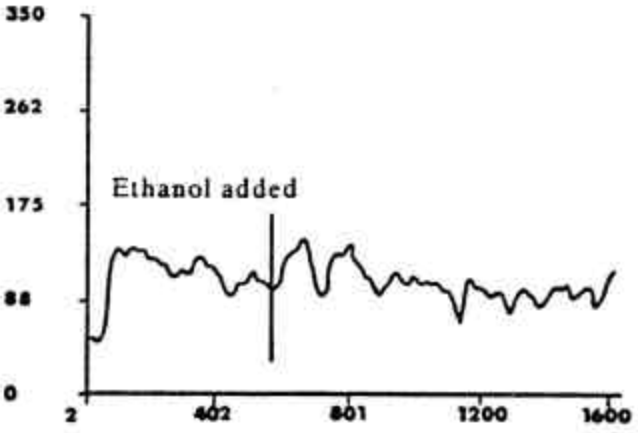


Fig. 8

In another study in Germany ten trials were run on each of the following criteria: nine milliliters of soybean suspension, measured over five hundred seconds; after that, the addition of one milliliter of ethanol, with ongoing measurement up to 1,500 seconds. Fig. 9 shows the results.



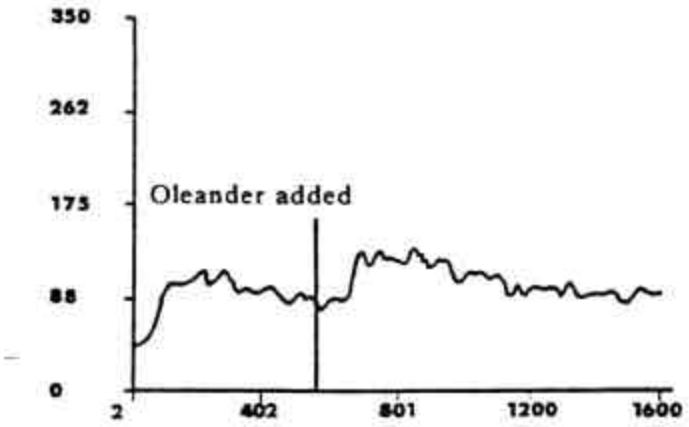


Fig. 10

The second experiment in these criteria was taking nine milliliters of soybean suspension measured over five hundred seconds; after that, the addition of one milliliter oleander 3x dissolved in 31% alcohol, with the ongoing measurement up to 1,500 seconds. Fig. 10 shows the results.

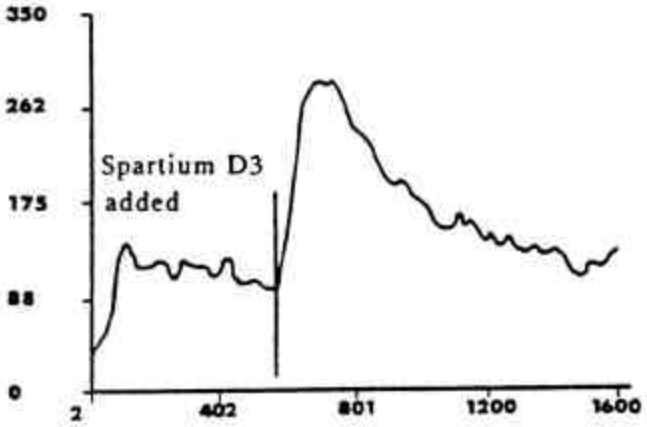


Fig. 11

The third part was nine milliliters of soybean suspension measured over five hundred seconds; after that, the addition of spartium scop, at 3x dissolved in alcohol 31%, with ongoing measurement up to 1,500 seconds. Fig. 11 shows the results.

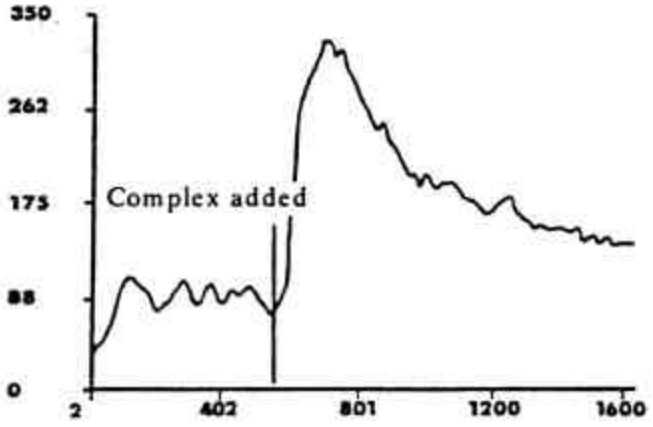


Fig. 12

In study four, nine milliliters of soybean suspension measured over five hundred seconds; after that, the addition of one milliliter Complex formula, with the combination of oleander 3x and spartium scop 3x, each dissolved in alcohol 31%, with the ongoing measurement up to 1,500 seconds. Fig. 12 shows the results.

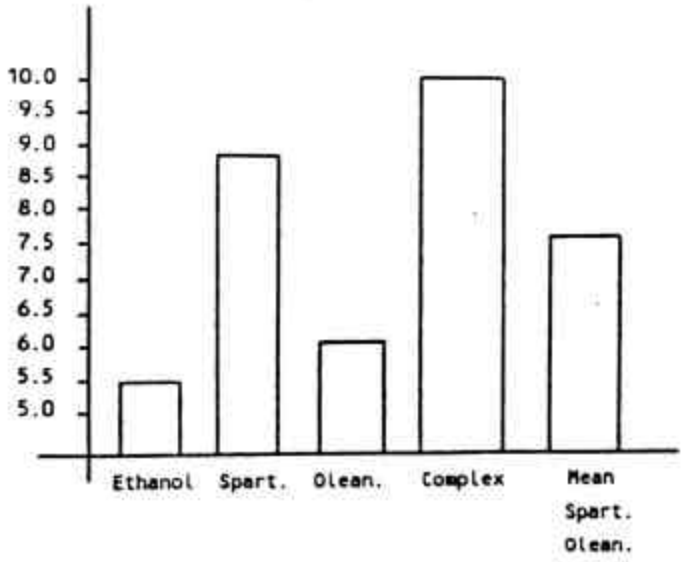


Fig. 13 is a graph of the results, showing the mean increases of the photo-emission curves, caused by alcohol, oleander singular, spartium scop singular, and the combination.

Conclusion: mitogenic radiation is a factor in biology that has not had the research or the intellectual attention that it deserves.

The phenomenon of mitogenic radiation could be an open door to the understanding of many factors in biology, such as information exchange, varying tissue growth, and the whole of energetic medicine. As we see from our study, we have been able to see the effects that different homeopathics can have on mitogenic radiation, and how the range of mitogenic radiation can possibly explain diverse phenomena in biology.

Other studies have shown how belladonna can influence mold development, even at potencies beyond 30x. In our study the EMI 9558QB Photomultiplier was used, which is sensitive to wavelengths between two hundred nanometers and eight hundred nanometers.

SUMMARY

1. **LIVING CELLS TRANSMIT AND RECEIVE MITOGENIC RADIATION.**

2. **THIS MITOGENIC RADIATION IS ESSENTIAL FOR CELLS TO INTERACT, COMMUNICATE, AND REGULATE EACH OTHER. MITOGENIC RADIATION IS VITAL FOR MULTICELLULAR ACTIVITY.**

3. **MITOGENIC RADIATION CAN BE MONITORED VIA A PHOTON COUNTER.**

4. **SINCE ALL BIOLOGICAL PROCESSES RELEASE OR ABSORB PHOTONS, PHOTON COUNTERS WILL ONE DAY BE USED TO MEASURE AND CORRELATE BIOLOGICAL FUNCTIONS WITH THE NATURAL BIO-PHOTON AND MAKE X-RAY AND IONIZING RADIATION OBSOLETE.**

5. **MUCH OF THE BIOPHOTON IS VIRTUAL AND SCALAR IN DIMENSION (SEE *QUANTUM VIBRATIONAL MEDICINE, SECTION 3*).**

Chapter 9

VIONS

Chapter 9

VIONS

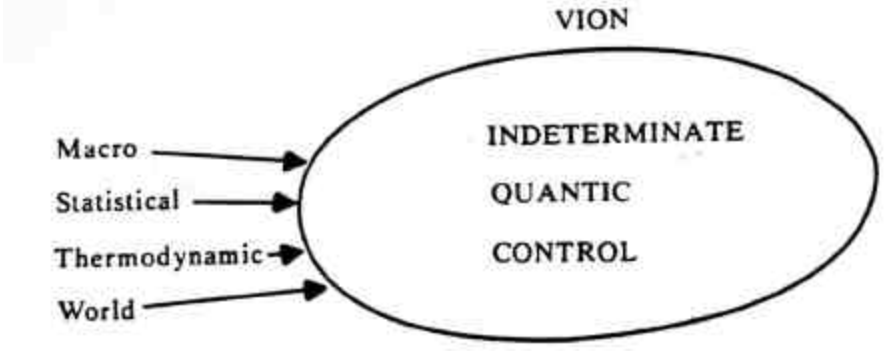
What is the smallest unit of life that reproduces and metabolizes?
What is the minimum amount of energy and mass needed for life?

In his book, "Complementarity of Biology", Isaacs asked the question: "Are there living units that exist under conditions of sufficiently few events in space and time, and sufficiently open transport of mass and energy to and from the environment at ordinary temperatures and pressures, so that a quantum description will fully describe this process, and that this process will meet the needed criteria of fulfilling metabolism and reproduction?" The answer to this query is definitely "yes".

Dr. Isaacs wrote about the "bion". Since there was conflict with the work of Wilhelm Reich and some of the others on their interpretation of the word "bion", we are substituting "vion" for it. Isaacs suggests use of the word "vion"; we will henceforth adapt that word.

A vion is the smallest form of collected componds and energetic systems that process and exchange matter and energy with precise accuontability. The actual process of the molecules and atoms of life are interactions of energy or quasi particles. These quasi particle have a variety of energy states. States such as orbital size, energy, shape, and momentum of spin or angle, quantum number etc. To adequate label even on quasi particle we need to have a matrix or table. The system must mathematically process a vast number of these energetic probability quasi particles for any activity in the system. As the system interacts with other quasi particle in the environment the result of the interaction will follow some mathematical flow. Flow involves time. All organisms encountered to date exist in the flow of time. Organisms could exist out of the time dimension in other subspace dimensions.

The factors of time vs. energy or space vs. momentum are the fundamental processes of handling the interchanges of information and the various entities needed for life. Time vs. energy and space vs. momentum, as we know from Chapter 3, are related through the Heisenberg uncertainty principle. The relationship that each has to the others is dependent on the uncertainty principle, so that it would fall under quantum dynamics.



These life energies will need to watch for separate types of entities that must be transferred and handled for life to ensue. These four transferrable processes are *mass, momentum, energy* and *charge*.

Mass is the convection of matter. Molecules, cell parts, membranes and golgi bodies have to be managed in a ten-dimensional space. Four of these are real, active, and reactive; whereas the other six are virtual, shadow-like, and passive/reactive.

Momentum has to do with the viscosity of liquid flow. A very viscus fluid in motion will have a momentum transfer; a light viscus fluid will have less momentum. Momentum has to do with velocity times mass. Thus we can see that the speed of interaction of oxygen, blood, hormones, ions, or other serum factors will be important in our transfer process.

Energy has its form in electromagnetic radiation, which is photon transfer. Here, the primary factor in biology is that of the photon of heat, which can be passed through conduction, convection or radiation. Other forms of electromagnetic radiation are also important in information control within our matrices.

Charge transfer deals with the electrical entities of electron, proton, ion, and electrostatic forces. These also must in biology for the factors of life to exist.

These units of mass, momentum, energy and charge, being four in number, can have twelve possible interactions, as one can interact and induce another. These are the basic transforms of energy that are accomplished and monitored by the cell. Activation energy, as we have discussed, might come from any one of the four, or from any possible combination. This might serve as activation energy for enzymatic action, for neural transmission, or other cell metabolic events.

	METABOLISM			
REPRODUCTION	MASS	MOMENTUM	ENERGY	CHARGE
	MATTER	VISCOSITY	PHOTON	IONIC
				ELECTRON
				PROTON

Thus the momentum and energies must be controlled through certain time and space dimensions. Each transfer acts as a transducer or converter of energy. Also each transfer is a potential information communique. Nature tends to be economical. When energy needs to be transferred for metabolism or power, why not transfer information along with it?

	Mass	**Momentum**	**Energy**	**Charge**
Information Transfer	DNA TRIPLET CODING	HORMONAL BLOOD AND LYMPHATIC TRANSFER	PHOTON MITOGENIC RADIATION	IONIC CODING NEUROLOGICAL TRANSFER

This will allow for reproduction and metabolism to occur through a controlled quantic organization of the flow of these energies and momenta through time and space.

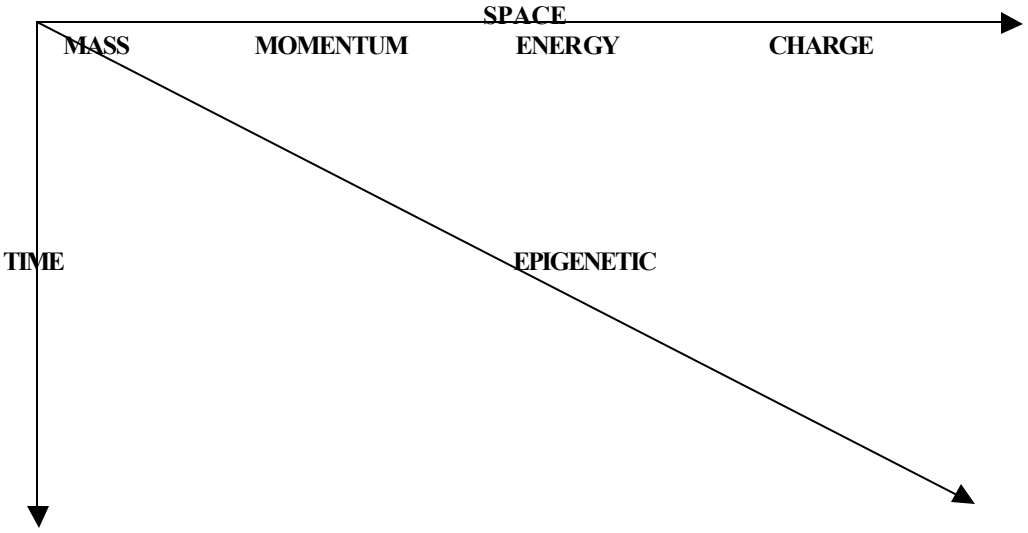
As we have pointed out, these events are happening intracellularly, and since they are within the cell, they fall under the dimensions of quantum dynamics. Since they are quantic, they will not make distinct steps; they will move in quanta, and they will also follow the uncertainty principle. Thus any type of graph that would be of a continuous flow nature would be an inappropriate way to classify these. To classify these changes we will need to develop a hermitian matrix, which will show the dynamic jumps and allow for an uncertainty of those jumps from one level to the other. This uncertainty matrix has been given by Dr. Isaacs, and we will give an account of it later in this chapter.

TYPES OF SUBCELLULAR VIONS:

NUCLEI	-	REPRODUCTION
CENTRIOLES	-	TRANSPORT
KINETOSOMES	-	MOVEMENT
PLASTIDS	-	LIGHT REGULATION
MITOCHONDRIA	-	ENERGY
MICROTUBULES	-	TRANSPORT

Metabolism and reproduction lie on the dimensions of this graph, as we handle mass, momentum, energy and charge through factors of time and space. Thus a cell can intake any one of these various energies and momenta and convert them into a living process via the transforms of life.

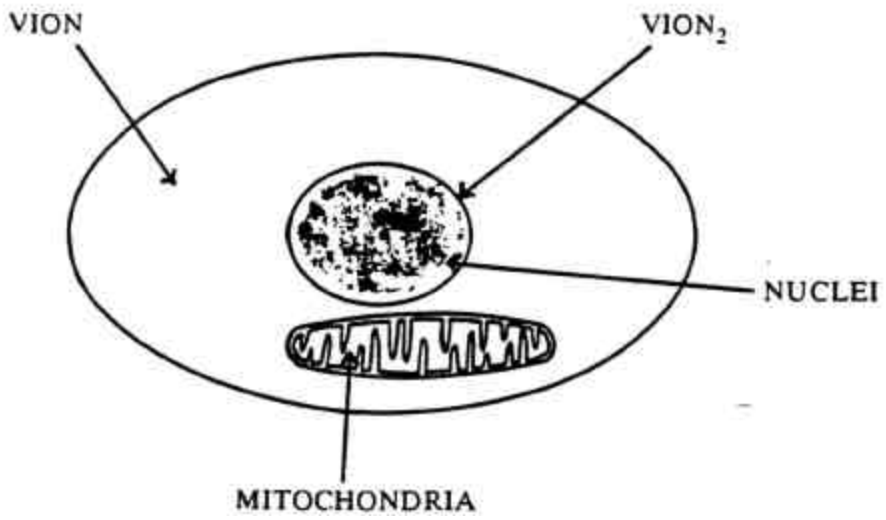
What Isaacs writes in the chapter on the vion is his speculative theory of what is the base minimum amount of mass needed to account for this biology principle. This he calls the "atomistic unit of life", or the vion. Within the concept of chemistry, we can assemble the different types of molecules we find in biology. Knowing the different types of vions, we can assemble the different types of cells. Isaacs speculates that it should take four vion units to make up a nucleated cell, and that the basic vions are cells that can metabolize and reproduce without nuclei. Thus this is life in its simplest form.



Types of Subcellular Vions

Nuclei	-	Reproduction
Centrioles	-	Transport
Kinetosomes	-	Movement
Plastids	-	Light Regulation
Mitochondria	-	Energy
Microtubules	-	Transport

FOUR VIONS MAKE A CELL



It also must be pointed out that in its handling of the diverse energies and momentum through metabolism, reproduction, and time/space, this process falls under the indeterminacy principle and follows the laws of quantum dynamics, so we will need to use a hermitian matrix as we have outlined. A trinary logic system also must be developed; a system that is not binary (on/off), but a *trinary* system (on, off and indeterminate). This trinary system of logic will also allow for the processing of life. The third state is influenced by subspace transfer(Nelson effect).

There are twelve possible interactions between the exchanges in transforms of forces; mass can act on energy, charge can act on momentum, momentum can act on energy, and so on. These twelve possible interactions are very important in the ways that mathematics apply to this system. There are also twenty-four possible permutations of accumulation of these energies; how mass, momentum, energy and charge can accumulate to achieve the different types of threshold energies needed to accomplish certain tasks, such as cellular polarization, depolarization, enzyme activation, etc.

1 (Mass)
(Momentum)
(Charge)
(Photon Heat)

4 x 3 x 2 x 1 = 24

Subspace imposition of morphic structure

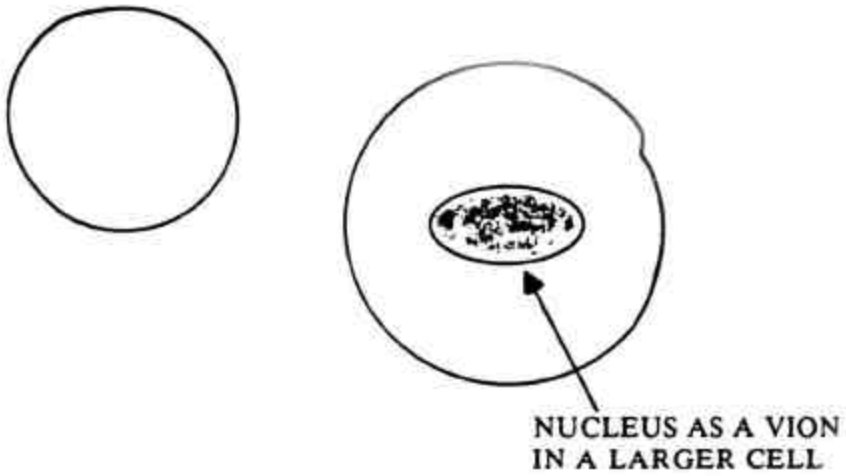
In terms of our advanced physics we can relate mass, momentum, energy and charge to particulate transfers of the gravitons, photons, electrons, protons, molecular and atomic interaction. It would be difficult to imagine any type of situation happening in a subatomic event that the cell would not be able to recognize. Even events of radio isotopes, such as radioactive iodine or sodium, would be recognizable as different by the cells. These quasi particle would indeed have incompatible characteristics with the cells. As such the cells and the system would have to treat them differently. Thus the results of our tracer experiments are deceptive. When radioactive iodine gravitates to the thyroid, it proves that radioactive iodine goes to the thyroid; it does *not* prove that *natural* iodine does. This is an assumptive mistake of so-called modern medicine and biology.

Even neutrinos in interaction seem to be recognized by the cell. We find that now and then, when there is a neutrino flux, a new type of viral A component is generated. Thus it could very well be that the cells of biology are even sensitive to neutrinos. Even Neutrinos are quasi particles of energetic patterns that biology must sometimes react to.

In his discussion of the vion, Isaacs enunciates certain examples of this base material, of mass collected to process metabolism and reproduction. His examples include blue-green algae, non-nucleated bacteria, the mycoplasmatales, along with some other subcellular organelles and organized cells.

In Isaacs's writing, many kinds of nuclei are examples of vions, simple atomistic units that reside within a larger collection of vions. Isaacs also accounts for plastids, chloroplasts, leukoplasts, and mitochondria as other examples of vionic intracellular substances. Plastids and mitochondria are responsible for metabolic mass and energy conversions. The centrioles and kinetosomes have primary motor and sensory functions. These, along with microtubulars, are connected to movement, and thus are utilized by the mass, momentum, energy and charge transfer to regulate movement of the various cells. It should be pointed out that vions can possess nucleic acids without having nuclei, and nuclei can be present as vions within a larger group.

A CELL WITHOUT A NUCLEUS CAN STILL BE A VION



Isaacs writes: "The coupling of vions into one unit or cell together with specialization in component vions, in the manner of molecularity of atoms, allows for greater versatility in structure and function of cells and cell aggregates as living organisms. This basic unit of biology is not unlike the atom of physics and chemistry. It is, however, associated with a broadened application of quantum theory." Thus these individual vions interact quantically to maintain stability as more complex organisms evolve.

It must be pointed out that not all organelles are vions; some are combinations of vions. As we mentioned, mycoplasmatales, blue-green algae and non-nucleated bacteria are examples of living vions, or univionic organization. Paramecia, amoeba and euglena are examples of living units that are made up of *many* vions, even though these are unicellular organisms. They are not univionic. Nuclei, plastids, kinetosomes, centrioles, and microtubulars are examples of subcellular organelles, which are vions. Endoplasmic reticula and golgi complexes are subcellular organelles, which are not likely to be vions. Many subcellular organelles were predicted by Isaacs which have not been discovered yet.

These will be structures or conglomerations of cellular material that will cause some type of process to happen within the cell. Thus the transcription of the replication process must have some guidance within the cell. This can be propagated through cellular protoplasm material that will cause the enzymes DNA components to cleave in precise patterns. This protoplasm material will not be definable through the microscope, as it will not have a definite existence such as that of an organelle like a golgi body, mitochondria, etc. This will merely be an organized structure of the protoplasm that will help in the guidance of mitogenic radiation, and also the push and pull of the various factors of the DNA as they pull apart or push together.

Thus it is wrong for us to think that all sub-organelle systems must be visible under microscope or electron microscope. With a simple shift in our thinking, we can realize that there might be entities which would perform their tasks invisibly. The gulf current is largely invisible, but we can see its effects. It is a variation in the water temperature creating sheer forces, but it does not exist in a solid state; it exists at a different level.

So we suppose that there can be many types of cell structure, which are organizations of the protoplasm to accomplish certain tasks. These structures allow the existence of certain phenomena and explain some of the mysteries of biology.

A single vion is limited in its size, but combinations of vions might not be so limited. Many giant cells can exist that might be combinations of small numbers of vions. Several of these univionic units can be of different sizes, even though they are usually exceedingly small, as little as one tenth of a micron. They may become bigger in one dimension, however, as they might extend. Some of these do not even have a cell wall, but they do have plasma membranes. Among some of these univionic organisms a large multiplicity of tropisms (directed motions) have developed. Also, vions have very versatile adaptive capacities. In dilute media they sometimes have quite heterogeneous capacities for both synthesis and motion, which has the same effect as providing a greater effect of volume.

As we have seen from the dictates of mitogenic radiation, as it goes from the wavelength of 10^{-2} through 10^{-5}, we can see that 10^{-2} sets a size on the amount of material vions can grow to and still become a unicellular structure. Thus there is a limit to the size on the high end set by the 10^{-2} cm. This can be voided at certain states of hyperplasia, or cancer; or in the case of miosis, in which egg cells attain very large sizes.

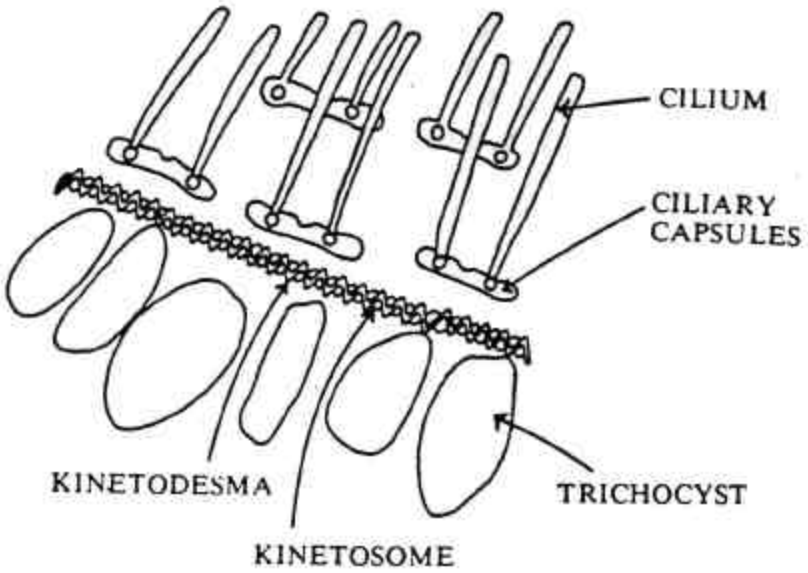
If a vion develops or evolves toward a special capacity, it will have a tendency to lose others. Sometimes a vion might develop for flagellation or movement, and thus might lose its ability to handle a certain vitamin or its ability to generate a certain type of combination transform. Thus the adjacent vion will need to adapt for support.

This molding of the forces of vions allows for the development of multivionic cells. These vionic capacities mold for different needs of environment or reproduction through metabolism and energy handling, or conservation of energy. This allows for the development of larger cells, multivionic cells, and even multicellular organisms. However, this evolution must maintain its quantic nature.

Thus the distinct vions trade off and reciprocate energies, so that they can provide colony support and a broader base of interaction in the environment. But certain vions will have to adapt toward information handling if certain other vions are going to adapt toward metabolic areas. This leads to the existence of sexual cells, and eventually the development of male and female abilities that are not exerted in these simple vionic cells.

As vions start to trade off information and start to develop into colonies and colonial groups, there are a variety of adaptation responses and compensatory activity, as the vions specialize toward different activities.

As Isaacs points out, even with multivionic cells, the vions within those cells will have to develop compensatory functions, but they will always maintain some degree of reproduction or metabolism. Even if they specialize toward one or the other, they cannot lose their capacity of reproduction totally, nor can they lose their capacity of metabolism totally. They must maintain some degree of each.



Inside the vion there are transfer and conversion of many forces. Much of this has to do with the electronic transport chain. From K value scales we can see that the outermost electrons, having various types of radii, can make various types of transforms (see *Bio-Quantum Matrix*).

In Szent-Gyorgyi's book on bioelectronics he displays some of the K values that have been calculated for various compounds. (see preface and Introduction) This is the amount of energy that the outermost electron has via its radii, or distance from the nuclei. Thus in a larger atom, such as iron, the electron has a greater K value than the outermost electron that is in hydrogen on a much smaller basis. Thus for electron transport there has to be a certain cessation or continuation of spherical values; therefore, the need for some of the larger molecules of the trace minerals of manganese, phosphorous, etc. Also there are quadrapole moments and other types of electron bonding, which can be used for information. The atom phosphorous, because of its five-part valent needs, can act as an excellent receiver of information; more or less as a small microchip of memory for a larger unit.

The outer valence of our phosphorous molecule is in a position where it can supply three or five electrons to fill in or donate to its outermost shell, needing an eight to fill its outermost shell. Phosphorous thus becomes a very flexible item in its ability to donate or receive these outermost electrons. The phosphorous atom is a collection of quasi particles. To properly describe them all would take a large matrix. Thes energy states in the phos atom are responsive to external stimuli. Biology will take advantage of this to store information.

Information of all elements can be stored in these outermost electrons; even hydrogen, in which distinct quantic electron shells can be influenced by the various photons, and this information can be stored into a molecule or atom, and then later retrieved.

Phosphorous, because of its peculiarity in design, has vast quantities of information that it can store. Perhaps billions of states can be stored and retrieved in a phosphorous molecule. Since phosphorous is found in almost all nucleotide preparations, and since each phosphorous atom can retain or condense so much information, we can see how biology might be so sensitive as to remember biological information within its genetic tree from eons ago. The information capacity to receive, store and retrieve is awesome; perhaps beyond our comprehension.

In the conversation of energy, time and mass, there are certain other very basic constructs of physics that must be followed inside the cell; ideas of conservation of momentum, conservation of radii, conservation of mass, and the energy transports. These laws of physics outline the needs that will be utilized by the cell. Oscillatory transfer of the photons is also extremely important, accounting for the vionic radiation and the interchange of photon information.

The handling of all this information, as we have pointed out, falls under the uncertainty principle, and must be handled through a trinary logic system in a hermitian matrix that will echo a ten-dimensional transfer process. Thus life is extremely complicated, and any attempts to reduce life to simple modalities, to try to reproduce entities through sinthetic processes, would be extremely ludicrous. In development of a medicine we must develop *natural* mechanisms, observe nature, and try to duplicate the beauty of nature's world.

POSSIBLE PERMUTATIONS
10^{23}

LIMITS OF GENETIC ERROR
10^{6}

This cybernetic transformation needed to allow for the metabolism reproduction of life must be rather machine-like; of an input/output manner. But since these things are quantic, they will follow an indeterminacy, or trinary logic system. Still, the transformations will behave very machine-like.

Isaacs outlines four ways a vion might interact to form higher organisms. One way is the form of selection of parameters; thus subclasses of transformations can be developed that represent the emergent living processes of the vion. This will occur through interaction of a vion with the external environment. Another is a variation of the epigenetic class of internal transforms within the vion, which represents some additional emergent processes that are coupled with the formation of multivionic cells in multicellular tissue, thus allowing for colony development and multi-organismic organisms.

1. Selection of parameters through subclass of transformations
2. Epigenesis
3. Input/output control
4. Retroversion

Isaacs writes: "Epigenesis has a more or less classical meaning in biology, namely environmental interaction with the zygote, in order to complete the information which is necessary for development of the zygote into an organism. This is contrasted with the preformation theory, which assumes a completely pre-formed germ that is so small as to be undetectable within the zygote, but which enlarges periodically to visible size in development. An evolved version of the preformation theory is the present-day concept of the gene, with the complete information for form and function of the organism, which is stored in genetic arrays of chromosomes that are held under gene repression in the zygote. It maintains readiness under derepression during development. Elsasser, in 1961, attempted to make a distinction concerning emergent living processes, which he called `biotonic'. Later, in 1962, Commoners suggested that he term them `epigenetic'. There is a risk of great confusion, unless the following comments are introduced at this stage. Our non-Gaussian emergent living processes (which include processes of reproduction, metabolism and epigenesis) are consistent with Elsasser's biotonic processes, as he originally described them. We use the term `epigenetic' specifically to name the emergent living processes of vionic specialization and collective adaptation of function. This building of reproduction and metabolism is achieved by giving up or losing of information among interacting vions in multivionic cells on an indeterminate basis of operation (that is, under conditions in which molecular motion is indeterminate)." Thus vionic epigenesis is an adaptation phenomenon in which reproduction and metabolism combine for cell presentation. This phenomenon is also found in multivionic or multicellular organisms.

There is a third way interacting vions can make more developed organisms. Vions may be considered unitary black boxes that are holistically capable of predictable inputs and outputs. These inputs and outputs include chemical concentrations, osmotic gradients, long-range forces, vionic radiation, mitogenic radiation, and others. Not all indeterminate processes involving molecular motion are restricted to vions. Also, not all indeterminate processes involving motion of elementary particles are limited to atoms in atomic theory. The indeterminacy principle extends to the macro world. Even a pitched baseball has an indeterminacy, but its large size and slow speed make this factor minuscule and almost inappropriate for our human sense of perception.

Thus a quantized description for reproductive and metabolic processes was shown without reference to the vion as a unit. Isaacs says that a disclaimer must be introduced that should the vionic concept not prove valid in generalization or useful in application, many biological processes, with their peculiar phenomenological conditions, still would require a quantic mode of description. Indeterminacy of molecular motion will then extend beyond the processes occurring in the interior of a single vion. This produces stability and resistance against the entropy and thermodynamics of the world. Thus a hierarchy of information transferred through space and time will occur as the interconnection of the units. A doubling back between vions forms between cells to form tissues, tissues to form organs, organs to form organisms, and organisms to form societies.

Thus we will find an indeterminate link between humans known as our language and intuition. Also there will be a whole new science of language when the laws of quantum theory prove that all societal interaction is a further express of quantum information transfer.

There may be modes of dynamic coupling that involve indeterminacy and molecular motion. "Retroversion" is the term given to incorporate this indeterminate molecular process for the major modes of interaction between biological subassemblies. Such retroversion will lead us to an emergent behavior of the cell or organ itself. Thus vions can control surface tension, diffusion rates, and so forth. These are very important for developing colony types of vionic interaction. Thus retroversion allows for the development of directed motion, secretion, neural/synaptic transfer, intercellular transmission, extracellular transmission, psychic states, intuition, body language, and the spoken language itself.

The four ways of interacting vions as indeterminate machines join to make more durable multivionic units. These four ways are: selection of parameters/subclasses, epigenesis, black box input/output control, and retroversion.

1. SELECTION OF PARAMETERS
2. EPIGENESIS
3. INPUT/OUTPUT CONTROL
4. RETROVERSION

There is a limit to the amount of information that can be handled given the size and space of a set of oscillators. Thus as Avogadro set a limit on the amount of molecules there might be in a mole of a substance, we will find similar limitations to the amount of information that can be handled in a given vion.

Perhaps it is Avogadro's number. A vion would be limited to 6.023×10^{23} bits of information for reproduction and metabolism.

The number of energy states in a statistical ensemble for reproduction must be kept *extremely* small, as small as possible while assembling the ensemble; whereas the amount of energy states needed to handle metabolic processes must be large. Given the limitations of what biology can handle, knowing the limitations of space, mass, and temperature, we know the type of environment biology can exist in. This sets up the requirements of the different metabolic energy states that must handle those transforms. So we can evaluate the limits of biology.

Thus an upper limit of the vion size will correspond to the build-up of the number of particles in the time and space for the events to become non-Gaussian. Thus as the cell approaches a larger space, it starts to approach Gaussian statistics. As push/pull thermodynamic events occur on it, through the Brownian motion of the surrounding molecules, we can start to see how large a unit might be before it does slip toward Gaussian dependence. Thus nature has set boundaries on the size of a vion, not only from information but also from interaction with the environment. There is a lower limit of the amount of information needed to handle these processes. Just the base is needed to become biologically active and handle metabolism and reproduction. The lower limit appears to be Avogadro's number. So a certain amount of mass and energy transport must occur, thus setting this lower limit.

Isaacs lists indications on what the upper and lower limits of vionic size might be:

One, the interaction between long-range forces and thermal collisions, as taken up in Chapter 7, is projected as setting limits on vionic size between approximately a thousand angstroms and several microns. Too large a vion would favor the forces of random thermal collisions. If a vion gets too large, it might not be functional, and it would pull from the various forces of the environment. Too small a vion would not be sufficient to handle the transitional probabilities, and the coupling in the transformation of the various energies. Also, if a vion is too small, it is not functional, in that sufficient amounts of varieties of electromagnetic input and output, and the ranges of thermal and infrared radiation, do not accumulate for holistic information of a given vion.

Two, limitation of the size is also connected with the consideration of simultaneousness and causality. The most rapid transmission of action known is electromagnetic radiation, having a speed of 2.997×10^{10} cm per second. The electromagnetic frequencies of virtual photons, which are an exchange between oscillators, are in the range of 10^{14} Hz to 10^{15} Hz per second. 10^{14} vibrations per second of the hydrogenic stretching frequencies are necessary for catalyses and synthesis. 3×10^{15} vibrations per second are needed for pre-disassociation and disassociation frequencies refitting the smaller molecule turnover of vionic metabolism. Thus several thousand angstroms or microns is the longest distance that can be transversed with one such vibration needed by a photon at maximum possible speed. Thus to develop and control the photon transfer, a certain size would be needed. To recognize this vibratory knowledge internally in the cell of the vion, we must be unrestricted. Isaacs offers this as explication for the process of photosynthesis, chemiluminescence, the Emerson effect of photosynthesis, the crabtree effect of intermediate metabolism, and the peroxide requirements of chemiluminescence. Biology depends on an information transfer of vibratory photons of light variety.

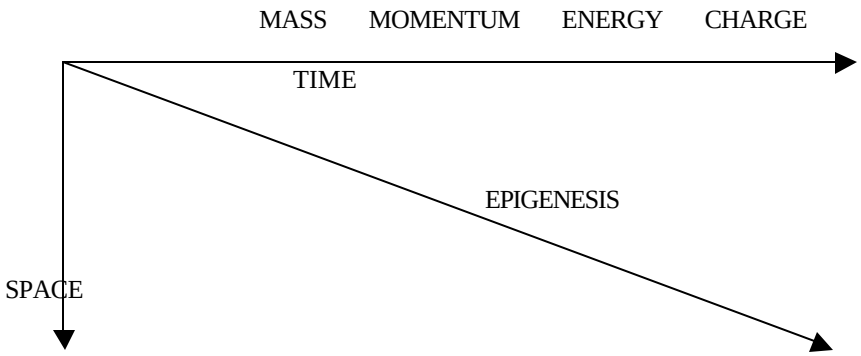
Three, living forms of blue algae, non-nucleated bacteria, some E. coli in forms without cell walls known as the mycoplasmatales, along with the cellular inclusions of nuclei, centrioles, kinetosomes, plastids, mitochondria and microtubulars, which have been labeled "vions", have sizes that range between several thousand angstroms and several microns. This is to say that there is actual biological correspondence to the mathematically predicted size of these entities. We have outlined a minimal and maximal size of healthy cells.

When we use visible light, in terms of a microscope, there is some minimal injurious system participating in the heat released in the biological organism. The smallest units can be visible and are reliably observed. To find units smaller than their sizes of normal light, we must resort to electron microscopes, which destroy what we are looking at, in the form of the ionizing radiation. Thus the smallest amount of light we would be able to use in visible light would be in the ranges of the vionic size.

Rife has developed a microscope that allows him to look at sizes smaller than this; viral capacities and entities beneath the size of our vionic limitations. This is baffling to modern forms of optics when we are using a type of visible light and observing something beneath the size of its wavelength. There is much strong contention that this might be possible by the Rife group, although proof of it has not been rendered to the scientific community. This researcher alone has had several occasions to meet with people who have made such claims of microscopes but were not able to validate them. Perhaps by using some type of lens that could twist or lengthen the wavelength, we might be able to look at particles beneath it. The possibility exists that Rife might be right, but at the same time, the scientific community is waiting for the evidence.

Now that we have looked at some of the basic parameters of the vion, let's look at some of the ways they can be coupled, as we use the atomistic units to assemble other molecules. We will first need to develop a periodic chart of our atoms or our different types of vions.

The types of vions capable in our basic presentation have many types of functions through their adaptations. We can see that they are developed to handle the entities of mass, momentum, charge and energy in different ways. Also vions have been developed for individual applications through space or applications through time, and also variants of metabolism and reproduction. So the vions that make up the various atomistic units are listed in the diagram below. Functions handling changes of mass, momentum, energy and charge dictate different vions.

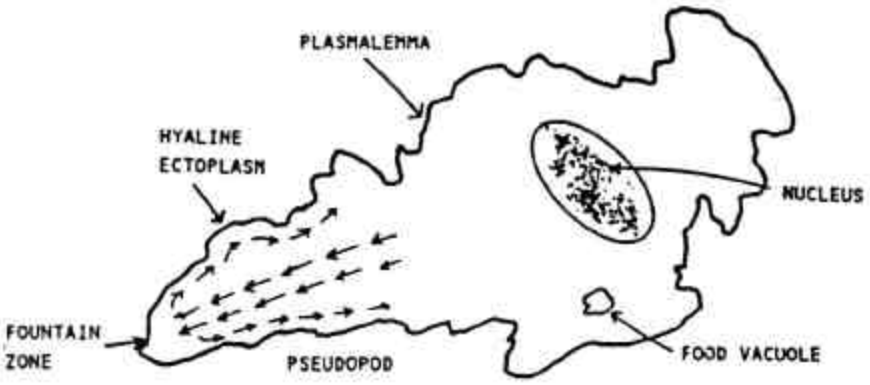


Univions are blue-green algae, myxophyceae, different types of fission fungi, bacteria that have no nuclei such as schizomycetes, and mycoplasmatales; these are examples of free living vions.

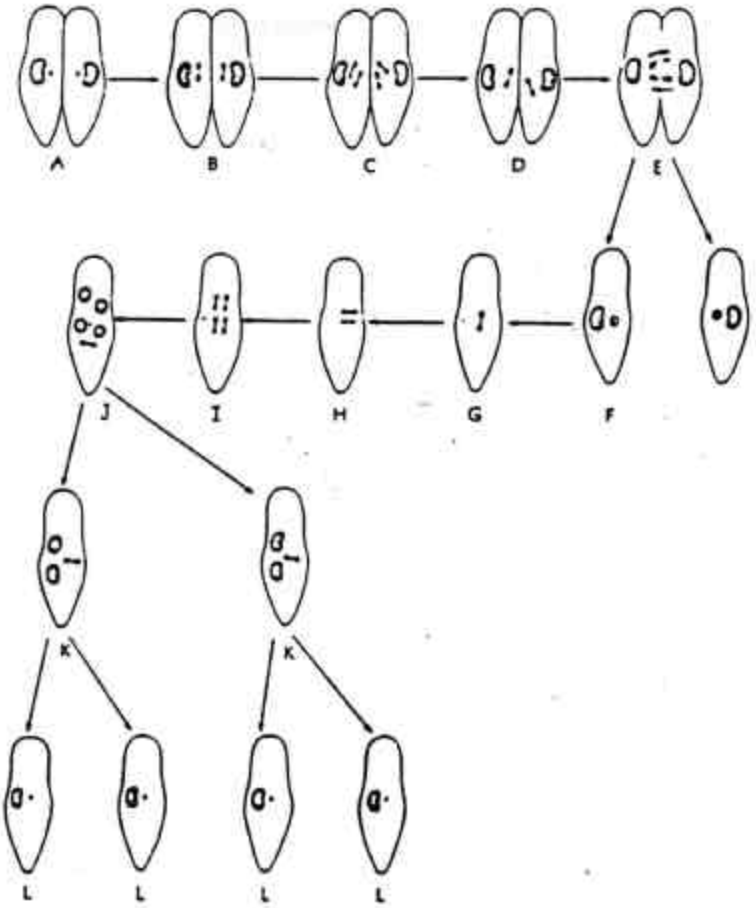
Thus these single-envelope systems have no nuclei, and can grow on cell-free media. They have the capacities of reproduction and metabolism, and they are limited in size, from .1 to 3.0 microns. (This is at least one dimension). They possess some large molecules believed to be nucleic acids and some proteins.

Viruses and rickettsia do not perform metabolism and reproduction independently, and thus do not seem to be free living vions. Rickettsia are of the vionic size, and they have a single envelope, no nuclei; but they require a cellular environment for growth. Viruses may also be the size of vions, but possess no plasma membrane, and they depend on cellular hosts. Both viruses and rickettsia need to live in symbiosis with other organisms that can totally reproduce on their own. Viruses would be analogous to subatomic particles, and rickettsia analogous to chemical-free radicals trapped in a matrix. Isaacs relates a strong analogy of quantum dynamics of the atom to biology.

Now that we can step out to build some unicellular, multivionic cells, we can apply this to the procedure of using certain atoms to make certain molecules. Here we will find that there are two envelope systems capable of division by mitosis or meiosis, as well as amitosis. Thus a multivionic living unit is analogous to the molecularity of chemistry.

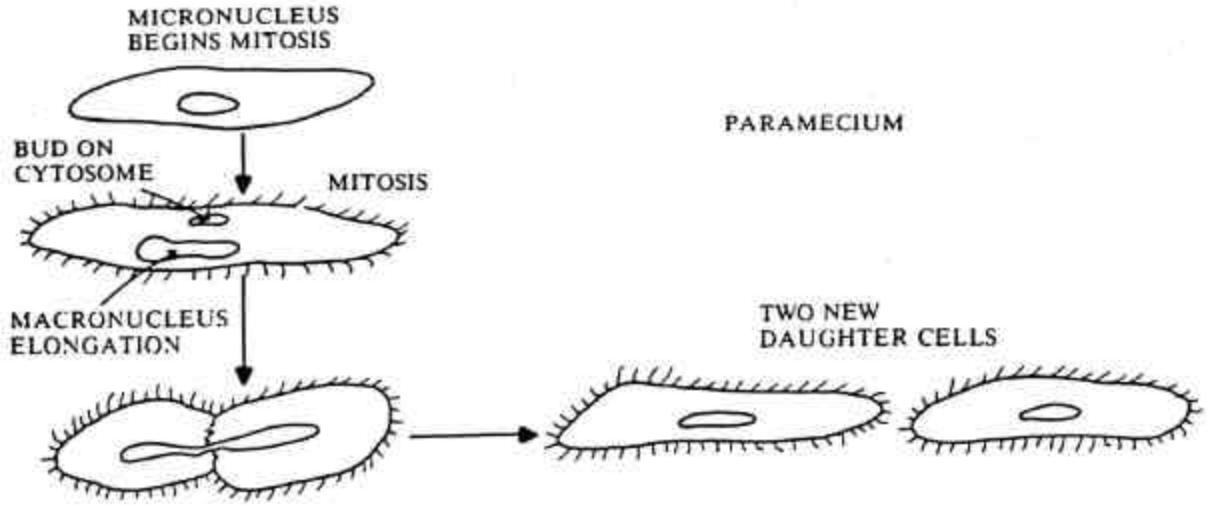


There are primitive unicellular organisms that possess only a nucleus in cytoplasm. Examples of these are green algae, chlorophyceae, ascomycetes fungi, some protozoas, such as sporozoa, and karyotic fission fungi. This is known as the *schizomycetes*.

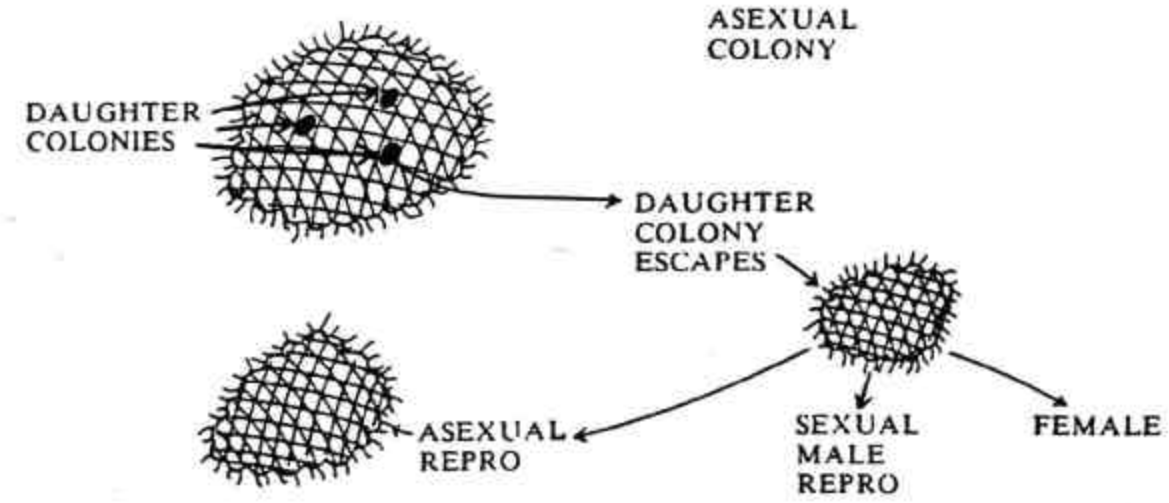


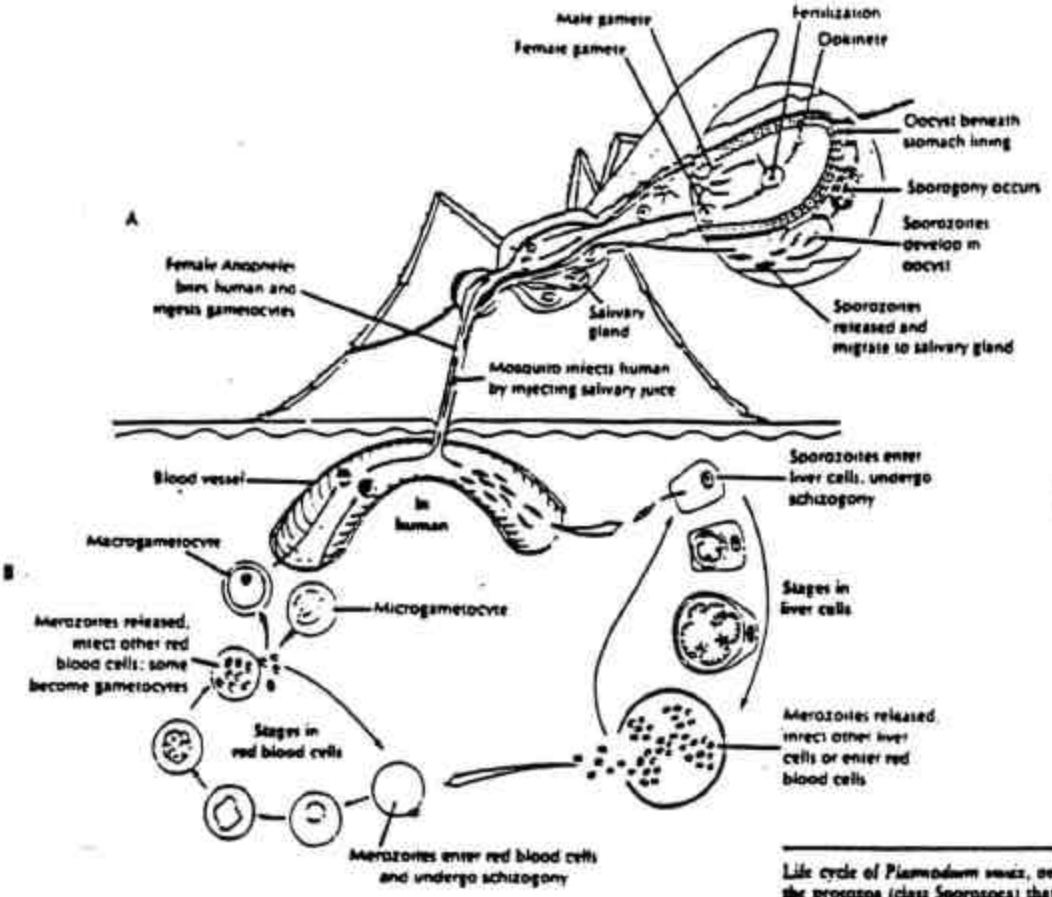
Sexual reproduction, or conjugation, in *Paramecium caudatum*. A, Similar individuals come in contact on oral surface; micronuclei prepare to divide. B and C, Micronuclei divide twice (meiosis), resulting in four haploid nuclei in each partner. D, Three nuclei degenerate; remaining one divides to form "male" and "female" pronuclei. E, Male pronuclei are exchanged between conjugants. F, In each conjugant, male and female pronuclei fuse to form synkaryon pronucleus (diploid); conjugants now separate. G to I, In each exconjugant the synkaryon divides three times to form eight micronuclei; the old macronucleus is gradually resorbed. J, Four of the micronuclei become macronuclei; three are resorbed; one prepares to divide as the cytosome divides. K and L, Micronucleus divides twice as the cytosome divides twice; each of the four resulting daughter cells receives a micronucleus and one of the four macronuclei.

There are some *colonial* primitive unicellular organisms. These are organisms that are unicellular but live in colonies, such as green algae, vaucheria, coenocycitic algae-like fungi, phycomycetes, and coenocycitic slime mold myxomycetes when they react at their swarm stage.

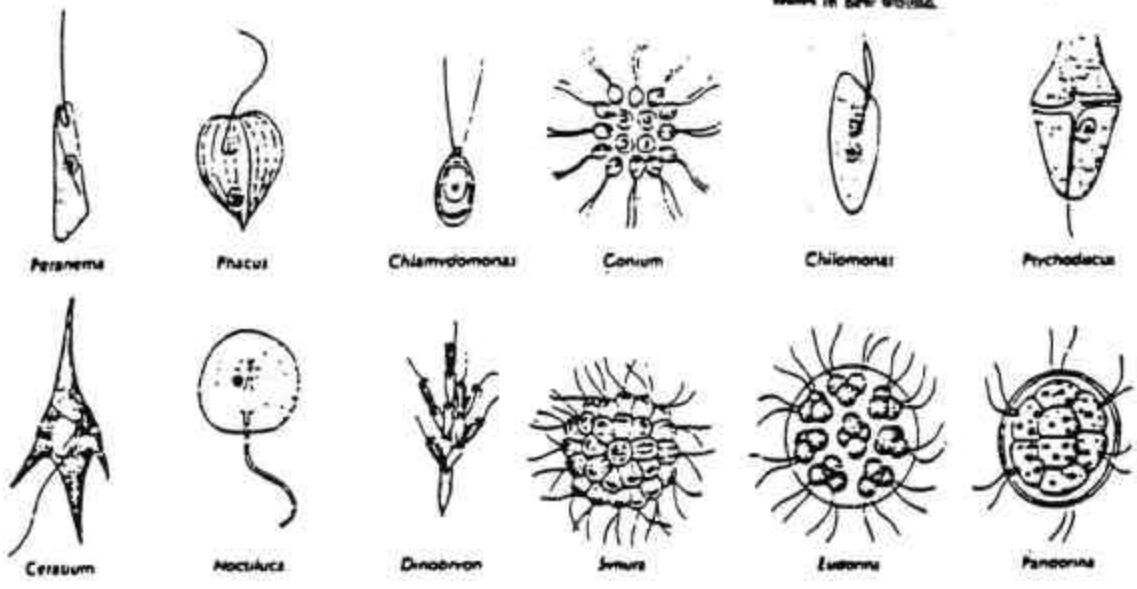


There are organized cell organisms that can exist singly or in colonies. They do have nuclei and are composed of many types of vions. These cells will have the ability to organize and aggregate various regulatory functions and connect the vions into a cellular system. These vions are subcellular units that still possess reproduction and metabolism capacities, even though they may be modified to possibly emphasize one over the other.

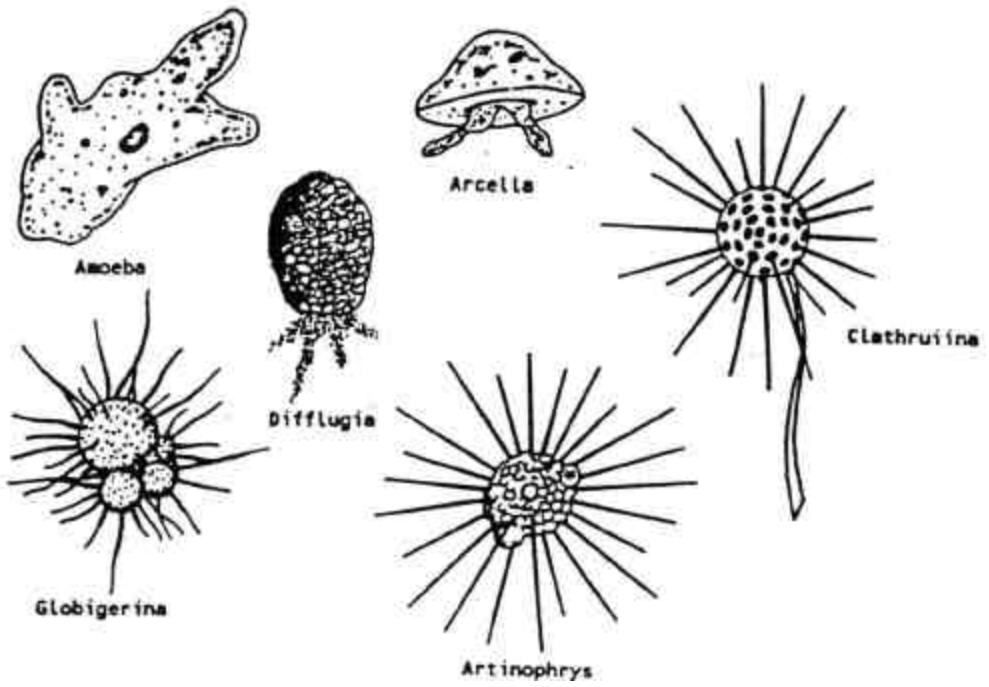




Life cycle of *Plasmodium* spp., one of the protozoa (class Sporozoa) that causes malaria in humans. A. Sexual cycle produces sporozoites in body of mosquito. Meiosis occurs just after zygote formation (zygote meiosis). B. Sporozoites infect human and reproduce asexually, first in liver cells and then in red blood cells. Malaria is spread by *Anopheles* mosquito, which sucks up gametocytes along with human blood, then, when biting another victim, leaves sporozoites in new wound.



Singly living organized unicellular organisms might include protozoa, mastigophora, and some types of flagellated protozoa, such as ciliata sarcodina. Some of these can organize in colonies to develop the various flagyls, such as the volvocidae of the mastigophora class like the volvocs. Some of these have twenty thousand cells and are completely reproductive and metabolic. Some of the cells have non-epigenetic change, and have functions regarding sex; some others for bodily recreation of the organism. Any cell may be reversibly separated and reproduce an organism, or metabolize independently. Thus these are called "reversible multicellular tissue organisms".

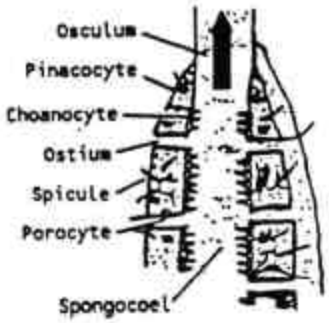


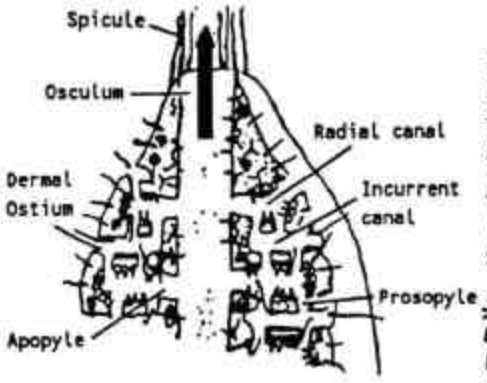
These organized cells can live together not only in reversible colonies but also in multicellular tissue organisms that are quasi-organismic. This is a type of macro-molecularity and -chemistry, in which molecules join to make even larger molecules, such as amino acids joining to form large protein complexes.

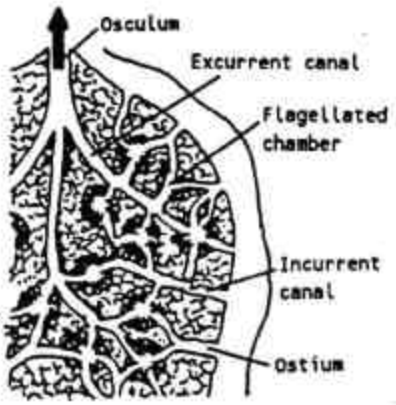
Amino acids are made up of atoms, which make up the various protein molecules, just as the vions make up various types of multicellular organisms. These multicellular groupings now become quasi-organismic large cell systems. If they have undergone an irreversible epigenetic change, the vion is said to be *breed-true*; it will propagate a direct line of tissue cell divisions. Here selection of function is very important. The vions and cells will reproduce and develop certain specialized functions.

The size of most cells has not been restricted under epigenetic change, according to Isaacs. Size, shape and function of these cells is dependent upon parameter selection in the particular situation. However, some epigenetic divisions of vions may occur. Multiplicity of functions dictate differential dimension changes.

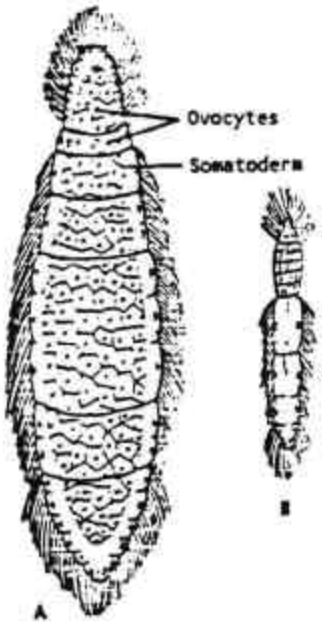
Certain cells are positioned to handle viscosity changes or momentum. These will need to be broad-based, or long. Some will need to handle changes in charge; thus they must be receptive to ionic changes, and will have certain propositional changes at their membranes, such as nerve cells, which must delicately balance the potassium and sodium production, and ionic proportions





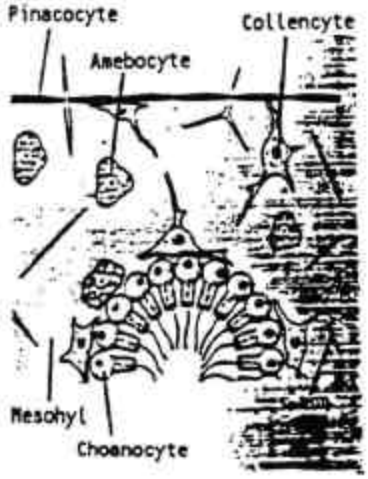


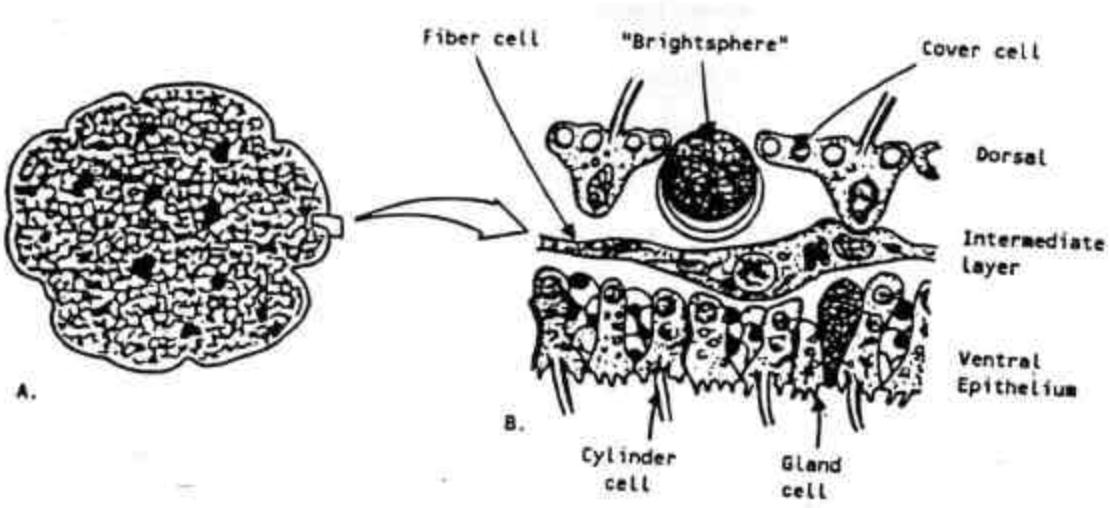
Three types of sponge structure. The degree of complexity from simple asconoid to complex leuconoid type has involved mainly the water-canal and skeletal systems, accompanied by outfolding and branching of the collar cell layer. The leuconoid type is considered the major plan for sponges, for it permits greater size and more efficient water circulation.



A, Female and B, male orthonectid (Rhopalura). This mesozoan parasitizes such forms as flatworms, molluscs, annelids, and brittle stars. The structure consists of a single layer of ciliated epithelial cells surrounding an inner mass of sex cells.

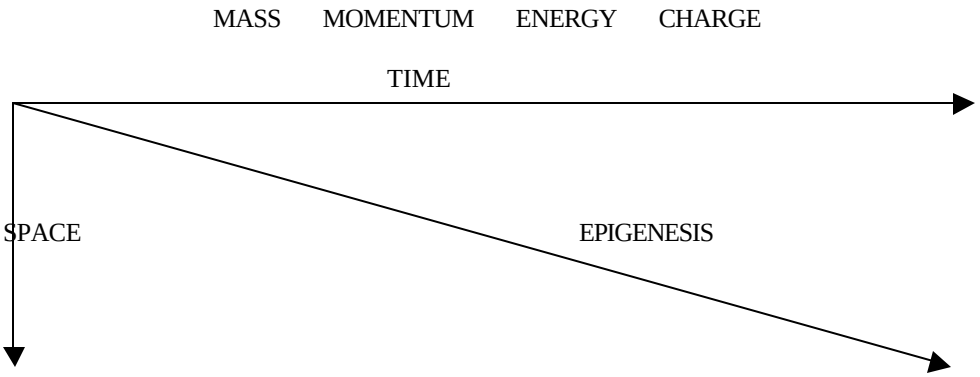
Small section through sponge wall, showing four types of sponge cells. Pinacocytes are protective and contractile; choanocytes create water currents and engulf food particles; amebocytes have a variety of functions; collencytes appear to have a contractile function.





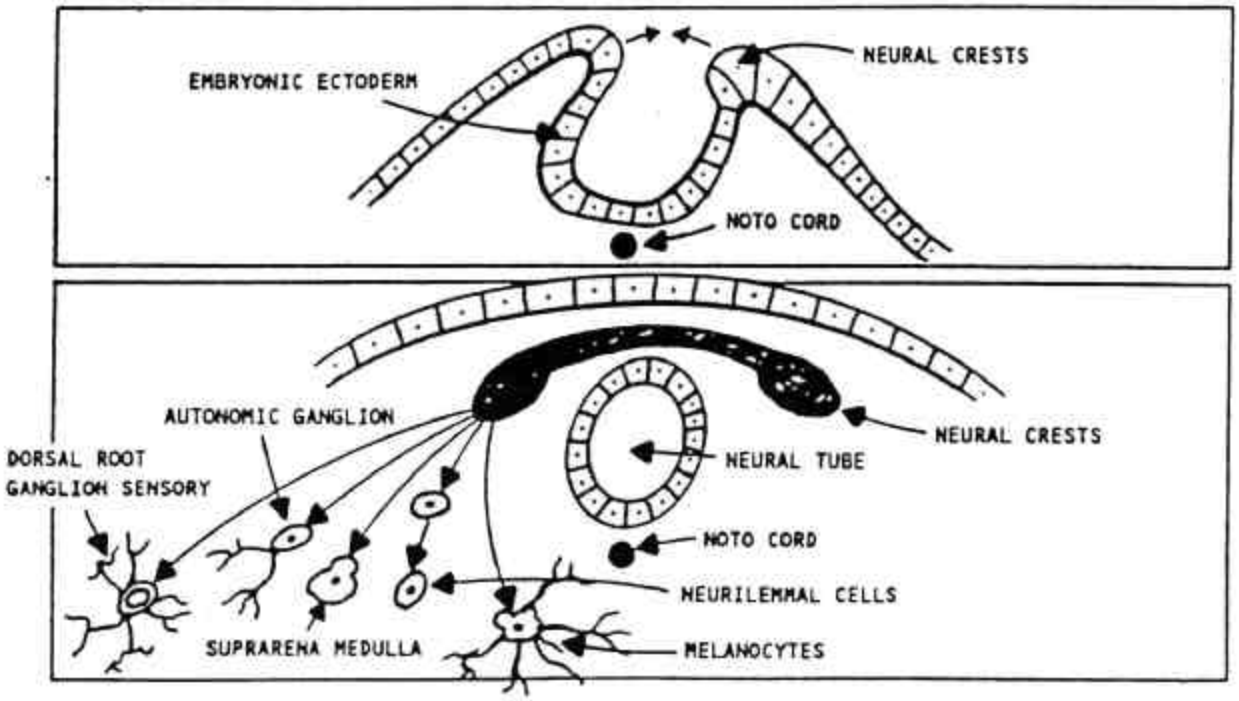
within the cell. Other cells that handle radiation will need to be small, so that they can receive the various photons, and transmute or transduce this radiation into some other type of variable. Certain cells will have to handle mass changes, such as the transport of proteins, carbohydrates and fats. These cells will line the intestinal tract, the alveoli membrane for handling oxygenation, and so on. Thus as we handle the variances of elements transferred, cells and vions must evolve for specialized tasks.

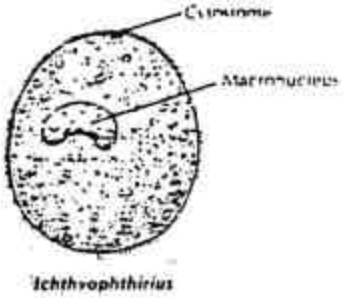
These types of divisions will lead to specialized multivionic cells, primitive multicellular tissues, and a few permanent organs. These types of divisions can occur, writes Isaacs, in a number of widely-scattered meristemic tissues of plants. Some of these epigenetic divisions are seasonably and environmentally recurrent. These quasi-organismic organisms include: red algae, rhodophycae, brown algae, phaephycaceae, club algae, rust, smuts, fleshy-woody fungi, other types of slime mold in higher plants, and embryophyta.



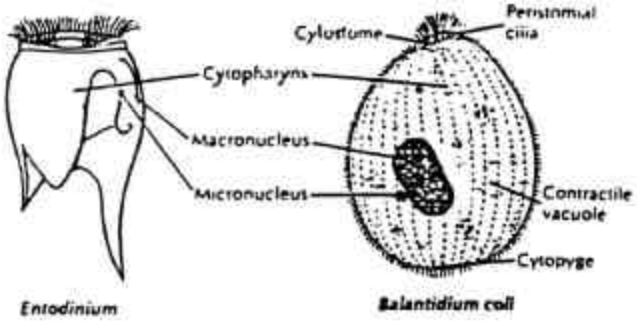
The divisions of full organismic organisms in addition to other parameter selection and epigenetic divisions will occur relatively early and provide history of the organism before sexual maturation of the adult form. These are exhibited as the zygote divides into tissue germ layers in the embryo, with subsequent development of many differentiated organisms in the number of systems. Epigenetic divisions will be displayed in the early embryo development, and as ontogeny recapitulates phylogeny, we will see the development of growth through many stages that might include larval metamorphosis, growth spurts, puberty, and other major divisions and growth factors of the organism. There will be gamete production and other development of epigenetic processes to support reproduction tissue.

Fully organismic organisms include sponges and all metazoan animals.



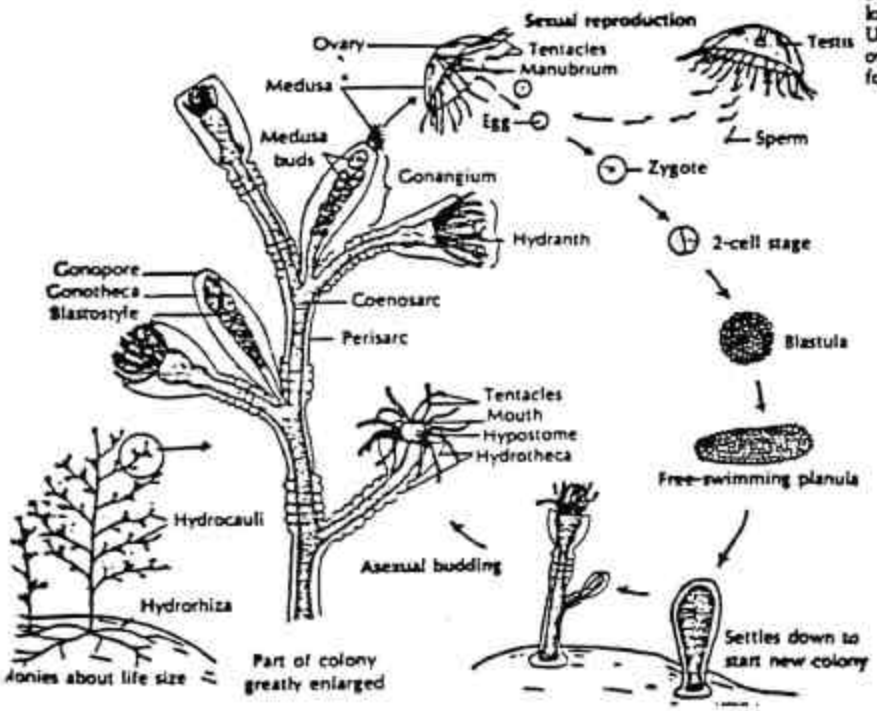


Ichthyophthirius

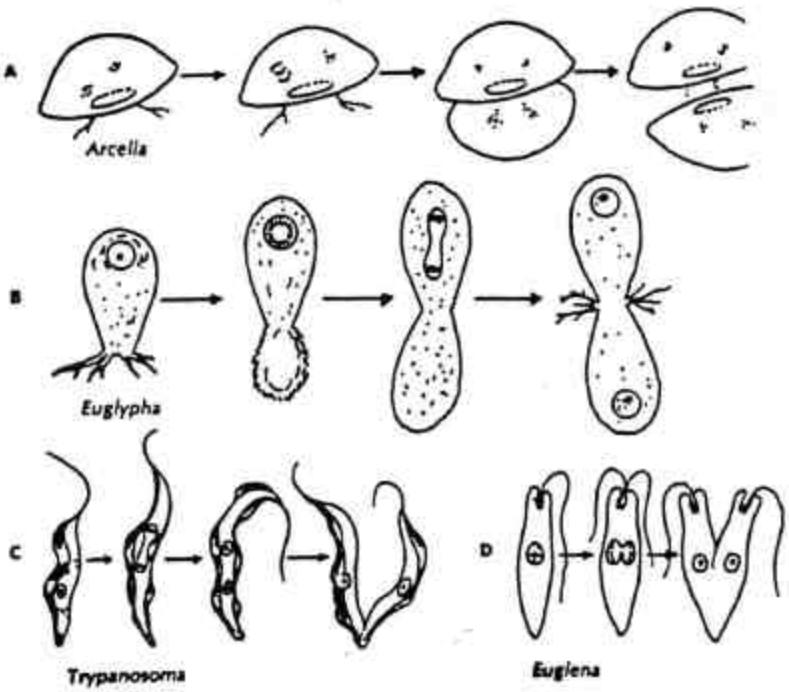


Entodinium — *Balantidium coli*

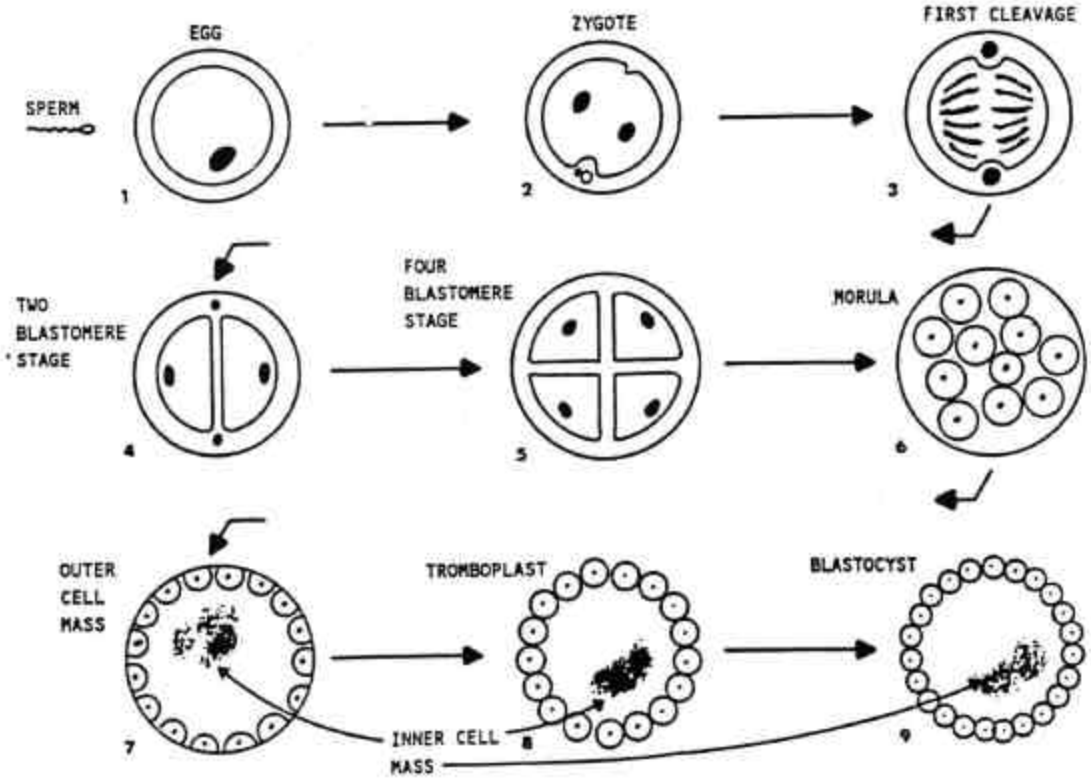
Some symbiotic ciliates. *Balantidium coli* is a parasite of humans and other mammals. This ciliate is common in pigs, in which it does little damage. In humans it may produce intestinal ulcers and severe chronic dysentery. Infections are common in parts of Europe, Asia, and Africa but are rare in the United States. *Ichthyophthirius* causes a common disease in aquarium and wild freshwater fish, known as "ick" to many fish culturists. Untreated, it can cause much loss of exotic fish. *Entodinium* is a complex ciliate found in the rumen of cows and sheep.



Within each species of *Paramecium* the individuals exhibit morphological and physiological differences. Since these differences are usually more minor and more superficial than those that distinguish species, the groups within a species are referred to as strains, biotypes, or varieties. Most species of protozoa can be divided into a number of these groups.



Binary fission in some sarcodines and flagellates. A, The two nuclei of *Arcella* divide as some of its cytoplasm is extruded and begins to secrete a new test for the daughter cell. B, The test of another sarcodine, *Euglypha*, is constructed of secreted platelets. Secretion of the platelets for the daughter cell is begun before the cytoplasm begins to move out the aperture. As these are used to construct the test of the daughter cell, the nucleus divides. C, *Trypanosoma* has a kinetoplast (part of the mitochondrion) near the kinetosome of its flagellum close to its posterior end in the stage shown. All of these parts must be replicated before the cell divides. D, Division of *Euglena*.



Comprehensive classification of living organisms based on the vion

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(Sub-vionic particles-- viruses, bacteriophages)
(Rickettsia-- "parasitic" vions)

I. Unicellular Organism — Includes part of Thallophyta (Vegetable Subkingdom)
   - Blue-green algae (Mycophyceae)
   - Akaryotic fission fungi (Schizomycetes)
   - Mycoplasmatales

II. Unicellular Organisms

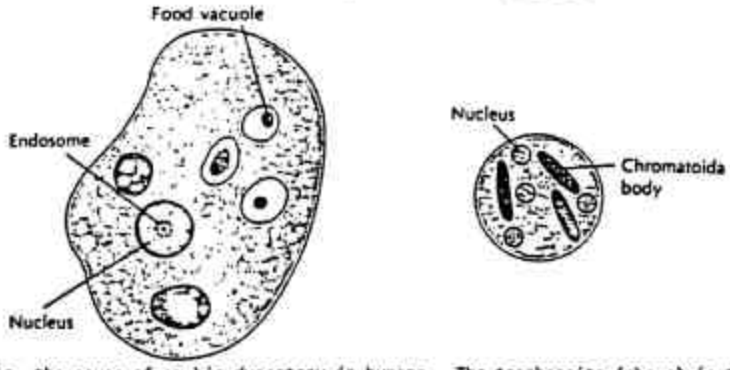
A. Primitive Unicellular Organisms
   (Parameter selection, reversible; 2 or a few vions; nucleus and cytoplasm, possibly chloroplasts)
   1. Singly Living Primitive Unicellular Organisms
      - Green algae (Chlorophyceae)
      - Sac-bearing fungi (Ascomycetes, yeasts, Fungi Imperfecti, some molds)
      - Some protozoa (Sporozoa)
      - Karyotic fission fungi (Schizomycetes)
   2. Colonial Primitive Unicellular Organisms
      - Coenocytic green algae (Vaucheria)
      - Algal fungi (Phycomycetes)
      - Coenocytic slime molds (Myxogastrales or Myxomycetes of subclass Mycetozoa)

B. Organized Unicellular Organisms
   (Parameter selections from environment which are usually reversible; many vions)
   1. Singly Living Organized Unicellular Organisms
      (Protozoa)
      - Flagellates (Mastigophora)
      - Ciliates (Ciliata)
      - (Sarcodina) and (Suctoria)
   2. Colonial Organized Unicellular Organisms or Reversible Multicellular Tissue Organisms
      - Volvox (Volvocidae), Mesozoa

III. Multicellular Tissue Organisms

A. Quasi-Organismic Organisms
   (Beginning of epigenesis, with some specialization and only a little internal degeneration of vions; epigenesis relatively late, i. e. after or concurrent with setting aside of gamete forming and embryonic germ tissues for reproduction of new organisms; mostly nonspecialized or primitive tissue with development of only a few organs)
   - Red algae (Rhodophyceae) — Includes part of Thallophyta (Vegetable Subkingdom)
   - Brown algae (Phaephyceae)
   - Club algae, rusts, smuts, fleshy and woody fungi (Basidiomycetes)
   - Higher plants
     - Bryophyta (Mosses and liverwursts) — Embryophyta (Vegetable Subkingdom)
     - Pteridophyta (Ferns and related plants)
     - Spermatophyta (Seed-bearing plants)
   - Cellular slime molds (Acrasiales)

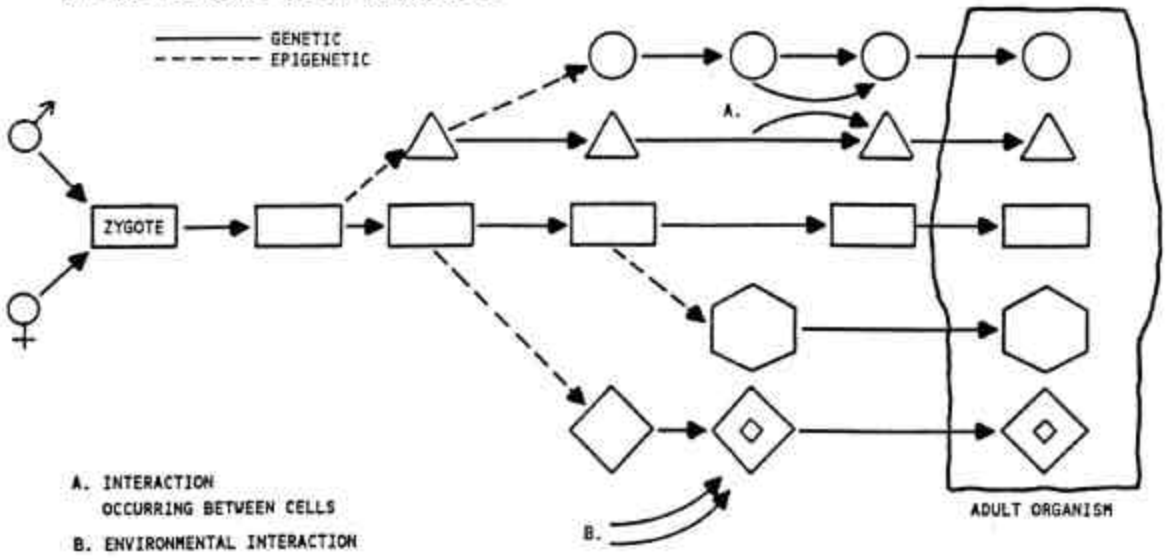
B. Fully-organismic Organisms
   (Definite epigenesis and specialized tissue formation, with epigenetic change early, i. e. before sexual maturation of the organism; multiple germ layers differentiate in embryo; ontogeny recapitulates phylogeny; specialized tissues develop into many organs in a number of systems)
   - Sponges (Porifera)
   - Invertebrates
   - Vertebrates

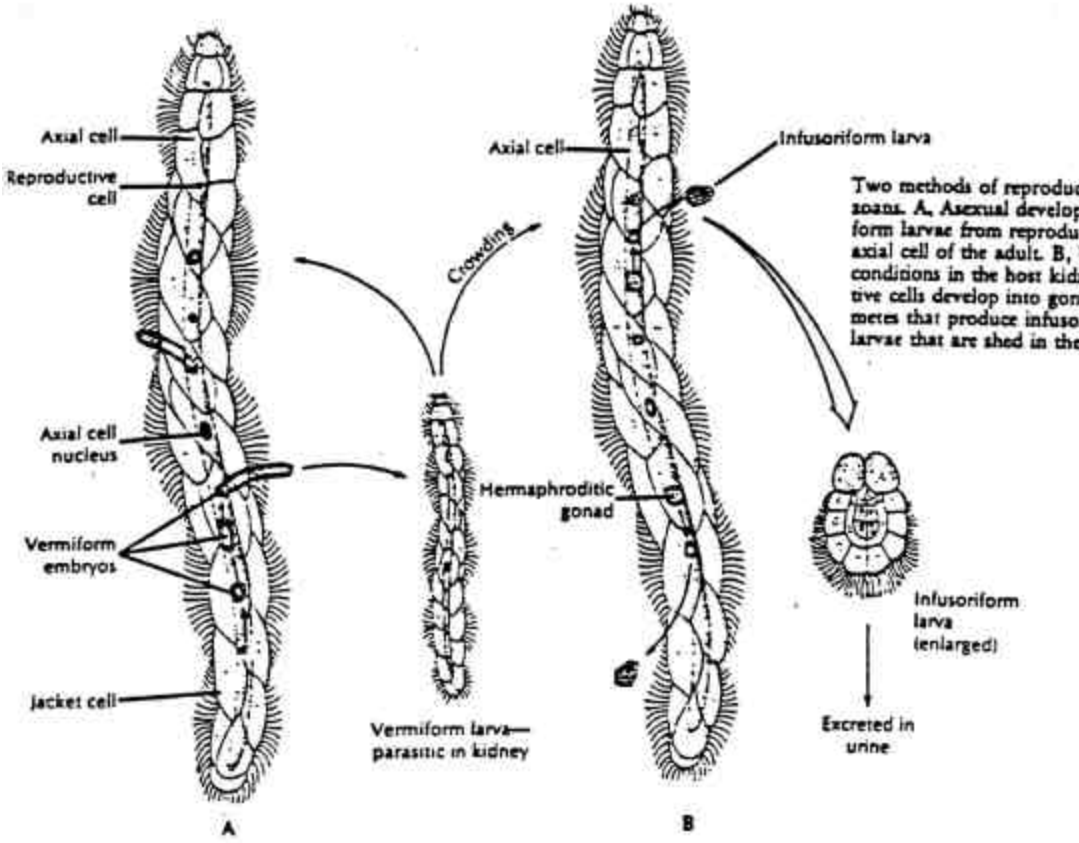


Entamoeba histolytica, the cause of amebic dysentery in humans. The trophozoite (above) is the actively moving and feeding form. It contains a single nucleus and several food vacuoles. The cyst can tolerate conditions outside the body and is infective to the new host. It contains four nuclei and several chromatoidal bodies. The chromatoidal bodies are an organized form of RNA. On excystment in the small intestine of the host, the nuclei will divide again, and the cytoplasm divides to produce eight small amoebas. The nuclei of both the trophozoite and the cyst are vesicular and have a central endosome.

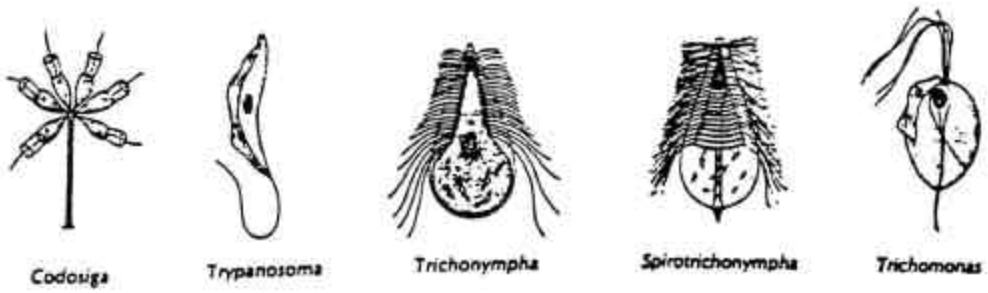
SOME FEEDING METHODS AMONG PROTOZOA

Amoeba surrounds a small flagellate with pseudopodia. Leidyopsis, a flagellate living in the intestine of termites, forms pseudopodia and ingests wood chips. Didinium, a ciliate, feeds only on Paramecium, which it swallows through a temporary cytosome in its anterior end. Sometimes more than one Didinium feed on the same Paramecium. Podophrya is a suctorian ciliophoran. Its tentacles attach to its prey and such prey cytoplasm into the body of the Podophrya, where it is pinched off to form food vacuoles. Technically, all of these methods are types of phagocytosis.





Two methods of reproduction by mesozoans. A, Asexual development of vermiform larvae from reproductive cells in the axial cell of the adult. B, Under crowded conditions in the host kidney, reproductive cells develop into gonads with gametes that produce infusoriform dispersal larvae that are shed in the host urine.



Some Zoomastigophorea. *Codosiga* is a colonial flagellate with cells similar to those found in sponges (phylum Porifera). The others are all symbiotic. *Trichonympha*, *Spirotrichonympha*, and *Trichomonas* are commonly found in the gut of termites and wood roaches, where they help digest cellulose from the wood eaten by the insects. Species of *Trichomonas* are also found in humans. *Trypanosoma* is a parasite of various animals, and some species cause serious disease in humans and domestic animals.

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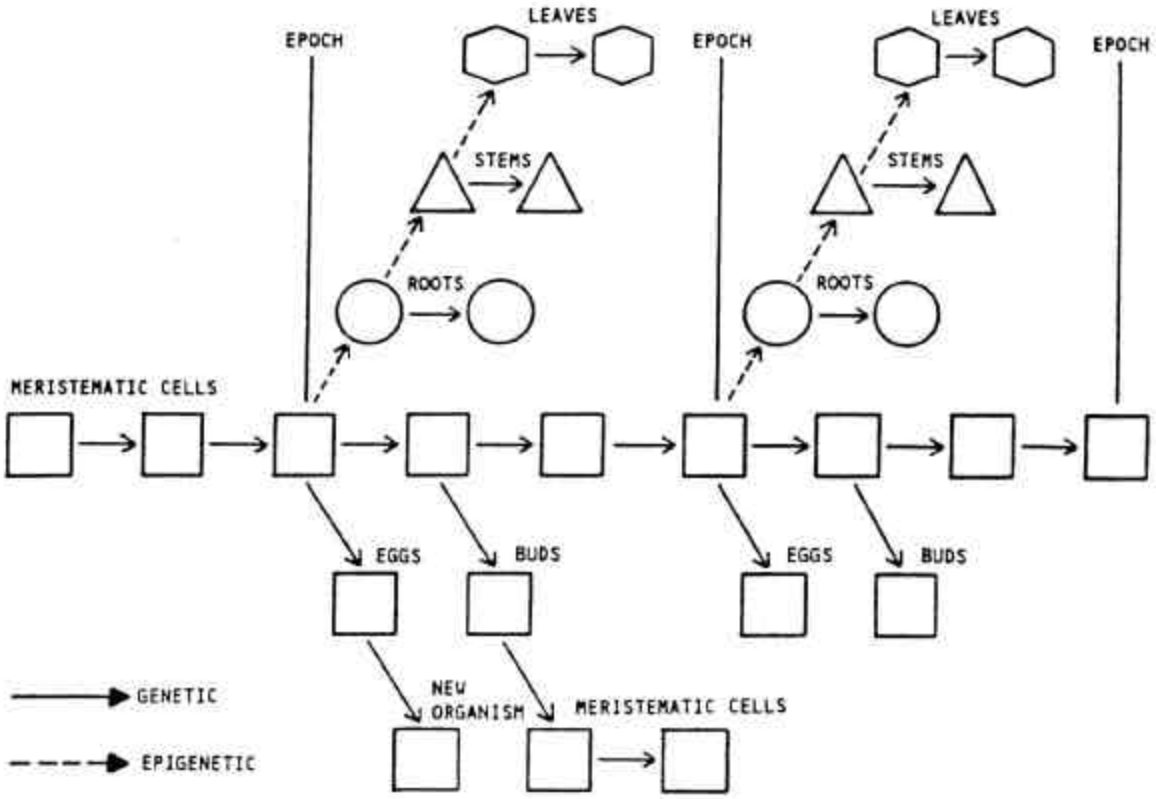
- Red algae (Rhodophyceae) — Includes part of Thallophyta (Vegetable Subkingdom)
- Brown algae (Phaephyceae) — Includes part of Thallophyta (Vegetable Subkingdom)
- Club algae, rusts, smuts, fleshy and woody fungi (Basidiomycetes)
- Higher plants
  - Bryophyta (Mosses and liverwursts) — Embryophyta (Vegetable Subkingdom)
  - Pteridophyta (Ferns and related plants) — Embryophyta (Vegetable Subkingdom)
  - Spermatophyta (Seed-bearing plants) — Embryophyta (Vegetable Subkingdom)
- Cellular slime molds (Acrasiales)

B. Fully-organismic Organisms
(Definite epigenesis and *specialized tissue* formation, with epigenetic change early, i. e. before sexual maturation of the organism; multiple germ layers differentiate in embryo; ontogeny recapitulates phylogeny; specialized tissues develop into many organs in a number of systems)

- Sponges (Porifera)
- Invertebrates
- Vertebrates

The next two figures from Dr. Isaacs's book show the development of metazoan animals, as we assemble these vionic molecules.



In metazoan animals the germ cells of males and females undergo sexual conjugation. Vionic material of the nuclear variety is exchanged. This process is followed by meiotic reduction of the nuclear chromotin material, allowing for the fertilized egg or zygote. The zygote thus represents a new counting system of the number of occupied energy states for the vion of the developing organism.

The two major classifications of phenomena that occur are maternal from the division of vions other than egg nucleus, and the information exchange leading to heterotopy. This prevents the loss of hybrid vigor of the plants through asexuality exchange. The reduction/division of the zygote is followed by genetic division of new cells that occur in the blastulation and gastrulation stage. After these very early stages of embryo genesis, the epigenetic and genetic division begin to occur.

Environmental conditions have large effect here on the various epigenetic divisions. A multi-potent cell is a cell that can have many distinct functions, such as the stem cell that is born in the bone marrow. These stem cells later become a variety of blood cells. Any metazoan animal must have certain pleura potent cells that could fill in if needed by the organism. After the epigenetic division these cells can become breed-true, and reversibility becomes impossible.

Thus a breed-true cell would be a cell that would have much difficulty in trying to reverse, such as the germ tissue layers of the embryo. Here there is a trading off or loss of information augmentation of function among the vions of the cells, the cells being limited in volume and touching other specialized tissues of the fully-developed organs.

There are two types or environmental conditions where adult cells and tissues form; one, *organismic*; and two, *nonorganismic* or independent.

The organismic environmental conditions under which vions and cells exchange information can be broken down into two other categories: contact relations and distant relations. Contact relations include shape, pressure, adhesion, electrical interaction, molecule or template, and long-range forces. The distance relations include blood and lymph, circulatory, neural and hormonal. The difference of non-organismic influences are thermal, photic, gravitational, etc. Coupling of vions themselves occurs mainly through parameter selection and epigenesis. Genetic divisions continue to occur in some pleural, multi-potent cells, and genetic divisions occur without epigenesis.

QUANTIZATION PATTERN FOR INFORMATION STABILIZATION

UNIVERSAL ENVIRONMENTAL SOCIETAL

ORGANISM

ORGAN SYSTEM

ORGAN

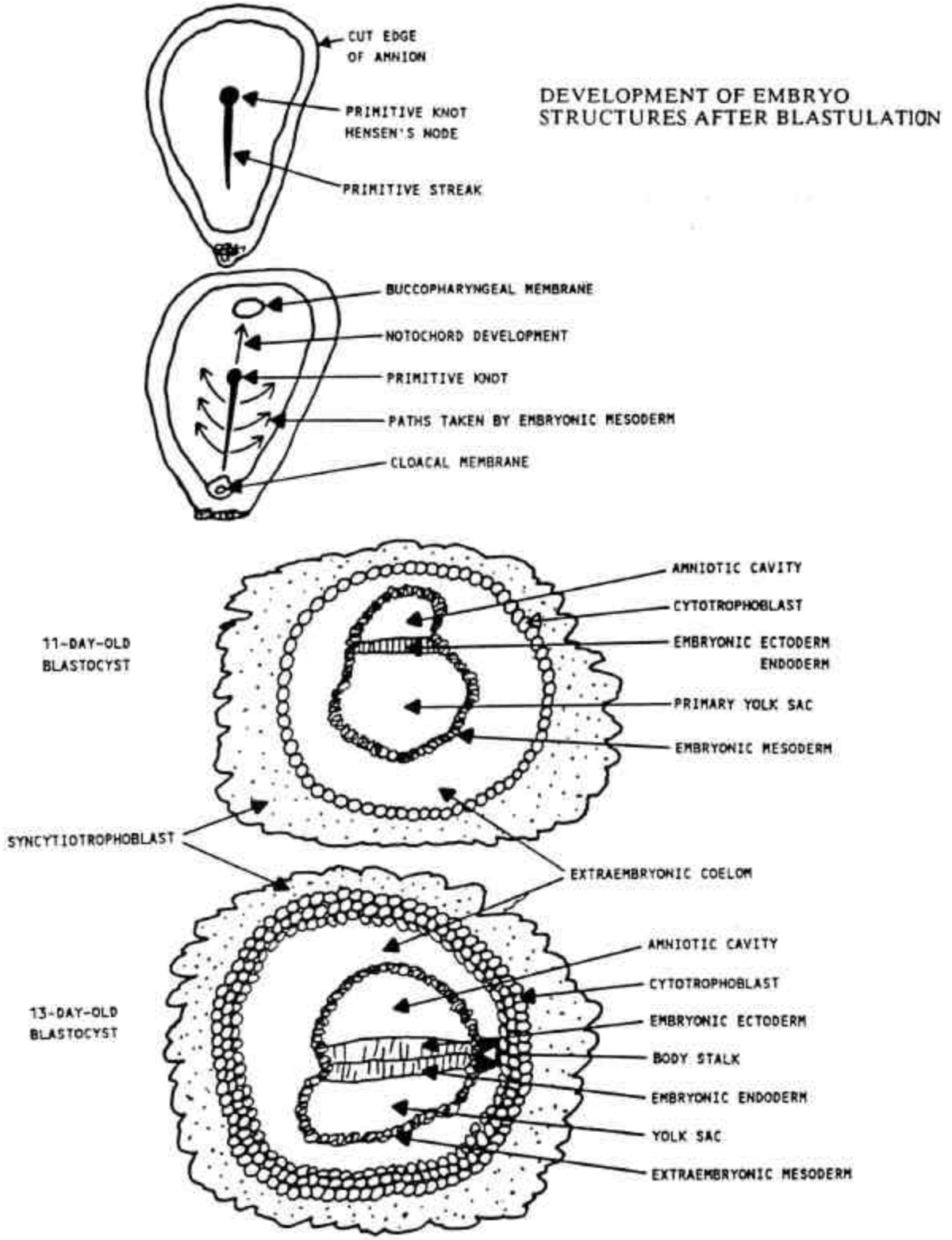
CELLULAR (Genetic vs. Metabolism)

MOLECULAR

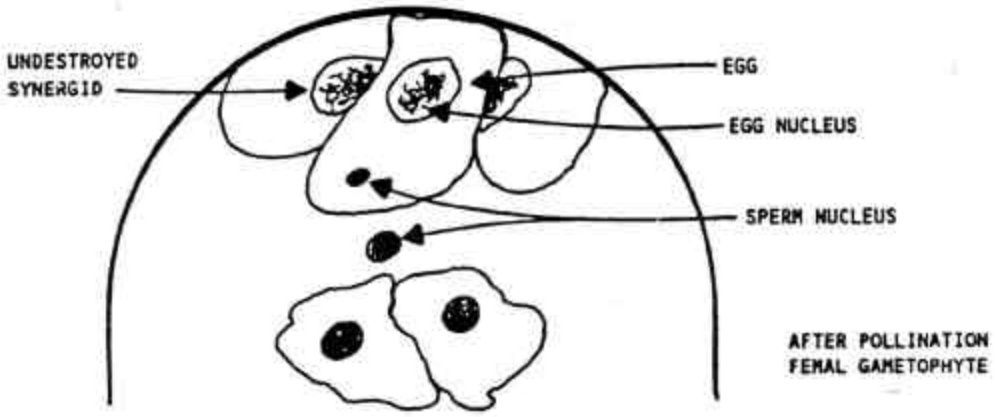
ATOMIC

SUBATOMIC

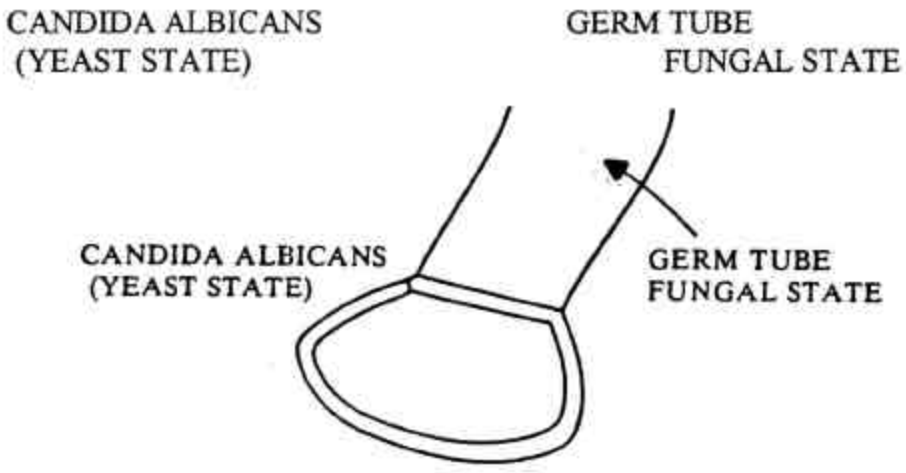
SUBSPACE


DEVELOPMENT OF EMBRYO
STRUCTURES AFTER BLASTULATION
CUT EDGE
OF AMNION
PRIMITIVE KNOT
HENSEN'S NODE
PRIMITIVE STREAK
BUCCOPHARYNGEAL MEMBRANE
NOTOCHORD DEVELOPMENT
PRIMITIVE KNOT
PATHS TAKEN BY EMBRYONIC MESODERM
CLOACAL MEMBRANE
11-DAY-OLD
BLASTOCYST
AMNIOTIC CAVITY
CYTOTROPHOBLAST
EMBRYONIC ECTODERM
ENDODERM
PRIMARY YOLK SAC
EMBRYONIC MESODERM
SYNCYTIOTROPHOBLAST
EXTRAEMBRYONIC COELOM
13-DAY-OLD
BLASTOCYST
AMNIOTIC CAVITY
CYTOTROPHOBLAST
EMBRYONIC ECTODERM
BODY STALK
EMBRYONIC ENDODERM
YOLK SAC
EXTRAEMBRYONIC MESODERM

ANIMAL	PLANT
EARLY SOMATIC EPIGENESIS	EARLY GAMETE MATURATION
LATER LOCAL GAMETE MATURATION	LATER LOCAL EPIGENESIS
EMPHASIS ON METABOLISM	EMPHASIS ON REPRODUCTION



Animals that perform large and extensive epigenetic division early can be exhibited as a development of different germ layers, embryonic tissues and organ systems, which are acted out as ontogeny recapitulating phylogeny in embryogenesis. When plants do this massive epigenetic division of cells later on, there are several ways this might happen: first, in the ability of a cell with appropriate metabolic support to reproduce the whole plant organism; second, in the more colonial-like living and development of only a few organs; third, in the pleomorphism of cells; and fourth, in the more primitive, less specialized embryogenesis.



One reason for the development of the nuclei of intracellular vions is the conservation of information in the reproduction of the cell. Each vion inside the cell is capable of reproduction and metabolism, and indeed it must divide in a certain time line in order to restrict the number of occupied energy states to qualify for molecular indeterminacy. The nucleus of a cell, moreover, seems to be a vion concerned with the information of the cell as a unit, setting up an overall information field for the rest of the coupled vions.

The role of the nucleus is seen to be integration, synchronization, transfer, and integration of the work of other vions into economy of the whole cell. Synchronization of cell division with vionic division and transfer of information to the daughter cells upon division are also the function of the nucleus. Even though this information is transferred from cell to cell, sometimes chance molecular aggregations may persist over many asexual generations. Such a phenomenon is that of the *miasm*, where a miasmatic infection of the nature of syphilis or possibly gonorrhea might cause a genetic dysfunction or irregularity of information; thus a certain disease or genetic dysfunction resulting in irregularity of information or tendency toward certain symptom profiles.

Isaacs writes that conjugation with the resulting dynamic interaction of slightly dissimilar molecular species is an effective method for countering such loss of biotonic information. Sexual conjugation is a further elaboration to insure molecular mixing in the zygote or beginning organism. Thus the multicellular organism insures that conjugation occurs at some point of its life cycle, since the germ plasm may have undergone repeated division within the organism itself. Thus a miasm might be in the germ plasm of a cell, and not the genetic structure.

In quantum theory we have the law of anomaly. Another anomaly we must cover here is that of *amitotic division* of the multivionic cells. Amitotic division can act as one form of information conservation process within the cell.

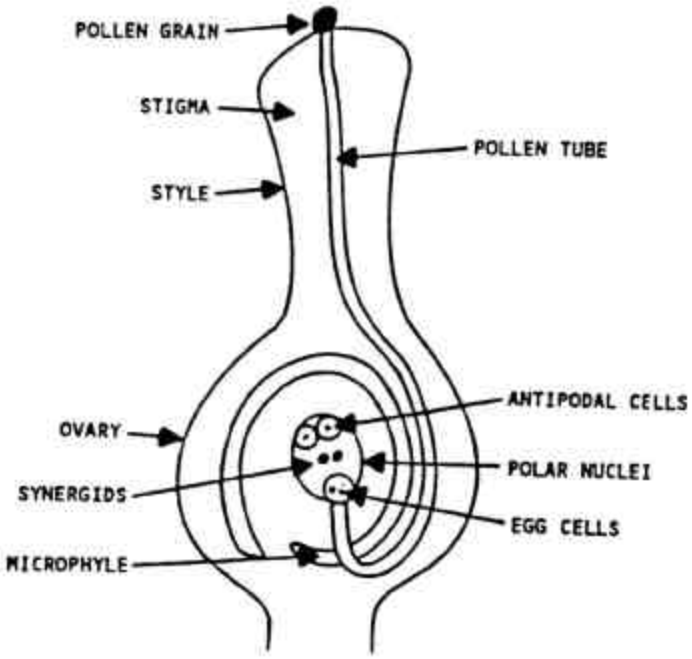
As we summarize and paraphrase yet again from Dr. Isaacs's work, we will find that this amitotic division may be more prevalent than originally appreciated. Most observation of cells under fixation, staining and microscopic manipulative techniques tends to have definite limiting effects on what we can view, and the effects during mitosis and meiotic divisions might be interfered with by our observation process.

Amitotic division can occur in specialized and epigenetically transformed cells under subtle conditions. The reproductive and metabolic capacities of the cell will have been warped toward placing the kinetosome to the outside for ciliary action, such as in bronchiolar epithelium, or in sarcomeric distribution for striated muscle action.

The centriole function in motion of nuclear vionic chromotin material in mitosis may thus be lost. It is not surprising to observe that any regeneration of striated muscle cells or bronchiolar epithelium cells is either abortive or amitotic. Please review the laborious studies of amitotic cell division in the ovaries of the sheep tape worm proglottides by Childe (1907).

The basic distinction between genetic and epigenetic information transport is that there is a restriction in the number of occupied states of molecular motion, which necessitates an indeterminate basis of operation for vionic processes. Under this model of molecular motion conservation of genetic information occurs cyclicly in the form of emergent processes of reproduction of an organism. Loss of information can occur among vions of an organism, which are composed of interdependent cells that allow augmentation of vionic function in the form of emergent processes and epigenesis of the organism. Here are basic processes that have a straight-forward holistic colition on the basis of nonconventional statistical applications of quantum theory. The above list can be extended considerably to bear upon a host of others; biological phenomena which appear to be disconnected but might be readvised and observed again with the idea of epigenesis.

Development of the vion in interaction will follow the periodic table of quantic interactions, as we have postulated earlier in this chapter. We will cover this periodic table in more detail later to show the interactions that might fall out of a hermitian matrix through a trinary logic system.



SUMMARY

1. THE VION IS THE SMALLEST UNIT CLASSIFIED AS "LIVING" BY BEING ABLE TO METABOLIZE AND REPRODUCE ON ITS OWN.

2. THE VION CONTROLS MASS, MOMENTUM, PHOTONS, AND CHARGE TRANSFER. THEY ALSO CONTROL THE QUASI ENERGETIC PARTICLE PROCESSES OF THE SYSTEM TO EXTREME MATHEMATICAL DEGREES.

3. VIONS CAN BE ORGANIZED INTO A PERIODIC TABLE LIKE THE ELEMENTS.

4. VIONS CAN UNITE TO MAKE LARGER CELLS, JUST AS ELEMENTS CAN UNITE TO MAKE MOLECULES.

5. MANY PHENOMENOLOGICAL PROBLEMS IN BIOLOGY CAN BE SOLVED WITH VION THEORY, BUT MODERN MEDICINE STILL REJECTS IT.

6. VIONS CAN ADAPT TO THE BASIC NEED OF THE ORGANISM.

Chapter 10

LONG-RANGE FORCES

Chapter 10

LONG-RANGE FORCES

How do compounds in the cell move?
What controls the cellular process?

Several parts of this book have alluded to the existence of long-range attraction, effective forces and their ability to control, manipulate, and maneuver the various aspects of biology. Because our treatise has been that statistical mechanics is incomplete in its description of biology, there must be some type of organized information field that accounts for the various procedures within biology. Random statistical effects cannot explain biology.

In developing a computer, we would collect all the materials: copper, gallanium, germanium, etc., and manufacture various circuits. We could not just put all of these together in a mish-mash and allow statistical thermodynamics to make the computer operate. Some type of organization must be applied to the system. Thus just a couple of electrons in the right place at the right time can provoke the needed response to allow the computer to control, transfer and recover its information. The computer is under an energetic control model in which electrical forces of attraction and repulsion are used in a process that accounts for the dynamics of the computer's ability to take in and manipulate data. The cell acts as a mini-computer, and controls the various aspects of manipulation through different matrices.

From Chapter 9 we know that mass, momentum, energy and charge can be controlled through a process of metabolism and reproduction. This very sophisticated system we call life is a finely sophisticated system that can control the processes needed for metabolism and reproduction. The control over the quasi particles in the cell must be such that it is pervasive, nonlocal, and system responsive. The molecular distances are emense comapred to the size of these quasi particles. The subspace Nelson effect is limited to indeterminant levels so another system of control with more meat is necessary. Such are the long range control effects.

Thus oxygen in the air of the room around us is under thermodynamics, or Boyle's gas laws. As it bounds about, the temperature from one molecule can be transmitted to another when they make their collision. This is a statistical mechanical operation falling under thermodynamics and entropy.

As the oxygen crosses the alveoli barrier and is absorbed into the cell, it leaves the world of statistical dynamics and gets into a controlled process. Like taking copper from a mine and making it into the wires for our computer, it now is becoming part of an organized process and must be in a specific location to allow for its best utilization. As covered in Chapter 4, it should be pointed out that there is an organization beyond mere statistical mechanics that occurs even in nonliving systems. This seems to follow a certain pattern that has been explored by fractal and chaos theory in the 1980s and 1990s.

So there appears to be a strong tendency of matter to disobey, or follow a different type of law than statistical mechanics can describe, even in nonliving systems. But in the living system there is an extra gap, an extra jump into a very controlled process, allowing for metabolism and reproduction. This process can be described in quantic terms.

As we have pointed out in other parts of this book, the lock-and-key phenomenon of how a receptor site on a cell is stimulated by a certain chemical has intrigued chemical pharmaceutical companies for years. Under a statistical mechanical dynamics we would have to put lots of keys into a situation so that one of them could have a good chance at hitting the lock. But as we have pointed out several times, biology does not operate by statistical mechanics. Thus the keys of biology must reach their locks via some other process distinctly different from randomization. There must be an attraction, and often a repulsion, that controls the processing of these elements in biology.

Often cells might have one molecule of zinc. Different processes must be guided because of the severe limitations of the *in vitro* number of molecules; whereas if we look at nonliving systems *in vivo*, a tremendous number of certain enzymes are needed and a tremendous number of certain minerals, as well.

In sinthetic chemistry the elements are deprived of the life force or photon reactivity needed for action. Thus lots of keys must be enamored into a system in order to find the lock. However, in biology a control process ensues where our key functions energetically. The key finds the lock via photons. This control process can be interpreted through long-range forces and vionic radiation, described by Dr. James P. Isaacs.

In his book on "Complementarity of Biology", Dr. Isaacs writes that "a prediction may be made that non-Gaussian conditions from molecular motion have an expression of critical significance to biology in the generation of long-range specific additive forces. These forces have the required characteristics for bridging the gap from protein and nucleic acid molecules to macro-molecular aggregates, or vions, to combinants of vions and to combinants of cell forms of tissue in organisms."

In 1957 Hoffman stated, "One speaks of long-range and short-range forces, depending on the phenomena concerned. But the basic problem is how forces come into being that move parts of a living cell relative to one another. The movement is not merely a random wiggling; there are precise and strong forces producing them, and these forces have special properties. The observed biological phenomena, at times, point to forces not yet measured or studied by the standard molecular biological physics." These long range forces are a reaction of certain photon transfers, magnetic action, and perhaps even a variance of the weak and strong forces of the nucleus; a biological counterpart.

The processes of cellular life, given the small size and amount of certain proteins and enzymes that exist there, could only be explained through long-range forces. The existence of the quantum electrical force and its prediction of the dependency on photonic radiation and absorption is the new answer for biology and the description of the forces that could make accountable and understandable the interaction of life.

In 1937 and 1942 London postulated that these forces might arise from induced dipole interactions of fluctuating electronic charges within these cellular systems. This is a variation of one of the forms of Van der Waal's forces. London describes a quantum mechanical connection with these forces, showing how at ordinary temperatures the oscillators could exist, transmit and receive these types of information. London found that these forces would fall off very rapidly with distance, to the seventh power. This is similar to the inverse square law: when we move further away from light, the power of that light diminishes by the inverse square. Here, instead of the square, this would be a power to the seventh.

$$\text{Force} \;.\; 1/R^7 \quad R = \text{Distance}$$

Thus from the microscopic electronic polarizability, biology can use a dipole to induce another dipole into a specific action.

London also found that these small forces that fall off so rapidly could also be additive; that is, force A added to force B could render force C, which would be more powerful than forces A and B.

Derjaguin, Abrikossoba, and Lifschitz found that through quantum electrodynamics they could account for the dipole antenna of the molecules and their ability to radiate and absorb these virtual photons. These interactions will allow for a force of attraction that we can calculate through knowledge of microscopic electronic polarizability.

A key in this type of transmission dipole antennae forces is on the ability of these forces to remain coherent; that is, within the correct phase for maximum interaction. Thus the forces will not be indefinitely additive. They are additive in a small amount, and as we approach statistical mechanics the forces will not be additive. The distance of the effect is correspondent to R being greater than or equal to the wave length divided by two, for simple vibrational molecules or atoms.

Spheres - R^{-1}
Rods - R^{-2}
Platelets - R^{-3}

Large molecules, having a large number of vibrational oscillators, can give attractive forces that are greater due to the electronic polarization at moderate distances. The total energy of attraction is ten times the Boltzmann constant times the absolute temperature; the formula 10KT, where K is the Boltzmann constant and T is the absolute temperature.

$$E > KT$$

This is for oscillators that are polarized in the classic regions. Also where E is less than KT, and where E is equal to KT, vibration rotation modes will vary in the infrared region.

The attractive distances of the electronic polarization will also be reflected, where spheres will vary as R^{-1} broads as R^{-2}, and platelets as R^{-3}. This is the simple variation of how the more spherical and tightly packed the

items, the further their force of attraction will reach. The relationship of B is thus accountable to the power of electronic polarization and relative to the energetic values of the external electrons.

Proteins are shown to have a very large number of states of these Van der Waal forces, and these Van der Waal forces are considered to be specific in that the molecules possess such a wide range of polarizabilities over a wide range of vibratory modes. Also, there could be a strong individuality in the type or the extent of an attraction force or repulsion force implied by an activated dipole. In a universe where irrational numbers are significant to primary intervention, determinism must take a back seat. The effects of B, R, F and other irrational numbers dictate an irrational aspect of the universe.

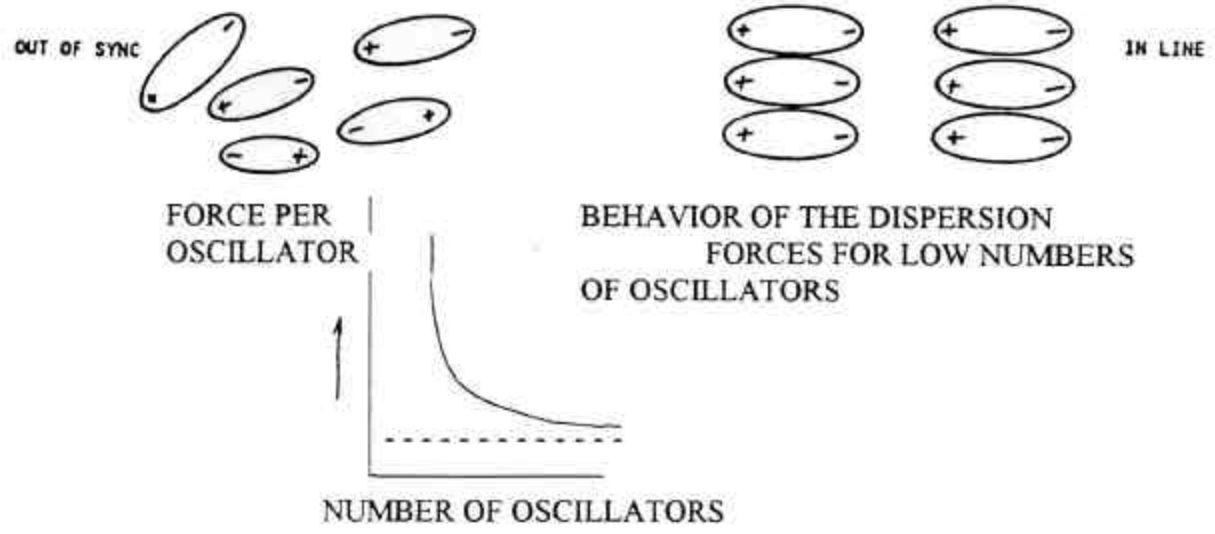
Isaacs speculates that if we extend Lifschitz's treatment of long-range radiators, it would give us forces and components that would fall off slowly and be extended over very long distances. Thus a polarized, electromagnetic radiation could have a longer range of extension to act as these long-range forces occur and are transmitted through greater distances.

Isaacs relates that inside the vion there are many variables that can add flavor to the variants of the long-range force: one, the smallest of the volume; two, the largest of the molecular sizes; three, the smallest of the molecular numbers and four, the limitation of the time intervals. All will contribute to these forces in biology.

Thus we can see that these Van der Waal dipole forces have their roots in the uncertainty relationships, and we will not be able to measure accurately all the conjugate variables that arise from these energy states. If we try to examine energy and time, we will not be able to measure the variables exactly. The inequality will show us, from the Heisenberg uncertainty principle, that the accuracy of knowing energy times the accuracy of knowing time is greater than or equal to Planck's constant divided by 4B.

$$) T @) E \$ h/4B$$

If we look at a living situation in which there are a small number of oscillators, the amount of energy will not fall under Gaussian statistics. From our formula for uncertainty, Planck's constant will become a factor. If we increase the number of oscillators, Planck's constant then will affect this by showing a decrease in the amount of force.



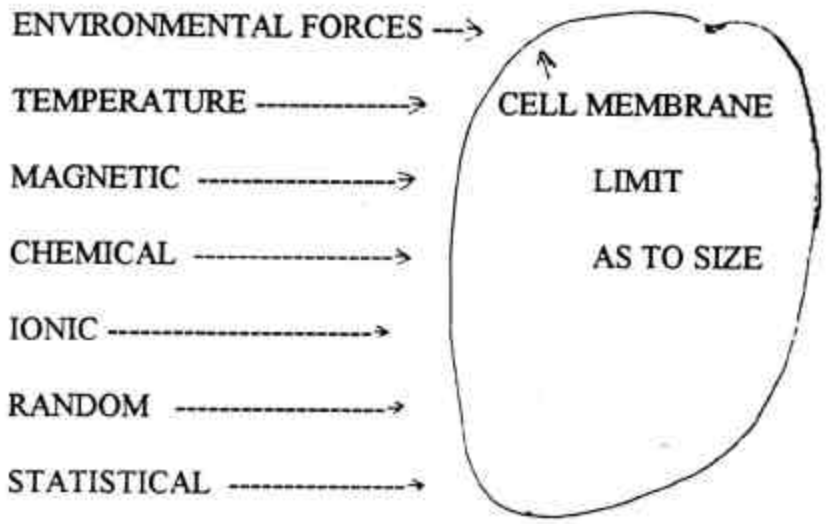
Thus we can see that as we increase the number of oscillators, we decrease the amount of force *per* oscillator. The inverse is true; as we decrease the number of oscillators, we increase the amount of force per oscillator. This is biology's way of compensating for small systems and allowing for life within a cell; *maximum utility with minimal mass*.

Isaacs remarks that "...the existence of directionalizing long-range bonds in the biological process does not eliminate the need for an important operation of short-range bonds of the covalent, ionic, and hydrogen types, or even shorter length Van der Waal's bonds."

As we develop more long-range effective forces, we do not do away with the need for the Van der Waal dipole effects, which are of short distances. These are still needed for mid-course correction modalities and end-system regulation.

Here we have some of the forces that help to hold the process of biology together. Biology fights against the thermodynamics of nonliving systems. This is the fight we call life. If an organism should die, it would succumb to the statistical mechanics and fall back into entropy and fractal polarity.

All the molecules, and atoms within a molecule, will be driven at their periphery by the forces of room temperature, the environment, and other statistical dynamics. These forces are trying to dispel or dislodge molecules and atoms from their balanced state, and the internal, long-range forces and bonds of life, as well as the short-term bonds of dipole interaction, are fighting to hold these atoms and molecules together.



Thus as a unit of living molecules grew larger and larger, there would come a certain point where it would be very difficult for these forces to hold that process together. Thus we would find that there is some range or maximum size that these molecules might attain. Each macro-molecule will develop its size to the functionality of the components within that system.

Isaacs makes the postulate that there are other functions of the protein portions of enzymes, other than that which is providing just a skeleton to the enzyme. Isaacs then proposes that the rest of the protein provides a large surface area for the impact of solvent molecules, which have high kinetic or thermal energy. This energy is absorbed by the protein and allows it to initiate the reaction. We must understand enzyme threshold energy.

As we have outlined before, to initiate enzyme action we need to have a certain mass, momentum, heat, charge, or other form of electromagnetic force necessary to allow this to happen. It is Isaacs's contention that this large protein complex attached to the enzyme can act as a receiver of this type of energy, and help to initiate the various reactions needed.

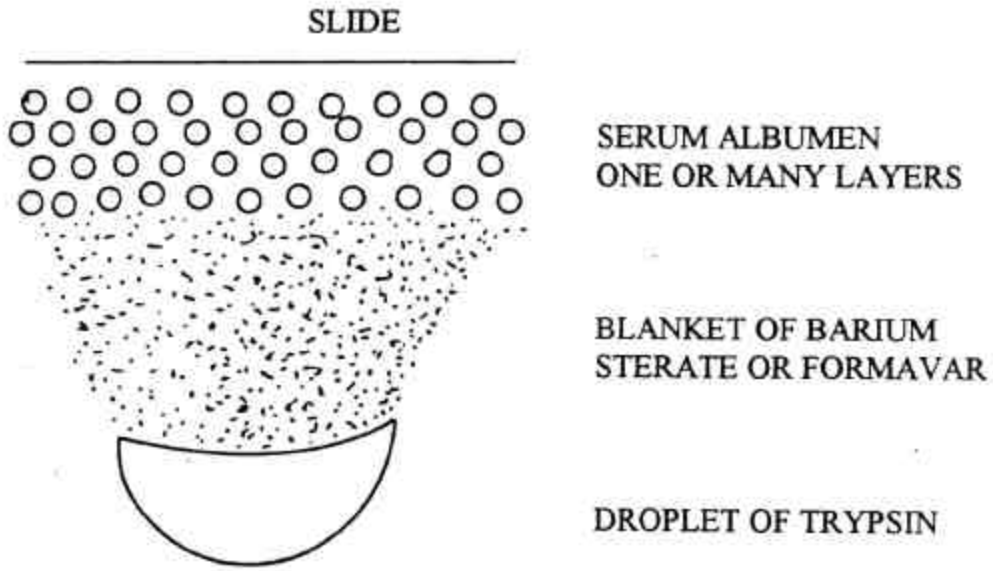
The long-range coupling of these forces that exist between their vibratory modes can be seen to provide and access a communication route favorable for transmission of activation energy between the protein surface and the active cell. Such an increase in the effective circuits of an active site would greatly increase the rate of the reaction compared to the situation in which the surface of substrate would be only the receiver of the impact of thermal colliding reaction.

Thus many students of biology have found that the surface area of enzymes is not sufficient to explain its action regarding the large number of catalyzed substances. It is Isaacs's postulate that the protein part acts as an antenna to absorb energy, and also to play for position, as the key moves toward the lock. And just as the key moves toward the lock (via the photon receptors of the human entity) these protein receptors also have a photon transmission and receptive capability, which allows for its key to find the lock. Thus the energy of reaction, instead

of being degregated by heat, or degregated *to* heat, can be made available over intermolecular coupling to serve as the activation of the enzyme reaction.

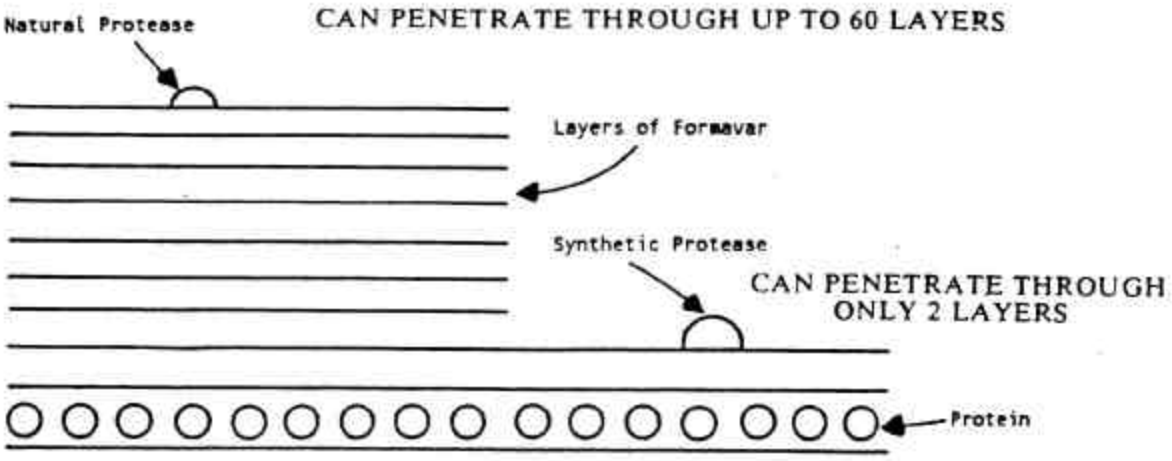
As we have seen, proteins will increase dipolarized effect when in smaller numbers. Thus we can see how a small amount of an enzyme performs differently from a large amount. We can see the need for an *in vivo* analysis rather than *in vitro* in our pharmaceutical development.

Rothen (1948, 1950, 1959, 1962) performed a series of careful experiments that are meant to show us the existence of long-range forces. By using different compounds and measuring their reaction through certain films, Rothen found that there were certain conditions in which enzymes could produce reaction, even though they were separated through many layers.



LONG-RANGE FORCE OF TRYPSIN ON ALBUMIN
THROUGH LAYERS OF AMORPHOUS MATERIAL

In one study Rothen put a layer of serum albumen over a glass slide. He covered this with blanket layers of barium sterate, or formavar. On top of the blanket of formavar he put a droplet of trypsin. The enzymatic effect of trypsin on albumen is well known. The effect of the trypsin on the albumen through the layer of formavar was proven effective. The minimum thickness of the plastic blanket required for total protection from the trypsin's effect on one layer of albumen was found to be twenty angstroms. He also found that it took over six hundred angstroms of formavar to protect six layers of albumen.



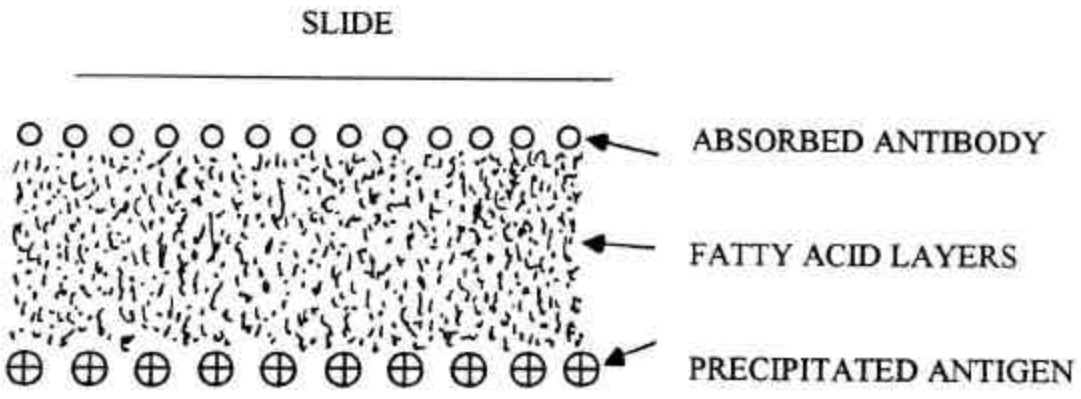
Thus the action of the trypsin depends on the number of fatty acid layers below the protein layer.

Rothen also found that there were different effects of certain qualities of trypsin, and that natural trypsin could force its effect through layers of formavar even over one thousand angstroms thick; whereas sinthetic trypsin could not force itself through even fifty angstroms of formavar. Rothen tested for the residual albumen on the experiments with a titrating antibody preparation to the albumen layers. This allows for one of the first cases in which we can see the effect on albumen by trypsin at a distance without chemical contact.

Rothen's study is one of the first that accounts for a true accountability field that is much bigger in natural biology than sinthetic. Here we can see that our natural trypsin has a much larger photon field and dipole attraction than a sinthetic substance. This field was found to be isolated in the virtual photon field coming off the natural agents. The high-tone natural agents are made with a resonant outer layer of electrons that are capable of producing this powerful virtual photon field.

In 1962 Rosenburg related another experiment about the relative abilities of long-range forces. He accounts that long- and short-range can be demonstrated as having an effect through fatty acid layers. These forces act by successive polarization of the adjacent molecules, and can have effects over considerable molecular distances. Rosenburg found that serum fractions, surface charges, basic peptides, divalent ions, electric double-layers, Van der Waal's forces and others were considered, but still were inadequate to account for the long-range forces found in his experimentation. In Rosenburg's experiment he laid out a different number of model layers of a fatty acid. There was an absorbed antibody on the slide and a precipitated antigen separated by layers of fatty acids.

LONG-RANGE ANTIGEN--
ANTIBODY PRECIPITATION THROUGH FATTY ACID LAYERS



Here, antigens could have an effect on antibodies that could be detectable with precipitated antibody results. These effects were measured through layers of fatty acids. This type of experimentation brings into consideration the fact that antigen reaction and surface receptor triggering of antibodies by antigens might happen through long-range forces, and might not necessarily follow statistical mechanical rules. This would account for how sometimes so small an exposure to an item can induce allergic activity, as a small amount of an item might set up a cascading field that would cause difficulty and possibly a cascade toward the allergic systemic reactivity of antiphalatic shock. These and other speculations of an energetic medicine, or a photonic activity of cells, have been largely rejected by a chemical society and a chemical pharmaceutical concept that is contingent on sinthetic chemistry.

In 1957 Hoffman related that the only way of properly explaining the pairing of chromosomes was through long-range and specific forces. Statistical dynamics could not possibly explain this type of phenomenon, even in an open system. Specific pairings of these chromosomes in early meiosis states of animals such as the diptera fly have shown a reversal of such forces, and there is indeed repulsion and attraction that guides the pairings of the chromosomes. Electrostatic and short-range forces cannot be used to totally explain this phenomenon. Additive long-range and specific forces that offer directionalized influence have a more likely possibility of explanation. The long-range forces are coherent, and thus must be directionalized. Since they are directionalized, they could bring a specific item to a specific field for a specific event.

Electrostatic and short-range forces are incoherent and extend in every direction equi-potentially. These long-range forces, being coherent, are directionalized and can be used to direct specific pairing of the chromosomes. Gegion (opposing positive and negative ions) effects cannot be ruled out as to their possible effects in guiding specific reactions. Weiss and Mascona found that the reaggregation of cells, which happens with hydras, sponges, and other mammalian organs could eloquently be explained through these long-range specific additive forces.

One other phenomenon that would be very eloquently explained by this process is a part of synchronization of individual wave movements between undulating organisms. This happens with viruses such as spermatozoa, and even within cells of the body, such as the peristalsis action of the large intestine and the cilia action of the lung. One only has to feel the bottom of a starfish or a sea dollar to see the effects of the muscles and how they react through these types of cilia. The effects of long-range forces could also account for this, as it turns one cell on, then off, then on, accounting for the pattern of behavior.

Another extreme example of where long-range forces could be applied to biology is in the phenomenon of the *acupuncture meridian*. The idea of an acupuncture meridian system running through the body is one that is indeed intriguing, and could only be explained through long-range forces. Molecules or acupuncture points are stimulated by what happens to one along an entire meridian chain. It must be pointed out that this phenomenon of what happens at the acupuncture point is a phenomenon of coherence. Activity at an acupuncture point does not spread out incoherently in all directions; it follows the acupuncture line of the meridian.

It must be pointed out that Vega practitioners and others made their mistake in thinking that the body energy field has equi-potential in all directions, and that one point could give us all the information. This is ludicrous in light of the coherence of the long-range forces, which is directionalized. What happens to an acupuncture point is directed down the acupuncture meridian, and *does not* proceed out like ripples from a rock thrown into a lake. This is the coherent part of biology, in the quantic direction of the energy force.

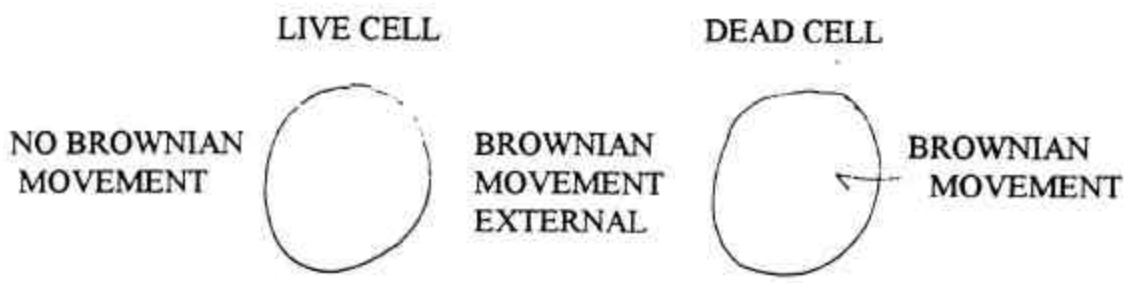
Thus biology has a strong, coherent factor. What is found at the liver meridian might not be found at the kidney meridian or the lung meridian. *There is definite directionality*, and individuality of meridians. These long-range forces, in their coherent factor, could account for the phenomenon of the directionalized acupuncture meridian system. Vega systems exist because of time savings. Any Vega practitioner depends on the partial gestalt field effect of information theory. Information theory relies on two components:

1. Overall gestalt effect (endocrine)
2. Directionalized specific effect (exocrine)

To depend on one or the other is to ignore biology's truth. Vega practitioners save time, but sacrifice effectiveness. Our patients deserve more.

Different types of slime bacteria or slime mold, such as myxobacteriales, cystophaga, navicula, oscillatoia algae, fungi, and many other bacteria have different communal effects. These effects can occur as the slime mold takes in a very large state in which all the cells get together. Even though they are independent, they share some information, and move in pursuit of food and/or water. This is another phenomenon that can be accounted for via long-range communicative forces.

Isaacs recounts another paradox that can be explained in these long-range forces: the paradox of the maximum viscosity that bacteria suspensions have when they approach an isoelectric point. Colloidal solutions, however, have minimal viscosity when they are near the isoelectric point. Why do bacterial suspensions have maximum viscosity at the isoelectric point? The bacterial sizes are approximately equal to that of the colloids, and the suspensions collectively demonstrate many similar properties, such as light scattering effects, Brownian motion in the external fluids, viscosity, increased by suspending the media; magnetism in the electric fields, and agglutinization by salt air dehydration.



The absence of Brownian mo tion within living cells, along with the maximal viscosity of bacterial suspensions at the isoelectric point, both point to a fundamental fact: that the basis of the physical nature of protoplasm is not encompassed by the laws of ordinary chemistry.
Long-range forces factor in, but offer little advance for the scientific explication without some appropriate and nondualistic theoretical grounding in quantum biology.

Another phenomenon that can be explained by these long-range forces is the phenomenon of acceptance or rejection of transplant tissue. When tissue is removed from the human body and put into a different place within the *same* human body (plastic surgery), the new cells arriving in the new area sometimes can make rather severe changes. This is because they are getting a different long-range factor, or long-range force, supplying information to the DNA and RNA as they split and make new cells.

The two criteria on which this is based are: one, volume of cells transplanted from one area to the other; and two, the health of the organism in making enough energy to supply the long-range forces that can reacclimate the new cells to their new function. If we take cells of a tremendous difference, such as bone cells to epithelial, this would take a lot of energy to make the change. But epithelial cells can become skin cells very easily.

In the idea of transplants from one item to another we also account some different phenomena. The Nobel Prize in Medicine in 1990 was received by a group of practitioners, including a doctor in Seattle who found an easy way to transplant certain cells. The cells easiest to transplant were those of bone marrow.

These bone marrow cells are highly responsive, since bone marrow is the father of all of our blood cells. There, stem cells are made, which are later determined by the body to become red or white, or whatever type of white blood cell is needed by the body. The bone marrow is also a lymphatic in part of the infection system, and thereby highly responsive. We can look at it in light of the Isaacsonian matrix and see that they probably are very in tune to various environmental factors, and as such can make responsive changes in metabolism, thereby being easily transplanted.

Recently sinthetic chemical companies have used these Nobel Prize-winning theories to their advantage. Chemotherapy destroys cancer by destroying cells. It is the hope of the doctor that chemotherapy destroys the cancer cells before it kills the patient. Now, with proof that bone marrow can be transplanted safely, it is the medical hope that larger amounts of chemotherapy can be utilized. This backward trend of medicine is medieval in design and unnatural in utilization. There is ignorance of prevention, natural techniques, and requirements for safety. This is not to say that this chemotherapy is not needed in dire circumstances, but when medicine's efforts are 90% focused on heroic intervention prevention, early detection takes a back seat.

Other cells having much more difficulty being transplanted are cells of the liver, kidney and brain. These more sophisticated cells are not as responsive to the cellular environmental activity as is the immune system. Thus they take a longer time to acclimate and are more likely rejected by the body.

As we master and learn more about long-range forces, we will understand why these transplantations are increasingly difficult. As we learn more about the medicine of the body and the mechanism of biology, we will see that transplantation will become less needed. We will develop different medical techniques at early-detection prevention. Rather than waiting for organs to go so far along in the pattern of disease, to expire and die, these organs and cellular systems can be cleaned, fortified and renewed and brought back to life by good nutrition, behavioral medicine and homeopathy.

The needed transplants will still have only a one-in-a-million chance of total success, but as we learn more and more about the long-range forces and the electrical nature of biology, we will find the answers for transplantation (total success meaning return to the quality of life previously possessed). This leads us to an account of mitogenic radiation, or what Isaacs has accounted as "vionic radiation". In Chapter 8 we recount the duplication of the experimental work done by the Gerwiches. Now let's explore it in a little more detail, in the light of some other research.

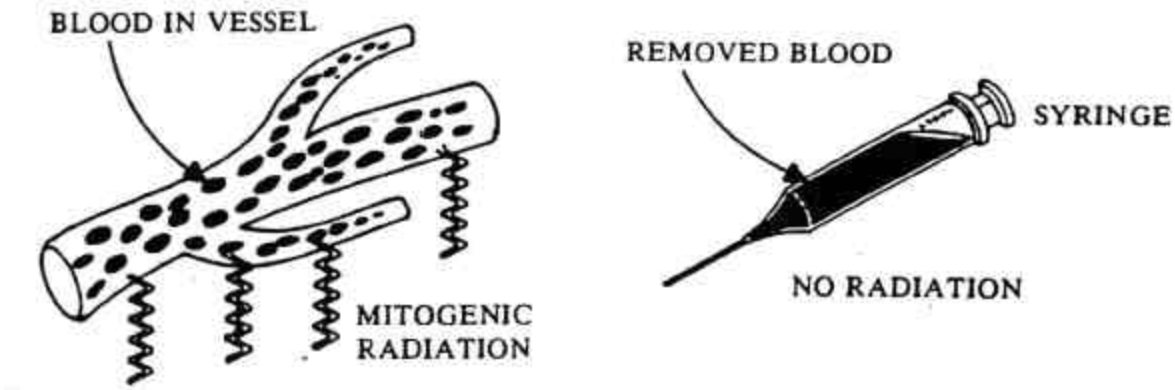
Isaacs accounts in his research that the vionic radiation might differ from that of mitogenic radiation, and that they are seemingly equivalent, But there might be some interesting differences on deeper introspect. The differences in each will be outlined later in this chapter.

Rahn wrote a very interesting treatise on mitogenic radiation. He found that the growth rate of yeast and bacterial cells was specifically responsive and very sensitive to mitogenic radiation. He found that the radiation appeared only from living organisms in quartz vessels. He concluded that there were ultraviolet capacities to this radiation. He observed that similar emission from oxidative reactions of proteolysis also was enhanced by diffuse daylight. This could provide the backdrop or the bath of photons needed for activity. He found the wavelengths to be between 1,800 and 2,600 angstroms. His original explanation for the emission was that it was a leak of activation energies. The growth rate of bacteria and yeast can be stimulated, and the intensity of the radiations moderated. The wavelength had to be below 2,600 angstroms to accomplish this.

Process	Mitogenic Wavelengths in A	
Oxidations	2200 6 2280 A	2280 6 2340 A
Sugar Fermentations	1910 6 1920 2120 6 2180	1930 6 1940 1950 6 1960
Nuclease	2150 6 2160 2280 6 2290 2350 6 2360	2240 6 2250 2460 6 2500
Phosphatase Cleavage	2010 6 2060	2090 6 2150
Proteolysis	1980 6 1990 2030 6 2050 2110 6 2130 2300 6 2400	2410 6 2420

High amounts of the radiation failed to enhance or retard the growth. The distance between the emitter and receiver of the radiation was two to three cm in air, periodically increasing to ten to fifteen cm in tissue. The following tissues were found to be good radiators of mitogenic radiation: cells in culture, cornelial epithelium of frog, sea urchin cells, and brain, blood and active muscles of most adult animals. Intermittent rhythmic and resonic radiation seem to have more effect than just continuous radiation. The rate of conduction of the mitogenic radiation in the frog sciatic nerve was thirty meters per second. Muscle tissue radiated five times more mitogenic radiation during work, or when greatly fatigued.

Blood, when removed to the outside of the blood vessel, lost its radiating power very quickly, but while inside the blood vessel, blood was a very powerful irradiator of the mitogenic radiation. Perhaps since the red blood vessels of blood have no DNA, this might just be a resonant effect; and once removed, without the backdrop of the radiation, the blood might lose its resonating effect in developing this mitogenic radiation.



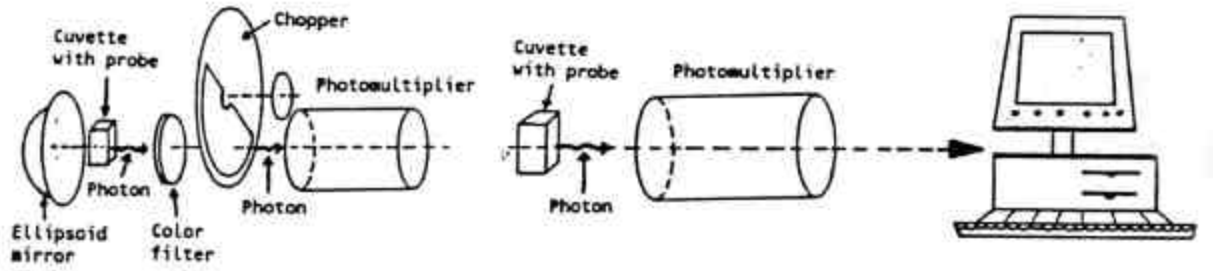
The myelinated sheath was found to be transparent to this radiation, where skin was found to absorb and block some of its transmission. Lecithin scattered the radiation. The glia cells of the brain seemed to produce some scattering, yet periodically focused the radiation for a diffusion effect.

The lag phase of bacteria and yeast was found to be the phase that had the maximum response. When irradiated, sea urchin eggs could develop into abnormal larvae. This seems to involve the stimulation of early-stage

growth, with distortion of the larvae. Lead glass absorbed the radiation; quartz did not. Glass with a layer of paraffin or fatty acids did not absorb the radiation.

Isaacs remarks that other physio-chemical detectors of mitogenic radiation are: the Liesegang rings, the decomposition of hydrogen peroxide, flocculation of colloids (gold sols), and photoelectric counters.

In the research of Dr. Nelson, photoelectric multipliers and photon counters were used to count photons and to produce the effects needed to measure mitogenic radiation photon by photon. This was found to occur only in the backdrop of a needed amount of photon bath, supplied by infrared radiation ala heat of room temperature variety.



Rahn found that the only diseases that prevented blood radiation were cancer and tonsillitis. Other diseases were found to actually stimulate a different pattern in mitogenic radiation. Disease may be an aberrant electrical pattern of photons as a response to energetic challenges.

In our description of disease we outline how the flow or pattern of health is disrupted by the primary causes of disease. These are all stimuli that could produce field problems, and thus alter wave patterns.

	SELYE	**NELSON**
1.	Stress or alarm reaction	1. Primary causes of disease:
		Stress Lack of Awareness and Education Mental Factors Heredity Allergies
		Trauma Toxicity Pathogens Perverse Energy Deficiency or Excess of Nutrients
2.	Stage of resistance and adaption	2. Functional Disturbance
		3. Organic (Physical)
		4. Death or Irreversible Disease

Thus the primary stressors make a bifurcation point for the body (stress stage). Disease is then only an attempt by the body to produce a more adaptive pattern to stabilize its reaction to the disease stimuli. If the cause of disease is abated early enough, the organism can return to its healthy pattern. If the cause is *not* relieved, the adaptive pattern deepens (adaptation stage). Finally the organism may lose its struggle with disease and expire (exhaustion stage). This describes the stages of Selye in energetic terms.

Wounded plant leaves and wounded parts of most animals radiate this mitogenic radiation. Tadpole tails were found to emit high amounts of this radiation, and it is speculated that this radiation could be used to rebuild the tadpole tail if it were removed. The stimulation of what happened after removal of a wounded tadpole tail was found to be periodical, and varied in a twenty-four hour schedule. This offers hope for human regeneration through energetic photon fields. Bacterial cultures could affect each other and retard or accelerate growth. The growth rate of yeast was affected by menstrual blood radiation. Yeast showed enormous vacuolization, hyperplasia, and giant cell formation. Other yeasts showed abnormal forms. Some bacteria were affected by the menstrual blood radiation, and some bacteria were not affected by this radiation.

Malignant tumors were found to irradiate very strongly, whereas benign tumors irradiated very weakly. However, the blood from patients with no malignant tumors irradiated very weakly; whereas the blood from patients with malignant tumors irradiated very strongly. Could cancer rob irradiation power from the blood and put it into the tumor? The dead or necrotic parts of malignant tissues showed strong proteolytic radiation. The main growing part of a malignant tumor, however, emitted the glycolytic radiation.

Frequencies of Radiation Emission

SPLEEN CANCER - 10^{10} *Hz*

LUNG CANCER - 10^{9} *Hz*

BRAIN CANCER - $10^{9.5}$ *Hz*

NERVE CANCER - *10 to the 8th hz*

INTESTINAL CANCER 10 to the 6th hz

LYMPH CANCER - $10^{869.5}$ *Hz*

The conclusion was that a growth-stimulating source of radiation could be removed from blood and concentrated in the tumor. Another conclusion was that cancer is frequent in old age, where blood radiation is lower. Blood radiation could prevent tumors. Such a machine is the Quantum Med C.I. that can help reverse cancer with energetic stimulation.

Sources of mitogenic radiation can be contracting muscles, oxidations of biological compounds, sugar fermentation, nuclease activity, and phosphate cleavage.

Wadsworth found that the following values were valid for radiant wavelengths of photosynthetic radiation:

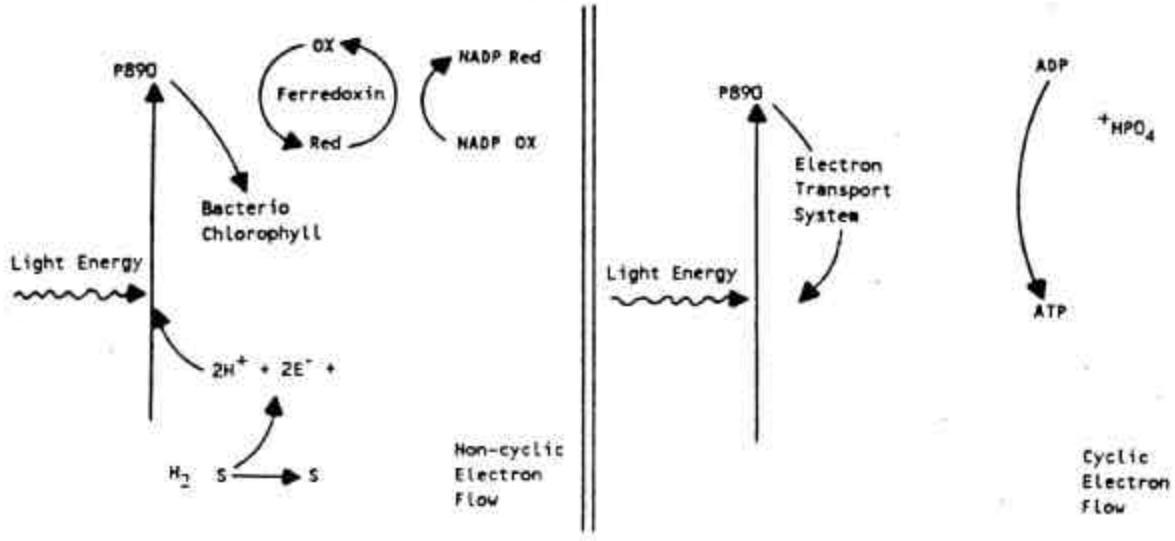
Chlorophyll	A)	-	Algae	-	6750 A
Chlorophyll	B)	-	"	-	"
"	C)	-	Brown Algae	-	6400 A
Bacterio-Chlorophyll		-	Bacteria	-	7700 A
Cartenoids					
Carotenes		-		4000 - 5000 A	
Xanthophyls		-			
Biliproteins					
Phycocyanin		-	Blue-green algae	5000 - 6000 A	
Phycoerithin		-	Red algae		

ENERGY ASSOCIATED WITH LIGHT OF VARIOUS WAVE LENGTHS

Wavelength	Color	Cal/Einstein
3,950	Violet	71,800
4,900	Blue	57,880
5,900	Yellow	48,060
6,500	Red	43,480
7,500	Far Red	37,800

Rahn found that his detectors had to be in correct biological phase. Some of the detectors that he used in his work were bacteria and yeast, in the lag phase of growth in the culture.

In a 1940 book called "Living Light", Harvey talked about the detectable radiations from living materials. He criticized mitogenic radiation on several major points. His technology did not include the idea of coherent radiation or the idea of the virtual photon. In light of those two developments, today Harvey's criticism would not hold up; we would find that electromagnetic radiation is happening through mitogenic radiation factors.



It was very difficult to measure this mitogenic radiation with the equipment existing in the 1960s and 1970s. Our new equipment allows for better insight, but still mitogenic radiation seems to be best detected and emitted by living organisms.

Royal Lee, in his book on "Protomorphology", also reports research on mitogenic radiation developed by many other practitioners. Isaacs accounts for five quality experiments, and all the experiments were duplicated by this researcher. This mitogenic radiation is something biology will not be able to ignore for long.

This researcher, Nelson, has applied for a patent of a device that will count and multiply the photons coming off the human body. It will be able to receive and interpret the mitogenic and vionic radiation released by the human body. At the time of this writing, the patent for this device is still in application, and thus real intricacies of design and utilization should not be released. Suffice it to say that mitogenic radiation will be the true utilization of theories of the future.

The advent of nuclear magnetic research is finding that there are photons that come off the body and can be used for imagery and information. The pinnacle of this photon release comes in the form of the mitogenic radiation, which comes off the body without having to be induced by any sinthetic means. This information will tell us about many factors of organ development and parasitic control, as we will be able to find the spectrum and sort out *from*

that spectrum the various types of diseases and also the various types of infectious conditions and other organisms that might be hybrid within the human body.

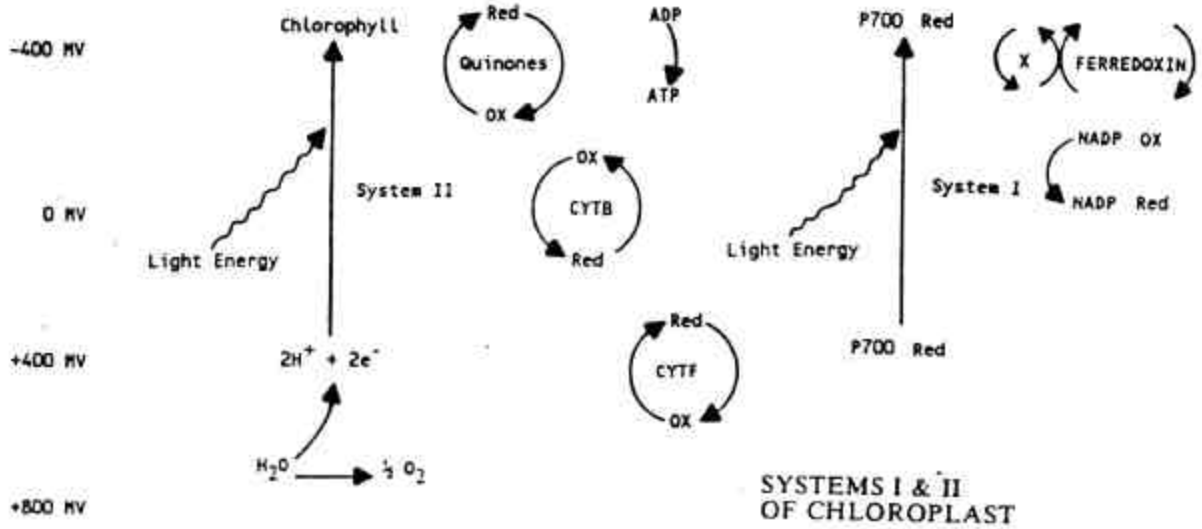
In Chapter 8 we can see how mitogenic radiation exists through the infrared spectrum, visible light, and a touch of the UV. This helps us to understand how biology existed and developed in the light of a warm-temperature climate on the planet, in the presence of the full-spectrum light of the sun.

In Chapter 6 we outline how the virtual photon could be developed, captured and utilized by biology, allowing for the development of this mitogenic radiation. The organization ability of biology (because it falls under quantum rule, not statistical dynamics) allows for the existence of this control, and thus allows for the development of an increased mitogenic radiation, or focused photon field differing from the unfocused, incoherent field of other entities.

Thus biology has been found to have an information state of extreme sophistication, going beyond the type of photon transmission that we can accomplish with radio, television and other means. Thus as Isaacs says, "The long-range forces of vions are exchange forces. They arise from an uncertainty in position and momentum of time and energy through a large molecular motion that is essential for living processes. These exchange forces help to hold the vions together. The interactions and exchange forces of large molecules in vions have a mechanistically indeterminate basis, which involves exchange of virtual photons [vionic radiation]." Note must be taken to distinction that vions may also be excited and emit photons, which is vionic radiation. Mitogenic radiation is a byproduct of DNA activity; whereas when the entire vion radiates, this is called *vionic radiation*. This is an emission of the photon or the entire vionic oscillatory field. Thus the vion might act as an amplifier of the mitogenic radiation to produce a vionic radiation of the oscillatory nature. Thus we can see how one cell can influence another. The photon is essential for explaining quantum theory. Since our quantum theory is the basis of our quantum biology, the photon is the basis of biology.

It is pointed out that vionic radiation is more akin to the bioluminescence phenomenon, whereas the mitogenic radiation is more of an intracellular exchange of information. A tremendous opening for biophysics has been developed by the publishing of this book, outlining a process where the vionic and mitogenic radiation factors might step into their prominence in biology. This can be understood and studied through a quantum dynamics, and the old statistical dynamics of the sinthetic pharmaceutical companies will have to be reevaluated.

Since all chemistry is presently understood through photon dynamics, all biology will be likewise explained. We are indeed beings of light and vibration.



SYSTEMS I & II
OF CHLOROPLAST

SUMMARY

1. LONG-RANGE FORCES CAN BE SIMILAR TO MITOGENIC RADIATION, BUT DIFFERENT IN THAT LONG-RANGE FORCES CONTROL MOVEMENT AND ENVIRONMENTAL SENSING. LONG RANGE FORCES ARE ALSO ELECTROMAGNETIC AND STATIC IN NATURE AS THEY FOLLOW THE TRIVECTOR EFFECT. THEY INVOLVE PHOTON REGULATION. (MITOGENIC RADIATION IS MORE CONCERNED WITH INFORMATION TRANSFER FOR GENETIC CODING.)

2. ENZYME AND CATALYST ACTIVITY IN THE FACE OF SMALL NUMBERS OF ENZYME SURFACE AREAS CAN ONLY BE EXPLAINED VIA LONG-RANGE FORCES.

3. ALLOPATHIC MEDICINE WORKS BY OVERLOADING A PATHWAY TO UNNATURALLY FORCE ACTIVITY. ALLOPATHY LARGELY USES UNNATURAL, SINTHETIC MEDICATIONS, WHICH ARE A FURTHER INSULT TO LIVING SYSTEMS.

4. ALLOPATHY THUS INTERFERES WITH BIOLOGICAL BALANCE AND *ALWAYS* CAUSES OTHER (IATROGENIC) DISEASES BY UPSETTING DELICATE CYBERNETIC FEEDBACK CONTROLS.

5. ALLOPATHY IS UNABLE TO ACCEPT THESE NEW BIOPHYSICS BECAUSE IT SO DRAMATICALLY CHALLENGES THE CHEMICAL CARTELS' MONEY-MAKING AMBITIONS.

6. ENERGETIC STIMULATION MEDICINE HAS POTENTIAL FOR CANCER AND ALL MEDICAL TREATMENT. THE LONG RANGE FORCES BEING ELECTROMAGNETICSTATIC ARE RESPONSIVE TO SUCH THERAPY. THE QUANTUM MED C.I. IS DESIGNED FOR THIS.

7. HOMEOPATHY IS AN EXCELLENT CHOICE FOR MEDICINE IN LIGHT OF THIS PROOF. HOMEOPATHY CAN BE USED TO REDUCE SYMPTOMS WHILE BALANCING THE SYSTEM. USING NATURAL PHARMACEUTICAL PREPARATIONS, HOMEOPATHY CAN THUS RETURN THE SYSTEM TO HEALTH BY LETTING THE ORGANISM RETURN TO BALANCE.

Chapter 11

THE MINIMAL DOSE

Chapter 11

THE MINIMAL DOSE

What is the least intervention possible to cure with minimized risk of hurting?

We have pointed out before that for a statistical Gaussian distribution we must have:

1. equi-probability of events
2. a sufficiently large number of events
3. independence of the events

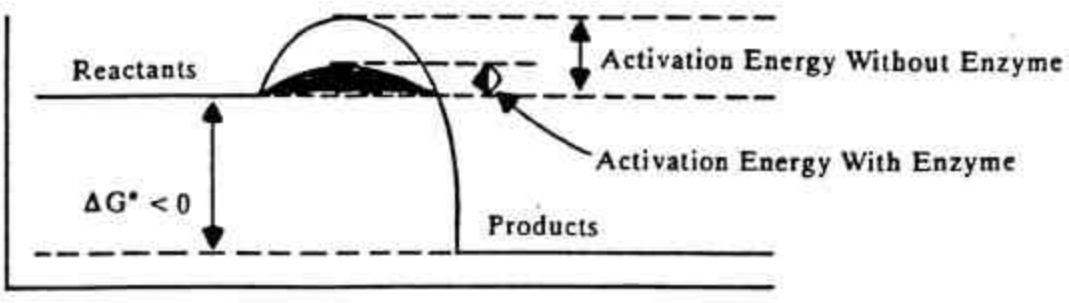
This makes up a statistical profile. For a process to be quantic and fall under indeterminacy:

1. the number of the molecules must be smaller
2. the size of the molecules must be larger
3. the motion of the molecules must be slower

At body temperature the motion of the molecules is slow enough, the size of the molecules is large, and the number of the molecules is small. This is why the temperatures of the body and the motion of the molecules are within the limbo of indeterminacy. At higher temperatures (above 106E F) not only are fatty acid bonds destroyed, but the motion of the molecules starts to go *too* fast, and goes beyond that needed for indeterminacy. So we can see the balance needed for temperature in biology.

McIlwayne tells us that riboflavin in certain bacteria is produced at an average rate of 1.422 molecules per bacterium per second. Vitamin H (biotin) is produced in these same bacteria at .08 to .34 molecules per cell per second. PABA (Para Amino Benzoic Acid) in E-coli cells, is manufactured at 3.3 molecules per cell per second.

In vitro (in the test tube) enzymes are able to produce these vitamins and molecules at rates of one hundred molecules per enzyme molecule per second, or higher. This would point out that within the cell there could only be two possibilities: that one such enzyme molecule exists per cell, or that the biological process controls or slows down the process so that an over-abundance of these compounds is avoided.



The factors of life are factors of balance; everything must be done in a controlled balance process. We will become just as sick from too much as from too little. Thus biology, to maintain itself, must have the ability to control, and to allow the process to happen with a small number of molecules per system. Even too much water or vitamin C produce problems.

Beta galactosidase is present in the E-coli grown on glucose. If grown on lactose, a thousand times the amount of the enzyme is required, and inductively synthesized. This amount now represents 1% of the protein of the cell. The dry weight of the protein in the E-coli is 4.7×10^{13} grams, so that before adaptation the enzyme comprised about 5×10^{-18} grams, converting the molecular weight, four thousand, to actual weight; one enzyme molecule weighs roughly 7×10^{-19} grams. By this estimation there are nine enzyme molecules per cell.

Setlow and Pallard point out, "This leads us to a remarkable idea that some doctors find that the whole process must take place in the vicinity of one molecule. Where this molecule is in the cell, how its substrate can

reach it, and the considerable consequences of the formation of a second molecule are excellent subjects for thought. It is also clear that any process that occurs at a single molecule is not one to which the statistics of large numbers can be applied."

King, Norman and Connell (1964) pointed out that only one molecule of ragweed antigen is necessary per receptor cell for immunological action. Wald (1965) told us that one molecule of Hegemon factor is required for the initiation of blood clotting. Lamanna (1959) pointed out that two thousand molecules of botulism toxin are fatal to mice. The zinc concentration in human leukocytes has been determined to be 3.2×10^{-10} micrograms per million cells.

From Hock and Vallee (1952) this concentration represents about .2 atoms of zinc per cell. Maybe all leukocytes do not need zinc, or was this proof of deficiency syndrome?

It has been proven that thyroid hormone at concentrations of 10^{-10} can have effects on animal and human metabolism. Angiotensin at concentrations of 10^{-9} can have effects on human blood pressure. Catecholamines, baldostra, serotonin and other bioactive peptides can exert large effects with only one hormone molecule per cell in a target organ *in vivo*; whereas *in vitro*, much larger amounts of these bioactive peptides are needed to induce molecular activity.

Classic allopathic medication is contingent upon working against the symptoms. The symptoms are the messages of the disease, so allopathy shoots the messenger. This is the major component of allopathic medicine. An antihistamine is used to block histamine release. An MAO inhibitor is used to block monoamine oxidase utilization. Much of pharmacology depends on either sinthetic stimulation of an event or blockage of its event, either through the re-uptake process or by a counter hormone. In homeopathy, however, we are trying to stimulate the biological response of the organism.

Thus we can see that using hormones homeopathically in very small amounts (sometimes as low as 10^{12}) can effectively stimulate an organism to respond. The criteria of homeopathy are not by measurement of *in vitro* results, but by measurement of *in vivo* results. Homeopathy means working *with* the body by not trying to out-think it.

The International Journal of the Medical Science of Homeopahty gives us a very nice critique in experiential evidence of the validity of homeopathy. Homeopathy is a valid, useable form of medicine in many parts of the world today. Homeopathic medications will outsell allopathic medications almost two to one in today's world market.

As we can see from the quantum biology in the quantic profile, the number of molecules must be smaller, the size of molecules must be larger, and the motion of molecules must be slower. This is the natural process, and we can see how one molecule of a given enzyme or hormone can have powerful results because of long-range forces and biophoton control.

Thus we can see that in our utilization of the quantic theory we must have a small number of molecules. The size of the molecules must be larger. As we have pointed out, biology could use an enzyme or hormone very effectively, and get the most out of it by using long-range forces and other dynamics to move these molecules effectively.

From its tests *in vitro*, allopathic medicine would have to slide into statistics, in which we would have a sufficiently large number of events. There would be independence of the events. This shift toward statistical distribution would account for why pharmacology does work, by putting in a large amount of a certain pharmaceutical, via synthroid, prolactin, thorazine, or whatever. The large number of molecules overwhelms the quantic, natural flow, and by causing a statistical distribution, they can engage the lock-and-key philosophy. Not through the natural process of lock-and key, but by the statistics of overloading the system, thus demanding action via its unnatural push.

To produce the control needed for biology, the quantic system would need to be able to control small molecules rather than having an entropic process of thermodynamics. This and many other examples can tell us that to understand biology we must apply the concepts of quantic interaction and indeterminacy and learn about the *in vivo* reactions and the limitations of our *knowledge* of *in vivo* reactions. Since we cannot proceed to measure intricately the phenomena within a quantic system as the living *in vivo* test does, we must adapt by observing nature and hallmarking what nature knows. "Healing shall come from the leaves of the field," the Bible says. As we watch nature in its activity, we will uncover more and more about medicine.

In the past, many practitioners have done this; this is how medicine was originally developed. An herbalist could find an herb that had a reaction, and use this activity to treat patients. Valarian root was used for its calming effect, in making valarian tea. The *in vitro* sinthetic chemical experts found that this activity had certain enzyme and metabolic processes. Their system of knowledge *in vitro*, being thermodynamic, was also reductionistic, and did not depend on natural control mechanisms. Thereby, they attempted in their system to isolate the most active chemical within the valarian root, and thus followed the existence of valium. Valium was then derived from the valarian root, and this sinthetic deriving process robbed it of some of its natural activity. But then, as more and more profit was

sought, it was found that valium could also be derived sinthetically from petrochemicals. This sinthetic valium process could be patented. *Any* sinthetic manufacturing process can be patented; whereas any natural remedy or naturally-occurring chemical from plant or animal tissue cannot be patented.

The patents on valium paid off big. Billions of dollars were made by the valium manufacturers, and profiteers were able to profit from the sale of sinthetic valium. Then a strange thing happened; valium started to have toxic effects. Now people hooked on valium had to go to detox clinics to kick valium. Jill Claybourne's movie, "I'm Dancing As Fast As I Can", was about a woman hooked on valium. Many clinics and hospitals have dealt with this problem of iatrogenic (doctor-caused) overdose. Yet, to date we have no clinics for valarian tea addiction. We need no clinics for natural valarian root addiction, because in using the natural valarian compound, nature has supplied us with other factors to help stabilize the reaction. Nature presents the amounts needed, often in harmony with support items or detox enzyme controls.

Thus the thermodynamic *in vitro* concern has been a profitable one via the process of patenting. The natural process of using natural herbs, homeopathics and naturopathy have had much less play in modern medicine. Billions of dollars are spent every year on iatrogenic malpractice suits, primarily involving sinthetic drugs. Yet homeopaths and naturopaths have law suits that are less than 1% of 1% of 1% of their figures. Less than $10,000 has been spent on malpractice concerning homeopathy in ten years. So a thermodynamic philosophy does not explain or account for biology, but it does make large profits for *in vitro* thermodynamic chemists. The motivation of such corporations is often for profit, not healing.

The topics in this book hallmark the pinnacle of modern science through quantum physics and chemistry; all of chemistry depends on the quantic theory and the filling of the quantic valances. Thus chemistry becomes a very precise science, as we know that atoms tend to try to fill their quantic shells. Still, modern medicine resists this type of theory and depends on allopathic, sinthetic chemical pharmacology, which is deeply entrenched in thermodynamic theory.

It must also be pointed out that homeopathy and naturopathy are legal entities within the United States. It is this researcher's experience, presented in lectures on these different theories, that many people feel that naturopathy and homeopathy are illegal and cannot be practiced in the United States. This is not true. *Homeopathy is legal*, and the FDA has created an entity known as the HPUS (Homeopathic Pharmacopeia of the United States). This completely allows for the legal practice of homeopathic, energetic medicine techniques. It allows for the control of manufacture and dispersing of these homeopathic pharmaceuticals under the guidance and control of the FDA. The proven science of homeopathy also offers practitioners of modern medicine thousands of items in the forms of nosodes, sarcodes, allersodes, isodes, combinations and others, to help the body heal naturally.

HOMEOPATHICS

1. Classical-- very symptom-specific
2. Nosodes-- used to stimulate body defenses
3. Sarcodes-- used to prompt proper tissue building or to compensate for tissue destruction
4. Allersodes-- used to desensitize immunoglobin or antibody reactions
5. Isodes-- as in hormesis, used to prompt organism healing and recuperative powers
6. Combinations--- a preparation blender for grater success in safety and broader-base effectiveness

The research of homeopathy is the research of *in vivo*, which results as we study the human reaction to compounds and stressors in their environment. How we can use various entities to cure the body by producing a body reaction is studied. System reaction is researched *in vivo*, not chemical *in vitro* reactions.

The science of homeopathy is truly the science of quantic interaction; of studying *in vivo* results in the system. For a longer treatise on homeopathy and a discussion of the experimental modalities of its action, see the *Natural Repertory* of Dr. Nelson.

Another problem that holds back homeopathy and naturopathy is the existence of those who do not understand the *in vivo* technology, and try to apply the *in vitro* technology of sinthetic chemicals to homeopathics and naturopathy. Thereby what they do is attempt to take sinthetically-made vitamins such as B-1, B-2, vitamin C, etc., and apply *in vitro* philosophy to the body. Thus if a scientist finds in the test tube that B-6 has a certain reaction on serotonin production, a lot of fake naturopaths will run off and start encouraging B-6 as a calmer, assuming that the ingestion of B-6 in the human body will manufacture the serotonin, as it did in the test tube.

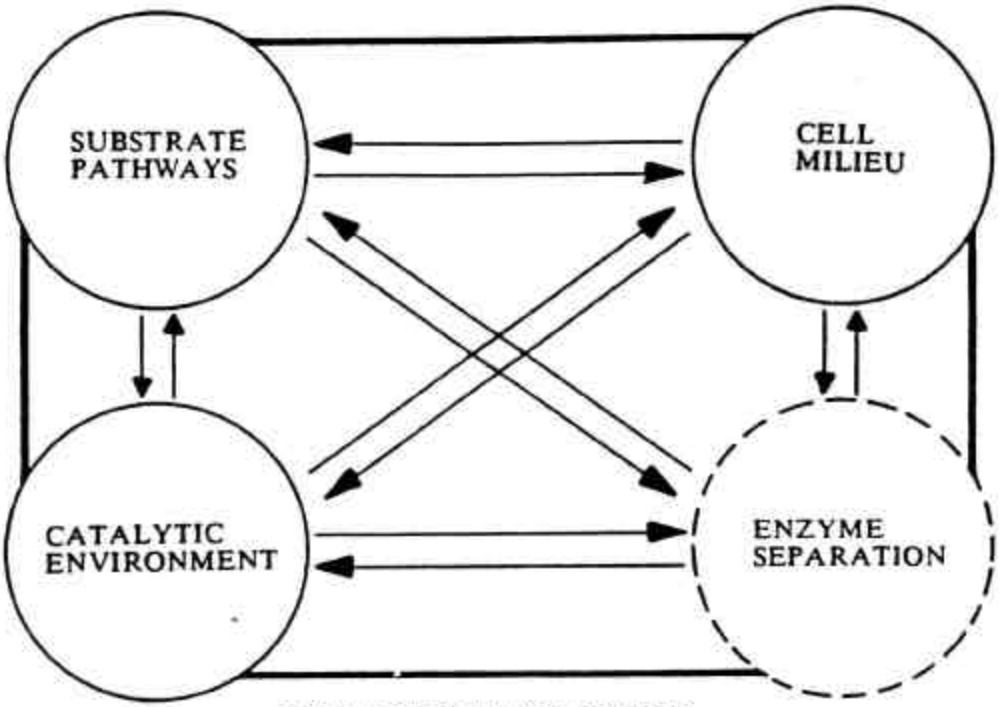
The *in vitro* sinthetic chemical philosophy is so pervasive in the United States that it becomes contagious. Many so-called natural practitioners utilize these theories and misconstructions to jump into production of amino acids and other sinthetic compounds, and put them into patients' bodies, without true *in vivo* testing. This is neither indicated, encouraged nor condoned within true naturopathic and homeopathic philosophy; yet, even in naturopathic schools in the United States, sinthetic pharmaceuticals (sinthetic vitamins) are taught, and often encouraged.

It is the hope of this book that perhaps natural philosophy and *in vivo* testing, using naturally-occurring food supplements and herbals, can become the hallmark of medicine, and of naturopathy and homeopathic philosophy.

We hope that the American people will realize that they have a choice in health care, and that their choice might be homeopathic and naturopathic. We also encourage people to make the choices of naturopathic physicians and homeopathic physicians, and hope that they choose wisely. The choice of a physician whom you believe to truly stand for natural and homeopathic philosophy can be a misleading one. Many practitioners will still use sinthetic vitamins in large, unnatural amounts, which violate the laws of nature and enter statistical dynamics. So the choice of a practitioner can be very difficult. The Academy of Applied Bio-Quantum Technologies in New Mexico can help in the choice; they can recommend practitioners who are truly trained in natural quantic homeopathics and naturopathy.

Thus to stay alive, we must remain quantic and indeterminate, and influence our indeterminacy. We must fight against entropy and against thermodynamic conditions. If an organism loses its fight against thermodynamics, it will fall into statistical dynamics and thermodynamic control. This means that the organism will now obey the first and second laws of thermodynamics, and lose its body temperature. The molecules within the cells will go into Brownian motion. So each of our cells must fight against the statistical flow of thermodynamics.

The command center that fights this entropy are the DNA molecule and its RNA assistants. The DNA molecule will control the process and the interaction through its enzymes and the manufacturers of proteins, the fat and carbohydrates, and the utilization of the energy and the metabolism.



METABOLIC INTERACTIONS

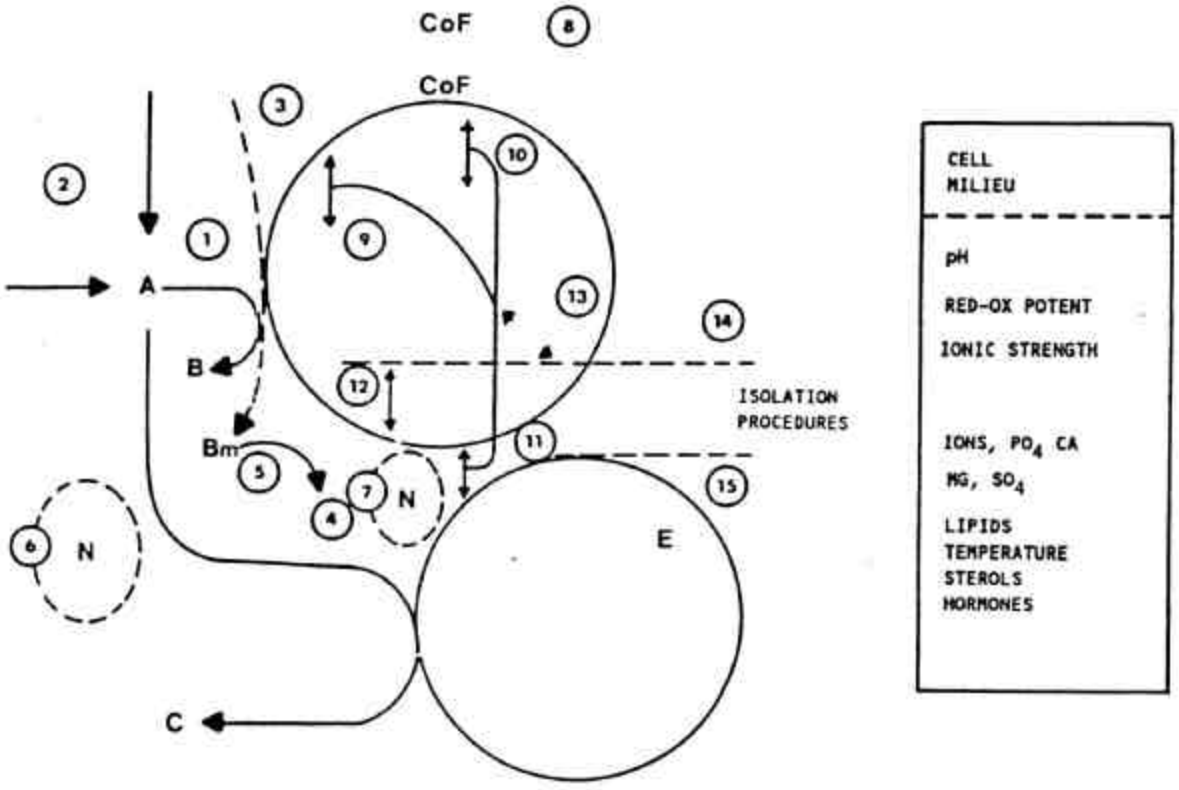
This DNA is the so-called `captain' of the ship. When a new captain comes into a ship in the Navy, he'll tell the men to tote that barge and lift that bail. He'll come in and tell everybody what needs to be done and how to do it, that the ropes need to be coiled a certain way, that the mast has to be maintained a certain way, and that the decks have to be swabbed at a certain time. This control maintains the preciseness on the ship. Gradually, as the captain gets to be more familiar with his men, he'll start to weaken his control. The decks don't have to be swabbed at exactly the right interval. The ropes might not be coiled exactly as they were before... and gradually, the captain starts to lose control, and the ship goes into a process of entropy. The Navy's solution is to bring in a new captain. The Navy oscillates captains among its ships at regular intervals, just as churches oscillate priests and pastors to help bring control to the paritioners. And in a democracy we have regular elections, to bring in new politicians to control and regulate the affairs of the state.

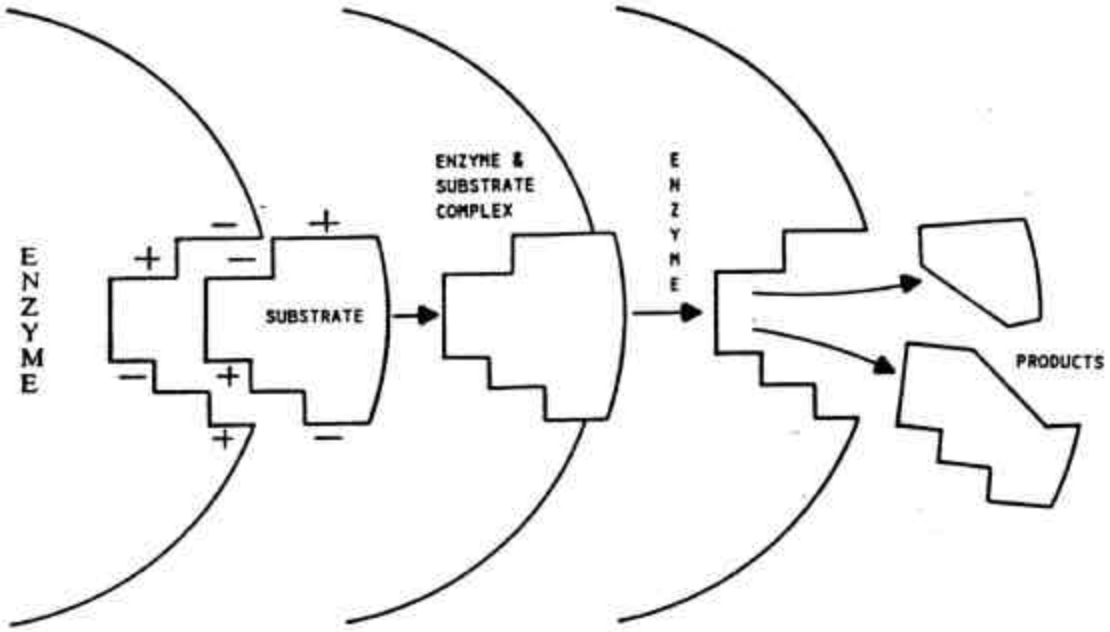
As DNA starts to lose its battle in the entropy process, biology must have a solution: formulation of a new DNA. The old strand of DNA is cleaved, replicated, and through a process of transition, becomes two new strands of DNA. This process is called *mitosis*, and allows the DNA to be immortal. In the definition of life, a cell must metabolize and reproduce. Metabolism takes up 90% to 95% of the life process, and the reproductive process takes up about 5% of the life cycle.

Clark and Marcus (1956) showed that DNA synthesis occurs during only about 5% of the life cycle in mammalian cells.

Metabolic interactions within the cell can be divided into four groups: substrate pathways, cell milieu, catalytic environment, and enzyme separation techniques. Substrate pathways tell us about the concentration of pathways of chemical conversions with relatively small molecules. The cell milieu refers to the physio-chemical properties of the solution; that is, the cytoplasm, etc., and the chemical conditions where the interactions take place. The catalytic environment, introduced by Grisolia in 1964, refers to the enzyme behavior during its catalytic action. This includes the plastic-elastic concept at the active cites of the enzymes, plus the contribution of the secondary and tertiary structure of the protein, the states of aggregation of various subunits, and the possible energy transfer mechanisms over the protein and its surface. Thus the enzyme should not be regarded only as a passive partner in reactions. Through enzyme separation techniques, enzymes are separated and prepared for reutilization.

The figures show a more complex interaction of these events.




ENZYME
SUBSTRATE
ENZYME & SUBSTRATE COMPLEX
ENZYME
PRODUCTS

SUMMARY

1. *IN VITRO* TESTING IS DRASTICALLY INADEQUATE COMPARED WITH *IN VIVO* TESTING. *IN VIVO* TESTING IS LIMITED BY OUR TECHNOLOGY AND THE INDETERMINACY PRINCIPLE.

2. BIOLOGY IS HIGHLY DEPENDENT ON BALANCING MILLIONS OF SUBTLE FACTORS ON A CELLULAR AND ORGANISMIC LEVEL.

3. ALLOPATHY RADICALLY UPSETS THIS BALANCE AND HOMEOSTASIS. BY BASIC PHILOSOPHY, ALLOPATHY CANNOT CURE. ALLOPATHY AT ITS BEST CAN SEDATE, COVER UP, OVER-STIMULATE, REMOVE, OR IMPROPERLY INTRUDE ON A COMPLEX CYBERNETIC CONTROL SYSTEM.

4. HOMEOPATHY WORKS BY RE-REGULATING THESE CONTROLS SO THE PATIENT CAN HEAL THEMSELVES.

5. THE MINIMAL DOSE MEANS THAT EXTREMELY SMALL AMOUNTS OF AN ITEM CAN HAVE PROFOUND HEALING EFFECTS (NOT *IN VITRO* BUT *IN VIVO*).

6. NATURALLY-MADE ITEMS SUCH AS HERBS, GLANDULARS, AND PLANTS HAVE MORE DRAMATIC ENERGY AND SUBTLETIES BEYOND SINTHETICALLY MADE PHARMACEUTICALS.

7. ALLOPATHIC MEDICINE USES ANTIQUATED CONCEPTS OF STATISTICAL CHEMICAL DEMAND AND IS IRREGULAR TO HEALING. ALLOPATHY BUILDS AND FOSTERS DEPENDENCE.

8. HOMEOPATHY AND ENERGETIC MEDICINE ARE TRULY THE MOST SOPHISTICATED MEDICINES USED TODAY.

9. "FIRST DON'T HURT" INDICATES A NEW, INVASIVE, DIAGNOSTIC TECHNIQUE SUCH AS ENERGETIC MEDICINE.

10. "FIRST DON'T HURT" DICTATES A SOFT MEDICINE FOR PRIMARY USE, SUCH AS HOMEOPATHY.

Chapter 12

THE DETERMINATE POOL OF THE BODY

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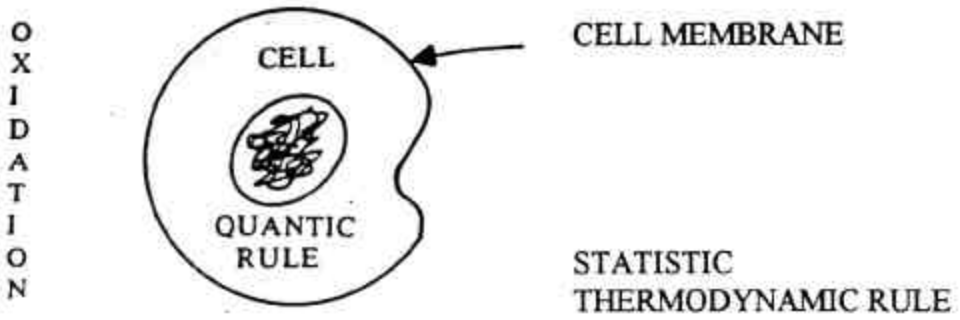
THE DETERMINATE POOL OF THE BODY

As we have pointed out several times in this book, intracellular conditions are dependent on a quantic and indeterminate reactive path. Extracellular conditions, however, are under a more Newtonian dynamics. Extracellular dynamics fall under a type of statistical mechanics, and thus have a determinate nature. The Bohr correspondence rule concerns a place where indeterminacy gives way to determinate nature. As the items we analyze get increasingly bigger and enter into the macro world, they become more determinate, and thus more statistical.

The Isaacs rule of indeterminacy comes into play at the membrane of the cell, where everything beyond a molecular weight of 500 becomes determinate. Inside the membrane of the cell all things are indeterminate. External to the cell everything beyond a molecular weight of 500 follows a determinate statistical path. Isaacs relates this to the DeBroglie wavelength theorem, which is used in biochemistry to set the pathway of the membrane of the cell. The Bohr correspondence rule speaks of the dove tail of the small indeterminate process with the Newtonian process. This occurs by the Isaacs rule of indeterminacy at the cell membrane.



The vast majority of our discussion in this book regards the indeterminacy that exists within the cell membrane. In this chapter we wish to discuss the environment of the extracellular solutions of the body, and how they follow determinate statistical processes. It is because of this phenomenon that modern medicine can perform statistical and chemical analyses of the body. By analyzing serum for minerals, Ph resistance, redox potential and many other variables, we can measure a biological substrata that allows for the existence of cells. Cells can live within a certain precise type of pool provided by the determinism of the serums of extracellular fluid. The intracellular phenomenon follows the indeterminate or quantic theorem.

Isaacs accounts for the Nernst equation and other extracellular phenomena known in molecular metabolism with his rule of the poising theory of the electron. This poising theory is utilized to determine the conditions of the extracellular pool that allows for cellular metabolism.

This chapter will concern itself with the electrical and chemical constituents of this extracellular pool. It must be pointed out that a different set of rules will apply for this extracellular pool as it fits into statistical dynamics; whereas the intracellular situation falls beneath that of statistical dynamics, and under quantic rule.

Many practitioners have misinterpreted Isaacs in concluding that the electron poising rule is universal to biology, and that no further analysis needs to be done. This is a drastic mistake. To the kineseologists who worked with him on his electron poising theory Dr. Isaacs presented an in-depth analysis of quantum biology that hinged on the idea of indeterminacy. Indeterminacy was repulsive to these kineseologists, who sought to be perfect in their analyses.

In 1991 the Nobel Prize in Medicine was presented to a team whose research found electronic or avionic means of cellular communication. This research opens the door to the philosophy or ideation in this book. If the reader can review this research, it will be easy to capture the vision needed to understand the treatise contained in this monograph. Although this chapter's analysis of extracellular phenomenon is indeed vital for biology, it is not complete. As we have pointed out several times, a quantic theory is a more accurate description of the effects of biology.

In matter transport through metabolism we are still concerned with charge, mass, momentum and heat: heat, as it moves through thermal conduction; momentum, as it affects viscosity; mass, as it moves through diffusion processes; and charge, as it affects current or electrical transport.

The Nernst equation is similar to the Henderson-Hasselbach equation. This expresses a relationship quantitatively between the dissociation constant of an acid and its Ph and the concentration of the proton donor acceptor series. The Nernst equation expresses the relationship between the standard redox potential of a given redox couple. Thus the observed potential and the concentration ratio of the electron donor and acceptor series is seen to have a mathematical relationship. Much of this has to do with the existence of water, which is by far the most prolific compound in any living organism. It has a high freezing point, boiling point and heat evaporation. The surface tension also allows it to be a strong, intermolecular attractor, because of the hydrogen bonding of the water molecules. Water has short-range order, and thus consists of the *flickering clusters* of very short half-life. The proton and electron exchange occur at extremely fast frequencies, producing this flickering cluster effect.

The hydrogen bonding properties and the polarity of the water molecule makes it the most powerful solvent known for ionic compounds and neutral molecules. Water disperses amphipathic molecules, such as soaps and polar liquids, to form *micelles*. These are clusters of hydrophobic groups with electrical tendencies to keep them suspended in the surrounding water. There is a polar group surrounding the micelle group which produces the suspension. The formulation of micelles is a result of a tendency of surrounding water molecules to engage in maximum hydrogen bonding to each other.

Water ionizes very slightly to form hydronium, H_3O+; and hydroxaline, OH-. Hydronium itself can be hydrated to form H_9O_4+. Protons may jump from H_3O+ to H_2O molecules with extremely high frequencies, producing the flickering cluster effect. As the protons jump, the high electrical mobility of the protons and water is accounted for. In dilute hydro solutions the concentration of H+ and OH- ions is inversely related by the expression: $K = (H+)(OH-) = 1 \times 10^{-14}$ (25E C).

The hydrogen/ion concentration of biological systems is expressed in terms of pH, in which pH equals the negative log of (H+). This is an electrical process that can be measured through electrical means by measuring the pressure of the protons on a glass electrode.

Acids are defined as *proton-donors* and *electron-acceptors*, and bases are *proton-acceptors* and *electron-donors*. An acid/base pair consists of a proton-donor (HA) and its corresponding proton-acceptor (A-). The tendency of an acid (HA) to donate protons is expressed by its dissociation constant, K, or the PK, which is defined as the negative log of K. The pH of a solution of weak acid is quantitatively related to its PK, and to the ratio of the concentration of its proton-donor and proton-acceptor series.

Through this process we arrive at the Henderson/Hasselbach equation, in which pH = PK + the log of the proton-acceptor ÷ the proton donor.

$$pH = PK + \frac{\log \text{proton acceptor}}{\log \text{proton donor}}$$

An acid/base pair conjugated can act as a buffer and resist changes in pH. Its capacity to resist and to buffer pH is numerically equal to its PK. In biological systems the most important combination of buffers are H_2CO_3, HCO_3, H_2PO_4 and HPO_4.

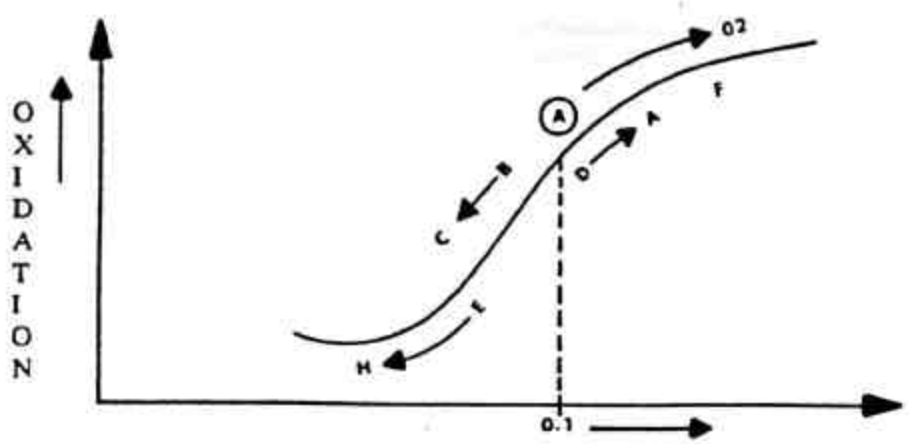
The catalytic activity of any enzyme is strongly influenced by the surrounding pH. The condition of the surrounding environment, the intake of the organism, and the condition of the extracellular pool of the organism are highly important for the use of enzymes.

In statistical dynamics, an analysis of Boyle's gas laws; room pressure, temperature and volume have an intertwined relationship. Thus there is an intertwined relationship between the disassociation constant, pH, and the concentration of the protein donor acceptor series. This follows the Henderson/Hasselbach equation.

If we observe an electrode potential that equals the standard redox potential of a +.03 log, then the electron donor is prevalent over the electron acceptor. The equation expresses the shape of the titration curve of a given donor with a strong oxidizing or reducing agent. Redox potentials tell us which way the current will flow.

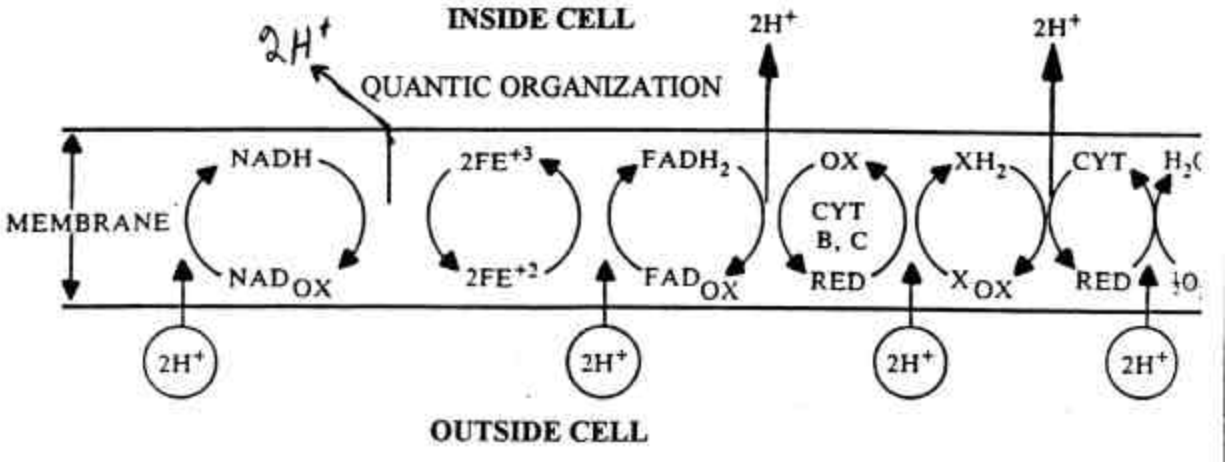
Acid/base reactions are fast ionic reactions not requiring catalysts; whereas redox reactions are slow and require enzymes. Here Dr. Isaacs divides this into an electron poising action of enzymes that control the redox and acid base reaction.

Here we can see that the midpoint, **A**, is the rest potential of the curve. **B** is the potential charge upon depolarization, with a corresponding increase in the SH to SS ratio. **C** is the direction of the effect of epinephrine. **D** is the effect of repolarization. **E** is the state required for a tendency in the absence of oxygen or thyroxin. **F** is the state tended toward the restriction of the substrate reducing equivalents, or the absence of estrogen. Thus electrons and protons in the extracellular system will cascade up and down the electron poising curve, as they are affected by repolarization, redox potential, the degree of oxidation, resistance, and pH.



The Klotz mechanism can be put onto this curve. The Klotz mechanism is the manner in which a proton is transferred along the proteins, almost at the speed of an electron through a wire. This allows for the reduction of sulphur on the protein, and possibly the reduction of oxygen on the protein, as well. After the electron makes its appearance on ludithione, the reduction of the sulphur or oxygen can ensue on the rest of the protein. When the sulphurs are reduced to the SH state, the dehydrogenases are activated.

Thus the Klotz mechanism is a description of the hydrogen input system, as the hydrogen nucleus is a proton. This extracellular soup or pool must be at a very delicate balance to allow for the cells to exchange their products of metabolism, and also to allow for the conditions needed for reproduction. The cold, cruel, hard environment of the external world is not sufficient, and changes much too dramatically. The quantic conditions of the intracellular fluid must be at a very refined process of interphase to allow for metabolism and reproduction. This extracellular pool is the perfect buffer between the external and internal environments of the cell.



THERMODYNAMIC ORGANIZATION

Establishment of a gradient of H^+ on two sides of a membrane during electron transport according to the Mitchell hypothesis

Thus the conditions of the pH, the resistance, the oxygenation and the other metabolic factors of this pool must operate within a homeostatic balance. They can yield more dramatically to changes than the potentials inside the cell. The extracellular fluid has more flexibility because of its interface between the environment and the cells. This is where we need to buffer the pH levels, to control the resistance factors and the other dynamics of the electrical interphase between the extracellular solutions and the intracellular phenomena.

Peter Mitchell developed a theory of chemosmotic transfer. Here it is proposed that the phosphorylation of ADP is driven by an ionic gradient set up by electron transport rather than by direct chemical coupling.

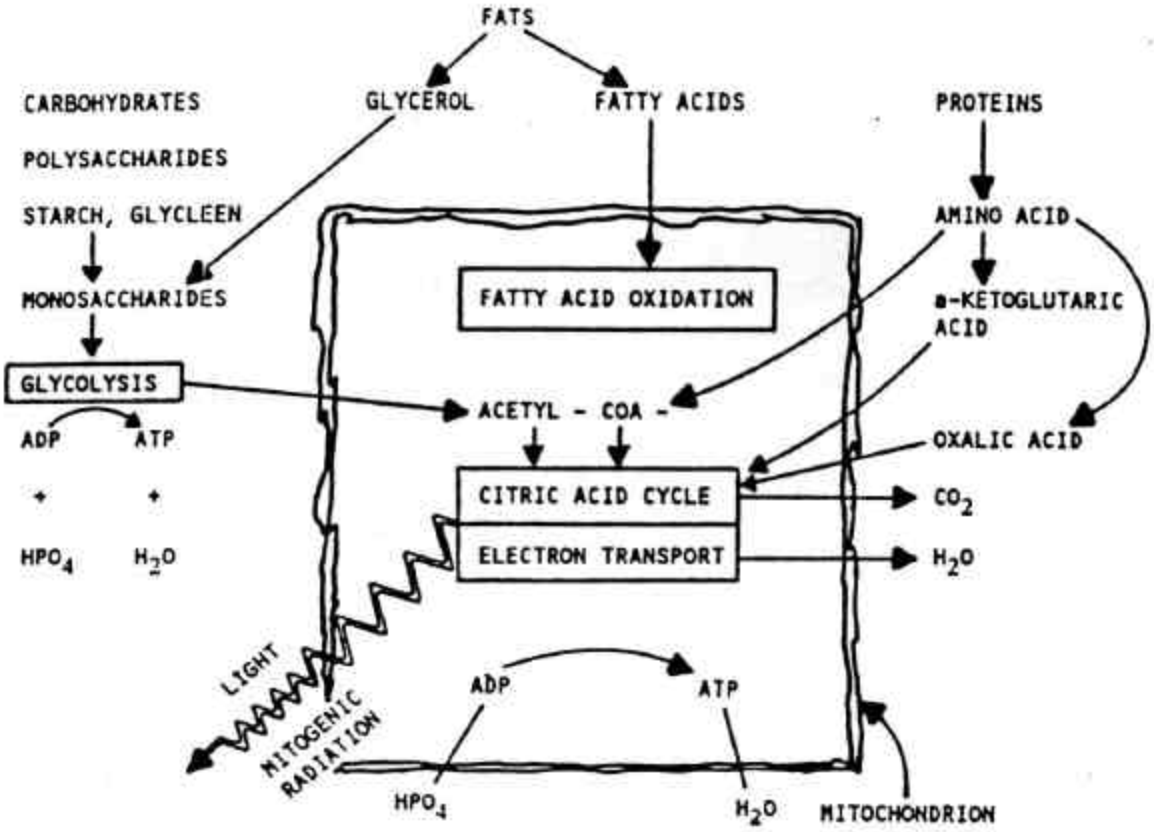
It must again be pointed out that to mistake the metabolic process of the statistical analysis of the extracellular fluid for all that is contained within biology would indeed be drastic. Intracellular biology falls under the quantic description, and these quantic analyses can affect responses of the system to different conditions and virtual photon flow. But to ignore the Henderson/Hasselbach analysis would be as deep an error.

Inside the cell electrons will flow through a cycle, such as the tricarboxylic acid cycle. They will flow down a multi-member chain of electron-carrier enzymes of successively lower energy levels until they reduce molecular oxygen. Oxygen is the ultimate electron-acceptor in respiration, and the ultimate oxidizer. Many people resort to using anti-oxidants nutritionally, not realizing that they are also anti-oxygen compounds (oxygen being the most powerful oxidant).

Much of the free energy in this process is conserved via electrons in the form of the phosphate bonds of ATP. This entire process is called the *oxidative phosphorylization*. Electron transport of this nature in the oxidative phosphorylization process will take place in nearly all aerobic cells. In eucaryotic cells the enzymes catalyzing these reactions are located in the inner membrane of the mitochondria. In procaryotic cells they are found in the cell membrane.

This complex process, using the krebs cycle and other electron transport chains happening intracellularly, falls under the dynamics of quantic explanation, and not statistical explanation. Thus the Henderson/Hasselbach reaction will not perfectly fit into this descriptive process.

Redox reactions are oxidation/reduction reactions in which there is a transfer of electrons from an electron donor (the reducing agent, or reductant) and an electron acceptor (the oxidizing agent, or oxidant). In an oxidation/reduction reaction the transfer of electrons is made via a transfer of hydrogen atoms, so it is also sometimes called "dehydrogenation", because of the taking away of the hydrogen. This is equivalent to oxidation.



Mechanism of oxidation of polysaccharides (carbohydrates), proteins, and fats. Electron transport dictates the photon release of one form of mitogenic radiation.

In others, both electron and hydrogen atoms may be transferred. A reducing equivalent or electron equivalent is sometimes used to refer to the electron or hydrogen atom participating in the oxido-reduction reaction.

An acid/base reaction is where a proton donor gives and takes from a proton acceptor. An oxidative reduction reaction is where an electron donor gives and takes from an electron acceptor. This produces an electromotive force that can be measured electrically. The electrical force in volts is expressed by the standard reduction potential. H_2O gives and takes protons and electrons from oxygen plus two hydrogen plus two electrons. This has a strongly positive standard reduction potential of .815 volts. Therefore, water has little tendency to lose its electrons and form molecular oxygen. To put it another way, molecular oxygen has a very high affinity for electrons, much higher than such biological electron acceptors as NAD, flavo-proteins and cytochromes.

As we have seen, the Henderson/Hasselbach equation expressed the quantitative relationship between dissociation constants of an acid, its pH, and the concentration of the proton donor and acceptor species. A variation of this equation, the Nernst equation, expresses a similar relationship between the standard reduction potential of a given redox couple, its observed potential, and the concentration ration of its electron donor and acceptor series.

A. $Eh = Eo' + \frac{2.303RT}{NF} \log \frac{[\text{electron acceptor}]}{[\text{electron donor}]}$

Simplified

B. $Eh = Eo' + 0.03 \log \frac{[\text{electron acceptor}]}{[\text{electron donor}]}$

E_0 is the standard reduction potential, pH equals 7, at temperature 25E C. E_h is the observed electrode potential. R is the gas constant of 8.31 joules times degree times mole. T is the absolute temperature. N is the number of electrons being transferred. F is the Faraday constant of 96,406 joules times volt. So at 25E C the term 2.303 RT divided by N times F has a value of .059.

Since it is customary to calculate the equilibria of biological redox couples in terms of two electron transfers, the Nernst equation will simplify to B. The Nernst equation will express mathematically the shape of the titration curve of a reductant by some oxidant, just as the Henderson/Hasselbach equation does the same for the titration of an acid with a base.

In biology there are three major oxidation reduction enzymes:

1. The pyridine-linked dehydrogenases. These require NAD or NADP as a coenzyme.
2. The flavin-linked dehydrogenases, which contain flavin-adenine-dinucleotide (FAD), or flavin mononucleotide (FMN). These act as the prosthetic group.
3. The cytochromes, which contain an iron porphoryn ring system.

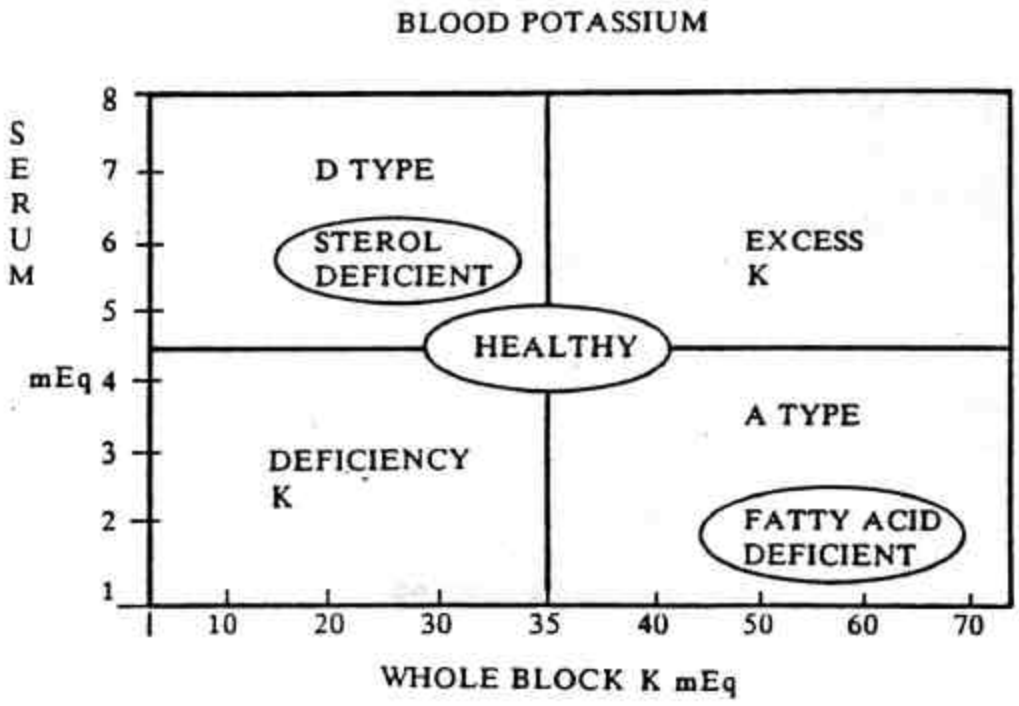
These three systems of enzymes are needed to facilitate the oxidation reduction reaction or the redox inside the cell. Measurement of these potentials extracellularly or *in vitro* to achieve their Nernst reactivity still is not a perfect relationship, because the intracellular process is not statistically dynamic, and cannot be grouped into such a continuous equation. Thus the Nernst equation is only a parallel of the system. It is a blend of a Henderson/Hasselbach reaction, which is extracellularly bound.

The rest of this chapter will offer a process for analysis based on an analysis of water, urine, blood, lymph and other extracellular materials.

Revici reports in his law of dualism that there are many metabolic conditions that need to be balanced in the factors of biology, the most crucial of which is pH. This is the shift between acid and alkaline. pH is actually indicated by proton pressure as the inverse log of the pressure.

In simple terms, acids are such because they have more protons, and thus they can accept electrons; whereas bases *donate* electrons, and have more electrons to be donated. Thus bases accept protons. In seeking to balance the quantic shells or valances, protons seek electrons, protons repel protons, and electrons repel electrons. As an item gets more protons and less electrons, it becomes more acid. As an item gets more electrons and needs more protons for balance, it becomes more base. This is based on the pH scale, in which 7 is neutral, 14 is highly base, and 1 is highly acidic. Since we are dealing with electrons and protons, the acid base or pH level is also a reflection of a certain degree of the electrical nature of the fluid we are analyzing.

Revici found that the biological system must have a very refined and precise balance of pH. The blood of a totally healthy person must be around a 7.4 pH (7 being neutral). Thus a slightly basic potential is needed for the biological system to be balanced. If the system of blood shifts from 7.4 to 7.2, we get sick, at 7 we get dramatically sick, and extreme sickness will ensue before we get to a value of 6.8. If the blood starts to shift toward high alkaline (7.5) we get sick, at 7.7 we get dramatically sick, and at 8 pH drastic disease will ensue. This shows how precise the electrical balance of blood must be.



	Test	Offbalance D	Average Values	Offbalance A
Urinary	Specific gravity	high	1.016	low
"	pH	low	6.2	high
"	Surface tension	low	68	high
"	Serum potassium	high	4.5 mEq	low
"	Total blood potassium	low	38 mEq	high
"	Body temperature	low	37E C	high
"	Leucocytes	low	7000/cmm	high
"	Eosinophiles	low	100/cmm	high
"	Chloride index	high	2.1	low
"	Calcium index	low	2.5	high
"	Chlorides in serum	high	525 mg %	4low
"	Pain pattern	alkaline	------	acid

Revici writes in his books about the delicate balance of pH. His entire book on metabolic balancing is dedicated to showing how first morning urine in particular is a reflection of the blood pH. Blood pH is very difficult to measure because it changes so dramatically in response to oxygen. Thus blood pH must be taken in a non-oxygen environment and measured very carefully. Modern techniques of measuring pH have included observing its response to oxygen as we shake or agitate the bottle, and then calculating the amount of fizz.

Blood pH is sometimes very difficult to determine in analyzing our patients. Urine pH is a much better indicator. Even though we lose a little accuracy (probably around 10%) the first morning urine pH is a very good indicator of the overall pH of the system.

Urine reacts as part of the buffer system. As the blood pH starts to shift to acid, the urine pH will do so in a more dramatic fashion to help balance the system. Thus by leeching out the excess acids through the urine, the body is attempting to balance its blood pH. The same applies for the inverse; as the body gets more base, the urine will need to be more base to try to balance the system.

REVICI'S A INDUCING GROUP OF ELEMENTS

A SERIES

COMPARTMENTS	I A	IV B	VI B	VIII	VIII	II B	III A	VA	VIII
Organic	Li						B	N	F
Metazoic	Na						Al	P	Cl
Cellular	K	Ti	Cr	Fi	Ni	Zn	Ga	As	Br
Nuclear	Rb	Zr	Mo	Ru	Pd	Cd	In	Sb	I
Submorphic	Cs	Hf	W	Os	Pt	Hg	Tl	Bi	At
Primary	Fr								

D SERIES

	METALS							**NON-METALS**	
Organic	Be							C	O
Metazoic	Mg							Si	S
Cellular	Ca	Sc	V	Mn	Co	Cu	Ge		Se
Nuclear	Sr	Y	Nb	Tc	Rh	Ag	Sn		Te
Submorphic	Ba	Zr	Ta	Re	Ir	Au	Pb		
Primary		Ce	Nd	Sm	Gd	Dy	Er	Yb	
Submolecular	Ra	Th	U	Pu	Cm	Cf			

First morning urine pH, as remarked on by Revici, will normally tend to be around the 6.4 through 7 pH area. If the urine shifts to 7.5, 8, or 8.5, it is reflective of a more base person. If the urine shifts to lower pH, towards 6, 5.5, or 5, it is reflective of a more acidic person. Revici encounters many places where metabolic disorders such as cancer can result from a change in the extracellular fluid toward basic, high specific gravity,

resistance factors, and electrical dynamics. However, it must be pointed out that the actual cancer is an intracellular phenomenon, and that treatment modalities that are contingent only on extracellular metabolic concerns are inadequate, as they do not address the total issue of the cancer. The intracellular conditions must be addressed as well. Those intracellular conditions must be addressed through the factors of homeopathy, seeking to balance the intracellular dynamics through homeopathic utilization of the various enzymes, perhaps of some venoms, interferon and the like (see Chapter 15). This chapter is dedicated to the Nemst equation, but the reader must always keep in mind that this is an inadequate description of the entirety of biology.

Thus pH must be balanced in this pool to allow for a balanced metabolism. The balance of pH will supply a needed amount of electrons and protons to be utilized. Revici also remarked that there must be a balance in the free fatty acid pool (FFA). The balance must be between the *polar* and *nonpolar* lipids. Revici talks about the balance of nonpolar and polar free fatty acids, the nonpolar being those that fear water (*hydrophobic*), and the polar being those that like water (*hydrophilic*). This, Revici says, is the balance of the sterols, which are hydrophobic, and the fatty acids, which are hydrophilic. This balance between the sterols and free fatty acids is a constant battle that is fought over the balance of metabolism. If we switch to too much free fatty acid deficiency, our urine will switch to a lower pH and a high reading in specific gravity, as well as high in surface tension. If we switch to low surface tension, low specific gravity and high pH, that shift shows a switch toward the more base balance of the body, and often a switch toward a more sterol-deficient or sterol-rich extracellular fluid.

It is not the purpose of this book to include a total descriptive process for use in a clinical environment. The purpose of this book is to offer scientific evidence for the need of a clinical modality. This author has included a more precise definition of the balance of metabolism through these free fatty acids and pH in documents that are more clinical in their origin (see the *Natural Compendium* of Dr. Nelson).

There are several other oscillating factors in the blood, such as the free amino acid pool, which likewise has hydrophobic and hydrophilic aspects. Oxygenation potentials and redox potentials can also occur which affect the O_2 free radical and its over- or under-disturbance in the body. This is regulated through peroxide and peroxidase effects, based on a free radical balance. Too much peroxide from an external source can be highly disturbing. Although it might be initially productive, the long-term effect would be that it would dramatically upset certain intracellular balances and cause severe complications.

Albumin balance is also essential inside these extracellular fluids. The normal serum level should be around 4.5 to 5. If there is less albumin, patients are found to be at risk of various surgeries, to the point that surgery on someone with less than 4.5 (the serum level of albumin) is contraindicated for any type of condition.

Albumin is also highly needed in our toxicity defense. The development of certain insecticides, malathion, and others could be made because the human body has albumin. Because of our serum albumin, these insecticides are not extremely toxic to the human body. If a person has too little albumin, those chemical entities of the insecticide world can be much more highly toxic. Insects do not have the serum albumin to fight against these assorted toxins. Insects *do* have extremely fast utilization of the ACHE (acetyl cholinesterase) molecules. The human being has a much slower response, due partially to the large protein molecules, such as albumin.

Thus the quality of the various proteins in the interstitial and extracellular fluid is another important balancing act needed for metabolism. As we remarked, it is a balancing act done via lipids, proteins, and also for carbohydrates. The balance of the free saccharides and their potential is highly important for biology. This allows for the utilization of various sugars and other forms that are balanced through the system. Insulin allows for the utilization of glucose into the cell, and the development of the ATP so needed for energy.

Another often unseen part of biology is one in which Royal Lee found that there were certain protomorphogen compounds that cycled through the bloodstream. These were certain nucleotide of RNA/DNA or RNA/DNA-type material that cycled through the bloodstream. In Royal Lee's book on "Protomorphology", much research was devoted to this study. Much of the research attributes how this build-up of protomorphogens in the bloodstream could have an effect on aging. (For review of the literature, read the book on "Protomorphology"). These nucleotide-type compounds also would need to be balanced in the bloodstream.

So blood must balance protein, carbohydrates, nucleotide and lipids in its extracellular pool. Free vitamins also must be balanced in this pool. These are all reflected by pH. Each factor adapts differently to the pH changes. The fat-soluble vitamins must be balanced in their access to the various cells, as well as the B-soluble vitamins. Their absorption tendencies are through the intestinal tracts of the small and large intestines, depending on whether they are oil-soluble or fat-soluble. But the interstitial fluid will need to carry these different vitamins to their needed areas.

Royal Lee's treatise on B vitamins that divides them into two different concepts of B and G complexes is highly important in our analysis of vitamins. The G complexes are distinctly insoluble in pure alcohol, although

they are soluble in certain lower percentages of alcohol. These compounds make up many of the B vitamins shown in the table.

B Complex	G Complex
B1, B3, B12	B2, B6, B15
Pantothenic acid	Niacinamide, choline, PABA
Adenine	Inositol, biotin, folate
(Deficiency Symptoms)	(Deficiency Symptoms)
Paralysis	Pellagra
Bei-beri	Mental depression
Neuritis	Disorders of liver and fat metabolism
Heart Block	Vasoconstrictor, asthma, angina
Fibrillation	Deterioration of vegetative functions, such as digestion, leading to ulcers
Degeneration of islets of Langerhans	

The B vitamins are soluble in pure alcohol and in pure water.

So Royal Lee divided B vitamins up into two complexes: B and G. Both must be in balance for the body to be in total balance. If the body shifts toward one side or the other, a certain type of symptom pattern will ensue.

Thus the contingency on balancing the extracellular fluid of the body is on several factors including oxygen, lipids, proteins, carbohydrates, resistance, pH, redox potential, surface tension, and even photons. So we can see that our mass, heat, charge and momentum transfer through the system is reflected on the balancing act of the extracellular fluids. Homeostasis is dependent on this following table.

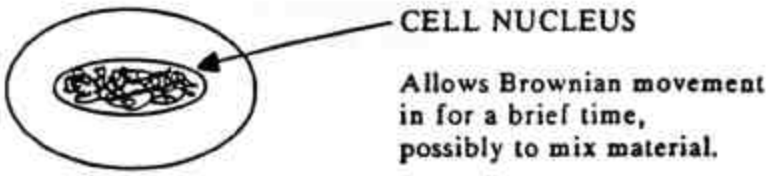
Mass	Charge	Momentum	Heat
Fats	Proton	Surface Tension	Heat Shock Proteins
Carbohydrates	Positive Ions (H_2O)	Surface Friction	Photon
Proteins	Electron	Osmolarity	Metabolic Process
Nucleotidase	Negative Ions (H_2O)	Viscosity Oxygenation	Mitogenic Radiation

The body has several mechanisms for balancing; in fact, the entire existence of biology is dependent on its ability to balance the constituents within these different categories. A switch in any way will cause dramatic results. It should be pointed out now that these shifts may be asymptomatic, or as Revici says, individual symptoms can signify a shift in the metabolic conditions or no symptom could present until crisis time. Thus a person may have an acid asthma or an alkaline asthma. The treatment of this asthma is not necessarily the asthma itself, but the base metabolism of the body.

Eclosion has developed the metabolic indices that tell us the Revici balance, the oxidation balance, the Vincents profile, the balance of carbohydrates, lipids, nucleotide and protein metabolism, and all these various

factors, to help to determine if the person is metabolically sick. It is the purpose of this document to entrance the reader with a philosophical treatise on the extracellular fluids. Total treatment of these can be achieved through contact with the author and reading of the *Natural Compendium* of Dr. Nelson.

The dynamics of this extracellular fluid do not fall under quantic law, nor do they fall under a closed statistical dynamics; they fall in the middle, under *open* statistical dynamics, which is analyzed in depth in *Toward a Bio-Quantum Matrix*. Thus we can see that the extracellular fluid follows a statistical protocol, but not a closed statistical protocol of thermodynamics, as it interfaces with the environment and the quantum dynamics of the intracellular phenomena.



Our open system of statistical dynamics allows for the mix or intertwining with entropy of the closed statistical dynamics of the environment interfacing to the quantic dynamics of the cell.

In a very important book, the treatise on "Irreversible and Statistical Thermophysics" (an introduction to nonclassical thermodynamics), Yourgrau writes, "A seeming violation of a physical principle is encountered if one erroneously regards a living organism as an isolation system. When an inanimate system is isolated or placed in uniform surroundings, an evolution of the system takes place, during which all gradients and thermodynamic parameters are leveled out. All permissible chemical reactions occur; all higher forms of energy become completely degraded to internal energy. Ultimately equilibrium reigns when every macroscopic property is uniform throughout the system and all observable events have come to end. The system has reached a state of maximum entropy, or maximum disorder. In general the state or nearly inert state for which entropy is not yet a maximum is attained very rapidly. Exceptions to the development here may happen in the micro-physical domain. Compare the synthesis of helium atoms from hydrogen atoms in the interior of stars and in hydrogen bombs.

"But on the macro-physical level the requirement that any transition should be directed towards maximum disorder seems to be fulfilled when lifeless matter alone is affected. In an animate system, living system, the situation appears to be quite the opposite. The growth of a living organism or cell is characterized by transitions leading to states of ever greater order in increasing differentiation, and once the adult stage is reached, the organism successfully inverts a speedy decay to the state of equilibrium, or death.

"The apparent conflict between the principles governing the behavior of animate and inanimate bodies may easily be resolved if one treats a living organism as an open system, which exchanges both energy and matter with its environment.

$$D_s = D_{es} + D_{is}$$

For a system of this kind, DS equals D_{es} plus D_{is}, according to Prigogine's equation, so that an increase of the entropy S per unit mass may be avoided by an importation from outside the negative amount of entropy, D_{es}/DT, exceeding in absolute value the inescapable positive production of entropy, where entropy equals D_{is}/DT inside a living object. The main contribution to the entropy production arises from metabolism, that is from the chemical and physical changes continuously going on in the living organism of cells. Metabolism comprises processes by which assimilated food is built into the protoplasm and broken down into simpler substances, or waste matter, and release of energy is needed for vital functions. During a period of growth D_{es} divided by DT equals D_{is} divided by DT in absolute value, so that since D_{es} divided by DT is less than 0, the sum DS/DT becomes negative. This decrease in the entropy S manifests itself in an improved organization in a greater differentiation of the protoplasmic structure... thus at the adult stage of growth the entropy production, as well as the entropy itself (S) has attained its smallest value, compatible with the imposed constraints.

"In connection with nonliving systems the state of minimum entropy production is, as we know, referred to as the stationary state. For biological systems it is customary to employ the alternative designation `steady state'. When the steady state is established, the DS/DT is 0, so that the positive entropy production is exactly counterbalanced by the negative influence of entropy, that withdrawal of negative entropy from the environment is a device whereby a living organism succeeds in keeping alive, or postponing the final state of equilibrium... contrary to popular belief the essential purpose of eating, drinking and breathing is therefore not to provide energy for vital functions, but to rid the system of the entropy it can not avoid producing while alive. As Schrödinger put it, `An organism feeds upon negative entropy rather than on energy.' Since negative entropy may be considered a measure of order, it is legitimate to say that an organism maintains a steady state by continually extracting order from its surroundings.

"In the case of human beings and higher animals it is clear how this process is realized. Food stuffs consisting of highly organized entropy-poor organic molecules are taken in by the body. Their energy is partially utilized and finally returned to the environment in a highly disorganized, or entropy-rich form.

"There are three different examples which show the evolution towards minimum entropy: one, that among animals resembling one another closely the intensity of metabolism per unit mass diminishes as the size of the animal increases. Two, migrant animals usually settle in environments allowing them to function with minimum amounts of metabolism; and three, the development of bacteria tends to proceed in the direction of states of minimum metabolism.

"In the opinion of biologist Von Bertalanffy, thermodynamic principles related to open systems lie near the very root of central biological problems, and seem to point the direction and pave the way for biology to become an exact science."

For a longer treatise on the condition of the extracellular pool of the body as a case for an open system of thermodynamics, please see our scientific workbook, *Toward a Bio-Quantum Matrix*.

Application of Liouville's theorem, Hamiltonian relations, ergodic phase averages, canonical distribution, Bose-Einstein, Boltzmann distribution law, and Fermi-Dirac statistics will be involved in blending a new type of thermodynamics to guide us in analysis of extracellular dynamics. These topics are discussed in *Bio-Quantum Matrix*.

Louis Pasteur received much acclaim, and is still famous throughout the world for his discovery of the microflora. He found that bacteria and other entities could exist beneath the vision system of the naked eye. This received much publicity, and rapidly medicine started to attain a germ theory of disease and a cause and effect relationship that would relate almost all types of disease functions to the intrusion of some type of germ. But on his deathbed Louis Pasteur confided in his friend, Claud Bernard that Claud was right, in that microbes don't mean anything; everything depends on the terrain. As he said, "It is not the fauna, but the flora that is important."

What did he mean by terrain? This terrain is the state of the biological organism that allows for bacteria to reproduce. There are many types of bacteria on our skin even now that do not propagate or increase in number, because the conditions surrounding these bacteria are not right for their rapid development. If we wish to grow tuberculinum in culture, we need to have a Hahn's egg culture. It is the only place where tuberculinum will grow. It won't just grow on anything; the conditions must be just right. Candida albicans grows on corn meal agar in culture, but will not grow in other culture plates.

These and all microorganisms need specific types of cultures in order to grow and propagate. The body keeps them in check with the conditions of the extracellular fluid dynamics. When the extracellular fluid dynamics are out of balance and are pushed toward extremes, these fluid dynamics will allow for the development of certain types of bacteria, cells, fungi, or viruses, etc. It is thought that these types of microorganisms might be a mechanism via which nature could possibly return to balance. Thus these microorganisms might be our friends, and not the germ-enemies that they were once thought to be.

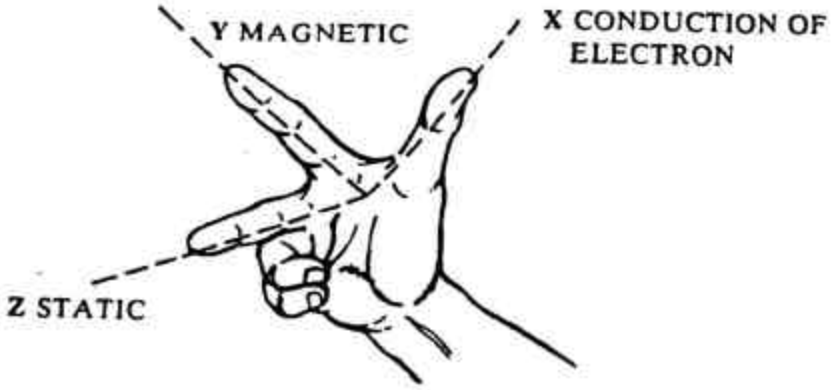
As we will discuss later, flies don't cause the garbage. A fly and its offspring, over a three-day period, can remove over one hundred twenty pounds of dead meat. Thus flies serve a very vital purpose in nature's plan.

The biological terrain or conditions of the extracellular fluid must follow a type of great attractor, and have a type of torus that would be shaped at certain asymotopic levels where the conditions would become too extreme, and thus put the organism into danger. These types of asymotopic levels would be at extremities of too acid or alkaline an environment, too much or too little resistance; too much or too little oxygen, fatty acids, amino acids, etc. (see "The Great Attractor of Life" in *Bio-Quantum Matrix*).

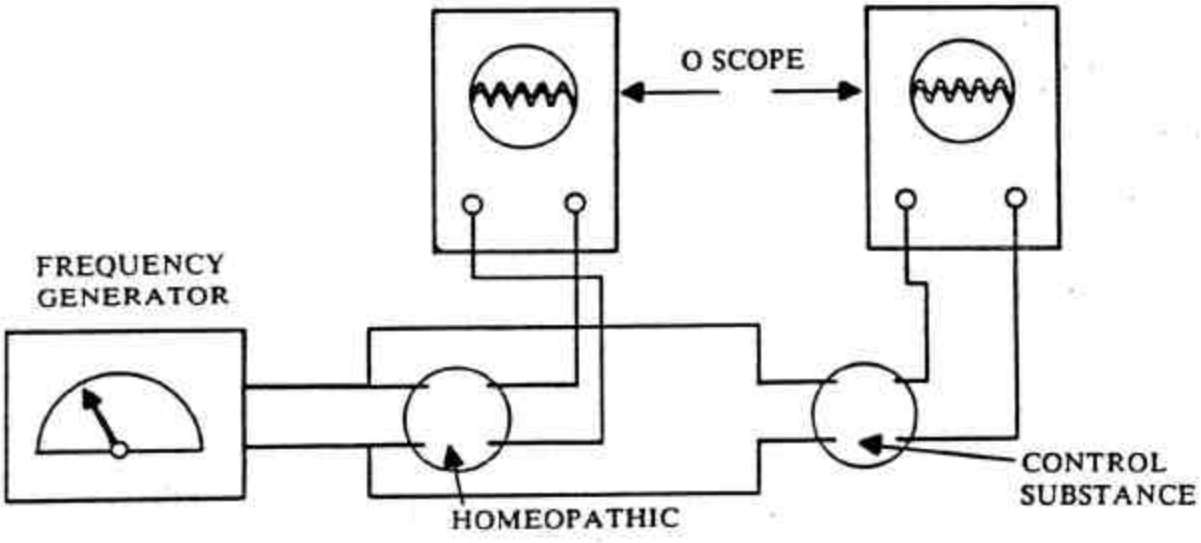
Thus the law of dualism dictates that a balance needs to be attained in order to reflect the perfect environment needed for the cells of biology. By charting the extremes, thus calculating our asymotopes, we can perhaps understand the great attractor and the torus of life better.

A topic we wish to discuss at this point is the pH value or ionic potential between acidity and alkalinity. This is a needed balance between the flow of electrons and protons. The rH value also must be discussed. It is the electronic potential of the system, thus a measure of the resistance that the extracellular fluid shows to an electrical current. Another value is the redox potential, which is the value of the active transportable oxygen in the system.

These three values are very easily measured and can be used to measure the water intake by a system, the urinary output, the lymph, the blood conditions of the body and the extracellular fluid. The pH value is a value of the amount of protons and their indication of pressure. This has relations to the kinetic energy of the system. So the pH value can play an important role in the manifestation of the energy of the system. This proton-electron balance reflected in pH can also be related to magnetic potential, and is definitely affected by magnetic action. Via the right-hand rule there is a magnetic field that directly appears at right angles to the flow, and an electrostatic field that appears at right angles to that.



This trivector analysis system was developed by Dr. Nelson in analyzing interstitial fluids as well as homeopathics, so that a spectro-analysis could be attained to find the resistance of a homeopathic circuit or a biological fluid to conduction, induction, and electrolytic or electrostatic currents (see *Bio-Quantum Matrix*).



This patent-pending device can be used for the first time to chart a trivector analysis of the extracellular fluid. The electronic potential can be measured with a different index of the rH_2 value. Thus the statistical value of the electron can be measured through the double bond of the 2 (H+) and two electrons, through the polarization potential of H2. Thus an electronic potential of the extracellular fluid can be charted.

A resistance value can also be calculated to measure the resistance that the extracellular fluid has to an electrical current. The higher the resistance, the more heat is made by the system.

Medicine needs an electrical analysis of the capacitance, inductance, dielectric constant, resistance, amperage, voltage and redox value, as well as pH. They can all be attained into a total extracellular system, to find the electric balance of the body, and to chart patients who are moving away from the great attractor to the boundaries of their torus. It must be pointed out that this system of balancing the body is independent of symptoms. It is dependent on measurements, and not on patient symptomatology.

NORMALS

	pH	rH^2	Resis.	mV	mA	u Watts
Blood	7.1	22	210	236	1.12	262
Blood of Cancer Patient	7.6	28	140	384	2.74	1053
Saliva	6.5	22	140	270	1.93	520
Saliva Cancer	7.5	29	230	440	1.93	849
Urine	6.8	24	30	312	10.4	3244
Urine Cancer	5.1	19	90	264	2.43	774

Thus the patient might be absent of symptoms, but be very sick. The correction might be to restore pH balance or any of the other variables discussed. Also it should be pointed out that all of these factors are intertwined, and changing one will change the others. These factors do not operate independently. Reductionism of variables is another fallacy that generates iatrogenic disturbance.

All of these values and more can be attained in a simple way through use of the *Eclosion* system, in developing a "vital signs" page under the metabolism matrix. Within ten minutes of preliminary lab work, a vital sign inventory can be attained that will tell us about these functions.

Indications of this terrain could be achieved from analysis of different body fluids, such as saliva, urine, blood, lymph, stool, hair, etc. Also indications can be achieved from a physical analysis of the body, measuring resistance potentials, voltage, amperage, body capacitance, inductance, resonant frequencies and other electrical measures of the body. To reduce this complicated set of variables to any simple pattern or any combination of variables would be illogical and over-reductionistic, especially when a simple machine could be used to measure these variables quickly.

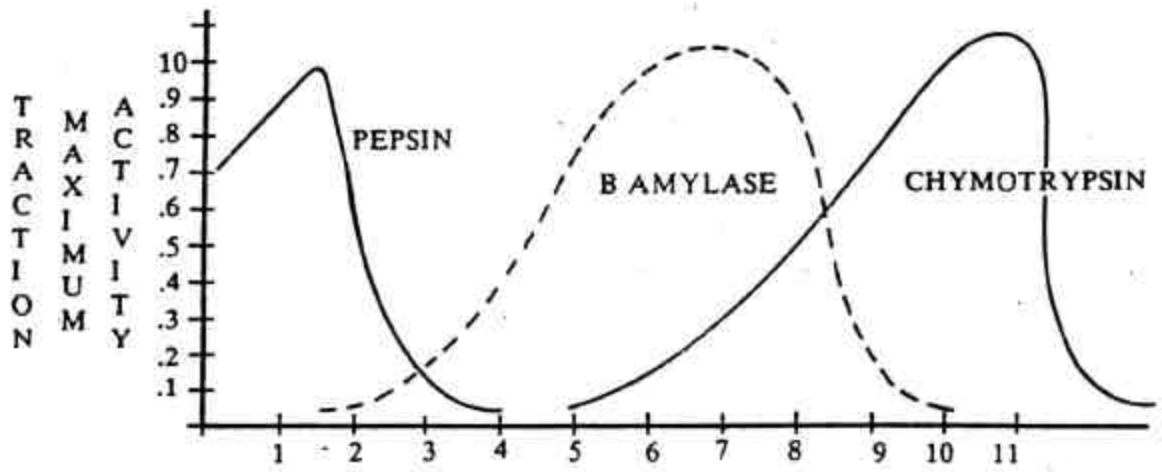
Volts = **A**mps @ **R**esistance Ohm's Law

Volts @ Amps = Watts (Power)

In the analysis of pH resistance and oxygenation potential we must realize that these can vary from organ system to organ system. In attempts to reduce overall body readings of urine, blood, saliva, etc. can sometimes be deceptive, as they might not truly tell us about lung function vs. digestive, or endocrine function vs. neurological. We need to chart such activity and reflections of the conditions of this pool of the body, but also realize that the intracellular effects can have other variables.

One such attempt to reduce this terrain to a set of measurable electronic variables was made through the Vincents technique. In a brief summary, let us take a look at some of the factors of the Vincents and some of the correlates to disease. Vincents reduces these variables of the terrain to 1) a pH value, which is a statistical value of

the proton pressure. This, he feels, is representative of the mass factor of the kinetic energy. 2) Another factor is the rH_2 variable, which is a statistical value of the electron produced through the double bond of the two H ions with two electrons, activated through a polarization potential; and 3) the resistance value, which is specific electrical resistance, measured for viscosity. Vincents remarks that the atomic bond containing one or more hydrogen ions is acid; if it contains OH ions, it is a base; if H and OH are absent, it is a salt. Water, as the basis of life, contributes heavily with its proton and hydroxyl radicals, which allow the backdrop of the majority of biological processes.

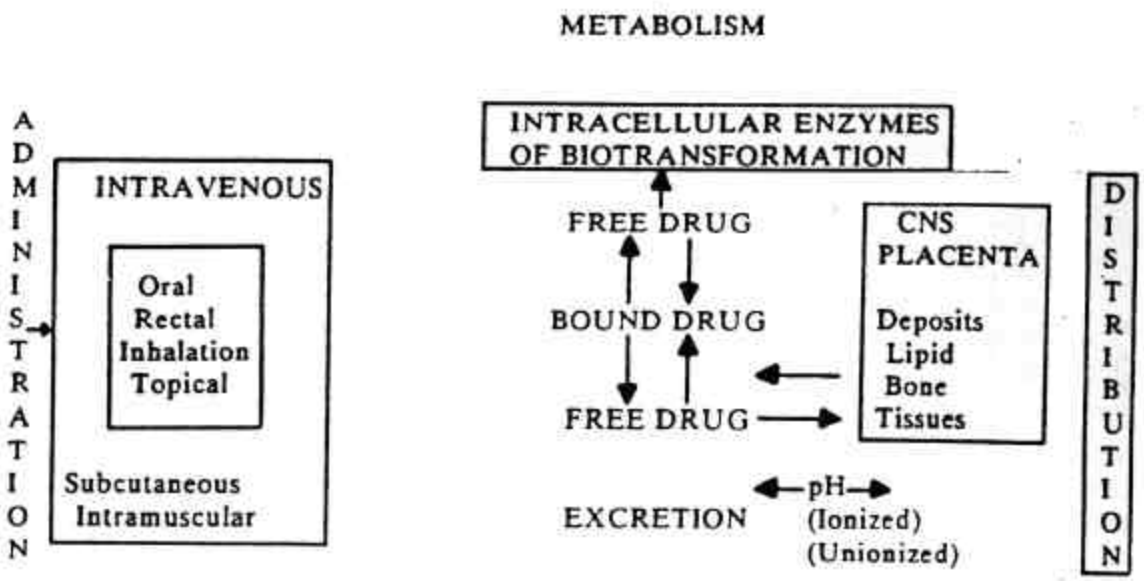


The perfect pH of the blood lies at 7.4, where values can be attained between 6 and 8, which set the extreme limits for biology. The rH_2 factor refers to a coefficient which indicates the value of the electron potential. pH defines the proton pressure; whereas the electron pressure can be set by values of rH_2. This is measured electrically as a value of the electrical strength of the media. We can see a relationship with pH in that rH_2 will equal 2pH plus 33.33 times E. E here is the solution, measured in relation to the potential of the hydrogen electrode, where we make our electrode potential reference.

$$rH_2 = 2\,(pH) + (33.33 \times E)$$

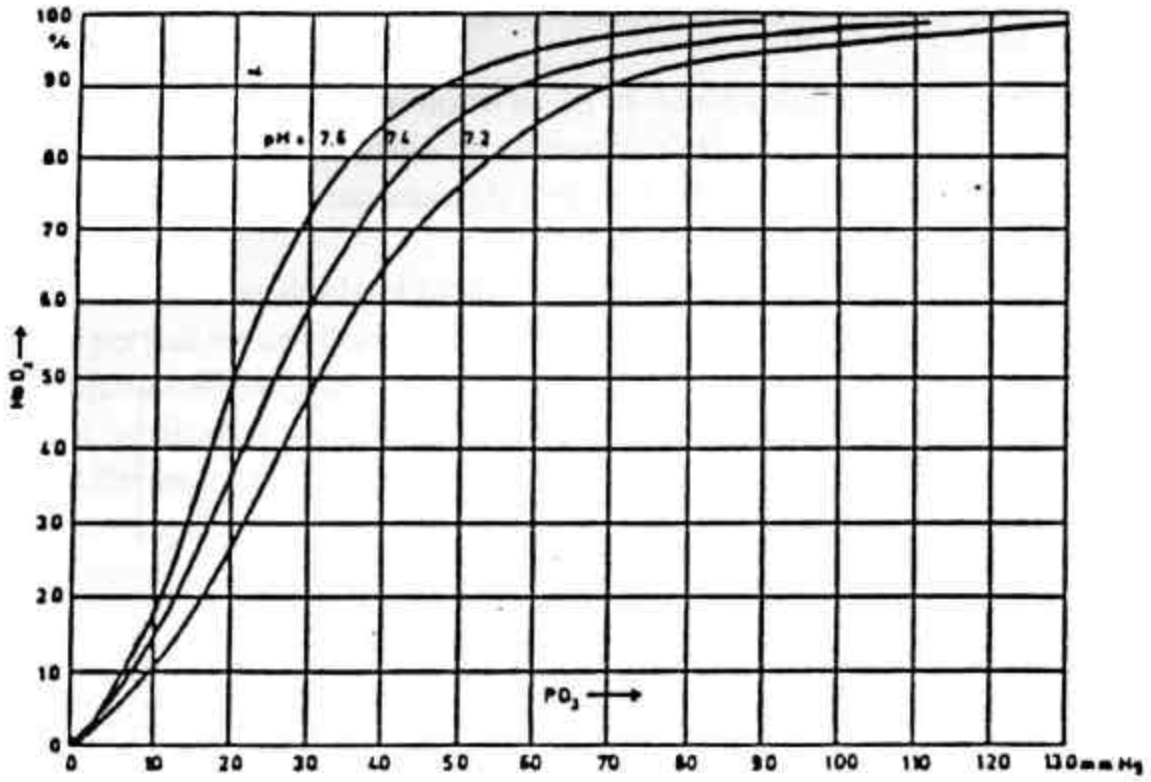
We can see here that the lower the pH is, the more acid; at the same time E will be weaker, and load the equation with a negative tendency, so that the rH_2 value gets weaker as well. The rH_2 value also corresponds and has a direct mathematical relationship to the H_2 factor.

The polarization pressure is expressed in atmospheres per square centimeters. This exerts a direct effect on the solution through an electrolytical system, and can be measured with electrodes placed into the solution. The rH_2 value corresponds also to a more oxidized condition in relation to lower rH_2 factors, but also a greater H_2 pressure. As well, the rH_2 values will correspond to a more reduced condition in relation to another condition of a higher rH_2 value, but also a lower H_2 pressure.



The cellular phenomena of polarization and depolarization represent the determining factor of the life of the cell. This operates as an electronic exchange between the oxidized substance, which emits electrons, and the reduced substance, which attracts electrons. Both processes occur at the same time. The speed of one will affect the speed of the other.

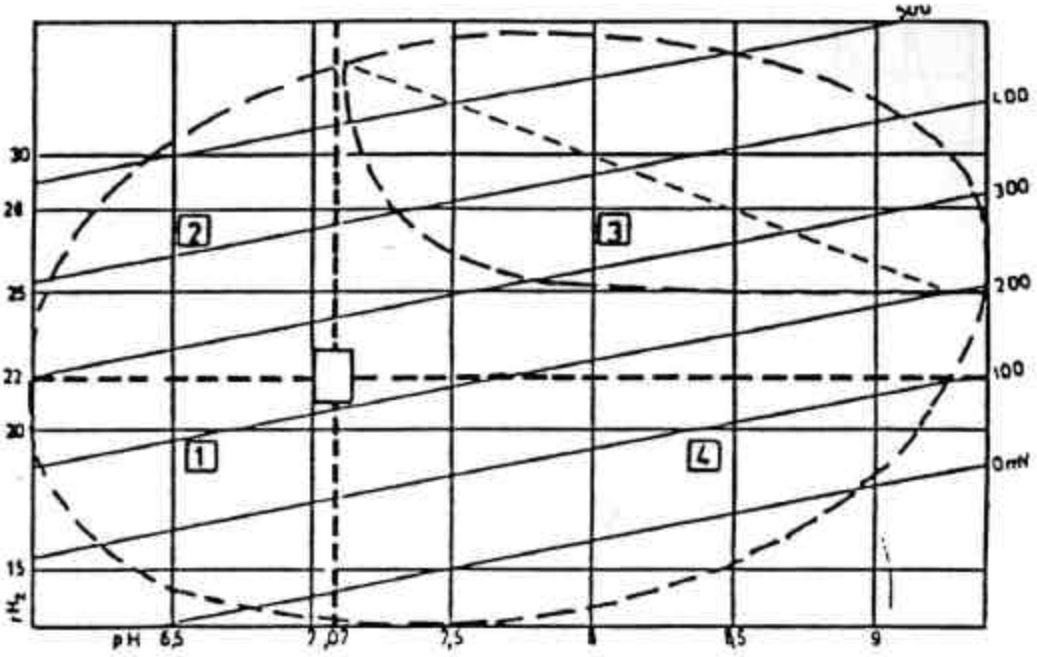
It must also be pointed out that there are other ions that are affected, such as the potassium and sodium ions that are affected through the nerve transfer, and thus the polarization of the nerval membrane. Values of these and other ions can affect the electrical nature of the fluid, as well as the polarization and depolarization of the membrane. Thus the absolute value of the rH_2 factor will vary from 0 maximum hydrogen pressure to 42 maximum oxygen pressure.



Oxygen dissociation curve of the hemoglobin. The O_2 bond to the hemoglglobin is dependent on the pH, the pO_2, the pCO_2, and the temperature.

28 corresponds to a neutral value, where the H_2 and O_2 pressures are identical. H_2O_2 is the chemical formula for hydrogen peroxide. Much of biology and cellular metabolism is dependent on the balance of the hydrogen peroxide and peroxidase enzymes, which are continuously balancing. These are also effective in certain cellular processes including white blood cell defense against bacteria and fungus.

Many other energy transformations are dependent upon the H_2O_2 conversion factors, setting up a need for the respiratory burst phenomenon of white blood cells. This delicate balance can be displayed on Dr. Isaacs's electron poising graph, which also directs the effect of the hydrogen and oxygen pressure.



The four zones of the bioelectric terrain. The pH values are marked on the abscissa, the rH_2 values on the ordinate. pH 7.07 as neutral value results in a vertical; rH_2 22, the ideal parameter for blood and saliva, results in a horizontal. Verticals and horizontals from a cross dividing the biological terrain into four zones or quadrants: Zone 1= acid and reduced; Zone 2 = acid and oxidased; Zone 3 = basic and oxidased; Zone 4 = basic and reduced. The oval defines the terrain in which life can exist. The curved line within Zone 3 marks the actual degeneration zone; the straight line divides reversible and irreversible stages of degeneration diagrammatically. In reality the modulation is fluid.

The oxidation and reduction cycle of contribution and absorption of electrons can be graphed in the electron poising theories of Dr. Isaacs. As we have shown, this falls under an open-ended thermodynamic equation and describes the effect of the extracellular fluid that surrounds the cells of the body. When we upset this balance of reduction and oxidation through unnatural means, such as the addition of large amounts of hydrogen peroxide, too large or too little amounts of oxygen, we set the entire cellular pool into disarray, and many kinds of disease can result. Once we upset the apple cart, the diseases that could result will follow the weak genetic link theory; where if the weak genetic link is respiratory, asthma might result. If the weak genetic link is in cartilage, arthritis might result. The whole spectrum of disease can fall out of metabolic imbalance.

Increased values from the norm of 28 to 42 on the rH_2 factor correspond with increasingly oxidized conditions that are caused by electronic deficiencies. When the numbers are decreased from 28 to 0, these show in increasingly reduced conditions for conditions with an increasing electronic charge.

The extracellular fluids of biology will vary from 15 to 35, setting the limits of the asymotopes, perfect values being 21, 22 or 23. The resistance of a fluid is a measure of the molecular concentrations, and also the electrolytical strength of the item. Together with pH and the rH values, resistance becomes a very needed modality, which can tell us correlates of osmotic action and electron transport conditions. Osmotic pressure is the reverse function of the dielectric condition. Low resistance is a condition of premature old age and other pathological conditions. High resistance corresponds to a healthy state, supposing that the pH and the rH_2 values are normal.

The average values of system resistances range from 100 to 120 ohms in the degenerative condition, 190 to 200 ohms in the average adult, and 220 to 250 in athletes. These three factors of pH, rH_2 and resistance are connected in a certain relationship.

These describe the terrain in some limited detail, not in full exactitude, and follow a classical formula of the Nernst equation, which is a variant of the second law of thermodynamics. Here E equals R times T over 2F times the log of 2H+ over H_2.

$$E = \frac{RT}{2F} \log \frac{[2H+]}{[H_2]}$$

Here E represents the measured potential in proportion to the hydrogen electrode, R is the constant of the full gaseous condition, T is the absolute temperature, F is the charge of the monovalent ions, approximately equal to 96,500 coulombs. The 2 in the division shows that there are two protons in the system, two H+ ions, and two electrons, 2E. According to a reversible reaction of reduction and oxidation $H_2 = 2H + 2E$.

The hydrogen ion concentration is factored through the logarithm of the reverse value in this concentration, thus it is a co-logarithm of the pH value. Likewise the rH_2 value represents the logarithm of the reversed hydrogen molecular concentration. This results in another formula, in which E equals RT divided by 2F times (rH_2 minus 2pH) R divided by F is to .000198 T equals 273 plus T, which corresponds to roughly 30E C. Thus E equals .000198 times 303 divided by 2. E, therefore, equals .3 times (rH_2 minus 2pH). rH_2 in the equation will equal 33.33 E plus 2pH, and pH will equal (rH_2 minus 33.33) divided by 2.

Thus pH and rH_2 will have closely defined and mathematical relationships.

The correspondent values of pH and rH_2 can be graphed in an xy axis, which will give us four quadrants in which our patients and substances will fall. In conditions of high pH and high rH_2 we find the condition that corresponds to sweet flavor. This shows that our substance is alkaline and oxidized, and thus will be in a condition of sweetness to the taste. Where we have high pH and reduced substances, this is a condition that corresponds to saltiness. When there is low pH acid and high rH_2, this shows acidity and oxidation, which corresponds to a sour flavor. Conditions of acid with reduced conditions reflect bitter flavors.

The Chinese treatment of acupuncture also found that there were conditions of sour, sweet, salty, bitter, and pungent. Pungent can be reflected on the above diagram corresponding to central areas.

Flavor	**Corresponding Organ**
Salty	Kidney, bladder
Sweet	Spleen, pancreas
Sour	Liver, gallbladder
Bitter	Heart, small intestine
Pungent	Lung, large intestine

The type of flavoring and cooking used in French cuisine and drinks reflect a more pungent flavor. This type of pungency might contribute to some of the noticeably healthy conditions of French people.

The acupuncturists found that at certain times these different flavors and foods in those criteria could be good treatment for different conditions. They found that the sweet flavor was

ALKALINE AND OXIDIZED
DECREASED PHOTONS AND DECREASED ELECTRONS

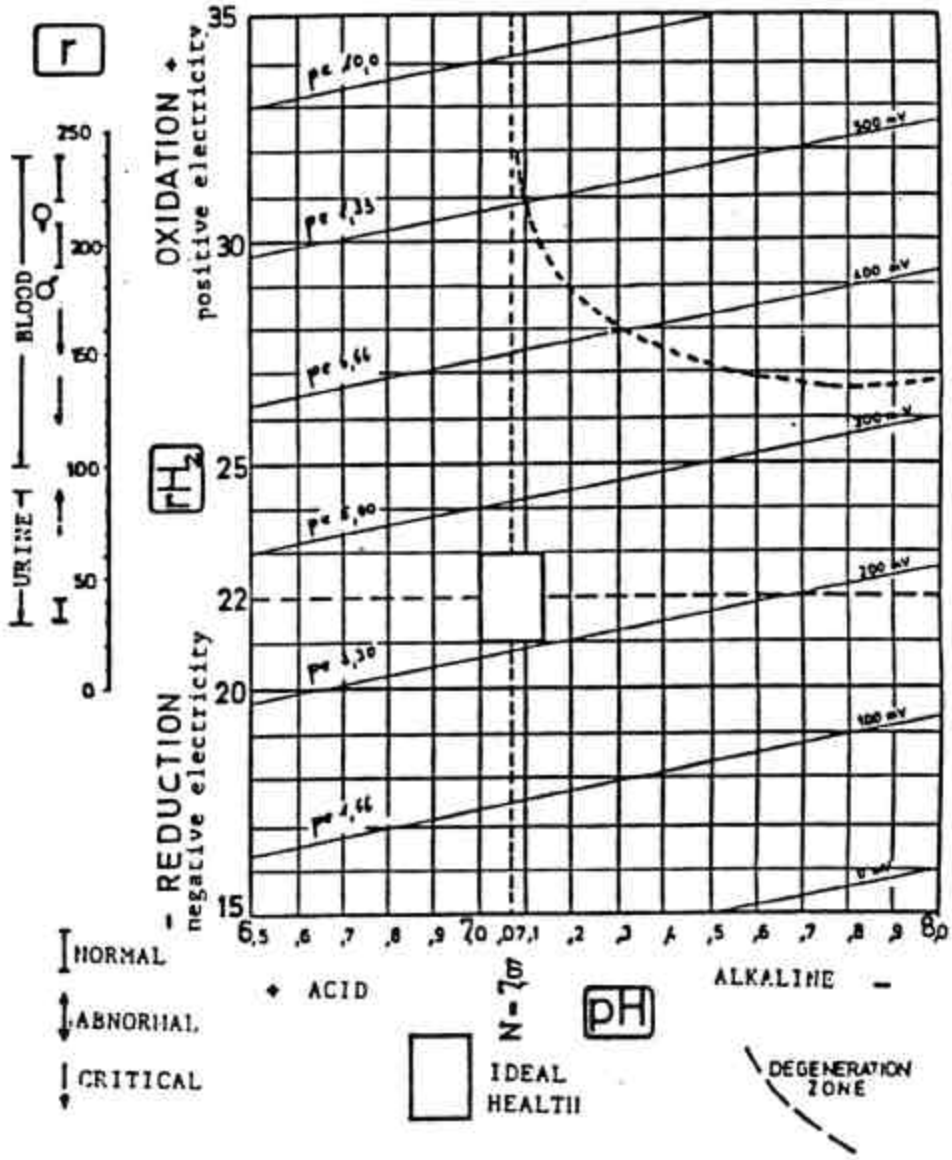
- VIRUS

- CANCER
- THROMBOSIS
- HEART AND CIRCULATORY DISEASE
- NEUROSIS
- DIPHTHERIA
- ARTERITIS
- ALKALINE ARTHRITIS
- DIABETES ALKALINE
- EPILEPSY
- CRETINISM
- MULTIPLE SCLEROSIS
- PERIODONTOSIS
- INSECTICIDE
- PASTEURIZATION
- CHLORINE, FLUORINE, OZONE
- THE PILL
- VACCINATIONS
- PSYCHOSIS
- FOOT AND MOUTH DISEASE
- RABIES

ALKALINE AND REDUCED
DECREASED PROTONS AND INCREASED ELECTRONS

- BROWN ALGAE

- PATHOLOGICAL ORGANISMS
- PLAGUE
- TYPHUS (fleckfeber)
- SYPHILIS
- CHOLERA
- PNEUMONIA
- PLEURITIS
- TYPHOID
- MENTAL DEFICIENCY
- CARIES



. Bioelectronigram according to Vincent. - In the coordinate system the pH values are inserted on the horizontal abscissa and the rH_2 on the vertical ordinate. The diagonal lines give the redox potential in millivolts. The graphics correspond to formula 2: $E_h = 30 \cdot (rH_2 - 2pH)$. The normal, abnormal and critical values of the specific resistance are shown in ohms/cm/cm² beside the illustration. As an alternative to rH_2 the electron activity pe may also be used for graphic representation. The point of intersection between pH 7.1, rH_2 22 and E 334 mV - or pH 7.1 and pe 3.8 - shows the terrain of ideal health. pH 7.5, rH_2 28 and E 390 mV or pe 45 give a point of intersection that lies within the degeneration zone. The r value, when measured, supplements the definition.

treatment for people of spleen conditions (spleen meridian deficiencies). Saltiness favored kidney and bladder meridian dysfunction. The bitter flavor was around heart and pericardium meridian problems.

Thus various metabolic conditions might need a treatment modality, which is reflected through this rH_2 and pH criteria. The entire field of Chinese acupuncture and nutrition is all centered around these five classifications of foods, and finding patients who are in need of these different criteria as indicated by their symptom profile, patient history, and acupuncture diagnosis.

The *Eclosion* computer system directs a diet for patients placed on exactly this type of criteria. Knowing foods that are in the classifications of sour, sweet, pungent, bitter, salty, and knowing that the classifications are what the patient needs to help those conditions, the *Eclosion* computer charts a four-day rotation diet built on those exact foods that not only helps to satisfy amino acid vitamin needs, but also has whatever the body needs to stabilize its metabolic condition. Knowing what types of food, herbs, water, homeopathics, etc. can be used to balance a patient is highly important in finding the various metabolic disorders and curing them.

Once again we can see that the acupuncturists in their age-old system had dramatic insights into an electro-biological physics that they were not capable of explaining in terms of modern-day physics, but yet was a viable working system of cure.

Balanced and correct water is extremely important for balancing the metabolism, and also achieving health in any organism. The fact that life exists can largely be attributed to the fact that water exists on the planet. Isaacs makes the point that water, due to its dipole effect and its ability to focus light energy, is absolutely needed in biology to focus the virtual photons into the cells. Water makes up a large part of the extracellular fluid which we are describing in this chapter.

Thus our discussion will not border on the quantic effects of what water does in intracellular activity, but how it contributes to osmosis in the extracellular fluids.

At a balanced pH of 7 we will find that in a cubic millimeter of water there are sixty thousand million hydrogen ions or protons. Thus at a pH value of 8 there are six thousand million hydrogen ions, and at a pH value of 6 there are six hundred thousand million ions. So we can see that small changes in the pH value will have enormous effect on biological balance as to the amount of protons and electron pressure, and that it can be affected by low pH.

At a pH value of 7 there are sixty thousand million ions per cubic centimeter. A man of normal health with a weight of 160 pounds will have an extracellular fluid that will be made up of roughly 108 pounds of water. This will arrive at 2.94 times 10^{18} hydrogen ions. 2,940,000,000,000,000,000.00

At balance in the water this 2.94 times 10^{18} hydrogen ions will also reflect as an equal number of hydroxyl ions. As the blood pH increases the hydroxyl ions will increase and the hydrogen ions will decrease. The reverse will happen in cases of acidity.

Thus we can see that there are extreme effects that pH can have on biology.

SYNOPTICAL OVERVIEW OF THE OXIDATION-REDUCTION REACTIONS

oxidation:

gain on:	loss on:
oxygen O2	hydrogen H2
halogens	protons

reduction:

gain:	loss:
H2	oxygen O2
protons	electrons

Variations in charge fluctuations and electrical disturbances can bring about neural excitation; anxiety, neuroses, neural exhaustion, and other factors that can be relieved through relaxation training. Insomnia, infarction risk, etc. can also be found as factors that have electrical components. Variations of negative and positive electrical charge, as well as other electromagnetic wave phenomena, can be used as treatment modalities as we learn more and more about the body electric. Disturbances of the electrical matrix of the body can contribute to positive or negative feedback conditions. Thus the biocybernetics of the body can be disrupted.

The collective pH resistance and redox potentials of water that we intake is very important. Many mineral waters get too low a resistance as the minerals act as electrolyte enhancers. The electrolytes of mineral water can thus affect water inversely. Thus the conditions we intake are very important.

In developing a metabolic therapy, Vincents has used a simplistic example of these three variables. There was statistical evidence that these three variables could be reduced and other variables ignored. It is the basic treatise of this book on the topic of quantum biology that so doing would be ludicrous. But that does not minimize the need for undertaking metabolic therapy, which is why we have taken the time to analyze the Vincents method so thoroughly.

Energetic, metabolic balancing will definitely play a part in the prevention of disease in our energetic medicine. Future energetic, metabolic balancing will find its way into the emergency medicine field, as well.

SUMMARY

1. THERE ARE THREE GENERAL TYPES OF ORGANIZATION OF MOLECULES :

   A. STATISTICAL DYNAMICS-- NONLIVING SYSTEMS
   B. OPEN STATISTICAL DYNAMICS-- EXTRACELLULAR FLUID
   C. QUANTUM DYNAMICS-- INTRACELLULAR

2. EXTRACELLULAR FLUID NEEDS TO BE IN AN ELECTRICAL STATE OF READINESS. A BALANCE OF OXYGEN, PROTONS, ELECTRONS AND IONS IS DEFINITELY NEEDED.

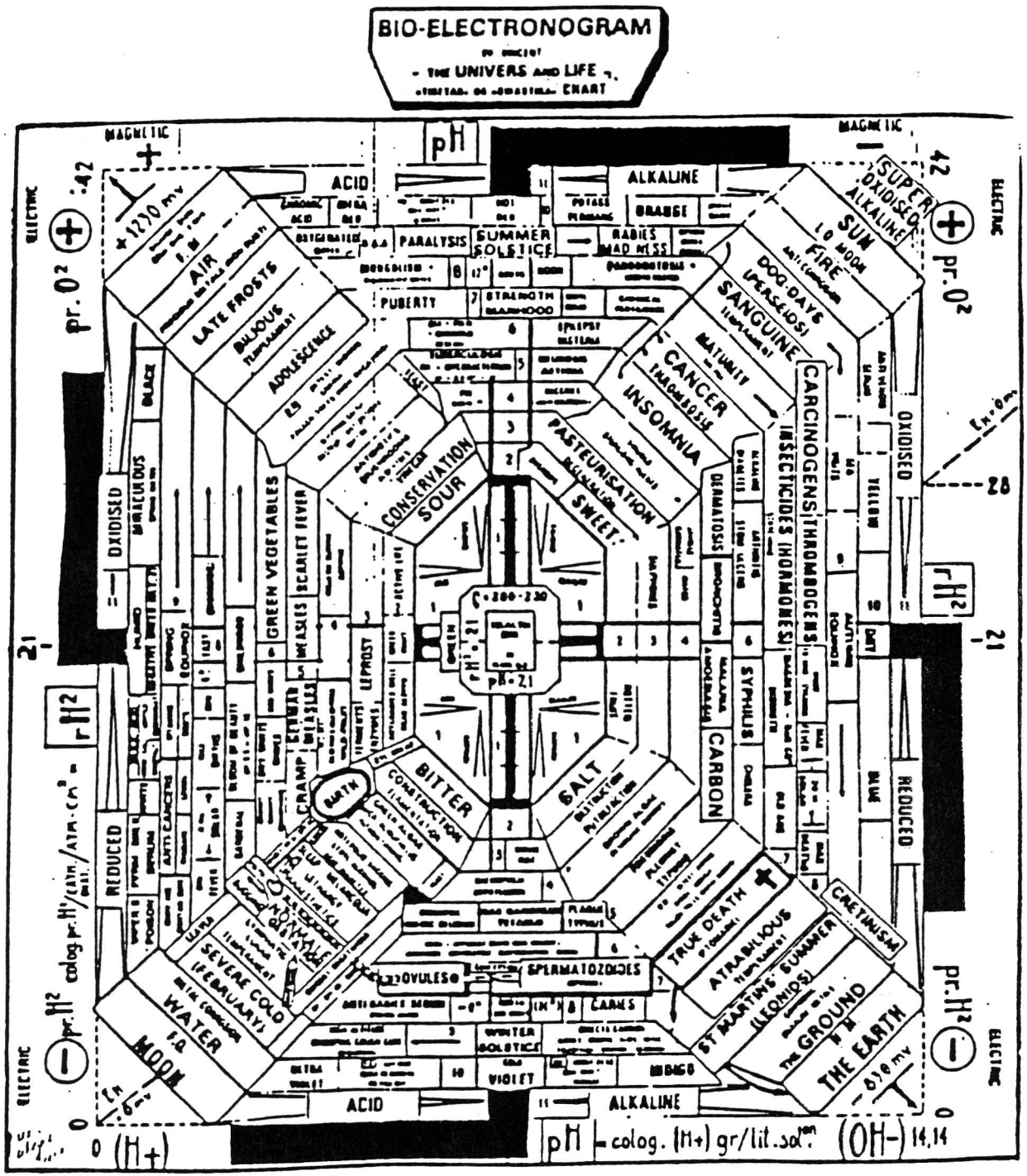
3. BALANCING OF OTHER EXTRACELLULAR FLUIDS INCLUDE:

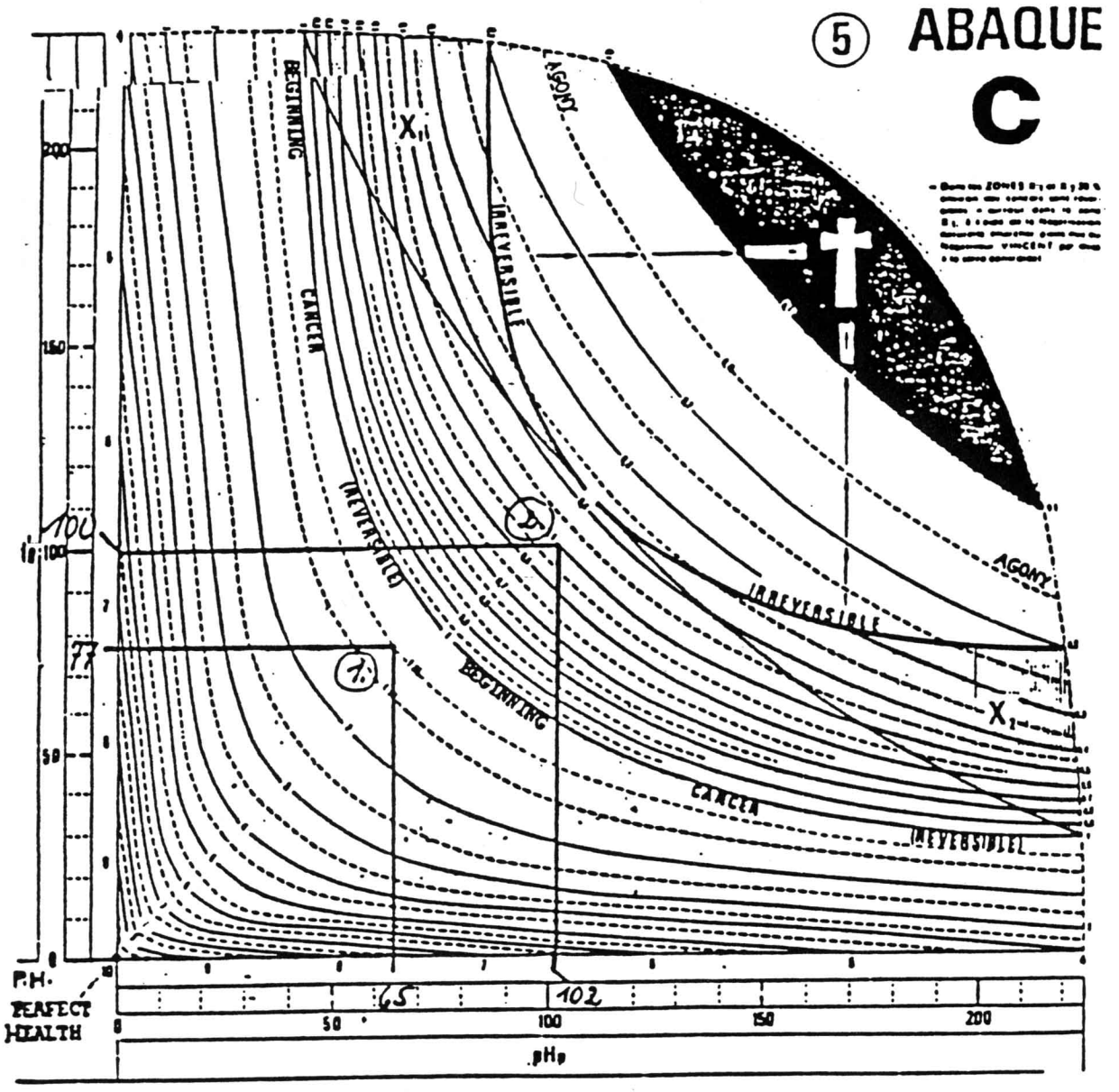
   A. PROTEIN (FREE AMINO ACIDS)
   B. CARBOHYDRATES (SUGARS-- STARCHES)
   C. FATS (LIPIDS AND FREE FATTY ACIDS)
   D. NUCLEOTIDE (PROTOMORPHS)
   E. REDOX POTENTIAL
   F. HORMONE TRANSFER
   G. VISCOSITY (SURFACE TENSION)
   H. HEAT (PHOTONS)
   I. INFORMATION

4. CERTAIN FOODS AND FLAVORS CAN BE USED TO BALANCE METABOLIC DISORDERS AS IN ACUPUNCTURE NUTRITIONAL THEORY.

5. METABOLIC IMBALANCE CAN BE SYMPTOM-FREE OR RESULT IN A WEAK GENETIC LINK SYMPTOM. METABOLIC THERAPY MUST BE USED FOR PREVENTION OF DISEASE.

6. MEASURES OF BODY VOLTAGE, AMPERAGE, RESISTANCE, CAPACITANCE, INDUCTANCE AND OSCILLATION ARE MINIMALLY NEEDED FOR ENERGETIC MEDICINE.


BIO-ELECTRONOGRAM
- THE UNIVERS AND LIFE -
MAGNETIC
ELECTRIC
pH
ACID
ALKALINE
pr. O²
pr. H²
rH²
AIR
LATE FROSTS
BILIOUS
ADOLESCENCE
PUBERTY
SUMMER SOLSTICE
PARALYSIS
RABIES MAD MESS
SUN
FIRE
SUPER OXIDISED ALKALINE
DOG-DAYS
SANGUINE
CANCER
INSOMNIA
CARCINOGENS
INSECTICIDES (HORMONES)
OXIDISED
REDUCED
CONSERVATION
SOUR
PASTEURISATION
SWEET
BITTER
SALT
CARBON
SYPHILIS
GREEN VEGETABLES
MEASLES
SCARLET FEVER
LEPROSY
CRAMP
EARTH
CONSTRUCTION
TRUE DEATH
ATRABILIOUS
ST MARTIN'S SUMMER (LEONIDS)
CRETINISM
THE GROUND
THE EARTH
SEVERE COLD (FEBRUARY)
WATER
THE MOON
OVULES
SPERMATOZOIDES
CARNS
WINTER SOLSTICE
VIOLET
MEASLES
pH = colog. (H+) gr/lit. sol.
(OH-)
14,14


5 ABAQUE
C
BEGINNING
CANCER
IRREVERSIBLE
AGONY
X2
X1
100
77
65
102
P.H.
PERFECT HEALTH
50
100
150
200
pHp

Chapter 13

A NEW DESCRIPTION OF NEURAL ACTIVITY

Chapter 13

A NEW DESCRIPTION OF NEURAL ACTIVITY

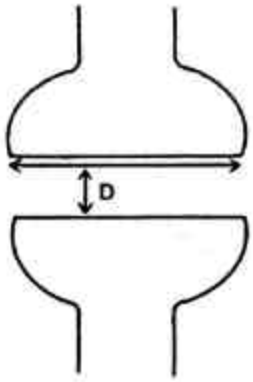
What is the quantic need for neurons?
How do neurons work from a quantic perspective?

As we have pointed out in our description of cellular phenomena, there is a need for indeterminacy and a quantic description of the processes within the cell. Inside the cell there are given input/output criteria, which are handled in a molecular transport process by a quantic transform machine. This is the quantic indeterminate machine of life.

As we proceed to more multicellular organisms, there becomes a need for more quantic interchanges to be developed in communication between the vast number of cells. Viewing the metazoan organism, or higher plants, we will also find that systems of intercellular communication must be developed that also will be quantic in nature, follow the set of transform processes guided by quantum theory, and thus have a degree of indeterminacy. As we have pointed out, the mechanical nature of the muscle sarcomere and the nerval action of the synaptic cleft are part of this phenomenon.

In setting up these intercellular communication processes, nerval tissue development starting at the noto chord was one of the first integral, intercellular techniques for communication. There is the development of the synaptic cleft along these neurons, which falls under the indeterminacy principle of the size of the synaptic cleft in the transport process. By putting mathematics to the size of the molecules and the size of the synaptic cleft, we find that our development of knowledge of the mass and position will fall under the Heisenberg uncertainty principle. Thus we are limited in our ability to know the actual transport process within the synaptic cleft.

As we have mentioned many times in this book, the process inside the synaptic cleft is one of an indeterminate matrix. Thus it falls out of the range of Newtonian entropic predictability (see *Bio-Quantum Matrix*).



ACETYL CHOLINE 200 ATOMIC WEIGHT $\frac{200}{6.02 \times 10^{23}}$

$$) \text{ MASS } @ \text{ (VELOCITY)}^2 @) \text{ POSITION} = \frac{6.67 \times 10^{26}}{4B}$$

$$(3.3 \times 10^{22} \text{ grams}) (1.0 \times 10^{-2} \text{ sec})^2 (1 \times 10^{-8} \text{ cm}) = 5.3 \times 10^{--27}$$

$$3.3 \times 10^{-34} \text{ ... } 5.3 \times 10^{--27}$$

D = 1 Angstrom = 10^{-8} cm

Velocity is speed of neural transmission

= 10^{-2} sec.

In the indeterminacy of the physics of the synaptic cleft the neural transmission process falls under indeterminacy.

As we dramatically increase mass, we can demand action in the synaptic cleft. This allows for the phenomenon seen in sinthetic pharmacology, in which pharmaceutical agents must be used in much larger amounts than those in which they occur naturally. Here the amount of lock-and-key and the amount of mass of a certain hormone can enter into the synaptic cleft and demand action. This demanding action is not a natural process, and does not fall under the laws of indeterminacy; some have short-circuited the laws of indeterminacy and made the system a determinate, mechanical system, which fits the paradigm of the sinthetic chemical companies. Since they do not understand life and its quantic interactions, they can sit back and enjoy the Newtonian effects of engaging in a super-chemical system, even though this unnatural phenomenon upsets the cybernetic balance and interferes with natural feedback control. However, the short-term symptomatic gains financially outweigh the long-term system disruption.

WORLD-WIDE/YEAR	**SINTHETIC PHARMACEUTICALS**	**NATURAL & HOMEOPATHIC PHARMACEUTICALS**
Sales	$300 billion	$30 billion
Profits	$150 billion	$1 billion
Malpractice Suits	$50 billion	$100,000
Malpractice Settlements	$30 billion	$10,000
Percent of Damage Risk	6%	.0000003%

This addition of a super-flux of a chemical demanding action of the synaptic cleft is also highly profiting, since these chemicals can be sinthetically derived and the sinthetic process can be patented.

This is why the need for the quantic indeterminacy principle is one that sets up the paradigm for a new biological perspective. Neural tissue needs to communicate. The various elements of this intercellular communication must be within the quantic flux of indeterminacy (to reference the mathematical nature of the synaptic cleft).

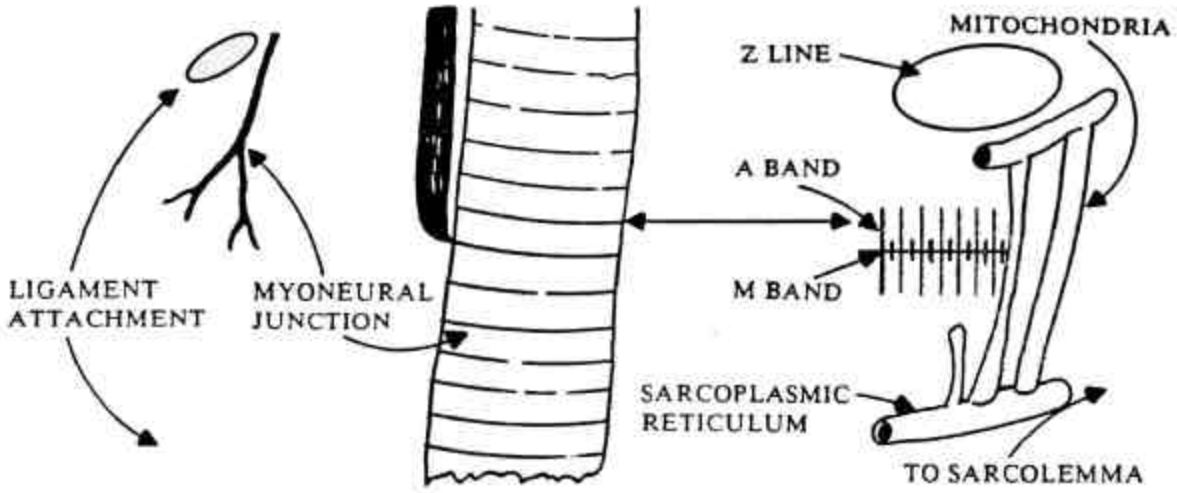
Thus the nervous system, having this quantic retroversion, is a good example of an organ system displaying emergent quantic behaviors. This allows for the dynamic connection of the parts of the organism to other parts. Thus our quantization of the molecular motion in the energetic flux and the shift of the photons can give rise to the emergent behaviors of higher integrative, and control organs within an organism.

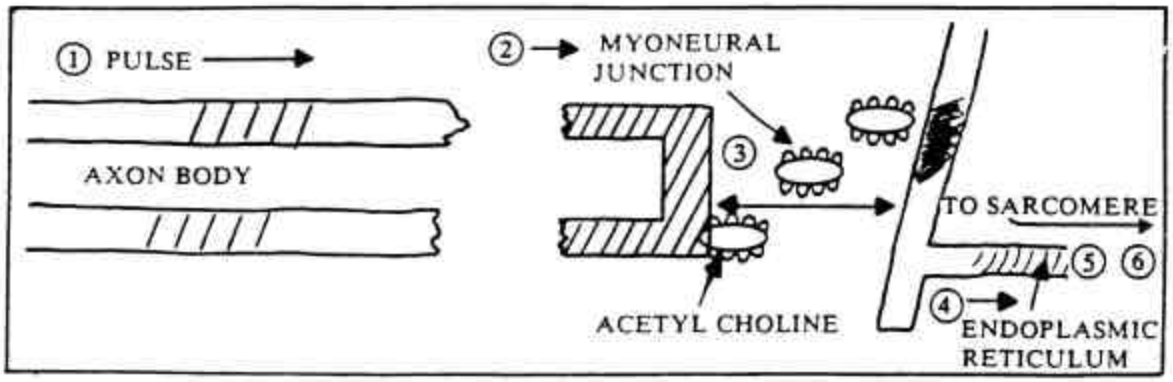
This book offers a new description of neural processes, one in which deterministic and reductionistic theories are inadequate as a description of the full force of what is happening within an organism.

As science begins to develop more nonlinear, quantic rationales for understanding the complexity of life and biology, we will see that simple systems cannot be reduced to their most important variables. Systems work on the interplay of a large number of shifts. Stephens (1961), through a long series of experiments involving sensory perception, comes to the conclusion that many aspects of sensory and neural phenomena can best be explained through the existence of a neural quantum element. Such a small unit of activity is not to be identified with the all-or-none response of an axon, but is found to be integrative with the sensory system. A triphasic operation is needed for systems analysis.

Isaacs writes that quantization imparts stability to a process. "Quantization adds a permanence to the time and space phase relationship. The process can become rather specific in many ways, especially when considering frequency and phase space energetic inputs. There are

INDETERMINATION OF MUSCLE SARCOMERE





1 - PULSE TRAVELS DOWN AXON (IONIC PERMEABILITY TRANSFER)

2 - IMPULSE ACROSS MEMBRANE

3 - PULSE ACTIVATED IN SARCOLEMMA

4 - PULSE CARRIED BY ENDOPLASMIC RETICULAR ACTIVATION

5 - CONTRACTILE UNITS FIXED IF POTENTIAL RECEIVED

6 - CONTRACTION

constant incoming and outgoing impulses of the nervous system, which under a rather complex quantic control can be executed wisely by the system." An over-reduced machine of simplistic on/off type behavior would not be able to handle the different modalities needed for reproduction and metabolism. Thus in the development of all of our computers, we have not been able to find one that can copy the factors of life (metabolism and reproduction), because our computers are built on the dictate of mechanical, determinate, reductionistic processes. Computers work on binary systems. A condition is off or on. Under quantization a circuit could be off, on, or both, indeterminately.

RECIPE FOR EVALUATING A MECHANISTIC MODEL WITH UNCERTAINTY RELATIONS

Step I. Decide the imprecision (uncertainty) of a variable from the model.

Step II. From uncertainty relation, obtain the minimum uncertainty of the variable conjoined to the variable chosen in Step I.

Step III. Compare this calculated minimum uncertainty (Step II) with the maximum uncertainty (Step I).

MUSCLE SARCOMERE UNCERTAINTY

CHOOSE MAXIMUM UNCERTAINTY

I. Gain in velocity of a C_A ion (excitor of muscle) is

$$\frac{0.5 \times 10^{-4}\text{cm}}{0.016\text{ sec.}} = 3.1 \times 10^{-3}\text{cm/sec.}$$

$$\text{Momentum of calcium ion } \frac{40}{6.02 \times 10^{23}} \times 3.1 \times 10^{-3} = 20.7 \times 10^{-26}\text{ erg}$$

II. Choose conjugate. [Position (distance)] is the conjugate of

III. Compare.) position ~= h/) momentum

$$\sim= \frac{6.6 \times 10^{-27} \text{ erg}}{2.07 \times 10^{-25} \text{ erg}} \sim= 3 \times 10^{-2} \text{ cm}$$

This is far beyond the desired range for locating the ion in the sarcomere.
This process is under the indeterminacy principle, and thus below the correspondence rule.

COMPUTER BINARY SYSTEM	TRINARY SYSTEM
0 - 1	0 - 1 - Indeterminate

In biology, factor 3 is influenced by the indeterminate life force-affecting principle.

Transformations describing synaptic function will embody two extremes of a continuum of the neural net function. Quantized emergent behavior will lead to the more permanent establishment of preferred neural circuits. The circuits will have a high degree of spatial and temporal specificity in their response to the environment.

Isaacs also writes that a set of neurons and their synaptic interconnections will contribute to the nervous state behavior, and will make it impossible to specify completely the exact circuit involved with a particular engram. The engram becomes dissociated from its parts of structure and pathways and becomes existent on the mechanical nature of its whole, thus leading to the idea of the holistic, or holographic, interpretation of thought. A review of Pribam's holographic idea of brain action would be helpful at this point.

BRAIN

Rational	Visual/Spatial
Logical	Intuitive
Analytical	Holographic

The overlap of spatial components of the neural circuits will point to the integrative and associative functions of higher nervous centers. The description of such modes of functioning and interconnections assume the integrative state-like character. These can be tentatively termed "micro states", on the basis that they are involved with a small number of elements and partial topological orientation in certain locales and that they are highly stable.

Thus the orientation of the parts implies the orientation of the whole, and the orientation of the whole imparts a feedback to the orientation of the parts. Thus a system can be analyzed from parts to whole or whole to parts. The only true analysis of any real meaning would be an analysis that embodies both.

Thus these micro-states function as in field theory; stable elements acting with the whole. This type of theory was put together by certain psychophysical phenomena, and is known as the *plasticity rule of psychophysical theory*. We learn gestalts that do not have precise localizations in neural phenomena. Gestalts can overlap on other gestalts, making rather complex, learned behaviors. Thus these psychophysiological phenomena aggregate in fields that overlap on other fields, which overlap on other fields; not in a mechanical binary process (such as in computers), but in a triphasic, indeterminate, quantic process.

As we have outlined, we can see that there is a localizability phenomenon within neurons of the brain, as well as a holographic, indeterminate whole of the process. Both parts of the process make up the whole, as Yin and Yang blend to make up the entire process.

Groups of associative micro-states, storage micro-states, and integrative micro-states will interact in concert and contribute to global states of behavior. Thus we encounter a phenomenon known in psychology as the *state theory*. In the sleeping state, waking state, awareness state, anxiety state, etc., there are various psychic sets of behavior, employing the associative, integrative, or storage micro-states. These become learned states, and thus behavioral theory becomes a profound way of understanding some of the guidelines with which the human being or any other organism operates. But since this learning theory or behavioral psychology has some degree of impreciseness, we can see that the indeterminacy principle applies even here. In other words, we cannot be exactly sure what will happen in an experimental situation; there is always a degree of unsureness, because of the indeterminacy built within the precept.

At the turn of the century Thorndyke outlined two theories of learning; one, the *law of effect*, and two, the *law of readiness*. The law of effect was thought to be an associative to classical conditioning, much like Pavlov's dogs, where autonomic nerval functioning could be shaped by behavioral training. The law of readiness occupied more of a psychic state, in which a conscious organism such as a human being would be able to attain an internal environment necessary to learn. Thus an alcoholic needs to first come to the realization that he has a problem, and get to the law of readiness; that quantic level where help might ensue. Many patients we see have similar problems, where they have to get to a place in the law of readiness to finally get to the point where they can accept behavioral change.

In the law of effect, in terms of quantization, the amount of conditioning that can be affected on an organism has to do with how an organism interprets its amount of negative or positive reinforcement. The health of the organism has to be at least of a base rate in order for the organism to receive and unconsciously interpret the reinforcement. Also the ratio of reinforcement is very important, as we will find sometimes that a non-fixed ratio gets the best type of reinforcements, such as the non-fixed reinforcements supplied in Las Vegas and gambling houses in other areas.

The law of effect, in quantic terms, is working on neurological organization, and must deal with global levels of achievement and minimal thresholds of conditioning; whereas the law of readiness is more of a conscious application. For the law of readiness to be utilized, the basic needs of the organism must be provided, that of shelter, food and clothing, before the person can go on to find other needs. Then a self-assurance must be achieved to a certain degree inside the organism, so the person has the self-assurance to make any type of change. Next, a perspective for change or growth must be supplied, either through fear of the present state, what might happen in the future, or attraction to the new dynamics of a healthy situation. Thus attraction and compulsion take place in our law of readiness, the perspective for changing growth. So Thorndyke's laws of effect and readiness can be utilized in developing a neuvo biofeedback practice.

We can become more and more sure, but we understand that even an increase in the probability of production through technology presupposes that we are always faced with indeterminacy. Indeterminacy is based in the very foundations of the operation of the system, and thus will display itself at the final output of any behavior. In chemistry the states of various molecules were known by their transformations in empirical presentations long before quantum mechanical understanding of electrons was developed.

The original periodic table of elements designed by Russian engineers, the Mendeleyev Periodic Table, was designed by observation of the phenomena of how certain possible elements might combine to make other compounds. Thus the periodic table was designed without the benefit of understanding the quantum theory or the valence interactions needed to truly make the mathematical understanding of why the periodic table works.

Thus a quantic table of psychic states can be proposed from observation.

Fear	Worry	Carelessness
Anger	Anxiety	Bashfulness
Joy	Sadness	Delusion

From the above table, we can propose several combination psychic states, just as one can make many different molecules from various atoms.

By looking at how oxygen reacts with water, the periodic table was designed on the understanding of all the other elements. Psychologists have observed many mental and psychological states, and developed a phenomenological consideration of these states, known as psychology. Without the benefit of a quantic mechanical process of understanding how these various mental states operate in a holographic field theory, psychologists have set up phenomenological observations that allow them to understand statistically some human phenomena. What we are adding is just an open door for an understanding of these various states. The states of integrative, associate, memory, storage, retrieval, and others offer us a quantic understanding that will account for the neurological process of psychology. Built into our system will be the indeterminacy principle; understanding that we never can absolutely know any situation; we can only make a good guess.

We will see that even abnormal mental states, such as psychosis and depression, will also be made up of these fields and overlaps. We would like to point out that the full range of human phenomena is inherent in every system.

← Anger, Fear, Joy, Sadness, Worry, etc. →

We know from psychiatric cases that everybody is a little schizoid; everybody has many personalities within. These are symbolic of the different types of psychic states that can be occupied by the overlap of these phenomena.

In psychology we talk about the state theory. When a person is in a certain mental state, he will remember what he learned in that state when he returns to it. Thus in the state of drunkenness, when a person is inebriated and learns a telephone number of somebody at the bar, he is less likely to remember it, until the next time he returns to that inebriated state, and then he is more likely to remember it. Thus we try to advise students to take a test under the same type of mental states and conditions in which they are going to study. If they study with coffee at three in the morning, the best thing to do to take the test would be to do it at three in the morning, under the influence of coffee. Since this is usually not the time tests are given, it usually is not the best time to study for a test. The best time to study for a test is in daylight hours, similar to the time you would take the test. Try to duplicate the state as much as possible.

Thus the state theory of psychology will allow us to understand that each of these very complex states interferes and interacts with others, and causes normal or abnormal behavior. Even the definition of normal or abnormal behavior is a very sociological one, in which different types of morays and social judgment cases influence what is normal or abnormal in certain situations. Attempts to reduce the field of psychology to simple phenomena, such as just behavioral, just Jungian, just analysis; or even attempts to classify an abnormal vs. a normal state, really do not fall under the type of psychology or biology we are trying to describe in this book. A much more loose, nonlinear form of thought would dictate a different type of psychology than what is practiced today.

People who go into psychological careers and take courses at college level are taught statistical, phenomenological observations of groups of behavior. They are taught certain counseling techniques. The entrance into and exit from such programs are evaluated on a truly analytical, intellectual basis.

People with high degrees of compassion, empathy, sympathy, love, sharing and trust are usually discouraged from joining such communities and finishing such degree programs. The over-analytical intellectualization of the person's condition dictates and dominates the field of psychology and medicine today. This type of analysis and intellectualizing separates the practitioner and the patient from the flow. Problems are maneuvered for solution within intellectual and analytical guidelines. Love, acceptance and sharing are replaced by guilt, anguish, and rejection.

Functional decisions and phenomenological observations should not be dropped from psychology, but they also should not be the hallmark or the primary decision-making process. Levels of compassion, trust, sharing and love should be dominant; whereas more functional moray decisions would fit better under sub-phenomena or sub-systems of treating our patients. In our priority of how we judge the interaction of a psychological problem, a more compassionate set of priorities must be developed.

America houses more criminals in jails than any other country on Earth. In the 1980s rehabilitation was deemed impossible. Our social and psychological systems are abhorrently unsuccessful. We must develop primary education and parenting skills rather than our tertiary crisis intervention system. Manic depression, anxiety, and other types of inappropriate mental states will be dealt with in a much different way; by looking at some of the bifurcation points that might have stimulated an inappropriate behavior pattern.

Finding a whole pattern of nutrition, disease analysis, causative factors and etiology, homeopathics, acupuncture and other types of theories will be the foreground of the new psychology. Doping up patients to cover up symptoms is just society's way of trying to reduce the negative situation at the sacrifice of the health of the patient.

An example of an integrative state behavior is that of a conflict in the fight/flight excitations of the autonomic nervous system. At this bifurcation point the stimulus is conducive to flee, or to fight and stand one's ground. This decision often comes as a surprise to the person involved, where he does not think that he would have run but did, or did not think that he would have fought but did. So sometimes this bifurcation point comes up to a crux in which an indeterminate decision based on some old pattern, or perhaps just some indeterminate molecule, might throw the threshold in one direction or the other.

The total causality cannot be assigned because of the conjugate of variables of the molecular motion in the neurons and neuron connections. Thus in the emotions and their link to behavior, a complementarity or indeterminacy link is processed through the nerves, leaving us with a good probability of observation in behavior, but an inability to absolutely know if, when or how a person will flee or fight.

In our development of holistic psychological interventions we can see that this is not just a possibility of a theory; this is an actual, viable, realistic, *existing* theory of psychological intervention. In this document we have not spent a great deal of time developing the psychological practices; we have just pointed to the need.

NEEDS FOR PSYCHOLOGICAL BALANCING

1. Metabolic
2. Bowel Flora
3. Relaxation
4. Reconditioning
5. B Vitamin Intake Balance (not over-sufficient or deficient)
6. Parasite Control
7. Heredity Control
8. Inflammation Control
9. Allergy Control
10. Homeopathic Treatment
11. Hormonal Balance

Once again, this author would like to take the opportunity to show the reader that although these quantic ideas are not mainstream in modern medicine, they are still being used today.

The principles of electroacupuncture, homeopathy, quantic psychology, compassionate counseling, chiropractic, massage, and others exist as legal forms of medical treatment today, in America and throughout the world. In fact, they dominate worldwide. It is only here in America where more intellectual, analytical, reductionistic thinking dominates the mainstream. Let me guarantee that these theories are not mere theories; they are actually practical and dynamic medical techniques employed today.

There are millions today who practice energetic concepts of medicine. This book provides a plausible explanation for this phenomenon, scientific proof of the philosophy, and an introduction into the practice of a new bio-quantum medicine.

Life in America is built on the precept of freedom of choice. However, there are those who choose to interfere with freedom of choice in medicine, control the philosophy and technique of American medicine and prohibit freedom of thought. Thomas Jefferson said, with such impunity that it is carved inside his memorial, "I swear on the altar to fight against any tyranny over the minds of men." Some have taken a similar stance against the medical tyrants of chemical philosophy. It is to these courageous few that this book is written. I pray that the egocentric tyrants will have a change of heart, and thus make available the freedom of choice in medicine for the American public.

SUMMARY

1. NEURAL ACTIVITY IS AN ORGANISM'S EXTENSION OF QUANTIC INFORMATION HANDLING USED AT THE CELLULAR LEVEL.

2. THE SYNAPTIC CLEFT IS A QUANTIC DEVICE WITH INDETERMINACY A KEY FACTOR IN ITS UTILIZATION.

3. THE NEURAL NET OF THE BODY USES QUANTUM INTERACTION RULES TO GENERATE A HOLISTIC OR HOLOGRAPHIC REACTIVITY.

4. PSYCHOLOGY AND PSYCHIATRY HAVE UTILIZED SO MANY INAPPROPRIATE DRUG-RELATED THERAPIES THAT THERE ARE VAST AMOUNTS OF IATROGENIC, INCURABLE DISEASES.

5. NATUROPATHY AND BEHAVIORAL MEDICINE ARE ESSENTIAL TOOLS FOR THE FUTURE OF NEURAL MEDICINE.

6. HOMEOPATHY IS AN EXCELLENT CHOICE FOR NEUROLOGY AND PSYCHOLOGY AS WELL.

Chapter 14

AGING

Chapter 14

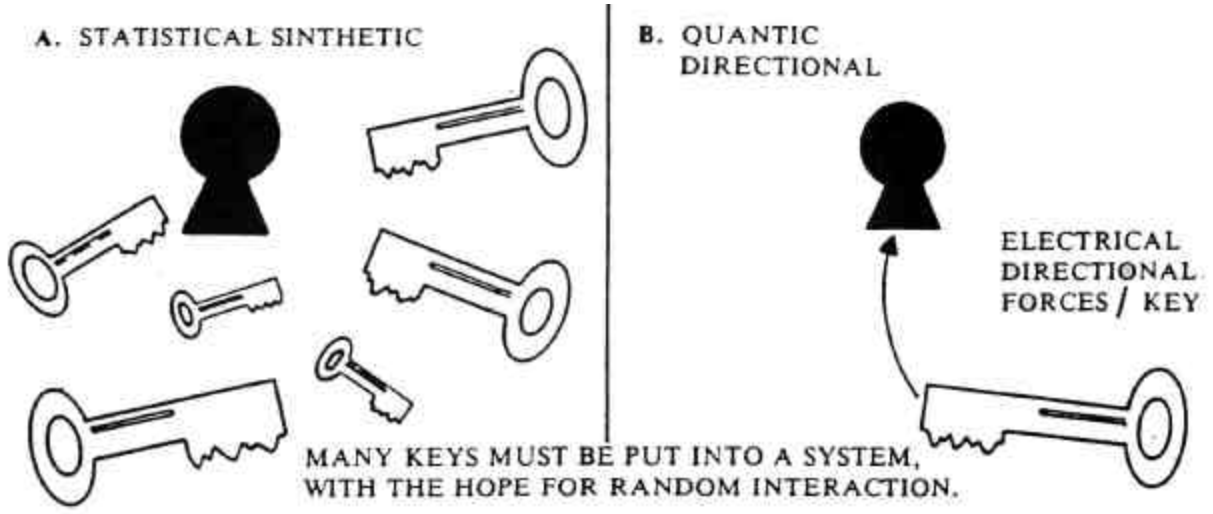
AGING

What is aging?
How can life be prolonged?

Quantitative rules for any type of situation as complex as biology, given the limited knowledge that we possess as human beings, must be taken with a grain of salt. Perhaps we need to develop more guidelines until we understand different rules leading to different laws of the phenomenological actions integral for life.

As Isaacs points out, in developing the uncertainty rule dealing with information handling in cells, we can predict that the existence of informational fields will be developed between very large molecules. Such informational fields will be directionalized and bonded through the long-range forces, as we have discussed in previous chapters. These directionalized bonds in long-range forces will be very prominent in the role of organization in the DNA/RNA in development of proteins and nucleic acids.

The replicative process of DNA can only be explained to date by these long-range forces. The recognition occurring between cell surfaces and receptor sites, and their attraction to each other, can be explained through these long-range forces. Antigen and anti-body reactions are specific, and a lock-and-key type theory of chemicals is not sufficient to explain the different concentration levels of activity in biology. Something must attract the key to the lock.



Enzymes can act because of the large surfaces of favorable collisions that are impacted. In order for high K values to be utilized with the enzyme molecules, there must be enough activation energies with the presence of enzymes. Since enzymes are small dipole magnets, they are brought into the field, and in the presence of base activation energy the enzymatic process can be activated.

Activation energy can happen in the presence of enough heat energy, charge, momentum, or mass. If there is enough of any one of these types of energy, it can start and activate the enzymatic process. Charge would help the attraction of the molecules. Heat would help by increasing the kinetic energy of the molecules. If there is enough mass increased in the field of the enzymatic action, by increasing the substrate and/or the components, then this will increase the probability of striking each other; and can increase the enzymatic effect, if two items, enzyme and substrate, are driven together by momentum.

Thus we can see that the combination of these energies might provide enough activation energy to start and activate the enzymatic process. Since the enzymes are the most prominent things in biology, their action is highly

important. Enzymes indeed make life possible. They are small dipole magnets, and in some cases, have some profound magnetic fields. This accounts for some of their heat sensitivity, as they are temperature-viable. In the case of the activation energy needed to supply these different enzymes' interaction, if there is too much of an energy presence, then it can shut down the enzyme action. Here again we are faced with biology's law of dualism, in which too little or too much of an enzyme can cause different problems.

The polarity of enzymes and their magnetic action can be explained only through long-range forces. As we find with the long-range forces, these things will be dependent on virtual photons, and thus will be photic. The electron transport process within biology is photic and dependent on photons.

Such photons, magnetic action, long-range forces, and perhaps even some undiscovered phenomena will account for the informational fields that are set up in biology. Even the polymorphic resonance of vibrational fields of these large molecules could have some dramatic effects in biology. The rather long wavelengths associated with such vibrations, possibly on the order of a thousand angstroms to several microns, would increase the long-range effects. They also can be very specific for reasons that these vibrations assume discrete values, and the strength of coupling depends on the occurrence of like modes in the interacting molecules. Thus the coherence can help overcome some of the distance variables. Coherent radiation is much more penetrating, as it has a longer range of action.

Isaacs describes these forces as an exchange of virtual photons between molecular oscillators under nonconventional statistical conditions.

We can see that there are definitely vibrations in biology, and that these take the place of photons, electrons, molecules, and even cells, which can occupy different vibratory statutes and set off different types of vibration photons or long-range forces. Whenever an electron, photon, or charged particle is moved in space, it sets up a magnetic field. The right-hand rule of electronics says that if an electron travels along the line of your thumb, there is a magnetic field developed at 90E to that line. There is also an electrostatic field developed at 90E, so that the electrostatic, magnetic, and electron-conductive flow make up a three-pole field that is essential to our understanding of energetic phenomena. All of these set up vibrations to the release of photons, in the knowledge that photons are responsible for the autodynamic energies.

Dr. Rife developed a Rife machine that utilized different types of these vibrations to treat different diseases. Just as a sound vibration might shatter a glass at a certain pitch, Rife found that certain vibrations might shatter other crystalline structures. He found that viruses were such crystalline structures. There are many liquid crystal effects; even DNA was found to be crystalline in its structure.

Rife will be discussed later. His work was ahead of his time, and the technological achievements that he made were disdained by chemical thought patterns; they couldn't accept Rife into modern medicine. Perhaps now, after the advent of more modern theories, Rife may be reanalyzed (see *Bio-Quantum Matrix*).

VIRUS
CRYSTALLINE
STRUCTURE

A specific frequency can destroy a virus, just as sound can shatter a glass.

Rupert Sheldrake's book on "Morphic Resonance" outlines the precept for different types of shapes and shape theories in the development of thought, and many other types of chemicals, crystals, etc. In line with these ideas, the current theory of one gene representing one amino acid sequence for one enzyme protein in the form of information storage, information handling is seriously flawed. We must now look at the more large-scale phenomena of these reactions, and how some of these genes can have multiple determinate factors and accomplish different tasks. This is again in the idea of the reductionistic mind of current today thinking in biology, and how seriously flawed that type of thinking might be. Some of this information may be carried on cytoplasmic elements themselves. The proteins might participate in their own code.

Sheldrake's concept of morphic resonance was applied to thoughts, actions and other human events. Even in the animal and insect kingdoms, there were found to be several instances in which morphic resonance explained phenomena that could not be explained by standard chemical entropic thermodynamic science. But as we look more closely at Sheldrake's theories and philosophy, we will find the need for a different perspective, something that might go beyond the dimensions of time and space and into the other dimensions.

Sheldrake challenges us to think about different ideas and entities, and our chapter on vionic forces will perhaps give some insight as to how morphic resonance might be explained.

Timing and phasing under quantum rules of information interactions will soon be important in larger functions described now to inducer and suppressor genes. Information can be transferred through timing of operations. The quantic aspects of nonmechanistic interaction would effectively insulate the information from thermal and entropic degradation, while letting some thermal agitation in from time to time to stir the pot, as it were. Thus we can see the need for Brownian motion before mitosis. This is part of the process of biology.

Information transfer for coding and genetics is going to be hard to interpret from chemical intervention only. As we attempt to interput through our studies by using DNA crystallization techniques and the like, we are actually studying a very sinthetic process, not a natural one. Most of the genotype project, thus, must be taken with a grain of salt. As we find different genes predictive of certain types of diseases, we will have to challenge the idea of the reductionistic simplicity of this claim. Mutual feedback of the other genes, as well as environmental feedback, have a very large interference. This is indeed a multi-body problem. Thus a nonlinear, non-reductionistic, quantic type of thought pattern that we wish to develop through this book would dictate that we must move very cautiously in trying to develop new medical techniques from the results of the genotype project.

The information that we glean from this large statistical challenge called the genotype project, looking at the different genes chemically and what types of processes they are involved with, could be very limited if we rush into an over-reductionistic view. We must be constantly reminded that the process does not work in that simple a form. The process of life is a very complex interchange of information that is happening on many, many channels with feedback and dependency involvement. To be over-reductionistic and try to reduce factors into some simple operandi would be making a drastic mistake.

Thus the principle of complementarity will lead us to the idea that information is a very complex process of interchanges happening in vast arrays that cannot be calculated without the help of machinery. Even though the human mind in the twentieth century attempts to reduce functioning to its simpler form, it is a mistake to think that this simple map is actually the functioning itself. In the twenty-first century we will have a different view point; man will evolve the thought processes needed to realize that nature works, and there is a vast complexity of the natural process.

As we see the limitations of reductionistic thought, we will finally learn to revere nature for its ability to control life. We will finally realize that nature is smart and man is dumb. Nature is doing; man is guessing. Only nature knows. Instead of developing institutions and prizes that revere man's limited interventions of allopathic medicine or against natural medicine, medicine will recognize nature's vast, awesome, incredible superiority. Then true healing of all of mankind's ailments can proceed.

Thus our new science will need to be built on reverence for the natural process, connection to the environment, and finally, some type of a religion, or at least connectiveness; this is what religion truly means. This reverence will guide us to a new level of thought, a new level of respect for the natural process and the environment.

As we find, the exchange of biological information in the DNA requires the existence of the total DNA, and requires the rest of the cell to interact *with* the DNA. To over-reduce the phenomenon is a very chronic mistake.

As we pointed out in Chapter 8, there is a vast intercellular, regulatory process, not only of photons but also of hormones. This interaction between the environment of the cells adds to a very complex situation in determining DNA utilization.

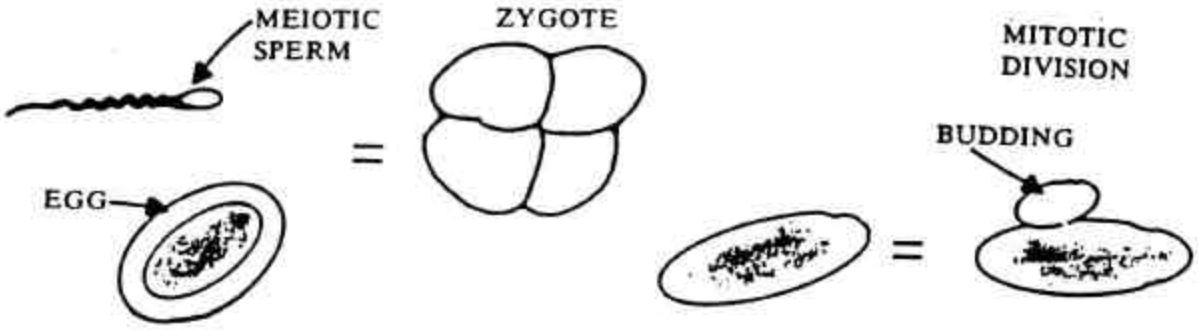
Sexual conjugation for cellular life forms is an informational correction device. As Isaacs puts it, at certain times we need new DNA, because the old DNA is starting to give way to thermodynamics, or entropy. Just as in the Navy, we need to periodically have a new captain restored to the ship. When a new captain comes into the ship, he brings order to the ship, making sure that the ropes are tight and that the decks are swabbed at their regular intervals, and everyone performs to the height of their ability. This is the order and control needed to help the ship run. Then as time goes by, the captain will be more lackadaisical in his workings with the sailors on the ship; the decks are not swabbed quite as regularly, and the ropes are not quite as taut as they might be. This type of give-way to entropy and thermodynamics eventually dictates that the Navy must bring in a new captain. The old captain is starting to get too familiar and lax.

Such is the necessity for sexual conjugation.

Royal Lee has outlined the build-up of protomorphogens in the cells and the interstitial fluids of the cells, where old types of DNA in broken form accumulate in the cells. We heartily recommend reading of the treatise of "Protomorphology" given by Royal Lee as an understanding for this phenomenon.

Thus the breakdown of essential information can be recovered through asexual cell lines over several generations, and reversed by coupling with large molecules of the cytoplasm of a new cell, and thus to overcome the rate of information loss.

Sexual conjugation offers advantages in preventing errors of information handling by one-to-one reproduction, rather than one-to-two reproduction, as in asexual fission, or mitotic division.

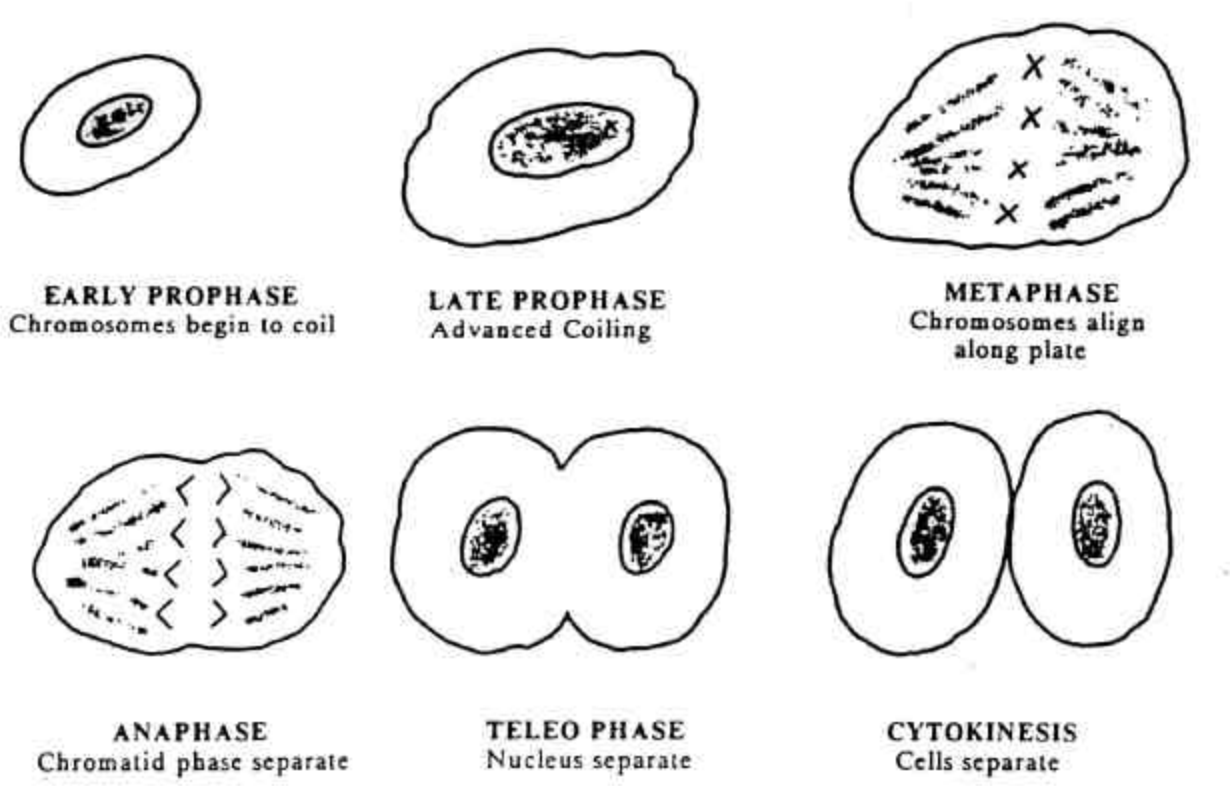


So sexual conjugation developed as an alternative to aging, so that the DNA can live on. Aging is the subtle decline of the body's ability to fight entropic thermodynamics. Subtly, certain changes start to happen as the organism loses its quantic information control and subtly allows in more thermodynamic entropy.

As we have shown, the vibrational modes of the different large molecules set up some long-range resonant frequencies through the release of virtual photons. There are also electro-elastic collisions, which are happening as a result of the long-range forces. As we have developed in the early part of this chapter, this is an important part of cellular information, and all cells will need to rely on this type of information transport to regulate their emergent processes of reproduction and metabolism.

The nucleic acids, thus, have more than just chemical components; they have energetic, vibrational and photon activity. This allows the cell to fight against entropy or noise coming into the system. As time passes by, the system gradually loses its fight with the noise. Then the inner cell regulation factors break down, lose their quantic indeterminacy, and fall into determinate Gaussian statistics, and thus, entropy.

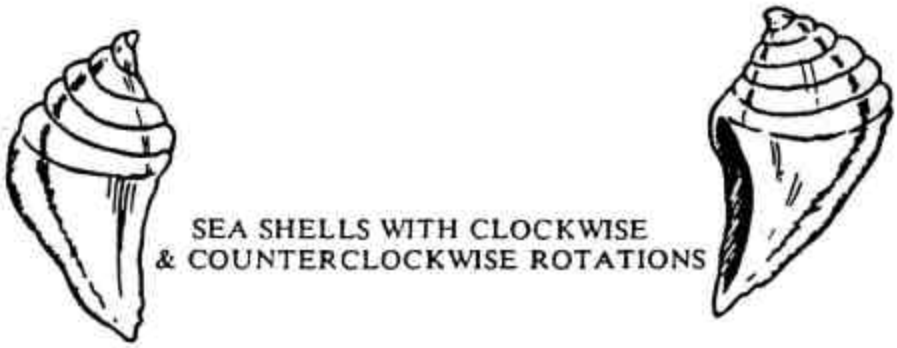
Every cell has its unique life span, and if we study the different types of cells, we can see that some of the higher-longevity cells have factors built inside that help to fight against this shift toward thermodynamics.



Modern science has found that photon emission from radio waves, television, and from all sources does not follow a simple two-dimensional modality.

It is the fallacy of the educational process that is displayed in two-dimensional books that we think of the photons as just moving through a two-dimensional plane, up and down, left and right. Actually these photons will rotate through a vibrational spiral that includes all four dimensions, including time, and as we understand more and more about other dimensions, we will find that the photons react through the full scan of four-dimensional activity (if not more).

The point here is that these photons do have a three-dimensional spin that is as a clockwise or counterclockwise activity; in other words, if the photon were fired directly at us and we could see the photon approaching, we would notice that the photon is rotating around its indeterminacy axis, clockwise and counterclockwise as it approaches.

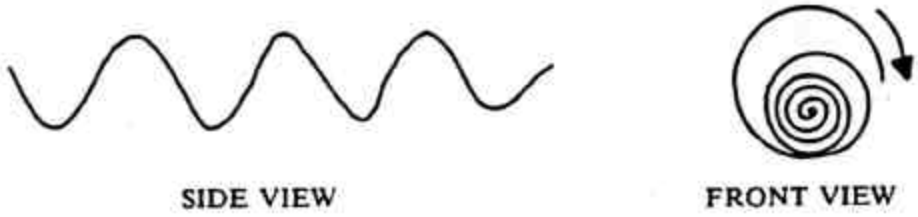


Clock developers through time have developed a universal idea of clockwise vs. counterclockwise. Many ancient traditions talked about walking to the right vs. walking to the left; that walking to the left was bad, and walking to the right was good.

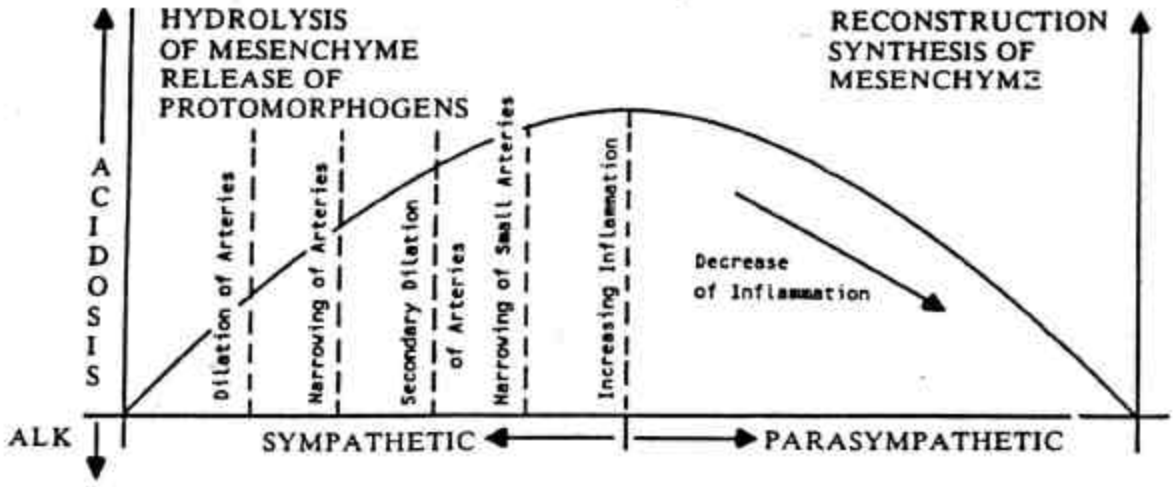
The science of chirality is based on the idea of handedness, and rotations right or left.

It is the speculative point offered by this author that perhaps some ingrained flow of time in the body that might happen through some of the vortices, which some religions have called *chakra*, allows for part of this timing action.

Twenty years ago, prior to the writing of this treatise, this author developed a meditative technique in which I would go into a meditative state and rotate the chakras counterclockwise instead of clockwise, with the idea of reversing the aging process. The effects have been profound, as the technique has worked on all the people who have been taught to use it. What we are doing, in effect, is trying to fool the body and reset the clock to run backwards; thus the irreversibility factors inside the body are slowed. Aging doesn't stop, because there are other factors inside the body which are deteriorating, but aging does slow with this simple technique. We even made a video tape to take us through this meditative state; this tape should be played once or twice a day to help reprogram the clock to go backward.



There are many other factors in the aging process which we may discuss. One such intriguing theory has been postulated by Royal Lee and other researchers on the idea of the accumulation of protomorphogens. In his book on "Protomorphology", Royal Lee recounts several experiments that would be very good to review at this time. He found that as organisms age, there is an accumulation of protomorphogens, which are a type of DNA/RNA complex given off by the cells, kind of like a cellular virus which gets into interstitial fluids and starts to attribute to aging. These are rather large complex molecules, seemingly inert inside the system. Accumulations of these protomorphogens can be determined with a simple blood test of the sediment rate of the blood. This sedimentation rate will tell us a lot of different things. Royal Lee found that a high sed rate would be indicative of a possibility of high protomorphogens.



In Royal Lee's literature he found that media containing bacteria for some periods of time would accumulate these protomorphogens, and if they took the bacteria out of the media and tried to re-culture new bacteria, it would be difficult, because of the protomorphogen factors.

Bacteriologists have found a very strange phenomenon, coupled with the idea of protomorphology and bacterial growth. The total yield of bacteria per unit volume tends to have a constant for every given bacterial species. Bail called this population of bacteria the "M concentration".

Organisms may be removed by centrifugation at the M concentration, where growth in multiplication is ceased, and a new inoculum was followed by growth and reproduction. As the bacteria exhaust their food and produce inhibition, the total toxic products cannot be found as the causative factors for the M concentration. Although one may point to a plausible minimal concentration of food per unit on the surface, volume of the organism needed for growth and reproduction, this would lead one to an idea of a geographical space needed by the bacteria in order to reproduce and metabolize.

Isaacs offers a quantic explanation for this M concentration factor, whereas Royal Lee offers the idea of protomorphology, meaning the release of the excess protomorphogens into the bacterial substrate.

Perhaps the phenomenon of geographical space is also exerted by bacteria. As we find in certain human beings that there is a sense of the amount of space needed to be comfortable, and even in deprivation of the major senses, there still seems to be some geographical sense that allows us to pick up and ascertain when people are in our space.

Isaacs, in the book on "Complementarity", outlines how gram stain and its importance to bacteriology could also be explained in terms of quantic phenomena. This gram reaction may involve the peculiar morphological organization, rather than a true staining.

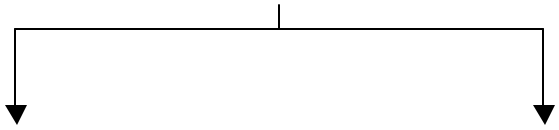
The specificity and directionality of the gram staining might be explained via the quantic action more readily than any other factor, just as the reactivity of certain hormones can be challenged.

We will find that the lock-and-key idea of chemistry, which is pronounced in pharmacology, does not explain why the lock *finds* the key. The pursuing of this on a random, entropic, thermodynamic basis would mean that the small amount of hormone needed to make these changes could not possibly have this reaction. Nature would have to work on some other phenomenon including the long-range force to explain this type of interaction. Thousands of exa mples of biological processes have too small a number to be examined through entropy chemistry. Present-day pharmacology, however, could work on the lock and key precept, because it overdoes by entering large amounts of a chemical into the system to demand action. The large amounts of this chemical will upset many of the sensitive cybernetic biological controls.

So here again we see some of the fallacy of present-day pharmacological theories, and also why there are billions of dollars each year sought in pharmacological iatrogenic malpractice suits.

Natural hormones act as if they have eyes, and indeed they might, because they might work on a photon basis.

INFLAMMATION



HOMEOPATHY THERAPY	*ALLOPATHY THERAPY*
Stimulation of Patient Defense System	External Intervention Interferes with Self Regulation Ferment, Blockages, Over-stimulation
Healing and Cure Through Release and Management of Poisons and Repair of Damage	Produces Dependency on Mostly-Sinthetic Chemicals Weakens Patient Defense System Through Lack of Use
Reestablishes Homeostasis	Produces Side Effects, Iatrogenic Damage, Lingering Diseases and Long-term Genetic Damage
Regressive Vicariation	Regressive Vicariation

INFLAMMATIONS

Part of the Defense Phase of Life
Sympathetic, Acidosis, Hyaluronidase,
Hydrolysis, Tissue Bouillon,
Hypertony, Histamine

HOMEOPATHY/NATUROPATHY (Wholistically Driven)	ALLOPATHY (Symptom-Driven)
Defense Management	Suppression
Restoration of Homeostasis	Chemotherapeutics
Release of Etiology	Antibiotics, Antipyretics
Minimal Dose	Steroids, Anti-Inflammatories NSAID
System Balance Restored	Precipitate Develops as Biology Reacts to Sinthetic Compounds Mega-Doses of Drugs Builds Dependency
System Release of Auto Toxins Reduced Cascades	Produces Wild (Illegal/Improper) Peptides (Overdose of Drugs) Induces Anti-Body Cascade
Proper Anti-Body Release	Produces Improper Auto Anti-Bodies
Cure	Produces Auto Aggression Disease Lupus, Arthritis, Asthma, etc.

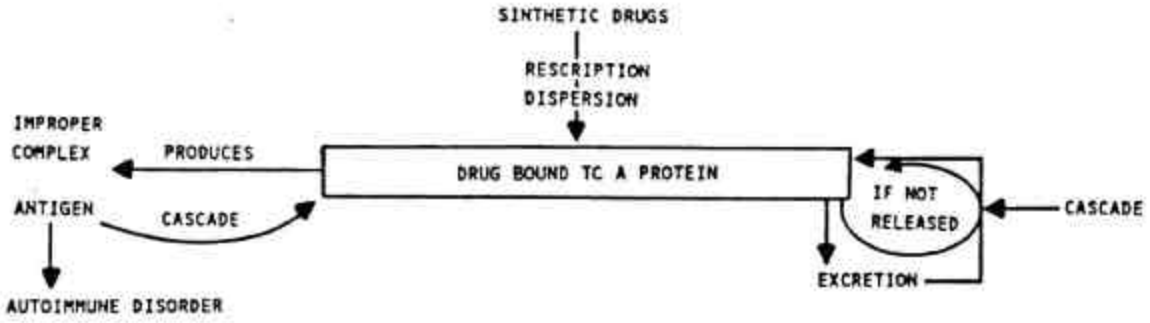
Recently, in a bar room discussion with an allopathic medical doctor, we tried to discuss just how the white blood cell would find its targeted query, bacteria or fungus, to destroy. I pointed out that for him to find the bathroom he would need his photon receptors, his eyes, to be able to ascertain the photons and home in on the destination. He needs photons to pursue and arrive at such a destination. This, as we point out, is a similar phenomenon to the white blood cell and how it finds its query, on the basis of photons, and how the different types of chemicals and hormones find things on the basis of photons.

It is the natural photon factor which will help us to understand more of biology in the future. As we do, we will find that the natural photon factor is much more present in natural phenomena than it is in any type of sinthetic. Nature indeed is of light, and light is the key to all nature.

The lock-and-key phenomenon and the bathroom, as discussed with our friend the medical doctor, is a good example of how nature has provided him with a photonic receptor ability, vision, to find the bathroom. In such a process one key can find its lock, if there is a "seek" function in a photon receptor process. Sinthetically we could

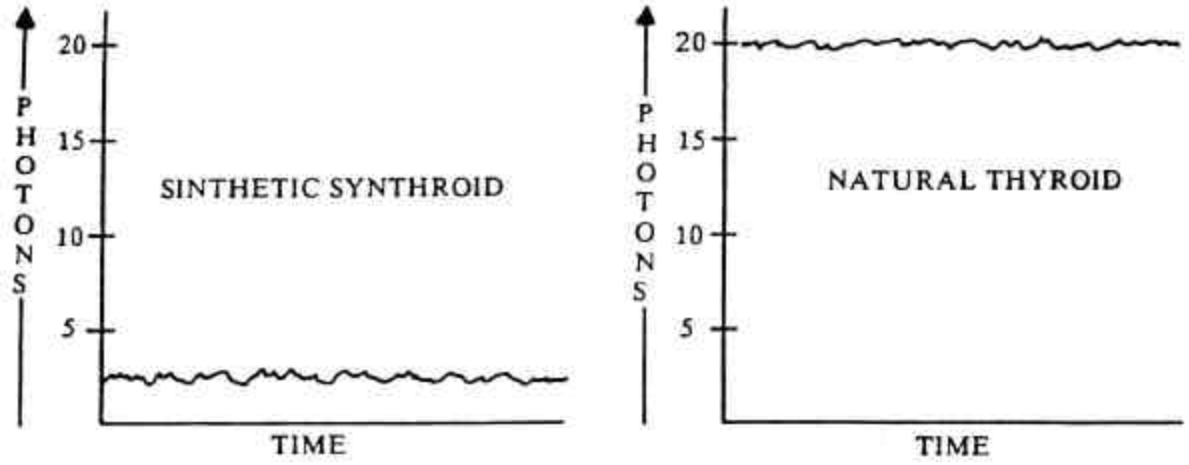
overwhelm the bathroom by putting in a hundred such medical doctors with their keys, looking for the lock, and then of course one will find the lock haphazardly, as with entropic and thermodynamic functioning. This is what is happening in pharmacology.

Where in the synaptic cleft there is a lock-and-key phenomenon, nature has a process wherein the key pursues the lock and homes in on it in a natural way. Sinthetic pharmacology plots to put a thousand or more keys into the situation, hoping that one of them will bump into the lock. The presence of these excess keys turns off, or on, many other processes that should not be turned off or on. However, with the focus on the *symptom*, and not the *whole*ism, we could see the great success that could be achieved, and the amount of money that a sinthetic pharmaceutical complex could earn.



To experimentally define this concept, we would have to see if the hormones are photo-receptive, and also if they are photo-productive, and if there is a difference in their receptor or production ability vs. sinthetic or naturally-made hormones. To answer this question, we simply need a photon counter.

The one used in this study was the Thorn EMI counter, using an infrared tube, so that we can count photons through the infrared and visible light spectra. In both cases the photon receptor tube was set at a base line of photons to compensate for the photon bath of room temperature.



SIMILAR RESULTS ON ALL HORMONAL TESTS

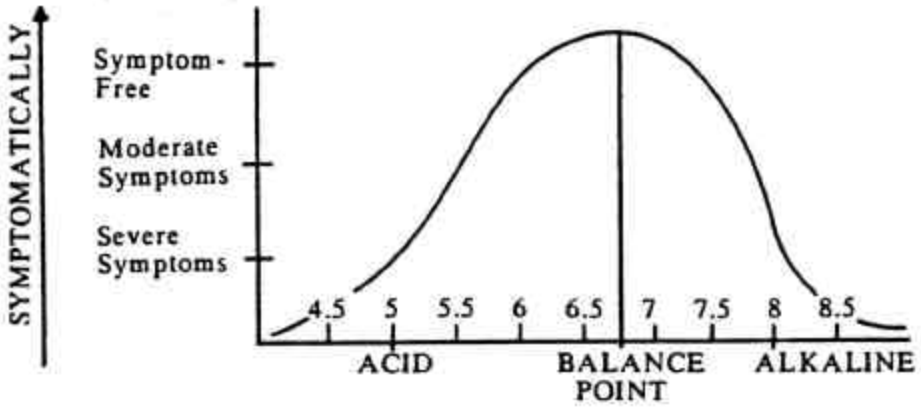
SIMILAR RESULTS ON ALL HORMONAL TESTS

As we can see from the diagram, the natural hormones out-produced the sinthetic hormones by almost twenty to one in their production of photons.

In our second test with tissue culture, we can see that the production of photons is dramatically increased by the administration of a natural hormone vs. a sinthetic hormone, and the production of hormones goes beyond that which is supplied by the natural hormone. Thus we can see direct evidence that there is a dramatic difference in the photonic ability of natural vs. sinthetic hormones. The hormones used in this study were androgenic, catecholic and indolic, as shown in the above diagram.

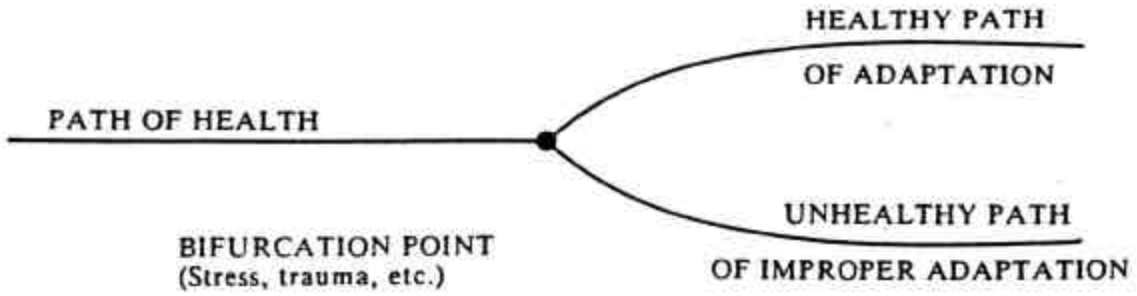
In a rather long treatise, which we cannot do justice to at this time, he came up with the idea that protomorphogens accumulate in between the cells, and the accumulation of these protomorphogen complexes attribute to aging. The body has to provide enzymes to break up these large protein complex molecules. As aging occurs, the taxation of the enzyme production capacities of the body increases, until the body cannot keep up with the production of the enzymes needed.

This couples well with the research done by Dr. Revici. Revici found that there were two counter-proposing variables in the body; anabolic vs. catabolic. He also found that this anabolic and catabolic process had strong correlates to acid and alkaline, and specifically to sterols vs. fatty acids, and thus Revici developed his theory of lipid balancing in the body, and the concept of dualism. A review of the Revici literature is well advised at this time.



Revici developed a rather large and extensive treatise on this subject, with many different types of experimental challenges which he performed to prove his theories. He also developed several different modalities, using different types of alcohols and other lipids to treat conditions that were taken out of balance, and were taken to one side or the other of the dualistic matrix.

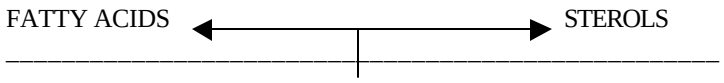
Thus Revici found that shifts in acid and alkaline balance, or anything out of the homeostatic control factors, were ones that could be disease-provoking, if we took the natural process of life, and could estimate the perfect balance needed to maintain perfect health.



Revici found that at certain crisis points or bifurcation points, as outlined in Chapter 4, could produce an alternative for the body to adapt to a new homeostatic condition or try to return to the old pattern. Patients with

acute disease were at the early stages of making a choice, and could be guided back to health a lot easier; whereas patients who had chronically adapted to new patterns of balance, and thus patterns of disease, were harder to stimulate, and perhaps they needed a new bifurcation point, or some type of crisis to help provoke them back; hence, the healing crisis, which can be provoked by using too precise a homeopathic. Here we are faced with a decision as to how much of a crisis our patient can tolerate. But let us leave this topic for now and return to that of aging.

Revici attributed part of aging to an accumulation of bad sterols and the body's inability to make *good* sterols, or hormonal complexes, as a vast part of the problem. Intake of good fatty acid complexes are a must nutritionally to help balance this delicate process. Fatty acids, as we have shown before, are sensitive to heat, and can be destroyed by cooking. In a world of over-processing and over-cooking of our nutritional needs, with less emphasis on vegetables and other fatty acid complexes, we can definitely see the link between nutrition and aging.



The body's ability to manufacture these sterol compounds, which are hormones, deteriorates with age. Many researchers have found that there is a deterioration in advanced aging in the ability to manufacture a *quantity* of hormone. New research has found that there is severe impairment in the ability to manufacture *good* hormones in later years. Thus two criteria must be met; the quantity and the quality of the hormonal manufacture of the human body.

By alleviating the different causes of disease, as outlined in our disease chapter, we can maximize the production of hormones to the ability of the organism. If we take out the environmental variations and get rid of the causes of disease such as radiation, insecticides, heavy metals, environmental pollutions and the like, we will be able to maximize the body's potential (see *Natural Repertory* of Dr. Nelson).

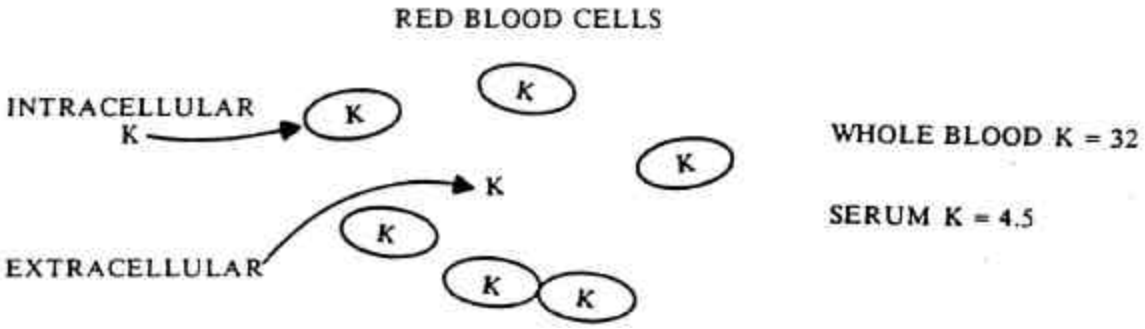
Small amounts of these toxins, as we have shown in our discussion of hormesis, can be helpful. However, large amounts can be rather toxic. Compensating with hormones is a rather tricky business, especially if we are going to compensate with sinthetic hormones, which do not have any of the full-range ability that our natural hormones do.

As we learn more about hormonal treatment with natural types of homeopathic sarcodals, we will approach better ways to find just the right amount to help stimulate natural effects and compensate for some of the losses. Large amounts of hormones can actually stimulate more atrophy of the hormonal manufacture mechanisms. So this is a very subtle process in which we need to find just the right amount needed to stimulate more hormonal production by the organism, and at the same time, compensate in small ways.

Perhaps the development of natural compensation techniques and different horary clock or circadian rhythms are where we might compensate for a hormone in the morning, and use a energetic homeopathic of it in the evening. Those types of therapy regimes will have the best effects in the future, in light of our new biology.

Another profound factor in aging is that of the build-up of certain minerals, the most prolific of which is calcium. Sodium is an extracellular ion that occurs mostly in the extracellular fluids of the body.

Potassium is an intracellular ion, which occurs inside the cell at a higher percentage. Measuring serum potassium and finding an average of 4.5 is misleading concerning the amount of potassium in the body. Whole blood potassium, as Revici points out, will have a norm of 32. Now we are measuring potassium where it occurs more naturally, within the cells. In whole blood we will use the whole blood cells to determine the amount of potassium, not just the serum, where the cells have actually been separated.



Thus, by the Revici system of knowing the whole blood *and* the serum potassium, we will have a much better idea of just where the potassium is in the body vs. where it belongs. The norm would be 32 in whole blood, 4.5 in serum. In a case where we might find 6 or 7 in serum, we might find a low value of 22 or 20 in whole blood; this would tell us that the person is actually potassium-deficient inside the cells, where the potassium belongs. But in the medical system, where the serum ratio might be 6 or so, the normal medical doctor would assume that potassium is not the problem; there is plenty of potassium in the system. But the potassium is not where it needs to be. Something has gone wrong with the cellular potassium pump, and the person is actually in a deficient potassium state. Thus we need to know about whole blood sodium as well, to find out if the sodium is really where it should be.

Another key balancing act is that involving calcium. Calcium is mostly a membranous mineral that occurs mostly in the membranes of various materials in different cells. Calcium also should be measured with whole blood and serum values to find out its contrasting norm, because when we remove the cells, we remove the membranes of them as well; we will not truly know some of the most needed material about calcium, until we can start measuring calcium, whole blood and serum values.

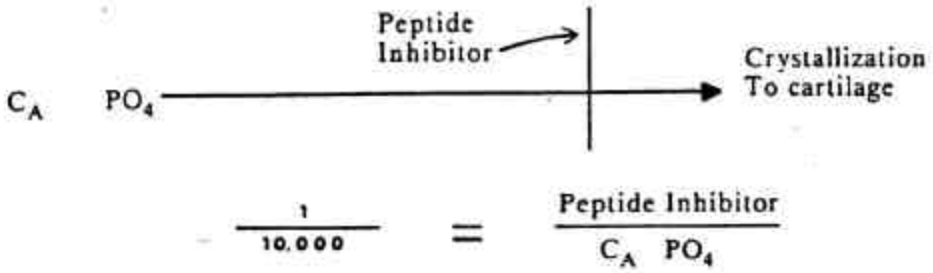
Calcium is an ion that can have different energetic states of the electrons and protons in it. These imply different energetic capacities. Calcium taken from mineral sources has low energies, as the electrons in the outer states are in tighter quantic states (closer to ground state). The process of photosynthesis and the like is that of elevating these electrons at the higher states; thus there is a higher quantic energy in the calcium taken from a plant or animal source.

The idea that calcium is calcium is a fallacy in light of quantum biology. There is a difference between good and bad calcium. Reports released by the AMA, published in 1989 in *Reader's Digest*, stated that calcium carbonate, mineral calcium, was found to be a poor source of calcium for the body. This is because it is a low-energy form. Calcium lactate, taken from milk, an animal source, was found to be a much better source of calcium for the body. Here again, modern medicine has tried to over-reduce the factors into just quantity, and does not realize that there are subtle qualitative energy states, subtle abilities of the body to utilize different types of ions.

Calcium is used by the body, just as asphalt is used by street crews for fixing roads. When there are problems; potholes, etc., street crews will come by and dump in asphalt to fill them in. Sometimes an over-zealous street crew will put too much asphalt into a spot, and produce a lump in the road. This is basically the type of phenomenon which is happening in the body, which uses calcium to fix holes within bones and other cellular structures. If too much calcium is put in by an over-zealous body, or if the quality of calcium taken into the body is not right, then, just as if the quality of the asphalt used by the street crew might not be right, the body might put too much calcium into an area, and thus develop a bone spur, or some other type of calcium accumulation.

As the body ages, calcium accumulates in its different parts and causes lack of flexibility, hardening of the skin and arteries, etc. This gradual accumulation of calcium in the tissues is another hallmark of the aging process.

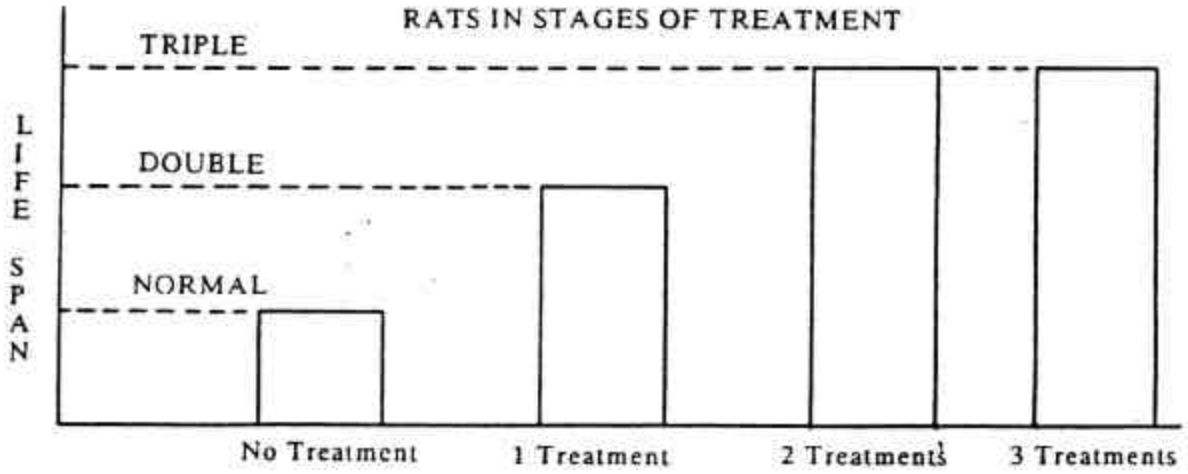
In 1967 Howard and Associates made some test tube observations regarding the inhibition of the formation of calcium phosphate hydroxyapatite by a polypeptide inhibitor, which is derived from human urine and serum. This is very important in our understanding of the nature of the clinical pathology process of *in vitro* calcification. These experimenters demonstrated that supersaturated solutions of the calcium and phosphate ions can be prevented from crystallizing by low concentrations of the peptide inhibitor, that no direct involvement can be postulated from peptide blocking of the crystallization sites. Observing the crystallization of the calcium phosphate hydroxyapatite structure by a quantity of peptide, which is sixteen thousand times smaller than the amount of calcium phosphate ions, forces us into the conclusion of how this rather small particle can operate in a quantic way to disrupt the crystallization. This means that it is stepping in at a very small concentration to disrupt the formation of the crystallization and stop the start of the process, operating at a quantic level, rather than at a large, chemical level. They demonstrated that just one nanomole of the peptide inhibitor prevents the binding to cartilage of up to seventeen hundred nanomoles of the calcium ion.



Thus the crystallization that might occur with collagen is different from the crystallization of the simple supersaturated calcium and phosphate solutions. The peptide inhibitor can inhibit the crystallization of both.

The collage large molecular sites are a fourth factor, and the system would be more amenable to treatment under long-range forces. The whole matter, when viewed from chemical concepts, seems mysterious and bizarre, and cannot be explained through normal stoichiometric calculations.

This report, taken from the Isaacs research on the inhibition of calcium by different polypeptides, further tells us about how these polypeptides might be declining in their action in the aging process. Calcification is indeed a very crucial procedure in our discussion on aging.



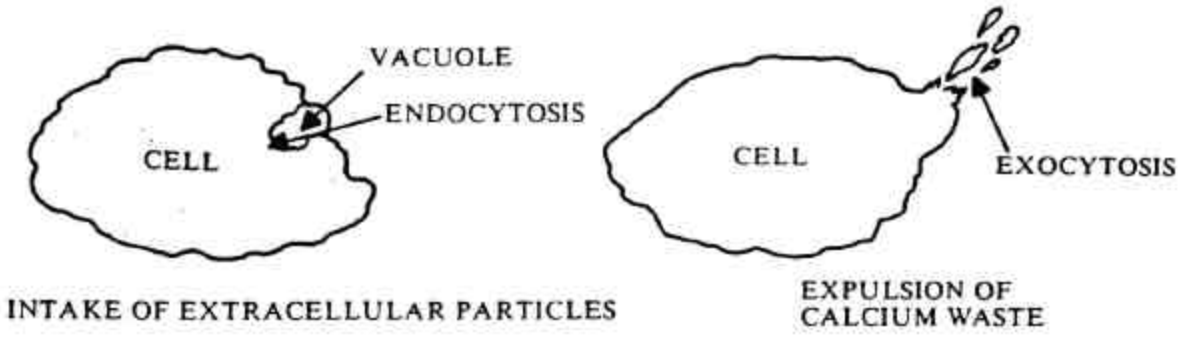
Twenty years ago this researcher duplicated several studies on calcium, metabolism and aging. In one such study, a dozen old Norwegian rats, whose life spans were approximately a year and a half, and which were at approximately a year and four months, were taken, and their coats shaved. The skin of these rats was old, decrepit, wrinkled, and inflexible. Onto their skin was massaged a skin cream containing a high amount of parathyroid hormone. Parathyroid hormone in the body is used to take calcium out of the cells. Thyrocalcitonin is the hormone made in the thyroid, which puts calcium *into* the bone, and parathyroid hormone is the hormone that takes calcium out of the cells. The skin cream, after being massaged onto the skin of these old rats, was left on, and within six to eight hours, a small bit of dust, or skin residue, exuded from the skin, looking much like the sleep coming out of a person's eyes. Thus the rats were encased in this little bit of residue coming from their skin.

After twelve hours the residue was brushed away, and lo and behold, the old skin of the rats had been restored to a much more youthful stature. They were very similar to rats who were six months old.

After having seen the changes made on the skin of these rats, another very strange phenomenon was found, not only by this researcher who duplicated the research, but by the other researchers from whom the original

research was taken. This was quoted in a 1966 issue of *Reader's Digest*. It was found that not only had the skin of these rats been restored to youthful vigor, but seemingly their entire health had been. Now their life spans doubled, and they lived another year and a half.

Six of the rats in this study, at the end of another year and a half, were readministered the parathyroid cream. Similar results happened; after the dust was removed, their skin was restored to the six-month age, and *these* six rats lived another year, whereas the other six rats, who just had one administration of the parathyroid hormone, had only doubled their life span.



Attempts on the third generation, by taking three of the rats and massaging the parathyroid hormone into their skin, showed little results. After three administrations within the period of two years, we found that six of these rats had tripled the life span of normal rats.

This intriguing research, done at many universities across the country, had profound effects, especially on the FDA, who within two years of the revelation of this research came up with rather strict controls on the sale, utilization, etc. of parathyroid hormone. Extreme care is taken to prevent oral use of parathyroid hormone, as it takes calcium out of the bone.

Under the topic of calcium accumulation comes the topic of flexibility. The theory of chiropractic dictates that there are energies flowing through the spine and nervous system, as well as other channels of flow, including acupuncture meridians, chakra points, and other vortices. If the spinal and nervous system should become inflexible, or perhaps subluxated through some small type of pinch (not quite a dislocation, but a subluxation) this would produce a disturbance in the flow, and thus, qualities of disease. Perhaps massage of PHT onto the spine might help.

The development of the oriental arts of yoga, kundalini, and even some of the martial arts, is around the idea of developing the flexibility of the spine on a daily basis, to re-tune the system. If the spine is flexed, and maintained in its flexion for anywhere from half a minute to five minutes, this will help to make the ligaments, cartilage, nerval structures, muscles, etc. more flexible, less prone to injury, and also more conductive of the energy of the body.

This is an example of the principle of chiropractic. The spine needs to be bent forward, backward, to the left, to the right, and twisted left and right. This action will help to stimulate flow of the different patterns of the body, to help establish proper hormonal, enzyme, and other life actions, and help the body in its fight against thermodynamics. It is pointed out that simple flexibility also means *holding* these points; just to touch the toes is not really holding the flexibility. Touching the toes for thirty to sixty seconds would help to build up the flexibility of the spine and joints. So athletes who hold their ankles, with their knees in locked position, and bob up and down, are not developing the same degree of flexibility as the yoga athlete, who is holding the extreme position for thirty to sixty seconds. This helps build the flexibility.

The most ancient of cultures have exercises in flexibility, and all attribute these types of exercises to longevity. Other factors in longevity that have existed in ancient literature are factors of good nutrition, of stress reduction, of love, kindness, psychological stability, exercise, using sweat lodges, etc.

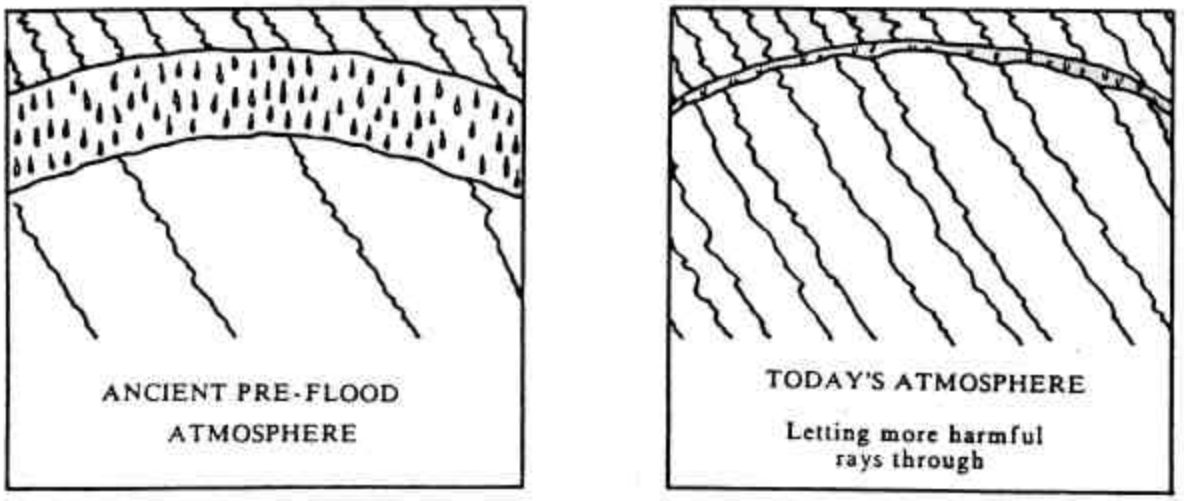
In Finland and Sweden, where we have probably the longest life spans in the world, we find that the Fins build their saunas before building their houses. Having traveled to the Hunzas tribe in northern Pakistan, we find that these people have long life spans, and they attribute this to the consumption of certain types of herbs, including bee pollen extracts, parsley, and other naturally-occurring herbs, as well as living lives of hard work, good flexibility exercise, and good nutrition.

Another interesting point developed in the concept of aging comes back to our theory of photons; there are certain photons and photic ranges toward the UV range that have been found to accelerate aging, making skin more

dry, hard, and inflexible. These things can be found in sunlight, and people who abuse their skin with excess sunlight have been found to age much more quickly. The part of the body that ages the least is often the buttocks, which are exposed to the least amount of sunshine.

In the Old Testament, Methuselah, Adam and many others lived past nine hundred years of age, Methuselah making it to almost one thousand years. It can be supposed that there was a faulty calendar, and that they probably thought that one year was, for example, four months by our calendar. If that were the case, and they thought that every four months was a year, then Methuselah lived to three hundred fifty years by *our* calendar. If they were off tremendously, and said that a year was every third month, than he lived over three hundred thirty years. They would have to have made the mistake of thinking that every month was a year, and thus Methuselah would have lived to approximately ninety years old. But in recounting the literature of the time, we see no evidence to that effect. Perhaps there was another variable.

Scientists have found many evidences of a global flood. Prior to this flood, they have found that the plant evidence in the fossils and in the plant material recovered, there was some type of difference. These plants seemed to have grown in a different type of light, vs. plants that were discovered in earth strata after the flood. Several scientists have speculated that there was perhaps an extra large amount of water vapor or the like in the Earth's atmosphere prior to the flooding, and this extra large layer of water vapor provided extra protection against infiltration of these harmful UV waves.



This protection could have greatly enhanced longevity.

In light of this, we must realize now, as our ozone layer seems to be depleting due to the mistakes of sinthetic chemical companies and an over-aggressive polluting economy, that we have destroyed certain amounts of our own protection complexes, and now modern medicine is suggesting the utilization of sun screens and other types of protection to be used daily to protect our skin from aging. This protects the organism from aging. There are also psychological tendencies toward aging, and programmed ideations of what the natural aging picture is like; how we should be, and how we should age.

So in developing an anti-aging regime, there are several factors we must consider, including developing enzymatic therapies for protomorphology, calcium therapies, flexibility training, psychological reprogramming of ideations through suggestivity, as well as retraining the direction of our vibration from clockwise to counterclockwise; nutritional techniques, exercise techniques, removing the causes of disease and aging, hormonal techniques, protection from radiations and environmental pollutions, improving the immune system, and other factors. These are all things that must be utilized in our development of a total anti-aging therapy regime.

ANTI-AGING REGIME

1. Protomorphology Balancing Enzyme Therapy
2. Calcium Regulation
3. Flexibility Training
4. Psychological Reprogramming
5. Nutrition
6. Cardiovascular
7. Detox (Xenobiotics) Hormesis
8. Ultra Violet Radiation Protection
9. Immune System Fortification

After twenty years of research by this author, we believe that the human life span can be increased to two hundred years without measurable loss of functioning. To do this, the intervention must start at some of the early ages; forty and fifty, rather than waiting until the age of ninety, where there is extremely crippled skin and utilization, and some irreversibility of the process.

This researcher has developed several homeopathic techniques to reverse the aging process and recycle and reconstruct the direction of the aging mechanism. In this document I have attempted to merely include some of the bare tips of the iceberg of the research we have done on aging. I do not want the reader to think that the sparse pages concerning aging are indeed a true, total thesis. Twenty years of research have gone into the development of our different therapeutic regimes, and how they are used in many different ways.

For more information, please contact the author.

SUMMARY

1. **ALL ORGANISMS FIGHT AGAINST RANDOM STATISTICAL ENTROPY.**

2. **AGING IS THE LOSING OF THIS FIGHT. AS WE AGE, ENTROPY ENTERS THE SYSTEM.**

3. **THERE ARE MANY FACTORS THAT CAN BE USED TO SLOW AGING.**

4. **AGING RESEARCH WILL HAVE TO CONSIDER QUANTUM BIOLOGY IN THE FUTURE.**

5. **HOMEOPATHY AND NUTRITION OFFER MUCH TO AGING PREVENTION.**

6. **HOMEOPATHY OFFERS US THE PROSPECT OF REPROGRAMMING DNA AGAINST AGING (SEE THE *NATURAL REPERTORY* OF DR. NELSON).**

Chapter 15

CANCER SEEN THROUGH QUANTUM BIOLOGY

Chapter 15

CANCER SEEN THROUGH QUANTUM BIOLOGY

What is the quantic definition of cancer?
What is the best quantic solution to cancer?

Cancer (neoplasia) is a radically different type of life form, but still is capable of reproduction and metabolism. Here the reproduction goes a little crazy and starts tapping the finances of the cell uneconomically, whereas in the normal cell the procedure of reproduction gets only six to eight percent of the energy of the cell. Here, in some types of cancer, a mismanagement is happening, and up to ninety percent of the energy might be tapped for reproduction.

Revici poses the argument that cancer actually could be a viable part of the immune system, where a new type of living organism is manufactured within the body in order to deal with some type of toxic contaminant or metabolic disturbance.

Cancer might be part of our toxic and metabolic response. In a report released in major newspapers in December 1990, the study showed that cancer in industrialized toxic nations is at an outstanding rate, higher than cancer in more natural environments. This was not found to be due to smoking or any other type of cultural intervention. There seems to be a definite link with industrial toxicity. We know the cause of cancer; we can easily cause cancer in the cells of animals by imposing different toxins. We know that Red Dye #2 causes cancer in certain animals. We know that in order to do research on certain animals, we use certain toxic agents called carcinogens to induce the cancer. So we can study our neoplasic animals by giving them cancer with toxicity.

The link between cancer and toxicity is profound. It is within the realm of logic that perhaps cancer actually is part of the defense mechanism of the body. As the immune system goes awry in lupus, this part of the immune system might go awry in cancer. The cancer might initially start to deal with some toxicity, and then depend on another part of the immune system to then deal with the cancer. If that secondary part of the immune system is inoperable, disturbed due to some other toxin, or perhaps from some surgical mutilation, as in the case of B cell-interrupted activity (via adenoids, tonsils or appendix); then we might find an upset in the balance that causes the cancer to not just do its job, but to vehemently attack the rest of the organism.

This is the proposition of Revici and many other researchers. Cancer is part of the natural organism that has existed since the beginning of time. Only when outstanding variables allow for it to be out of control in the body does cancer take the life of the organism. Cancer might be just another opportunistic infection.

Neoplasic cells have been found in many, many people, who have not died of cancer or come down with profound types of cancer. So the label "cancer" as a disease might be another way of saying that the fly has caused the garbage. Just because we find flies around garbage does not mean that the fly has caused it, as we have discussed in previous chapters.

The fly has a purpose in nature. So, too, might cancer. Cells can increase their reproduction over a long period of time as it loses its informational constraints. This is the Isaacsonian definition of cancer.

Organisms have to conjugate and reproduce at regular intervals in order to stop the loss of vitality. After many different types of reproduction, there is an increase in probability of losing information, or the information becomes altered. It is the job of sexual conjugation to correct the information and try to conserve the informational transport.

Germ cells involved in the reproduction of the organism can be set aside by the animal, and thus do not undergo epigenetic divisions of the vions. Somatic cells, however, have epigenetic divisions of their vions in the informational transport. These cells take on specialized capabilities not performed by the ordinary germination cells. These cells will go under an asexual mitosis for information conservation. This is done to help preserve the information so that we do not lose it as time passes.

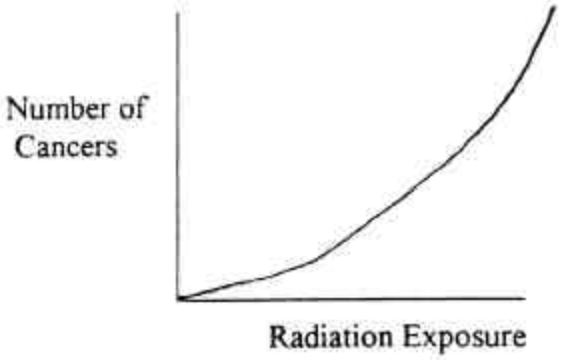
Huxley, in 1957, proposed the sixth power law of increasing incidence of neoplasia. The theory of neoplasia has two factors; the first is that neoplasia is an increase in the probability of losing information against time. The second factor is that an agency or process that enhances the rate of change of this increasing probability

of information loss will increase the chance of cancer forming. The second factor might be radiation, viruses, chemical carcinogens, toxicity, or any of the other things found to be linked with cancer.

These influences operate through the alteration of the emergences of the metabolic process, and feed more energy into the reproductive process. Many times there is a time lag, from a few months to twenty years between the application of a carcinogen to the development of a tumor.

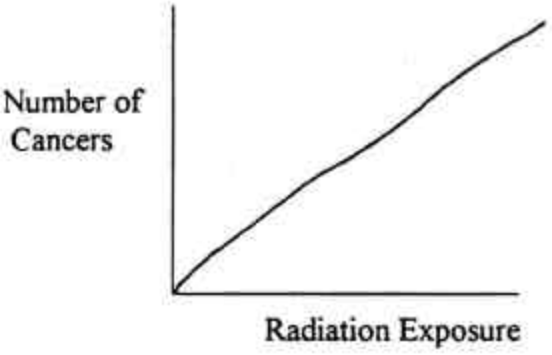
After the initial bombing of Hiroshima and Nagasaki, the general population exposed to those radiations were analyzed, and it was found that only a small portion of them got cancer. Thus in diagram A, we can see that there was a supposition that there *could* possibly be a safe level of radiation, a level that would not tend to cause cancer.

A.



As the population was studied over the years, another study was done which found that a higher percentage of the people exposed *did* get cancer. Thus in diagram B, we can see that the supposition was that perhaps a straight-line function was what the exposure of radiation would look like.

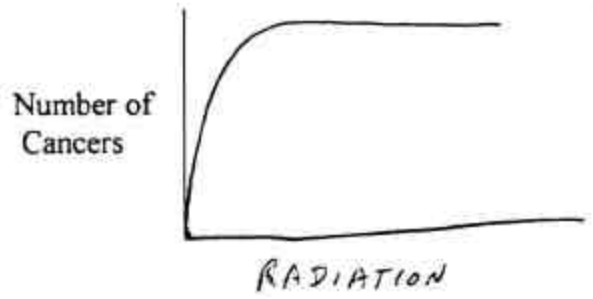
B.



From diagram B, we may still surmise that there might be a safe level at which radiation is harmless.

More years passed. Recent studies have shown that diagram C is a truer example of what happened at Hiroshima and Nagasaki.

C.



As we can see, there is probably only a very small range in which radiation is safe.

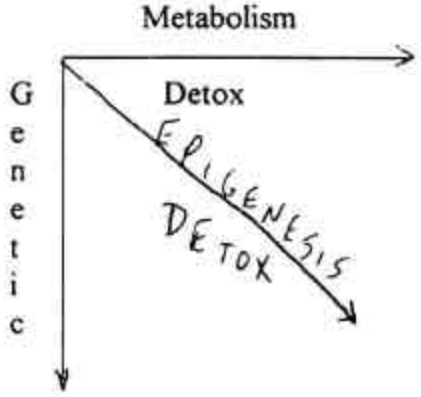
The results of Hiroshima and Nagasaki were devastating, not only in the short term, but also in the long term. Any entity on the planet willing to use atomic weaponry is making a grave mistake.

From our research in hormesis we have found that very small levels of radiation might have stimulatory effects on the human body. So there might indeed be a safe level of radiation, but this level would be very, very minute (a homeopathic).

It is known that one ionizing ray striking one cell could produce a mutation. It would be up to the body to neutralize this mutation; up to the immune system and the natural process.

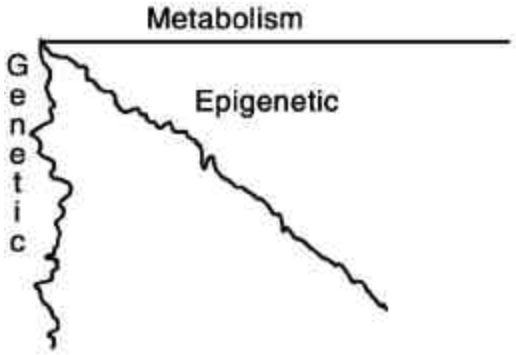
With this in mind, we must reevaluate the radiation statistics and the approach of the radiation industry in America. The Occupational Safety and Health Association (OSHA) needs to look at a more quantic idea of what ionizing radiation could do. Industry standards have not come close to really providing safety in the work area.

In our second factor of toxicity we find that the epigenetic and genetic information is attempted to be maintained through the process of metabolism.



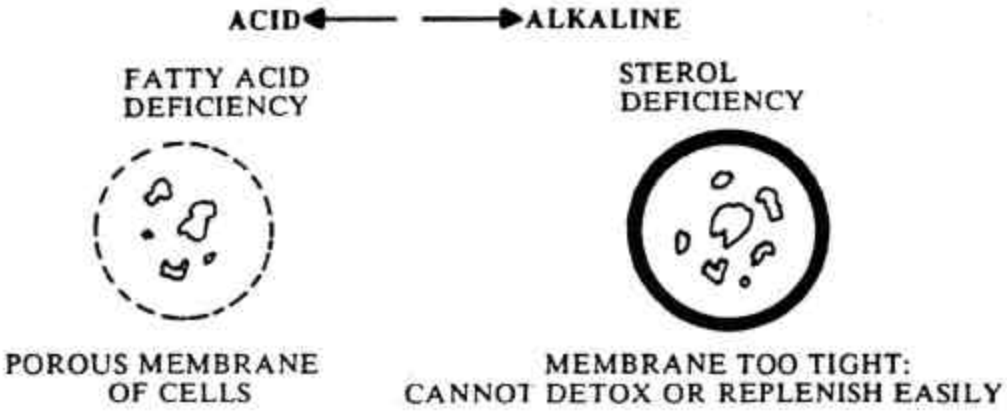
The emergent metabolic processes work through the incremental negative resistance factor, as displayed with electronics in our chapter on incremental negative resistance. Just as cue multipliers can be tuned for electronic circuits, the incremental negative resistance factors can be tuned to certain metabolic processes and certain vibratory stimuli.

As Isaacs points out, there is a time-dependent increase in the probability of epigenetic and genetic information degradation in neoplasia. The second factor is that the influence which enhances the rate of the time-dependent information loss by alteration of the emergent metabolic process maintains the fidelity of the genetic and epigenetic information transport process. Thus this sense of a cycle, where information loss *contributes* to information loss, does so across a time-dependent factor.



Revici found that there were anaerobic vs. aerobic cancers, and there were many different types of cancers, including types that were acid-responsive or alkaline-responsive. In Revici's work they were classified by their shift in dualism, through the different environments of the lipid control.

Thus in fatty acid deficiency states, where there are excess sterols, cancer might be developed because of the porousness of the cellular membrane, which is made up largely of fatty acids in calcium. In fatty acid deficiency states the membrane becomes porous and allows too many toxins and chemicals in and out of the cell, which can be cause for an alteration of the information process, and thus the type of cancer.



This fatty acid deficiency was coupled with the change toward acidity in the human being, which he measured through changes in urine and blood pH, as well as changes in specific gravity of the urine, which would be toward quite thick ranges of one thousand thirty specific gravities. This variable of high specific gravity and low pH were found to be conducive of the type of cancer Revici labeled as the acid-dependent or A type. This is somewhere between seventy and eighty percent of the types of cancers presenting in the United States, as we are in an over-increasing acid forming society.

The other type of condition would produce alkalinity, or high pH readings, correlated with low specific gravity readings of the urine. This is where Revici found that the excess fatty acids in the cell would cause the cell membrane to become too tight and too full, and thus would not be able to shed its own toxicity within, as well as not be able to receive the full nutrition from without. This type of over-tight membrane would produce a different type of cancer and a change in the informational transport.

Many researchers have found that there are changes in the energy input and output of cancer cells vs. normal cellular activity. Here we can see that the energy input and output is definitely a factor of neoplasia. It is right to suppose that there can be factors of energy changes that can *cause* cancer, or once a cancerous cell has been caused by some other reason, that the changes of energy would then ensue.

As we have shown in our research on photon release from the cells, cancer cells have different photon patterns, different wavelengths that make up different types of cancer cells. In cancer there are changes in membrane potential, changes in electrical response, and changes in membrane capacitance and cellular inductance.

These types of changes will open the door to a new understanding of cancer, as well as a new understanding of biology.

ELECTRICAL VARIATION OF NEOPLASIA

1. Information (Mitogenic Radiation)
2. Electron Transport Chains
3. Membrane Potential
4. Capacitance and Inductance
5. Variance in Rectifier Circuit

In some types of somatic mutations there can be a mutation that occurs at a given time and makes a new quantum leap to a new, perhaps irregular, information state.

Isaacs makes a distinction of two different types of cancer; in the first, there are vast irregularities of information transfer that cause the division of the cells to become erratic, and thus these types of virulent growth patterns will be shown in tumors that grow at rates beyond the other cells of the body. The second process can happen over the degenerative tumor, in which the epigenetic information transfer has been lost. These are degenerate-type conditions, which can be associated with scar tissue, degenerative arthritis, or other problems in which the degenerative cells and tissues are not growing or doing the job for which they were designed. Thus the loss of the mylien sheath around the nerves, as in MS or ALS, might be of the second type of cancer, where the cell tissue becomes degenerate, cannot reproduce, and cannot function properly.

Connective tissue diseases in arthritis and blood vessel sclerosis might be indications of other types of degenerative diseases, where the epigenetic information inside the cells has been lost due to some type of irregularity. If such cells of degeneration happen in a certain area, we must remove the cause of disease, or find the toxin that produced the problem. Without removing of such toxins, restoring of the cells would be of no consequence, because the new cells would succumb to the toxic conditions. However, once we *do* remove the cause of disease (chemical toxicity, environmental problems, social stressors, or whatever), we will have to rebuild the cells of this local area.

TREATMENT PROTOCOL

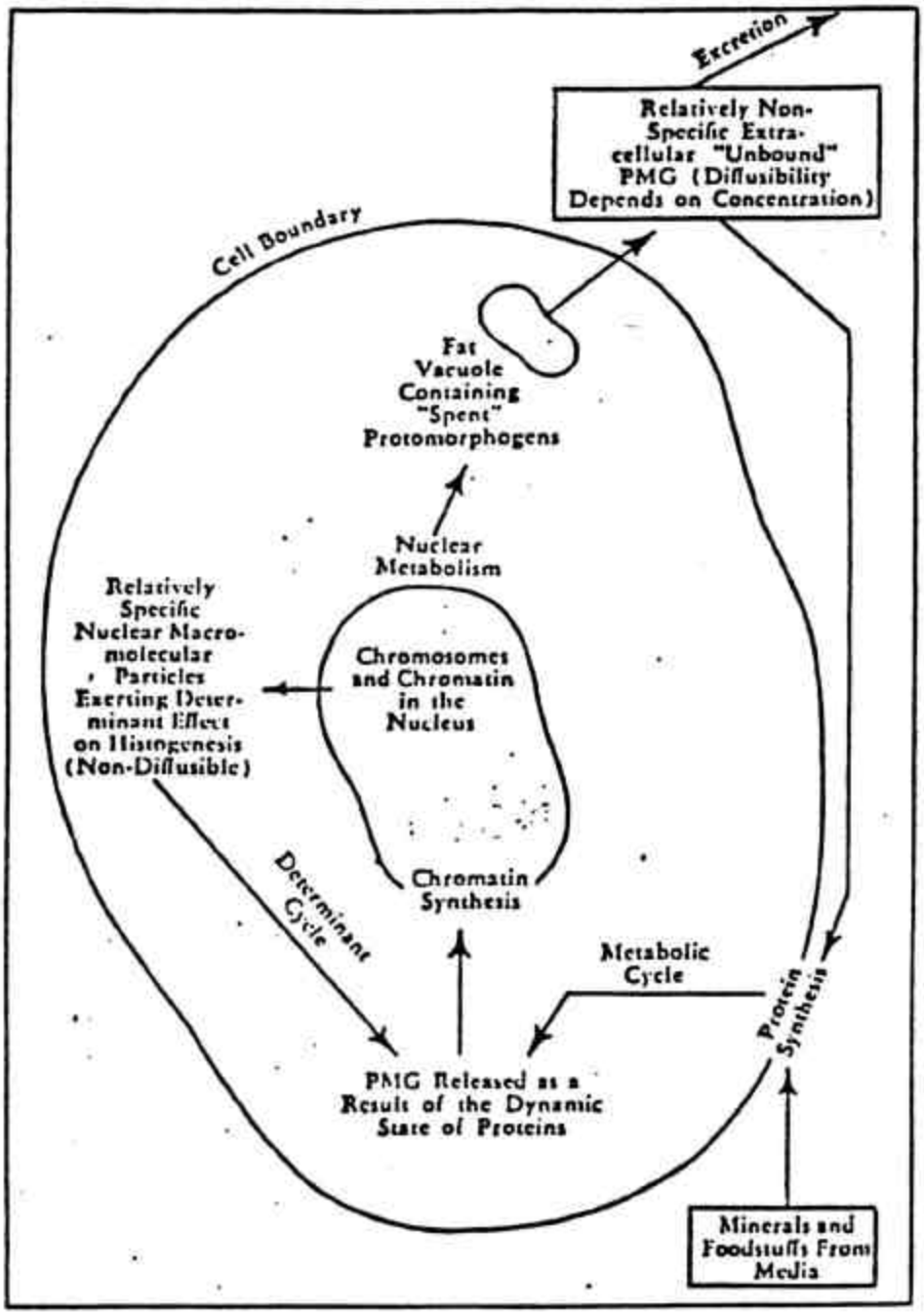
1. Remove causes of disease (nutrition, metabolic, detox, stress relief, mental factors, etc.), nosodes, isodes, detoxosodes, allersodes

2. Rebuild damaged tissue
   Sarcodes

3. Treat symptomatology with homeopathic rebalances.

4. Restore homeostasis of healthy organism

To supply the proper information, Royal Lee's theories on protomorphology with the concept of sarcodal therapy in homeopathy supplies the needed answer. For this and a review of sarcodal therapy, we would like to recommend the author's book, the *Natural Repertory* of Dr. Nelson, in which some of the techniques and mechanisms of sarcodal therapy are encountered.

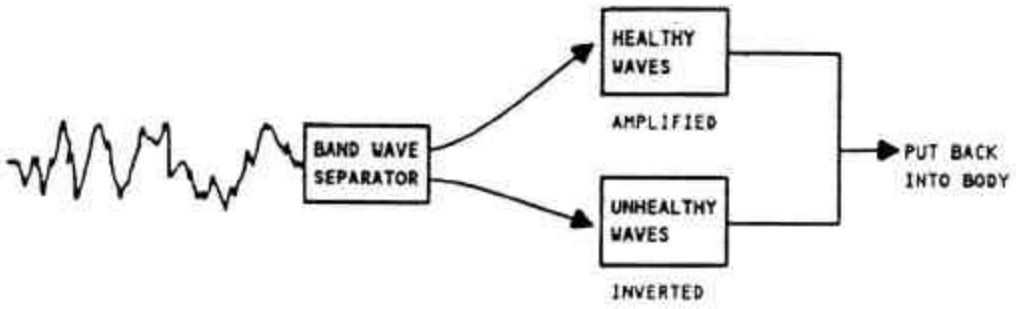


Schematic diagram of the dynamics of the mineral portion of the morphogen molecule as suggested by the morphogen hypothesis.

Some congenital malformations are instances of disruption of epigenetic transfer processes. Here we need to resort to different types of DNA homeopathics to supply new types of coding, to correct the irregularities. Much has been made of the link between DNA and cancer. This is definitely an appropriate one, as some people can inherit a certain bad gene, and when bad cells in an area are manufactured, they might have weak epigenetic information transfer processes. If such were the case, to restore a new information process would be the natural modality of treatment.

The idea of an informational transfer occurring through vibrational states of photon distribution has been researched by Dr. Morrell. After finding the different types of frequencies produced by cancer, as in Chapter 8, we can definitely see a link to a variant mitogenic radiation coming from cancer cells.

Dr. Morrell, knowing the bands in which cancer is produced, developed what he called the "Morra Unit". This unit was developed as a band wave separator, so that it would take the photon radiation coming from the body and separate it into two distinct groups: healthy radiation, and unhealthy or cancer-producing frequencies. The healthy radiation was then sent through an amplification grid and amplified.



The unhealthy frequencies were then sent through an invertor. The result of the inversion as well as the amplification was amplification of healthy waves, and inverting or canceling out of the frequencies associated with the cancer cells.

Morra therapy has been largely utilized by only alternative practitioners in Europe and America. It was not until 1988 that Dr. Nelson, this author, looked at radiation and found ways to perfect the Morra radiation. There were other bands outside the frequencies reported by Dr. Morra which also could cause and aggravate cancer.

Thus a true Morra unit had to be developed, which patients could carry with them to help cancel the frequencies in the long term. Such a unit has been under study by Dr. Nelson for several years, with outstanding results in the cancer field.

The two big groups of neoplasms are *carcinomas* and *sarcomas.* They involve epigenetically differentiated tissues in which the emergent metabolic processes of information transfer have been disrupted. Varied cells such as these cannot undergo proper sexual conjugation, and in some cases cannot undergo mitotic division, so they are not able to conserve their information. If the bad information is passed on, we may have the process of carcinogenesis.

Some of the more wild and growing neoplasms come from organs in which the epigenetic information transfer ability is not lost, but *enhanced*, and thus the cell system starts feeding energy into reproduction, and the cell starts splitting at a wildly fast rate.

In more primitive species, where the cells have not developed sophisticated epigenetic conditions, we see much less cancer, much less neoplasia. These less sophisticated plant machineries have smaller numbers of hormones, as we have linked hormones to the epigenetic process. Thus, by having less epigenesis, we find that there is less chance of cancer. This also helps to show why some cancers are hormone-dependent, where the existence of the epigenetic phenomenon can help stimulate their growth into wildly developed cycles.

Outline of the Metabolic Morphogen Cycle. A brief outline of the hypothesis we have presented in this chapter follows.

1. The chromatin of the nucleus is the only molecule in the cell capable of self-reproduction. It consists of nucleoprotein, which in turn is composed of a desoxyribonucleic acid and various protein moietics containing the cytomorphogen determinants for the cell structure.

2. The reproduction of this chromatin is necessary for cell division, and also occurs constantly together with the dynamic state of living proteins, as a part of the vital energy cycle of the cell.

3. The energy cycle is connected with phosphatase hydrolysis of the dipotassium salt of creatine-hexose phosphoric acid; the synthesis of nucleic acids, and their change from ribo- to desoxyribo- forms; and possibly the radioactivity of potassium in the morphogen molecule and its influence on the stability of the biological colloids.

4. The morphogens that have participated in this constant energy reaction are broken-down or split and are eliminated into the cytoplasm of each division, or at a slower rate in non-dividing cells. (The fact that after division ceases, aging still proceeds with eventual lysis, proves that morphogens are still being "shed" by the nucleus.)

5. These split morphogens must not be confused with the cytomorphogens and protomorphogens that are secreted by the nucleus into the cytoplasm at intervals to exert their histogenetic determinant effects.

6. The split morphogens in the cytoplasm are prevented from exerting lethal effects by a fatty or lecithin envelope, and are further discharged into the surrounding media.

7. The split protomorphogens in the media are available as determinants for cytoplasm protein synthesis at the cell wall; in this manner they are necessary to, and stimulate, growth. (In this effect they are not species-specific for they are simplified to the point where their complexity no longer allows it. If the cytomorphogens and protomorphogens present in the cytoplasm for determinant activity are experimentally extracted, they will also stimulate this protein synthesis, but will retain the species specificity as a consequence of their complexity.)

8. The split protomorphogens are now back in the cytoplasm as a part of cytoplasmic protein. (Other mineral elements are also present in the cytoplasmic protein that were supplied by the nutritive media.)

9. These protomorphogens, along with mineral elements and protein from the media, are now utilized at the nuclear wall for the synthesis of new cytomorphogen and chromatin material.

The dynamic state of cytoplasmic protein insures a constant supply of protomorphogens at this point for chromatin synthesis.

10. Due to the fact that nuclear cytomorphogen synthesis utilizes many minerals associated with cytoplasmic protein but not necessarily as morphogen linkages, the split protomorphogens in the media accumulate if the media is stagnant.

11. The increase in cytoplasmic and media concentration of polymerized protomorphogens causes a gradual breakdown of the integrity of the surface boundary of the cell and consequently of the nuclear membrane. (The primary lethal effect of split protomorphogens is exerted by the concentration in the cytoplasm. The toxic effect of the concentration in the media is simply due to its influence in preventing further discharge from the cytoplasm.)

13. This degeneration of the membrane results in a lowering of the electrical potential between the protoplasm and the media, and between the cytoplasm and the nucleus.

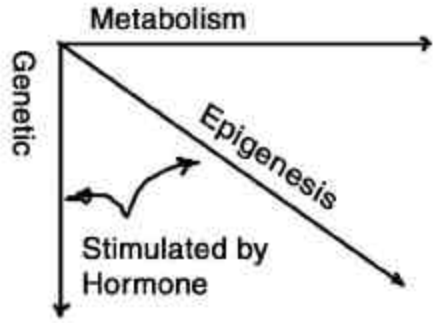
14. Concomitant lowering of pH values in the cytoplasm and nucleus inhibits the constructive phase of the protoplasmic enzymes, prevents repair and facilitates a general lowering of cell vitality.

15. As a consequence of lowered vitality and inhibition of protein synthesis, the synthesis of chromatin is impaired and mitosis ceases.

16. Eventually the vitality and cell potential drop to the point where the integrity of the cell can no longer be maintained against the physical forces of the environment; the cell "dies" and undergoes lysis.

17. This cycle may be broken by removal or dilution of the accumulating morphogens from the stagnant media, preventing the development of lethal concentrations.

18. When cells are transferred to new cultures, they exhibit a time lag before commencing mitosis. This is the time necessary for the cytoplasmic protomorphogens to be eliminated into the media in sufficient amounts to restore the catalytic balance of intra- and extracellular protomorphogens necessary for commencement of mitosis. If the cell contains depolymerized protomorphogen at the peak of its diffusibility, this time is negligible.



Thus we can see the link certain tumors can have with hormones. Certain hormone-dependent or hormone-inhibited tumors can be influenced by changing the amount of hormone in the system, which affects the epigenetic process. Thus in the case of estrogen-dependent tumors, which have high growth rate, if the ovaries are removed and androgen is given to the organism, we can inhibit tumor growth, and if we are lucky, the tumors will degrade their information to such an extent that they will lose the ability to reproduce at a wild rate, and possibly we might cure the patient and be able to return to the hormone of proper use.

Many cancer chemotherapies work by their disruption of the epigenetic process. Since the epigenetic process is more enhanced in these wildly growing tumors, we can see how chemotherapy might be responsible for healing them. Because the chemotherapy agents interfere with epigenesis, they will have a more disruptive effect on cells that have over-accentuated epigenesis. Hence the chemotherapy agents will interfere more with that accentuated process.

To this ability, we can now turn to Hoxy as a source of different chemotherapy agents. Hoxy's father watched as different farm animals that had cancer were turned out to pasture. They ate certain types of plants that seemed to help inhibit the tumor growth. Hoxy's father took some of these plants, and developed the Hoxy tonic, which utilizes much of the same types of chemotherapy agents used in modern pharmacology.

The periwinkle plant, the sanguinaria. burdock, and many other plants have been found to have certain chemotherapeutic agents. These chemotherapeutic agents will interfere with epigenesis, and thus have a much more detrimental effect on such cancer cells than they do on normal cells. Hoxy found, in developing this formula, that his Hoxy tonic and his Yellow Poultice would work *only* on cancer cells; they would not have enough potency in the dosages used to disrupt *any* of the epigenetic processes of normal cells.

In the chemical companys' search for reductionism, these agents were separated from their natural support and concentrated beyond natural levels. Thus a severe sinthetic chemotherapeutic was designed that could affect any cell, even though cancer cells could be destroyed by chemotherapy. So many patients die not from the disease, but from the cure.

Thus nature developed the perfect chemotherapy agent. But the over-reductionistic minds of pharmacology, looking for sinthetic patentables, tried to synthesize down to the most toxic agent of these chemotherapy agents, and have taken periwinkle and separated it down into several singular compounds. The over-reductionistic idea has generated an irregular, sinthetic, unnaturally occurring product, which sometimes makes the process of cancer cure worse than the disease itself.

This author watched his grandmother die of chemotherapy. I fully believe that a more natural type of cancer therapy could have saved her. At her funeral my grandfather said, "Don't compromise your values; go with the information. Tell the people in the populace that they are making a mistake by this over-reductionistic type of idea. Don't compromise."

The immune system is another large factor in the treatment of cancer cells, as in many cancer cells the immune system, the white blood cells, etc., seem to walk on by, and are not given the proper red flags. Some of these red flags are opsinating compounds, which act like small antibodies and can be supplied from lectins and other legumes and natural vegetables. These opsinating compounds can help provide the red flag that white blood cells need to see those different cancer cells. Lentils have the largest amount of opsinating agents known.

Thus we need to enhance the immune system in all of our cancer patients, and finding ways to supply good nutrition is part of our therapy regime. The length of viral conditions must be pointed out, and how they can be disrupted by an information transfer inside the cells of the body.

A large study recently showed the link between viruses and cancer, and how viruses can cause cancer in an organism. Viruses usually need some type of chemotoxic agent, such as smoking, x-ray, etc., to start the degradation process. This was done in several studies of cervical cancer and the link between genital warts. The presence of the virus alone did not propagate the cancer, but the presence of the virus and the toxin together seemed to greatly increase the number of cancer cases.

This author has worked with several hundred cancer cases in developing many different types of therapies. One such therapy follows the Arndt-Schultz law of pharmacology. Certain natural toxins, such as cobra venom, some other snake venoms and certain spider venoms can cause rapid cases of caner and degradation of cells to occur. Cobra venom causes degradation in the mylien sheath.

Indian homeopaths have realized for years that homeopathics, using small amounts of these cobra venoms, can help reverse degenerative cases such as MS, ALS and many other types of cancer.

Homeopaths in Germany have long known that the development of certain mistle toes (viscum alb) in homeopathics can help to change cancer cells. We known from sarcodal and nosodal therapy that by using a small sample of a cancer cell and making a homeopathic of it, we can help to reverse the types of particulars in the system.

Hoxy developed a natural chemotherapy agent using nature's chemotherapies, and the wisdom of nature, rather than the speculative profiteering impulses of sinthetic chemicals. The history of Hoxy and Hoxy's therapy and how it worked on many different cases is very profound; one could be pointed to the video on Hoxy's therapy, called "The Quack Who Cured Cancer".

It has been found that the more education a person has, the more likely it is that he will turn to alternative therapies rather than medical therapies for cancer. It has been shown statistically that in America people who get alternative therapies live longer than people who get traditional therapies for cancer. It is pointed out at the time of this writing that in America the only traditionally-approved therapies for cancer are chemotherapy, surgery and radiation, even though the Nobel Prize in Medicine was awarded several years ago to a team of researchers in Argentina who found that these were not good treatments for cancer, and that only the organism's own immune system is the pure way to try to treat cancer; through the development of immuno-stimulatory nutritionals in homeopathics, nosodal therapy to help trigger the immune system, and natural chemotherapy.

Biofeedback and other types of visual imagery also will have profound effects, and every day we are seeing more literature on how people using these therapies are finding sometimes cure and sometimes abatement of their cancers.

This new type of energetic and vibrational medicine now offers many solutions for this quandary. The United States government, in defense of its chosen medical form, has had to pass laws to try to stop alternative therapies, even though these alternative therapies have been proven valid and helpful. Many forces have fought to stop the factors of choice. Now that cancer has become the number-one killer of people in the 1990s, overtaking heart disease, perhaps we will see some type of shift in modalities.

The Nobel Prize in Medicine, which was awarded a few years ago for finding the link between nutrition, diet, cholesterol, and thus heart disease, has taken heart disease out of the number-one killing spot in America. Now that nutrition and diet have come into play in this form of disease known as cardiovascular, circulatory and heart disease, perhaps we will see the same type of trend leaned toward in cancer, and thus, perhaps all medicine.

This researcher, having worked with cancer patients, set up nutritional therapies, psychological visual imageries, homeopathic regimes and other energetic therapies, has seen tremendous, outstanding results, as a wide variety of cancer-type therapies have been corrected with these different types of therapies. Dr. Revici, in his cancer treatment using the lipid management, has taken much heat, and several law suits costing millions of dollars to defend his ability to treat cancer with these different nutritional entities. The forces of the sinthetic chemical companies apply large amounts of financial pressure to try to stop this type of thinking. Many states have cancer legislation, which prohibits our freedom of opinion and freedom of speech. In these states, if a person even pronounced any satisfaction in an alternative cancer therapy, it could result in a jail term and heavy fines. Such is the fear traditional medicine has of alternative therapies.

In a recent study released by statisticians at the 1988 Quack Hunters' Convention held by the FDA in Kansas City, these researchers found in comparing alternative patients and traditional patients, in a study

of over five hundred in each group, that there was a higher degree of intelligence in the alternative cancer patients. The more intelligent the patient seemed to be, the more education he had, etc., the greater his tendency to seek alternative types of cancer modalities. It was also found in this study that the people seeking alternative therapies had longer life spans; not only did they have more *quantity* of life, but they had a better *quality* of life than those undergoing traditional methods of chemotherapy, radiation and surgery. It must be pointed out that even these researchers were hesitant to give such statistics, and that they felt a strong need to hide their research data.

Recently the *New England Journal of Medicine* published a report showing that traditional methods of cancer treatment, including radiation, chemotherapy and surgery, were no better than alternative therapies when compared in the study. Since we cannot show that one is superior over the other, the American public needs to have freedom of choice, to choose its system of medicine. Since neither system of medicine can show dramatic results over the other, freedom of choice must be utilized in the American system. Perhaps with the types of theories developed in this book, medicine might be able to come out of the wood work, cease to be a pseudo-science, and develop some accuracy through the utilization of scientific homeopathy, naturopathy and behavioral concepts.

NATURAL TREATMENTS

1. Degex
2. Degex Liquescence Herbal Chemotherapy
3. Psychological Visualization
4. Xenobiotic Detoxifiers
5. Sarcodal Rebuilding
6. Anti-Viral Homeopathy
7. Nutritional Immune Fortifier
8. Behavioral Medicine
9. Humor Therapy
10. Structural Realignment
11. Shark Cartilage
12. Oriental Herbs

LEGAL ALTERNATIVES TO ALLOPATHIC MEDICINE

1. Homeopathy
2. Naturopathy
3. Chiropractic
4. Osteopathy
5. Acupuncture

These alternative entities are real and legal in the United States. Homeopathy is a viable and real regulated business within the government. This type of medicine is attainable through choice, and with doctors, patients should have the ability to choose their own types of therapy.

It has been known statistically that the treatment of cancer is not responding to modern sinthetic medical techniques. We are losing the battle with cancer; it is time to look for some other ways to help. In finding these ways it would be wrong to over-simplify them and look for a magic bullet, which then could

be manufactured by some sinthetic chemical company in gross. It is the precept of this book that such a magic bullet could not exist. Development of therapy regimes would need to be holistic, complex, and behavioral. Situations of nutritional involvement, psychological involvement, toxicity involvement, viral involvement and immuno-stimulation; and removing of immuno-suppressants, such as antibiotics, sugar, and other compounds, are needed.

It is not the purpose of this book to try to give an in-depth history of the different types of therapies needed to treat cancer; it is merely the indication of this book to outline the different theories of a new biology, and a new way to see. In a longer treatise we can attack cancer in a more thorough form, outlining some of the experiences of this researcher and others, in treating cancer by a more natural means. It is the purpose of this book to try to also outline the threat to personal freedom of choice, which modern sinthetic chemical medicine has proposed. They seek to remove the freedom of choice in health care.

The recent court case that chiropractors had to take against the medical establishment points up how the medical establishment has plotted behind closed doors to covertly remove chiropractic as a viable choice for people in America. The chiropractors sued, and won. In the appeal suit the chiropractors won again. Thus we can see, by their stand against the medical establishment, that in the end the freedom of choice in medicine will win out in America. Now acupuncturists, homeopaths and nutritionists must try to win a similar fight. It is the hope that this book on the highest form of science in biology will also help in this struggle for freedom of choice. It is to this end that *Quantum Biology* is written.

SUMMARY

1. CANCER IS TRULY A TOXICITY RELATED DISEASE COMPLICATED BY IMMUNO-SUPPRESSION.

2. ANY MEDICAL TREATMENT MUST DEAL WITH CAUSATIVE FACTORS. VIRAL COMPONENTS MUST ALSO BE USED.

3. CHEMOTHERAPY, RADIATION AND SURGERY ARE POOR TREATMENTS FOR CANCER.

4. NATURAL METHODS OF IMMUNE SYSTEM FORTIFICATION ARE THE BEST METHODS OF CANCER TREATMENT.

5. HOMEOPATHY ALREADY HAS DEFEATED MANY CANCERS. IT'S TIME THE ESTABLISHMENT OF MEDICINE LOOKED AT IT.

Chapter 16

ENERGETIC MEDICINE AND MERIDIAN THEORY

Chapter 16

ENERGETIC MEDICINE AND MERIDIAN THEORY

Over five thousand years ago, when the rest of civilization was living in caves and still largely dependent on Shamanism for medicine, the Chinese developed a system of medicine known as *acupuncture*. They had medical schools when other societies of the world didn't have cities. Over these thousands of years societies with strong cultural differences embrace acupuncture. Societies that argue about everything imaginable and go to war over small differences of opinion. But yet as much as it must pain them they all agree on where the heart meridian points are. Everyone who studies acupucture comes to the exact same conclusion of where the points are. There must be a stable form of science behind this ancient form of medicine.

Acupuncture has definitely withstood the test of time. The Chinese found that there were certain energy bands that ran through the body, and points on these bands. When these points were disturbed, there were certain effects on the physiology. It is rumored that a group of golden-clad beings gave the study of acupuncture to the Chinese circa seven thousand years ago. Other rumors pronounce the effect that people with certain illnesses seem to recover when they stab their fingers with needles, or sometimes when an arrow pierced them at a certain spot.

The development of the acupuncture meridian therapy thus had its infancy, and these early physicians, as they developed the idea, were working on an energetic form of medicine. Their emphasis was not on the chemistry, but more or less the energetic pathway. Without the technological skills to understand electrical phenomena or physics, these earliest practitioners were working on an energetic medicine model.

Modern medicine, the advent of physiology in anatomy from autopsies, developed a chemical philosophy, dependent on the chemistry of the body, and how it was diagnosed and changed. Now with the advent of modern technology and electronic theory, we have more insights as to the possibility of developing an energetic medicine model.

In 1953 Dr. Rheinhold Vol and Dr. Werner observed that the acupuncture meridians has different energetic components, meaning resistance factors, in sick people versus healthy people. This led them to be able to measure quantifiably the condition of an acupuncture meridian. A skin resistance device was developed, called the *Dermatron*, which was used to diagnose the variant resistance changes on different meridian points.

In 1955 Vol and his co-workers found that changes could be provoked in meridian points when a patient held the homeopathic medication that helped the meridian. Thus was the founding of medication testing; *Vol technique*. Later, practitioners developed different techniques of analyzing these conditions, and the technique spread around the world to many other practitioners.

In 1977 Dr. Shimmel found with his Vega test method that by electrically challenging a point with a larger dose of voltage, he could condense his testing to a mini-scan down to one point, and challenge the body through filters and medications.

But the techniques of hand held point probes were extremely susceptible to operator control. The operator can influence the readings by applying the pressure slowly or quickly. The speed of the pressure applied has control over the response. So thehand held point probe systems are very prone to therapist bias.

In 1982 Dr. Nelson found that skin resistance was not enough; other variables needed to be researched and developed in the field of energetic medicine. These variables are voltage, amperage, electrolyte potential, brain wave, EKG, gastric motility, and other variant methods. This blend of electrophysiological reactions was known as the trivector measurement. A lengthy review of the trivector principle is best presented in the International Journal of the Medical Science of Homeopathy, issue 1+4. A quick read of this material is suggested now.

In 1987 Dr. Nelson also discovered the *Xrroid effect*, using the indeterminacy principle of the morphic resonance of the universe as a meaningful modality of testing.

In 1985 Roy Curdin found the hololinguistic effect to have its part in the testing of different meridians.

In 1989 this was all brought together, along with standard medical blood testing, urine testing, personal health history, etc., to marry the best of modern medical diagnostic techniques with the new energetic medicine done by Dr. Nelson.

This new trend in medicine offers ways of understanding biology to answer questions that have gone centuries without solution, so that we can understand the biological process of healing much better than ever before.

In biology there are many different effects which need to be considered, including the ions in the electrolyte of the body; dipoles, including Van der Waal's forces and other para-magnetic forces within the body; boundary layers, ions and dipoles in viscus liquids, EMF, circadian rhythms (the rhythm of oscillatory functions, be it the heart wave, brain wave, or muscle tonus) and the resonant frequency of the electromagnetic radiation of the body, that is, the mitogenic radiation effect.

These and others will lead to the formation of a new medicine, capable of explaining biological phenomena better, as well as outlining new methods and diagnosis in treatment of the human condition.

First, the ions and electrolyte of the body. In electrically-neutral solutions the ions of both types are approximately equally distributed. Under influence of a voltage, the ions start to transport their charge to the pole with the opposite sign (Fig. 1). These ions can change reacting in one hundreth of a second(known as the ionic reaction time). So our xrroid device can measure electrophysiological reactivity of over three thousand items in less than one minute.

The newest form of testing devices to eleminate therapist control and utilize the xrroid is the Quantum Med C.I.

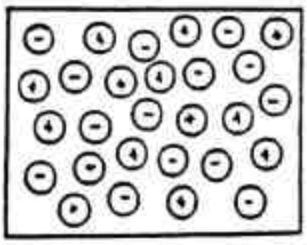
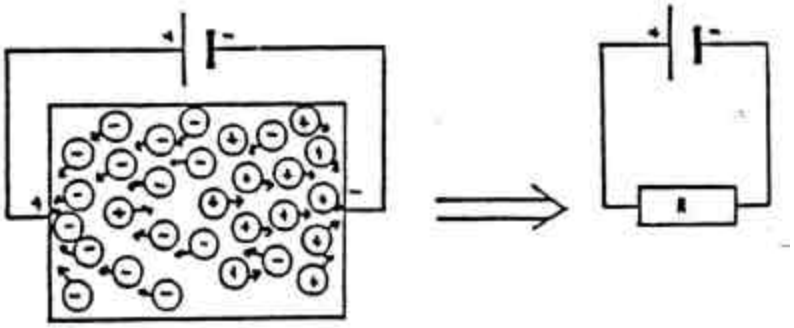


Figure 1



Ions in aqueous solutions

The resistance to this flow depends on the size of the ions and the kind of solution. To be more precise, the formula of the resistance is supplied by the equation R = L / A Q N U. L equals the distance traveled by the current; A equals the area of the cross section in the solution through which the current flows; Q equals the charge of the ions; N equals the number of ions; and U is the measure of the mobility of the ions. U itself depends on interactions between the ions in the water, so that R becomes a function of the concentration C of the solution, as well as the kind of solution expressed in terms of interactions. Thus every ionic solution has a concentration with minimal resistance. Vol found from his work that to challenge the meridian with more than a volt and a half was to disrupt this ion potential and to cause ion cascade.

Vol, in development of his equipment, chose to use a machine that would have a potential of one volt, so that it would not disturb the natural ion flow. The Vega test method developed by Shimmel uses four and one half volts to purposely challenge the system as an evoked potential to determine the body's reaction. Nelson, in developing his equipment, developed equipment that would use point one volt, to minimally disturb the natural function of the meridian.

Particles within which charge has been displaced are called *dipoles*. They have polar movements of positive, one size; negative, the other, making paramagnetic substances. Examples are: methanol, water, practically all macro molecules. We now assume that an electrically-neutral isolating medium is occurring. Within this medium, the directions of the dipoles are uniformly distributed, from a statistical point of view. If a direct voltage is now applied to the medium, the dipoles tip over in the direction of the generated electrical field. Furthermore, the field itself induces dipoles.

Both types of dipoles, permanent and induced, transport charge for a small amount of time, namely when they are changing their direction. After this process has been completed, charge transport is no longer possible. The displacement of the charge, D, is proportional to the electric field, E; the formula being: $D = \varepsilon \times E$, where ε is the dielectric strength constant.

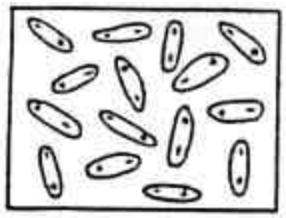
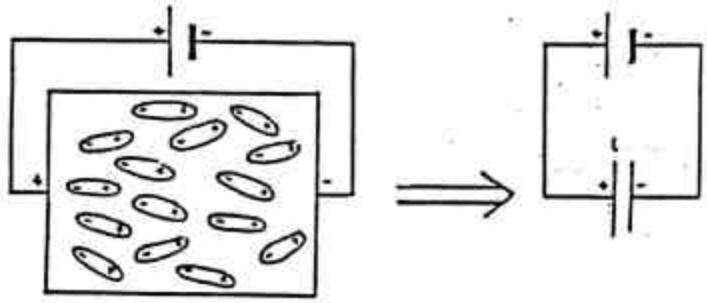


Figure 2



Behaviour of Dipoles

In Fig. 2 the situation of the dipoles is shown as in Fig. 1. In this case we have a capacitor which is interminable to direct voltages. When the voltage is switched off, the capacitor discharges, and the current with the opposite sine becomes measurable. The current, for instance, is used in diagnosis with the SEG machine and the IDG machine.

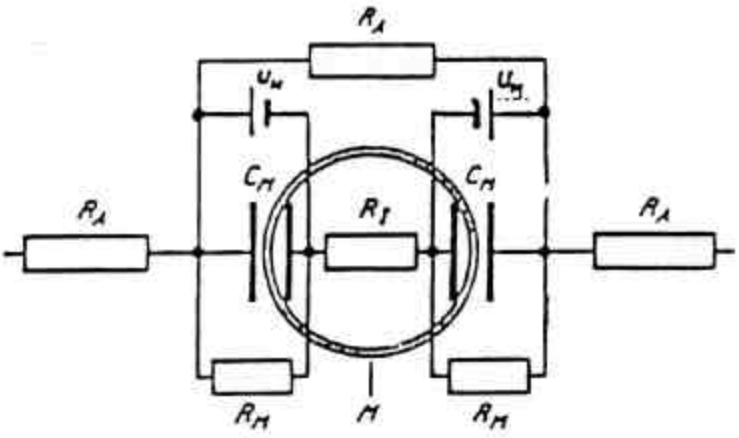
Boundary layers are normally found in the organism as cell membranes or strata of different tissues. Normally, potential differences are found at these boundary layers, which can be traced back to differences in permeability for different types of ions. A well-known example of such an effect is the membrane potential of cells. The potential of differences in boundary layers can be imagined as small batteries whose voltage depends on the strength of the current, which is used for the measurement. This dependence comes from the fact that the more rapidly ions diffuse through boundary layers, the higher the strength of the outer electric field becomes.

Another important boundary layer is formed by the skin and the applied electrodes of an electroacupuncture machine. In addition to potential differences with electro-chemical genesis, as in the above case, electrolysis can be recognized here. The skin and the electrode exchange ions. This causes a change in the biochemical balance. The boundary layers of the cell membrane must maintain an electro potential of forty to ninety millivolts, as does the boundary layer between the nuclear membrane and the rest of the cell. This maintaining of balance across boundary layers, where there is a difference in charge, requires energy to fight the entropic factors that would produce balancing. These are factors such as potassium pumps, sodium pumps, etc., which allow for life by the maintenance of electrical charge across boundaries.

Ions and *dipoles* in viscus liquids and jells are both components of tissue. Additional phenomena must be recognized. It is possible, for instance, that a local mobility of ions varies in a significant way. The time that is taken to reach a stable electric situation can sometimes be very considerable. Ionic changes can best be detected with slight volt and amp changes.

In a living system there are also variations of time and space. These variations of the ion concentration and variations of the interaction of ions and dipoles with their surroundings come from regulation processes in the organism. Therefore it is likely that the resistance R additionally will depend on space and time. But as if all these components are not complete through the dielectric constant, E will no longer remain constant either, but will also become a function of E x Time, that of the space and time. Furthermore, the regulation generates a polarization voltage which has opposite direction to the one of measurements current. This leads one to the conclusion that an analytic treatment of such a complex system is nearly impossible. It is necessary to revert to simple models. In Fig. 3 we show a simplified diagram of the situation, where a single spherical cell has been assumed.

Figure 3



Simplified diagram with a single spherical cell in a homogenous medium

M = Cellmembrane, R_A = Resistance of the outer medium, R_i = Resistance inside the cell, R_M = Resistance of the membrane, C_M = Capacity of the membrane, U_M = Potential of the membrane (after Glaser, R.: Einführung in die Biophysik)

Fig. 4 shows the principle behind the arrangement for measuring the resistance. Inside the EPR machine(ElectroPhysiologicalReactivity) there is a power source which provides a constant current within a broad resistance band. This is done electronically, as in Fig. 4. The body of the patient is used to measure resistance R. Between input and output of the EPR machine a voltage is measured and then represented in a scale from 0 to 100. Ohm's law shows that in a constant current the voltage is directly proportional to resistance. The EPR device measures voltage changes as brain waves, and amperage changes as static charge pulses. Since most of the acupuncture meridians are on the fingers and toes the wrists were found by Korean researchers to be the best points for electro measurement. So are EPR device will have wrist and ankle straps, these can detect miniscule electro changes.

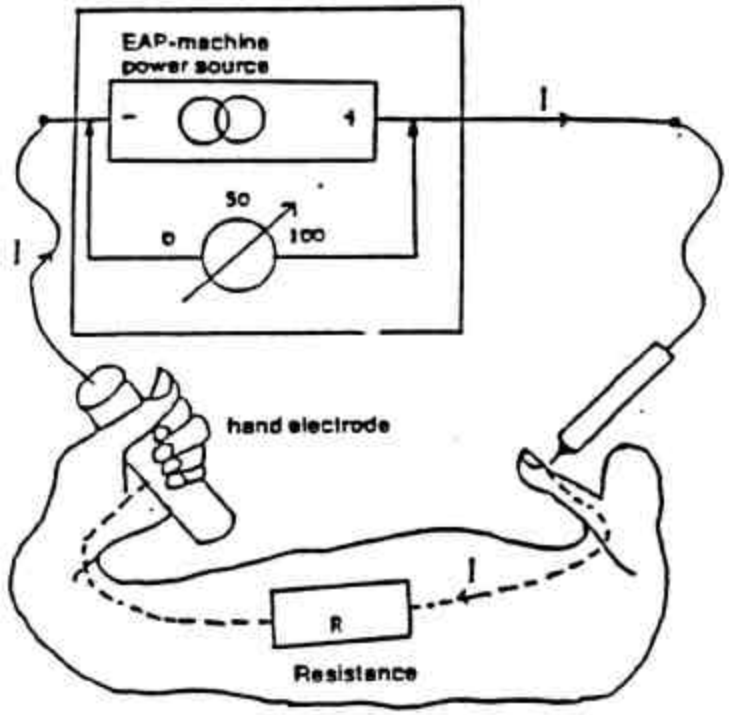


Figure 5

In practice a lot of difficulties are presented. For examp le, the reciprocal of resistance must be measured because of the small amount of current. In addition to this, the organism is by no means a resistance, obeying linear laws. This is in part due to the behavior of dipoles and ions in viscus liquids, in the regulation process, in the organism itself, which tends to set a voltage opposite to the outer field. This type of phenomenon has been little understood until now. For purposes of demonstrating this experiment, one reverts to a simplified model shown in Fig. 5. These vessels have relatively low resistance, which is negligible in practice. So principally, the distance between these vessels and the skin surface, the density of the vessels, and the state of the liquids in the outer capillaries are responsible for the electric behavior of the acupuncture point, hich is about two to three square millimeters in size, roughly the size of the end of the eraser head of a pencil. The computer can be programed to compensate for these problems with fourier analysis. The hand point probe therapists can not measure the changes at fast speeds and can not compensate for the other problems. The EPR device has been shown to be the most accurate system with testing of some criteria at 90%. SEE the International Journal of the Medical Science of Homeopathy issue 4.

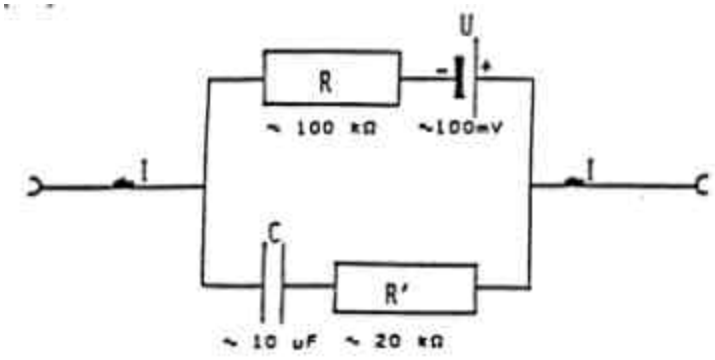


Figure 4

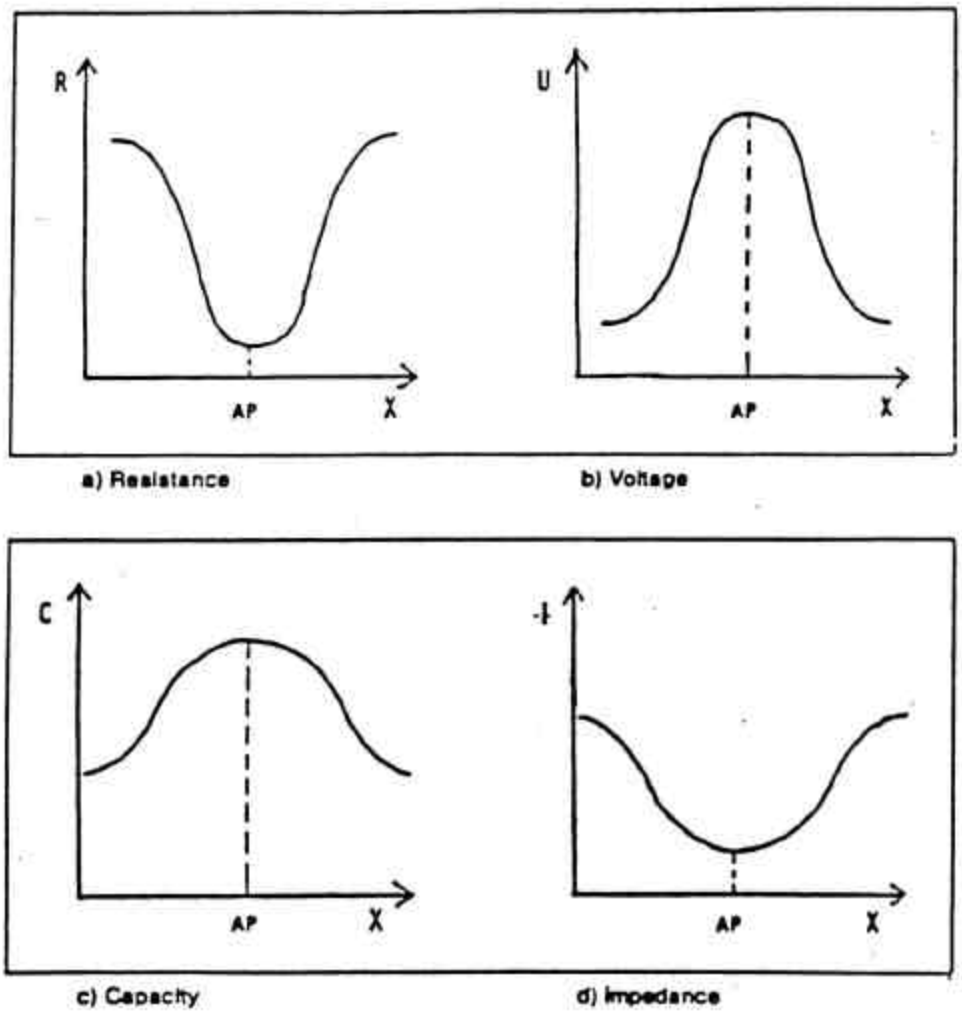


Fig. 6 presents the typical behavior of these different components of an EPR measurement. The measured resistance in the acupuncture point is between ten and one hundred times lower than in the surrounding tissue. However, the voltage of the inner battery is much higher.

Typical skin resistance might be in the neighborhood of 50K, that is, fifty thousand ohms, whereas the typical resistance of an acupuncture point that is healthy is somewhere between 28K and 33K, in order to exclude effects which come from pure polarization measurement with alternating current. This should also take into consideration the part which is due to the capacity, and therefore does not appear in measurements with direct current.

As we have shown in our diagram, showing the behavior, capacity and impedance, it seems to be essential for further research in biophysical behavior and the acupuncture points of resistance, voltage, alternate current, and impedance. Different frequencies and capacities will be determined and controlled as the techniques are developed.

The presence of an electrode of dissimilar metals placed across an electrolyte will cause electrical potential or electromotive force to be developed between these two, which can be used to align different dipoles and produce cascading electron effects.

Two equal charges Q of opposite sine, separated by a distance 2A constitute an electric dipole. The moment of the electric dipole, P, has the magnitude 2AQ, and the moment will point from negative charge to positive charge. Here we derive an expression for the electric potential V at any point of space due to a dipole, provided only that the point is not too close to the dipole.

The electric potential for the dipole gives us the equation V = 1P cosine of $2/4\pi \times R^2$. P, as we said, is the dipole moment, R is the given radius through which the dipole works. The electric dipole moment of water is 6.1×10^{-30} coulombs x meter.

Many compounds in biology can also have quadrupole moments, such as those involving iodine. The potential volts, as indicated in the formula, can tell us the capacitant potential. By varying the system mathematically, we can calculate that capacitance is Q divided by V, where V is the potential difference and Q the magnitude of the charge. Capacitance is measured in farads, where one farad equals one coulomb per volt.

Capacitors are used to control fields and energy in living systems; life could not exist without the capacitance factor to reduce voltage fluctuations, transmit pulse signals, generate and detect electromagnetic oscillations, control and calculate the pulsed information of the body.

The capacitance of a capacitor increases if the dielectric is placed between the plates. The ratio of the capacitance with the dielectric to the capacitance without it is called the *dielectric constant* of the material.

The dielectric constant of some key materials are as follows: air, 1.00054; paper, 3.5; porcelain, 6.5; quartz, 3.8; polyethylene, 2.3; polystyrene, 2.6; and water, 78. Hence, the need for the dipole action of water, as it enhances the capacitance effect of the cellular activity in the body. If the dielectric is placed in an electrical field, induced surface charges appear, which tend to weaken the original field within the dielectric. Thus as we increase the charge with our electroacupuncture machine, going beyond a volt, we disrupt the dielectric effect of water, and get unnatural measures in the body's electrical field.

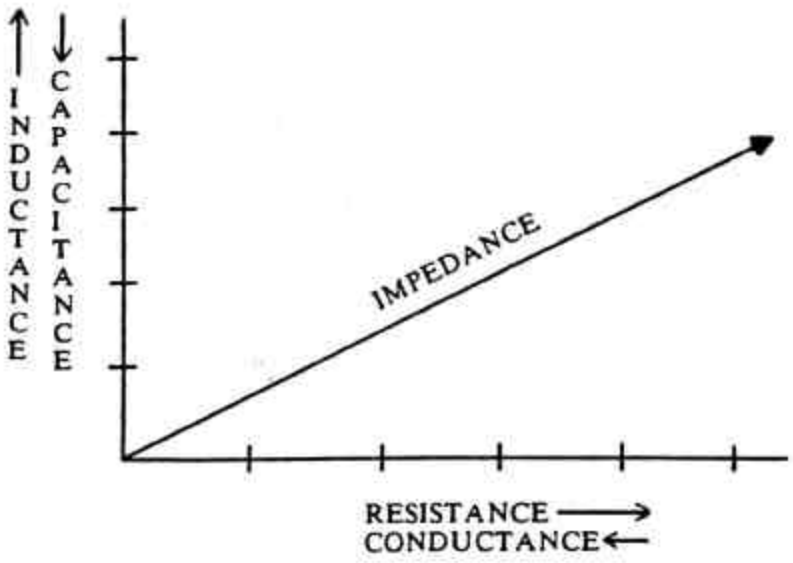
Another key use of water within the system of biology is its refraction capabilities and its ability to focus light. This is very important for the exchange of virtual photons and the interplay of the mitogenic radiation. Thus, water's ability to refract light in mitogenic radiation can be destructed by large energy fields run through the different systems of the body.

The body consists of many free electrons as well as free protons in the cascading principle of the alkaline/acid tide, as the body shifts from alkaline states into acid states. These free electrical charges are free to produce the electro-physical effects done with the electroacupuncture machine. Thus the electromotive force potential of an electrolyte can tell us about the freedom of movement, as well as the oxygenation potential and the hydration index, which can be calculated from these measures.

In biology much is made of the effects of pH, which is actually the inverse law of the proton coefficient. This proton coefficient, or *proton pressure*, can be calculated in the body very easily, electrically, to find out the proton pressure vs. electron pressure of a meridian or neurolymphatic reflex point, or neuromuscular reflex. Thus the voltage potential of the body from two spots has deep insight into the electrical nature of the proton and electron pressure.

The *resonant frequency* of an electrical circuit can be found via the formula: Resonant Frequency = $1/2\pi$ x the square root of the inductance x the capacitance of the circuit. Inductance can be calculated from variant resistances known in a circuit comparing the variances. Inductance can add to or detract from an electron effect, and it is part of our circuit in measuring impedance, which is a correlate of inductance, capacitance and resistance. Thus taking the formula of impedance, which is the vector of the right angles of inductance and capacitance vs. resistance, we can go back and solve the inductance of an equation via the changing pattern of resistances in the circuit. Change of voltage in the circuit, knowing the distance factors and the dielectric constants of the probes, can give us factors that will lead to the calculation of other capacitance of a meridian or the overall body system.

Figure 7



So the calculation of inductance and capacitance can lead us to the resonant frequency or the most imposing resonant frequency in the body, which from the work of the Gerlitzes and Dr. James Isaacs, would be intriguingly revealing of different medical conditions.

Oscillatory functions of the body are also important. The Fourier analysis of brain wave and heart rate can lead us to finding different healthy or unhealthy frequency paths through curve fit analysis, showing if there are patterns of obsession, compulsion, addiction, allergy, etc.

Because of the Heisenberg uncertainty principle, the more we know about one factor, the less we know about another. In biology indeterminacy seems to be more of a hallmark, because biology itself seems to be dependent on indeterminacy for its activity inside the cell membrane.

Dr. Isaacs, in his breakthrough book on "Complementarity of Biology", makes the proposition that living processes are shown to be non-thermodynamic and quantic in their interchange of energy. The laws of thermodynamics are the laws governing basically gasses, molecules and inanimate objects. The first law of thermodynamics is that energy is not created or destroyed. The second law of thermodynamics is that heat must pass from a hot body to a cold body. The basic law of entropy is that things will normalize in temperature.

The living process in any cell works against the laws of thermodynamics unless the object dies, and then the temperature of the organism gravitates to room temperature. The very process of life is fighting against the entropic functions of the laws of thermodynamics. In this book, the treatise of quantum interaction in biology is treated more thoroughly. Needless to say, for the purpose of the discussion in this chapter, biology is dependent on other processes, more quantic than thermodynamic.

Chemical philosophy is dependent on a thermodynamic system of analysis, and if Dr. Isaacs's proposition is correct that the body is actually quantic, not thermodynamic, than a whole other philosophical paradigm must be implanted into the study of biology and medicine.

Three factors will come into play in developing a theory for the acupuncture meridian: one, quantic energy exchange; two, the electronic stability of large macro molecules and the atomic structure; and three, the long-range forces effect known in quantum biology.

As we have outlined before, any organ, cell, or organ structure will need a certain amount of energy to perform its actions. This energy has several components, known as life force, which tend to correlate with the electrical force. Yet, it must be dramatically underlined and brought up that life force is not just electricity; electricity might be one of the foremost components, but there are other components to

this life force that are beyond our ability to understand in the scientific theories of today. And with today's technology we have electrical means of analyzing this life force correlate.

Copernicus was branded a heretic when he developed the idea of the cyclic nature of the heavenly bodies, and the idea that the Earth revolved around the sun. Harvey was branded a heretic when he came up with the idea that blood circulated through the body in an endless cycle. Perhaps we now will be branded heretics as we propose the cyclic interchange of energies through the meridian system of the body.

Each organ, cell, and organism must have flowing through it some series of cycles that allow for interchange; the cyclic flow of oxygen and carbon dioxide allowing for oxidation and reduction, the cyclic flow of metabolites and escritoires, which allow the body to intake and expel. There also is an electrical cycle of the body as the cells refurbish their electrical strength to fight against thermodynamics, to maintain order and control within the cells, the organs and the systems.

The Chinese acupuncturists thousands of years ago found this flow of energy to be true; in fact, they palpated, tested and found the channels through which this energy flowed, and it became the meridian system of acupuncture. The circadian rhythms, or daily flow of energy, was found by the acupuncturist to flow through what was called a horary clock, as the different energies flowed through the meridians in surges.

Let us now explore in quantic terms the hypothesis for this cyclic flow.

In quantic theory we sometimes refer to the electronic stability of an atom or molecule. In Fig. 7 we explore the nature of an atom.

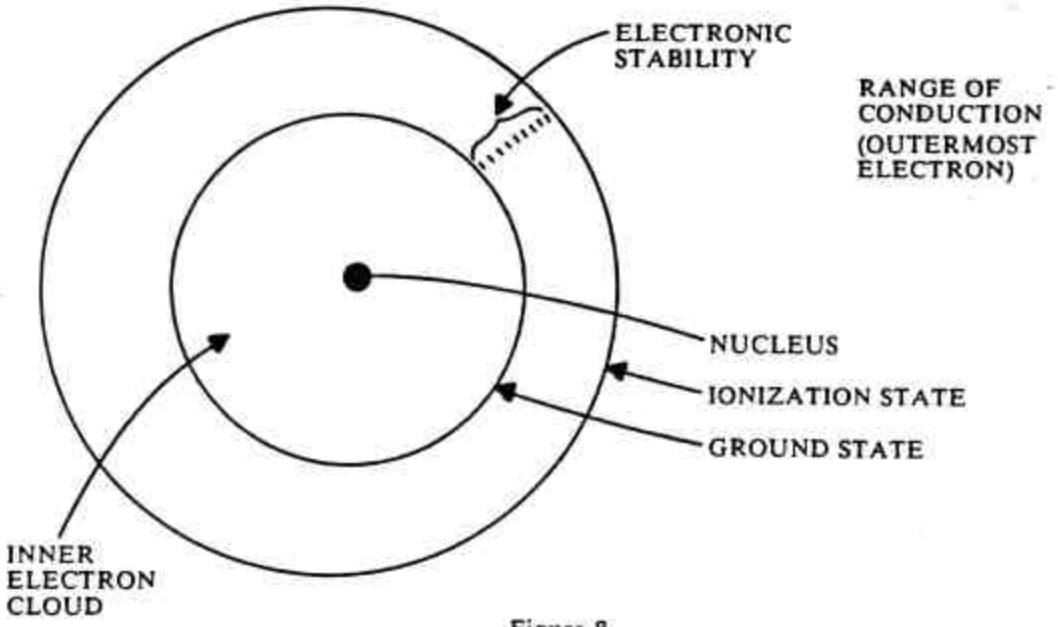


Figure 8

Inside the heart of the atom is the *nucleus,* consisting of *neutrons, protons,* and other subatomic particles. Revolving around the nucleus, in what could be termed a cloud, are the *electrons.* In the outermost shell of any atom or molecule there are electrons that are furthest away from the nucleus. These electrons occupy different quantic shell states within their orbital. To provoke changes in the quantic states an impartation of energy is needed. Electromagnetic radiation, be it heat, ultraviolet, etc., can provoke an electron to change its orbital to a higher state. These jumps in higher or lower states are done in *quantic levels*, not in half-steps. A *quanta* of energy is what is taken to allow the electron to go to the next quantic state; hence the name quantum theory. This is a discontinuous indeterminate leap of matter.

The electrons in this last valance state, furthest from the nucleus, have thousands of different shells that they can occupy. The shells furthest from the nucleus within this valance are called the *ionization orbitals*. If any more energy is given to the electron, it will jump away from the atom or the molecule, leaving the atom behind as an ion; hence the term *ionization state*.

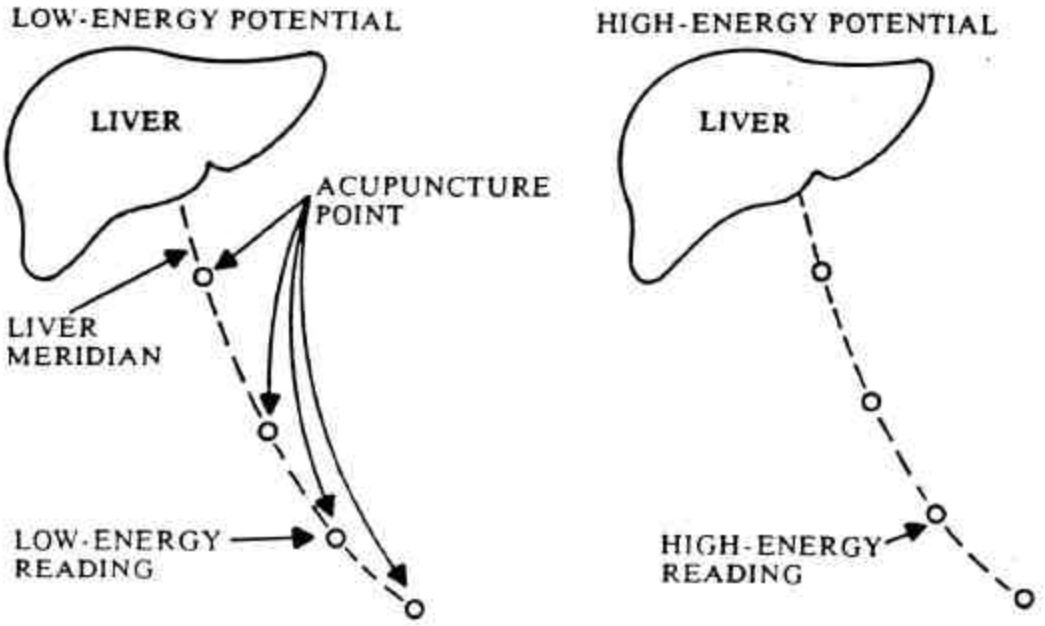
The lowest of this valance level, closest to the nucleus, is called the *ground state*. No more energy can be taken out of the electron. Any attempts to take more energy from the electron orbiting this atom would be futile. This is called the ground state. Between the ground state and the ionization state are thousands of different quantic shells where this outer electron can be.

As we can see, the further out the electron, the closer to the ionization state; the easier the electron can be separated from the atom or molecule, the easier the electron can take place, or part of conduction of energy. The range through which the electron in this outer state exists is called the *electronic stability,* as it ranges from ground state through ionization state. Changes in the valance state of this outer electron are induced largely through photon absorption or radiation.

Cashmere and Polder (1948) and Lifschitz (1956) have proposed that this electronic stability state can be influenced by virtual photons, as well as actual photons. It is the virtual photon that is accountable in the mitogenic radiation factors.

Isaacs accounts for the long-range forces of quantic theory, which can arise from dipole-induced interactions of fluctuating electronic charge in a molecular oscillator, meaning that in a coherent process a molecule or atom in a certain electronic stability range could communicate this range via virtual photons to another atom at a long-range distance, unaccountable by Newtonian physics, and that the long-range forces in this change can take place within a biological system through the virtual photons of mitogenic radiation. Simplified, an energy system such as the liver will share its energy through the liver meridian, which will cause changes in the electronic stability of the molecules through the meridian, especially at the meridian acupuncture points, which allow this liver energy, to palpate through the meridian to complete its cycle to other spots and other organ systems of the body.

The cycle of energy through the body is happening all around the clock at every moment of the day, but there are certain surges that happen on a circadian daily rhythm that account for slight increases in the meridian electrical strength at certain hours of the day. Thus, the long-range forces influencing the electronic stability can be detected by a resistance or conductance meter applied to the acupuncture points. If the organ system has too much energy, as in the case of an inflamed liver, this excess electrical energy could flow down the meridian into the acupuncture points, increasing the electronic stability of the points, allowing for a heightened conductance, and thereby a high reading on the electroacupuncture device. A weakened or degenerate organ system such as a necrotic liver would rob energy from the meridian system beneath. It has low electronic stability at the acupuncture points, an increased resistance, a decreased conductance, and a low reading on the electro-acupuncture device. Thereby the flow of energy through these meridian systems is not via electrons, but via the life force that the electrons try to follow.



One point must be expounded upon here: mitogenic energy, which we discovered from the Gerlitzes, is a coherent energy. It must be directed. The flow of energy through the meridian is directed through the meridian and does not flow equipotentially in all directions. Biology must have the skill to coherently direct this force in just the right way; hence, the field theory of biology.

The field theory of biology, which we will develop in brief form in this treatise, is as follows: the field of biology must have two components: one, a coherent, directed process that allows for the specific interchange of life energy; and two, a unified field theory of the body, as we realize that the body has one field of energy circulating the whole body. So when we encounter another human being, we encounter his total holistic field. Inside his body the energy will flow, and there will be a difference in the flow of energy in the liver meridian from the spleen meridian.

Our second part of the theory, the holistic field, allows for many phenomena within biology. In electroacupuncture it allows for the phenomenon of Vega testing. The Vega practitioner will test one point and filter, challenge that point, and interpret the results throughout the whole body. This is possible because of stage two in the body field theory.

Vol and other practitioners didn't use one point, but went to every meridian for readings of the activity at each and every point. Because the field theory of the body is coherent and incoherent, Vega testers can achieve the vast majority of information that they need; however, they will meet certain levels of performance at about eighty-five percent that will limit their ability to know all the factors of the body. Most Vega practitioners will get the information they need. It involves a time factor; requiring less time for the Vega test. But the intervention of therapist subtle muscle control prevents this point testing from being widely acceptable.

Over the last forty years since the advent of electroacupuncture, there have been close to a hundred thousand practitioners of electroacupuncture to varying degrees, each of which have found some degree of accuracy in the process. This practitioner, having done thousands of patients himself, has found unerring accuracy in correlating the different bodily conditions patients present with the readings on the electroacupuncture machine.

Many educational institutions have attempted to investigate electroacupuncture without attaining good practiced electroacupuncturists. They have taken medical staff, and with less than one day of instruction, had them testing different points. This would be like testing the effectiveness of a helicopter by judging the ability of someone who had never flown a helicopter before. The conclusions would be quick and simple: helicopters don't work. In fact, they are a risk. Many studies have been performed at the

University of Hawaii which have found electroacupuncture to be effective as a diagnostic tool, using qualified electroacupuncturists as the criteria.

Acupuncture is listed by the World Health Organization (WHO) as effective therapy in over three hundred different diseases. Electroacupuncture is simply the process of letting the qualified acupuncturists measure the electrical phenomena on the meridians.

The analogy of electricity to water has been used for centuries in the description to the uninitiated on how electricity behaves. Ohm developed the law that Volts = Amps x Resistance, known as Ohm's law. As we have seen, the electronic stability of an acupuncture point is measured by the resistance. But the voltage and amperage potential are also very important. There is electron force and movement through the body, but it is erroneous to think of these meridians as actual wires or circuits. At the different points of the body the knowledge of voltage, amperage and resistance offers more to the skilled practitioner than just resistance measures alone.

In water, as in electricity, the amount of flow, or the molecules of flow, is known as the *current*, or the amount of electrons or ions passing a certain point. The pressure behind this flow is known as the voltage. The resistance to the flow is known as *resistance*. Measuring the electronic stability of an acupuncture point can tell us the resistance, just as one might have a spicket on a pipe, and whether the spicket is open or closed or to what degree in the middle, that would be the resistance. The actual flow would be the current or amperage, and the pressure behind the flow would be the voltage.

When this practitioner first developed the art of measuring acupuncture point voltage and amperage, as well as resistance, we found several correlates over the thousands of patients seen. Amperage correlates very strongly to life force. We have watched people dying of various diseases, and as their life force weakened, the amperage dropped significantly. Vol found that sometimes toward the end his resistance readings would normalize in patients who were losing life force. We have observed the same phenomenon of resistance, because the amperage drops so much, the body is forced to try to stabilize resistance, and surge voltage. This amperage or life force component also has a correlate in the indolamines. The indolamines, such as serotonin dopamine, melatonin, etc., help to supply the amperage or life force in the body. Patients with weak amperage can be brought back to normal with indolamine phenolics. Voltage components correlate to pressure and willpower. Patients losing willpower in a meridian can start to have low voltage readings. The voltage correlates to catecholamines. Catecholamines, such as adrenaline, norepinephrine, thyroxin, etc., control the voltage of the body, with the pressure behind the electrical motive force. Patients with too high or too low voltage can be stabilized by proper catecholamine phenolics.

Volts times amps is power, measured in watts. The actual power of the body can be correlated from the volts times the amps. This has correlates in oxygenation, in hydration, in mineral balance, which tells us about the electrolytic strength of the body in its mineral and ion bath.

The factor in our energetic medicine is temperature. As the mitogenic radiation occurs in the infrared area, changes in temperature throughout the body are also insightful. So development of machinery that could do voltage, amperage, temperature, resistance, and oscillation all were extremely important in the development of an energetic medicine.

To this end I greet you, and entreat you to challenge the tenets of biology, and to look into the factors of energetic medicine and energetic biology. It is the purpose of this article to offer a quantic scientific basis for the possibility of electroacupuncture diagnosis. If there are any questions, please relay them to this practitioner, so that this discussion might continue.

The master equation for life is:

$$6\,(CO_2) + 6\,(H_2O) + \text{Light Incoming} = C_6H_{12}O_6 + 6O_2 + \text{Light Outgoing.}$$

This master equation of life accounts for the process of photosynthesis in the utilization of carbon dioxide and water by plants in the presence of light to develop the carbohydrate fuels and produce oxygen. Light is integral as an incoming process by the plants to utilize the photon energy of light to stimulate the photosynthesis process. As Dr. Isaacs has pointed out, the entire electron transport chain in plants or animals is a photodynamic process.

The animal process is one of taking in the carbohydrate structures, taking in oxygen, producing light as a byproduct, and producing carbon dioxide and water as the chemical byproducts. The electrodynamic process of life depends on the photodynamics of the light from the sun, as well as the light, the mitogenic radiation, within the cells of the body.

The energy of an oscillator, or photon, is given by:

$$E = (N + 1/2)\, h \times V,$$

where E is the energy, N is the quantum number, h is Plank's Constant, which is 6.625×10^{-34} joule seconds, and V is the oscillator frequency. Thus in the realm of mitogenic radiation, as we discussed in Chapter 8, we can see that the maximum energy in the range of the mitogenic radiation at 10^{15} hertz of that photon, to exchange one quantum leap, would be approximately 9×10^{-19} joules. This energy can be accounted for in the mitochondria of the cells from the conversion process of the eighteen hot electrons of glucose through the krebs cycle.

In 1965 the Nobel Prize for Physics was awarded to three theorists: Tomonaga, Schwinger and Feynman. The prize was given for the creation of the modern theory of quantum electrodynamics.

Quantum electrodynamics is a relativistic theory of quantum mechanics concerned with electromagnetic interactions. The Feynman propagator approach describes the scattering of electrons and photons in terms of an integral that sums up contributions to the interactions from all possible ways in which the particle can interact by the exchange which we call *virtual photons* and *electron positron pairs*.

The existence of these virtual photons is made possible by the Heisenberg uncertainty principle's allowance for brief violations of the law of conservation of mass and energy, during which, for short periods of time, particles may be created that would otherwise be forbidden.

Quantum electrodynamics combines the electromagnetic field with the particle manifestation of electromagnetic waves. We quote Feynam, "Since photons are also electromagnetic waves, and since these waves are vibrating fields, the photons must be manifestations of electromagnetic fields. Hence, the concept of a quantum field, that is, of a field that takes the form of quanta or particles. This is indeed an entirely new concept which has been extended to describe all subatomic particles and their interactions, each type of particle corresponding to a different field. In these quantum field theories the classical contrast between the solid particle and the space surrounding them is completely overcome. The quantum field is seen as a fundamental, physical entity, a continuous medium which is present everywhere in space. Particles are merely local condensations of the field, concentrations of energy which come and go, thereby losing their individual character and dissolving into their underlying field."

We quote Werner Heisenberg: "When new groups of phenomena compel changes in the patterns of thought, even the most eminent of physicists find immense difficulties. For the demand for change in the thought pattern may engender the feeling that the ground is to be pulled out from under one's feet. Once one has experienced the desperation with which clever and conciliatory men of science react to the demand for change in the thought pattern, one can only be amazed that such revolutions in science have actually been possible at all."

For now, we must challenge the very tenets of medicine with a brand new phenomenon that demands attention and research. This is the phenomenon of medication testing. Over the last thirty years a strange phenomenon of medication testing, of homeopathics, vitamins, glandulars, and other natural substances, has swept the world, so that millions have experienced, and thousands practice, a form of medication testing. There is a phenomenon that can be detected through various means, that the body shows reaction to different medications, such as homeopathics, vitamins, minerals, etc. This reaction can show whether the patient needs or rejects these items.

Muscle testers can test muscles of the body for their strength and degree of stability. Certain medications can provoke strengthening of a weak muscle and weakening of a strong muscle in the science of kinesiology. There are thousands of kinesiologists practicing around the world who depend on this phenomenon for livelihood. They use such techniques as therapy localization, medication testing and the like to treat patients who have strong or weak muscles. In fact, some of the simple techniques of muscle testing are taught to patients so that they can test themselves in response to their needs of different nutrition and foods on a daily level.

Electroacupuncturists use electrical devices to measure the resistance at different points and the body's reaction, as this resistance changes, on different acupuncture points in response to different medications brought into the patient energy field.

The sheer number of people experiencing and practicing this phenomenon demands the research and scientific community to investigate more thoroughly this procedure. If this procedure is correct, the very tenets of medicine can be challenged, as the body is capable of making response to different items. One of the problems of this technology is that rarely do sinthetic compounds identify as good for the body;

the body has a tendency to accept natural healing modalities, which offer the full energetic picture, rather than the sinthetic ones, which make much more profit for the chemical cartel.

To scientifically investigate this phenomenon this experimenter did the following study.

Ten qualified and practicing muscle testers were chosen to muscle test ten individual patients. Once these muscle testers had found a successful homeopathic item that would work on a specific muscle for the patient, this experimenter would take that homeopathic, put it into a bottle, mix it up with nine other bottles of water and alcohol placebos, have a third party number the bottles (so that it would be a double-blind study), and neither the muscle testers nor I would know which bottle was actually the correct substance. The muscle testers were then told to test the muscles of the patient as they had done before, and to try to find out which of the ten bottles was the actual substance. Then they were given their choice of the ten bottles to make as to their first or second choice. Six of the practitioners were correct on the first choice, and two of the practitioners were correct on the second choice.

Another study was done where three trained muscle testers, were given fifteen bottles of differing compounds; ten of which were placebo and five of which were combination homeopathics for different common ailments. These practitioners were skilled in using these compounds, so they were familiar with their activity. The three practitioners muscle-tested these items to try to guess which of the items were the homeopathics, which were the placebos, and which of the homeopathics had specific action. In this study the three trained muscle testers produced sixty-five percent results, which is similar to the statistics the muscle testers achieved in the first study.

Considering that chance in the first study was about fifteen percent, and chance in the second study even lower, we can see that muscle testing has a reality that must be dealt with. I can heartily suggest that anybody in the scientific or intellectual community reading this article would be intrigued at the prospect of muscle testing, if they could see a proficient, experienced muscle tester perform.

Two more studies were done to duplicate this phenomenon using electroacupuncturists. Ten moderately trained electroacupuncturists were chosen to work with a specific patient, find a homeopathic that worked, and then, as in the procedure with the muscle testers, given nine other placebos in a double-blind technique, and asked to choose out which one was the valid mixture. Eight of the electroacupuncturists were able to find the right mixture on the first try. When three trained electroacupuncturists were given the fifteen bottles and asked to find which one was which, they made eighty-five percent correct choices in the test. Electroacupuncture does not involve muscle testing; the patient sits back and has little intervention. The qualified technician then measures the electrical resistance activity at different points to calculate the reaction. Thus as we can see, electroacupuncture seems to be a better performance tool, although it does require an investment in machinery and some training.

The possibilities for explanation of this phenomenon are: one, the existence of some psychic ability not yet known to science; two, the fact of mitogenic virtual photons, produced by the cells themselves, to be able to produce a cascading change in long-range forces, which produce changes in the electronic stability, and thus, the resistance of acupuncture points, as well as changing the electronic stability in different acupuncture points could promote strengthening of weak muscles or weakening of strong. Also, there could be an electromagnetic change by the fields of such products, which provoke a change in the field of the human test subject. Another possibility might be the existence of a polymorphic magnetic field and its fit or non-fit with the magnetic field of the patient. Many other possible explanations, including other-dimensional subspace activity, could account for this phenomenon.

Let us account some of the rules and regulations that have been found by medication testers in their operation, and how they might contribute to a philosophical understanding. Medication testers, be the test muscle or machinery electroacupuncture, have found the following criteria to affect their testing.

Too many synthetic drugs, especially cortisone-type derivatives, interrupt the test. The existence of strong electromagnetic fields such as fluorescent lighting, etc., within three to five feet of the patient, disturb the results. States of extreme emotional disarray disturb the results. Poor alignment of the spine produces poor results. Excess electromagnetic radiation from x-ray, heat, etc. can produce unstable readings. From this observation we can see that all of these things destroy the mitogenic radiation or the photon transferability of the human body, leading us to the idea that the virtual photon effect is the most likely explanation for this phenomenon.

SUMMARY

1. Acupuncture is a real medical system in wide use today. Electrocupuncture is as well

2. Electrophysiological reactivity is a real and widely used system of medical diagnosis.

3. Resistance alone is a weak form of measurement.

4. Ionic changes dictate volt and amp (Voltammetry) as the best way to measure energetic medicine.

5. Since the ionic reaction occurs at one hundreths of a second only a computer could process such data. The old style resistance devices with hand point probes are prone to therapist control.

6. ElectroPhysiological Reactivity is the energetic medicine of the future.

Chapter 17

A PROPER MEDICINE FOR OUR NEW BIOLOGY

Chapter 17

A PROPER MEDICINE FOR OUR NEW BIOLOGY

Our discussion on quantum biology has led us to some radical discoveries regarding a new biology, with vast implications towards a new medicine.

As we have shown in biology, statistical dynamics of the thermodynamic principles of interaction of chemicals is incomplete in its inability to explain the factors of biology, so drastically incomplete that it is obsolete and explains the vast amounts of iatrogenic disease prevalent in America.

There are many different chemicals, enzymes, minerals, etc. which operate very precisely in biology, and not under the law of large numbers. Thus one mineral atom or one enzyme molecule can have very precise activity, and is utilized very extensively by a cell. This is to imply that there is a precision of forces, as we have outlined in the chapters on long-range forces and mitogenic radiation. A small quantity of an enzyme in a controlled situation can have dramatic effects on a cell.

Thus life, being organized under quantic law rather than thermodynamic law, will set up the need for us to re-evaluate our present system of medicine. Our present system of medicine is dictated by sinthetic pharmaceutical in *in vitro* testing, even in the face of reason.

We have also seen that there are several systems of intracellular communication, which are based on an electrical sharing of EMR, or photons. Most of biology and medicine can be explained via this photon interaction. The photon energy states can be balanced by biology.

We have also explored the tremendous amount of intricacies that biology utilizes, even in the most simple cell. These intricacies are based on several feedback and cybernetic loops of dramatic complexity. This dramatic complexity shall induce our new medicine to a level of reverence which must replace our old pattern of arrogance. Medicine must learn to bow its head to the beauty of nature and its ability to produce and regulate life.

In our old pattern of arrogance we thought that we knew enough, and could thus make sinthetic chemicals compatible with the ways of life, but this is an insult to the body. This is an insult to *nature*, and a serious flaw in medicine. Thus we need to re-evaluate our arrogant form of medicine. We must realize the superiority of natural dynamics over sinthetic impostors.

We have also explored the fractal dynamics of chaos theory, in which we see that making rough estimates is not apropos to the flow of a natural system. We also see that certain bifurcation points can induce adaptive behavior, which can also be attributive to the natural flow of biology. Allopathy always tries to out-think nature with sinthetic tricks.

COMPARISON CHART

	NEW HOMEOPATHY	ALLOPATHY
1.	Very small chance of side effects	Very great chance of side effects
2.	Cost minimal	Usually high costs
3.	Safe for children and elderly	Warning of risks if not used correctly
4.	Non-addictive	Creates dependency
5.	Works by letting the patient re-establish homeostasis	Works by externally blocking, stimulating, or interfering with the body
6.	Little if any malpractice, due to safety	Major malpractice suits iatrogenic disease is on the increase
7.	Philosophy: Body's reactions are an intelligent attempt to deal with toxicity and other disease-causing conditions	Philosophy: Body is stupid and malfunctions often; it then needs to be stimulated, blocked, or fooled by the doctor and his sinthetic medication
8.	Easy to use	Takes years of experience
9.	Safe for environment Natural	Manufacturing hurts environment
10.	Tries to cure	Tries to sedate reactions
11.	Tries to treat whole body metabolically	Tries to reduce patients to mere symptoms
12.	The patient is an individual	The patient is a set of symptoms
13.	Symptoms are only a part of a complex set of problems	Symptoms are bearers of bad news, and we should kill the messenger
14.	Pain is God's gift, and it is life's way of telling us about underlying problems	Pain is the enemy and must be covered up Improperly reduces inflammation
15.	Stimulates immune system	Weakens immune system
16.	Sensitive to energetic problems of the body	Ignores energetic nature of the body

MECHANISMS OF HOMEOPATHY

1. **Pharmacology**

   A. Arndt-Schultz Law
   B. Wilder's Law of Initial Values
   C. Herbology (Natural Pharmacology)

2. **Quantic Energy State; Coded Information Stored in Energy Shells of Electrons in the Homeopathic**

3. **Polymorphic States, Liquid Crystal Effect of Water and Alcohol Transfers Shape Receptors in Nasal Pharynx.**

4. **Electrical coding of conductance, inductance, and capacitance.**

5. **Other Dimensions**

QUALITY CONTROL HOMEOPATHICS

1. **Spectrophotometer, Chromatography, Culture, Chemical Analysis.**

2. **Kirlian Photography (REGAE -- Rare Electron Gas A-Allopathic Evaluation)**

3. **Freezing and Polarization Studies (polymorphic structure)**

4. **Trivector Analysis (analysis of conductance, inductance and capacitance of homeopathics)**

5. **Electro-Diagnosis (patient electrical reactivity)**

6. **Pilot Studies (statistical evaluation)**

(See *Quantum Quality Control*)

(*QQC*™)

QUANTUM RATIONALE FOR HOMEOPATHY AND ENERGETIC MEDICINE

1. Natural substances have greater photon and electrical fields which can stimulate the body electric to regain homeostasis.

2. Fractal theory disproves the reductionism drive of sinthetic pharmacology. Nature provides many subtle protectants and regulators not included in the "main" ingredients.

3. Shape receptors in the mouth can receive quanta of information and react to balance homeostasis in the complex system of cybernetic controls we call the human body (the minimal dose rule).

4. The body is an extremely complex interaction of photons, electrons, protons, ions, chemicals, magnetic and other energetic regulators. The body cannot be reduced to simple chemical terms. It must be gracefully encouraged to regulate itself.

5. Medicine must deal with the electrical and energetic aspects of biology and include measures of voltage, amperage, resistance, capacitance, inductance, temperature and oscillation, among others.

6. The body energetic has a field around it, and it reacts to changes and medications presented into this field.

7. Indeterminacy and all quantic theory affect biology.

Thus many of the challenges in this book imply a dramatic flaw in modern medicine. Modern allopathic medicine gets symptomatic results, but always at a cost to the organism's overall health.

At several points in this treatise we have also pointed to homeopathy, alternative medicine, naturopathy, chiropractic, and osteopathic techniques as being mo re conducive to the natural flow, and thus represent a more powerful medical intervention than sinthetic allopathy. Nature's sophistication is vastly superior to our limited symptom reductionistic system of sinthetic pharmacology and surgery. Chiropractic and acupuncture seek to balance the flow of energy through the body for the life force to heal itself. "Physician, heal thyself," is their dictum.

At this juncture let us further explore allopathy, homeopathy and naturopathy.

Allopathy is a word that was coined by Samuel Hahneman in response to his own *homeopathy*. He found that an allopath works *against* the body, and a homeopath *with* the body. A naturopath would work with the natural entities.

An allopath works against the body, meaning that if there is, for example, a histamine reaction, he would give an anti-histamine; if there is a depression, he would give an MAO inhibitor. The vast amount of the practice of allopathy in sinthetic pharmaceuticals and surgery is in trying to compensate for a flawed system; thus the doctor is smart, and the body is stupid. The doctor tries to overload the system by placing a large amount of a sinthetic chemical into the system to induce a specific reaction. As we have pointed out in this treatise, this might seriously disrupt any cybernetic feedback control mechanisms that were operating inside the cell and organism.

Allopathic medicine has been designed largely for symptom control. In the system of medicine that was chosen by different societies the society could choose to do a primary intervention at an educational level, and try to prevent different diseases by education, leaders setting an example and trying to educate the people in a healthy lifestyle.

People without proper education skills do not know how to how to eat or how to live. The word "doctor" comes from the word "educator".

Secondary intervention can occur in a system in which sick people at the earliest stages of sickness are referred to some type of early-stage therapy. Here the patient might receive counseling, nutritional advice, etc. This secondary intervention is at the first signs of any type of disease. Early treatment keys prevention. Crisis intervention is the theme of modern psychological and medical therapy.

The tertiary system is one in which nothing is done in the way of an intervention until there is a crisis or life-threatening situation. Thus we use the term *heroic medicine*, in which the doctor tries to wrest the patient from the jaws of death.

This heroic medicine is a tertiary stage system. The system of medicine chosen by the medical and psychological establishments in America was that of this crisis tertiary system. Often the symptoms and behaviors are left so long untreated that certain crisis-stage intervention must be undertaken, such as surgery, sinthetic pharmaceuticals, etc. With these techniques, action can often be demanded of an organism to prolong life.

This crisis system is predominant in America, but many people in our society feel that America offers a primary or secondary defense. This has not been developed within the confines of the traditional American medical system. So much of modern allopathy's surgery and drugs are an attempt to manage symptoms at any cost. Sinthetic pharmaceuticals, which are an insult to the body, should be reserved for the crisis tertiary stage, and should not be utilized in any primary or secondary involvement. Yet, the medical doctor with his standard education is ill-prepared to advise people about natural mechanisms in prevention or early-stage intervention. The need for more naturopathic and homeopathic intervention has never been greater. The homeopathic theory is that by stimulating the body slightly we can help the body to make its own adjustments through its own course of cybernetic and feedback control.

Thus subtle use of enzymes, catalysts, vegetable materials, such as herbals, venoms, and other types of biological entities can be used to gracefully cause the body to respond, and correct the dysfunction on its own. Homeostasis will respond to slight pressures to stabilize imbalances. The natural balancing ability of the body is paramount to early intervention in disease.

Just before the end of President Reagan's last term in office, the European nations decided that American meat was unsatisfactory. Europe rejected American meat because of the chemicals, drugs, and hormones. President Reagan had to threaten to tax or boycott other services in order to force Europe to buy the polluted American meat.

Free trade and free choice have their boundaries. Once again the chemical cartel flexed its political muscle. The question of whether our meat might be bad or not was not even addressed. The discussion was mute; the chemical cartel forced its issue.

The field of hormesis has basically given much credence and proof to the concept of homeopathy. Using small amounts of different toxic elements can have profound stimulating effects on an organism, and even detoxifying results.

Homeopathy indeed offers a very compatible and intellectually-sound modality of medicine for the 1990s and beyond. Many readers of this treatise with a medical or perhaps what is thought to be an advanced scientific background will be threatened by this document. To these, the field of homeopathy might appear to be "hokey" or "flaky", but let me reassure you that this is not only a *legal* modality but a very complex and intricate system of medicine. Homeopathy has been used throughout the world for centuries, and outsells allopathic medications by more than two to one in the present world market. Homeopathy has profoundly fewer side effects, is vastly more compatible with the human body, is more affordable and easier to manage, and works brilliantly along with the concept of behavioral medicine and lifestyle change. The future of medicine is already here.

An Advanced Treatise in QUANTUM BIOLOGY

What is Homeopathy?

The theory and practice of homeopathy is strange to those of us who are accustomed to conventional western medicine. But we all sense the rightness of a healing system which conceives of all symptoms as parts of a larger whole, which appears to stimulate the body's natural healing force, rather than attack its parts. Homeopathy seems to work with us, not on us. It assists our innate intelligence for health.

In the late 1700's, homeopathy emerged as a highly systematic medical science through the efforts of German physician and chemist, Samuel Hahnemann. Dr. Samuel Hahnemann, the 19th century founder of homeopathy, believed that remedies which, in large doses, could create a particular set of symptoms, could in minute doses, at times so small that no molecule of the original substance remain, relieve those symptoms.

The Chinese believe that the best doctors use no medicines and, instead, heal by giving guidance on how to live properly. Strictly speaking, homeopathy is a system of giving medicines, and even natural medicines can only temporarily improve symptoms caused by continued exposure to personal or societal health stress.

Hahnemann coined the Latin phrase "similia similibus curentur" (let likes cure likes) to describe his discovery that substances in a small dose stimulate the organism to heal that which they cause in overdose. He termed the medical system based on this principle "homeopathy" from the Greek words HOMOIOS for "similar" and PATHOS for "suffering" or "disease". This principle, most commonly known as the "law of similars", states that any substance which can cause symptoms when given to healthy people can help to heal those who are experiencing similar symptoms. This principle is not all inclusive, but is applicable to many situations.

Hahnemann's observation that a substance that can mimic symptoms helps cure a person, revealed a revolutionary understanding of symptoms. Instead of assuming that symptoms represent illogical, improper, or unhealthy responses of the body and that they should be treated, controlled, and suppressed, Hahnemann learned that symptoms are positive, adaptive responses to the variety of stresses the body experiences. Symptoms represent the body's best effort to heal itself. God's creation is in fact very intelligent, supremely intelligent.

Hahnemann began to experiment with the size of the dose to see how little medicine he could give to still cause a sustained healing response. After years of rigorous, study he found a method of diluting substances that kept the toxic properties at a minimum while the potential to cure was magnified. He called this pharmaceutical process "potentization" or "succussion".

Symptoms are not the disease. Symptoms accompany disease. Symptoms are evidence of disease. But treating symptoms is like killing the messenger for bringing bad news. In fact, by treating symptoms, you are suppressing the body's natural responses and inhibiting the healing process, interfering with life.

As far back as 180 years ago, long before the term "holistic health" was coined, homeopaths recognized the inseparability of body and mind. Homeopaths have always stressed the importance of assessing the totality of the person. Homeopathic medicines thus have physiological activity. Violinist, Yehudi Menuhin once said, "Homeopathy is one of the rare medical approaches which carries no penalties - only benefits".

How is Homeopathy Unique in the Medical Profession?

Throughout history, disease has been viewed from two fundamentally different perspectives:

1. As a malfunction of specific components of the body, where symptoms are seen as the disease itself.
2. As a result of a deeper disturbance or imbalance of the person as a whole, of which symptoms are simply the outward manifestation. Disease is blockage of the flow of life, and symptoms are the body's way of dealing with the blockage.

The former viewpoint is the basis underlying modern orthodox medicine. Whatever symptoms arise are counteracted by drugs, e.g., a decongestant for a runny nose, an analgesic for pain, steroids for inflammation, etc.

The latter perspective is an ancient concept which underlies the entire holistic health movement, including homeopathy. Nature is revered and utilized to balance the system.

This totality of symptoms is seen as an expression of the "vital force" that dynamic energy plane of existence which animates everything we call "Life". It is this vital force and its healing mechanisms which are stimulated by the homeopathic remedies and the naturopathic therapy is used to release the blockage of life force.

What is Homeopathy's Significance Today?

There is a growing consensus in the world that the massive expenditures on medical research have failed to demonstrate any significant improvement in society's level of health. The incidence of major chronic diseases like cancer, diabetes and heart disease has continued to climb, and medical costs have soared beyond the means of the average person. More and more, doctors and lay people alike are searching for alternatives.

Homeopathy offers a time-tested method which meets the need for a more economical and non-toxic therapy. It encompasses all areas of medical care - prevention, emergency and acute care, and chronic disease treatment. Homeopathy offers the individual and society improved health, productivity, and enjoyment of life.

New Vistas offers the finest in homeopathic and natural pharmaceuticals, and education in the world today.

An Advanced Treatise in QUANTUM BIOLOGY

TOXINS FROM OUR SINTHETIC CHEMICAL MEAT INDUSTRY

1. **Cholesterol**
   - A. Large mega-molecules in blood (Hypertension, arteriosclerosis)
   - B. Cancer cells relating to cholesterol

2. **Histamine and excess imidazole compounds**
   - A. Itching matter
     1. Dermatitis
     2. Urticaria
     3. Herpes
     4. Carbuncle
     5. Eczema
   - B. Inflammations
     1. Furuncle
     2. Appendicitis
     3. Cholangitis
     4. Cholecystitis
     5. Thrombophlebitis

3. **Growth hormone (promotes inflammations), adipositas, acromegalia, neoplastic phases)**

4. **Mesenchymal mucous matter containing sulphur**

5. **Pork fatty acids intracellular**
   - A. Adipositas
   - B. Hypertension

6. **Oncogene agents**
   - A. Endobiont
   - B. Siphonospora
   - C. Neoplasia

7. **Antibiotics, wild peptide production (Auto-immune disorder)**

8. **Sex Hormones**
   - A. PMS
   - B. Balding
   - C. Aging

9. **Insecticides, pesticides, and sinthetic farm chemicals**

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8. Sex Hormones

A. PMS
B. Balding
C. Aging

9. Insecticides, pesticides, and sinthetic farm chemicals

In the Natural Repertory of Dr. Nelson an ever-expanding treatise is developed for the justification of sarcodes, allersodes, isodes and nosodes, and their utilization in medicine.

In the new book, *Quantum Energetic Medicine Dictionary*, Dr. Nelson further expands not just on the studies, but on the intricacies of healing and the function of medicine that will embrace the precepts of this treatise on quantum biology. It is the purpose of this book to provide that backdrop for the existence of a quantum biology that will lead to the development of a quantum medicine. All of the issues and developments talked about within the pages of this manuscript will be intricately woven into a fine tapestry for the medical world, on how to treat the vast majority of medical illnesses. A new biology dictates a new medicine.

Also due to the length of this manuscript on quantum biology, we have had to separate this treatise into two sections: 1) a theoretical approach on the existence of the quantum biology for the lay audience, and 2) a workbook that elaborates on the mathematics, electro-physics, and deeper scientific aspects for the scientific world. It is the hope of this author that readers of both kinds, be they lay-readers or sophisticated readers, can read and decipher both books. We hope these new concepts of thought will not be so radical as to put off its acceptance.

Maxwell Planck once said, "For a new thought in the world of science to make any headway, the proponents of the old way will have to die off." Planck was very pessimistic in his viewpoint on science, but he offered some realism in that often men of science become fixated on a world view or scientific paradigm that blind-sights them to any new advances. Medicine often is the worst offender of rigidity of thought. If we can say anything about the world of science, we can definitely say that the number-one priority of the scientific community is not truth, freedom of thought or discovery; the number-one priority of the scientific community is ego. Defense of ego, rationalization and antiquated principles are perhaps the worst enemies of truth in modern times.

Often new ideas such as the ones offered in this book cannot be accepted until the standard scientists of the industry address the ideas as if they were their own. The history of science is littered with the bodies of scientists, whose new ideas attacked some aspect of the scientific or medical community's ego. Until these ego-defending entities find ways to pretend these ideas are theirs, the growth of science will be on hold.

Nowhere is this struggle more apparent than in the world of medicine, where egos and profiteering motives abound. There is an extreme profit in the sinthetic chemical cartel.

It is the hope of this author (and perhaps the hope of the world) that this rigidity of ego could be softened, and that a new medicine and biology, all compatible with nature, could be developed, to lead us toward a thousand years of peace and health.

To do so I have written several books on the philosophy of natural medicine. This book, *Quantum Biology*, and *Bio-Quantum Matrix*, are to justify the science of natural medicine, using the highest form of science known. The *Registered Wellness Consultant (RWC) Book* is the layman's version of a natural medicine handbook. The *Natural Repertory* is clinical, experimental evidence. The *Physical Diagnosis* book relates natural techniques of diagnosis. The *Natural Compendium* contains natural treatments for the diseases of this world. *New Biology I* and *New Biology II* have evidence of a natural, energetic medicine.

I hope that this wealth of evidence and philosophy will not be ignored for long.

INTRODUCTION:

In teaching Quantum theory instructors use models and metaphors that can be understood by the students. The metaphors are often then inappropriate Newtonian examples which can be deceptive. The example of a ball on a rod is often used to show the make up of a chemical. The student can easily lose sight of the truth that the subatomic particle is not a hard object like a ball. The electron is a collection of vibrational energies in a probability field. Modern Physics has taken a more realistic example of a horse and the cloud around him. This is refered to as the quanton. The particle has a field around him just as the horse has a cloud of dust. The arrival of the horse is preceded by the cloud of dust. Only in quantum physics the horse is still not real or hard but is made of vibratory quarks.

Chemistry has lost itself in several Newtonian metaphor misperceptions. The so called hardness of the electron and proton being just one. The proton is 1836 times larger in mass than the electron. The analogy of a golf ball to a large beach ball is sometimes offered. The size of the golf ball is determined by the consciousness of the manufacturer. If a manufacturer deemed it worth while to make a large beach ball sized golf ball it would be his perogative. The consciousness of the universe makes the choices and carries out the action. If the consciousness of the universe wanted to make a large golf ball the charge would be negative and an anti-matter proton might exist. The lack of perspective comes from the metaphor where the size and charge of the item dictates the label. When in actuality the mathematics of the consciousness dictates the size. The real perspective is in learning the mathematics of consciousness. It is the theory of Dr. Isaacs and myself that the solution for the mathematics of the universe is in the 23 chromosomes of the human being. The human has the potential for solving the mathematics of consciousness. Please don't make another mistake by seeing a solution as a static solution. The solution will indeed be a fractal and will be a changing vibrant reactive and interactive solution.

Another great misconception is that the mind is all because of the consciousness. This is not the lesson. The consciousness of the universe pervades all through the subspace around us. This consciousness reacts with our own consciousness and sometimes people mistake a drop of water for the ocean. Just because we have similar properties and share with the consciousness we can not completely control it. There still are mathematical laws and methods we need to learn and investigate.

Much of this knowledge was lost in the ancient libraries and destroyed by the power mongers who sought to control nature rather than live with it. But this book and others like it can help restore our society to the correct path.

To develop a unified field theory, we need to find a single small particle or constituency level where all other particles can be assembled. In this book I calculate such a level of vibration as to allow for the unified field theorem. The smallest level of reality, then, by my calculation is the quanton of consciousness. This is calculated in this book. With consciousness as the solution we will develop a much different path of technology. The subspace of the universe is pervaded and contained in consciousness. Subspace will offer comunication potentials independent of space and time. The tricorder of "Star Trek" is possible now. The subspace system will allow for control over the uncertainty principle to allow for beaming of mass. The development and control of antimatter with consciousness will allow for faster transport maybe beyond the known speed limits. The philosophy of consciousness will however limit destructive thoughts and negativity. The cooperative nature of elevation of consciousness will lower the destructive tendencies of our survival of the fittest culture. True intelligence is in cooperation with nature not in mindless displays of our ability to subdue it. Our new science of consciousness demands more honesty, less emphasis on technology, more emphasis on mind, and more emphasis on harmony. Towards this end an era of a thousand years of peace and tranquility is possible. Welcome to the millenia. Greetings from Maitreya.

Chapter 1

THE PATTERN OF THE UNIVERSE (Why are all electrons similar?)

(As the universe formed, the mathematical laws and relationships of matter are formed at the beginning of the universe. These laws are echoed in all subatomic and quantic physics. Biology is an expression of these laws as well.)

In Weinberg's book, "The First Three Minutes", and in Hawking's book, "The History of Time", we see a very good scientific guess as to what might have happened within the first instances of existence in our universe. This is important for biology because the laws of the universe are echoed in biology.

As we indicated in *the Quantum Biology section*, the system of laws was established at this first instance, and all matter would later follow these laws. This first existence could not have been so much of a "bang" as an *implosion*, or a "big implosion." Quantization of biology and quantization of the universe might have a similar thesis. The Mathematical laws and relationship of all matter were imparted into all the particles and energies of the universe as they passed into this universe. All subspace and space were together and then expanded into our still expanding universe. Everything in our universe will obey a set of common mathematical laws.

If all the matter, space and subspace in the universe were truly condensed into one spot, it would implode not explode. The implosion would act as a sieve, to reach out into a new universe. As it started to expand, it would define the space and subspace between different particles. The universe could have started at a "big suck".

An interesting article in the December 1991 issue of *Scientific American* describes "Quantum Cosmology and the Creation of the Universe", by Johnathon Halliwell. This discussion of the quantum universe refers to Guth's scheme, developed by Alan H. Guth of MIT in 1980. In his model he proposed that the universe has a quantic relation, and that the process called inflation, at the initial moment of existence of the universe, would have an unbelievably fleeting moment of 10-30 seconds. During this time the universe would have increased in size by an astounding factor of 1030, growing from the initial size of 10-28 centimeters to about 1 meter. This extreme approximation could also be a result of the implosion of all matter in *another* universe, which would have resulted from the start of *our* universe in this cosmic scheme. In other words, if all the matter of the universe were condensed, and then imploded from another universe, it could puncture a hole into our universe at a very, very small rate, possibly 10-28 centimeters. Then the implosion within 10-30 seconds would result in a ball of about 1 meter. Then the universe would expand from there. Thus our "big suck" or implosion thesis will help explain the quantization of the universe offered in Halliwell's article.

It must be pointed out here that the very existence of space is only because of the space between matter. When all the matter of the universe was condensed into one ball, all of this space was condensed with it. Even light and photons could not have been pushed out, because they would be sucked back by the strong gravitational pull. So all of space would have been condensed into one spot just before the implosion. So now we can posit the "big suck" theory.

The fact that the universe has spread out in an extremely flat contingency could also be explained via our implosion hypothesis: the universe, having started at one extremely small spot from this construction of the universe, might have an applied motion vector which would allow it to flow in a flat area and disperse along a time pattern, or phase space proposition, in a flat direction across the 360E. Space exists because of the effect of the dispersion of matter. The universe is a closed universe of increasing potential.

Perhaps the flatness of the universe is an optical illusion; we are on the surface of a large ball which is expanding. So the illusion might be a flat universe; whereas actually, it is an ever-expanding ball. A ball filled with additional dimensions of subspace. These subspaces are consistent and mutually intertwined with our four dimensional recognized space. But these subspaces exist unrecognized filling the universe. The subspace at some level helps to define and control morphic expression.

We will now develop the treatise that the rules established for the universe are integral for biology, and dictate the process of life.

The research of Hubbel revealed that the parts of the universe are spreading out from a central location. The Hubble parameter was found to be approximately 1.8 times 10-18 per second. The separation of 109 light years has a velocity of 1.5 times 107 meters per second. That's one twentieth the velocity of light.

50 km/sec/Mpc = 1.6 x (10 to the 7) m/sec/ (10 to the 9) light years

In 1965 Pensius and Wilson discovered that the universe has a black body radiation, and that the temperature would now be measured at close to 2.7E K. This and other values set the age of the universe at fifteen billion years after the "big suck". Thus in the last fifteen billion years material has cooled to 2.7E K.

The concept of a universal singularity, first proposed by Hawking and Penrose in the 1960s, is also afforded by our "big suck" hypothesis; that of the pin-pointedness, or singularity, of the initial factors of the universe. Thus our theory also utilizes the propositions of singularity as factors in understanding the universe.

Modern physicists have been unable to bring the entire process back to time zero, but they have found that certain criteria have happened that have set these laws which we now call physics. These laws will be of critical

importance in our development of biophysics.

As in the quantic theory of biology, things cannot equal zero in our idea of the universe. The inhomogeneous parts cannot be equal to zero, but will be subject to small quantum fluctuations. All matter has the quantum effect, even that in biology. Classical physics ignores the quantum fluctuations, but these fluctuations must be charted in our analysis of biology, as in our analysis of the quantum universe.

When the universe was about 225 seconds old, the temperature was 9 times 108E Kelvin. kT (eV) = 8.6 x 10^{-5} T (K). Thus to convert temperature in Kelvin to kT in electron volts, we will use the above formula. Thus electron volts can be converted to temperature in a reflection of thermal energy needed to separate electrons from an atom.

We have previously mentioned our concept of singularity. When time-space becomes highly curved, its volume, as it shrinks in small dimensions, must be under a theory of the very small. This is the theory known as *quantum theory*.

Schrödinger, Bohr, Heisenberg, Dirac, and many others proposed the idea of quantum mechanics as a solution for different variables in physics which were unexplainable in classic theory. These same equations in quantum theory can now be applied to the universe. The idea of the universe being wave or mass can now be understood in quantum terms.

Another proposition of quantum terms is that of *tunneling*, in which a physical entity can tunnel through a barrier and emerge at the other side. This tunneling can happen through subspace under the precept of indeterminacy. Tunneling can explain the factors of psychokinesis and ESP events, as we have offered in the theories of *Quantum Biology section*. Through the endorphin region of the brain, human thought patterns can open up minute tunnels, or wormholes in subspace from one dimension to another, and affect matter through time and space. This type of proposition is entirely compatible with the ideas of the founding of the universe, wherein the extreme tunnel started the universe through the implosion, or “big suck”, of matter from one universe into another. This tunneling will also have profound effects on our understanding of biology. Biology, through its quantic nature, will be able to accomplish tunneling in some sophisticated ways. The subspace connection pervades all existance.

The barrier is penetrated through *imaginary time*, which is time multiplied by the square root of -1. This means that time in the usual sense loses its meaning, and resembles a spatial dimension, or four-dimensional activity, more than it does the time concept we think of ordinarily. In subspace time is more relevant and flexible.

The Wheeler-DeWitt equation has cosmological analogues to the Schrödinger equation. In its simplest cases the spatial size of the universe is in an analogal position, and the rate of the universe’s expansion represents the momentum. Thus these events, to the known observer, will also apply to the Heisenberg uncertainty principle. As we make an observation of position, momentum will collapse. As we make an observation of momentum, *position* will collapse.

Hartle discussed a technique of solving the Wheeler-DeWitt equation, expressing it in quantum terms. This involved the existence of imaginary time at the initial stages of the universe. Quantum theory allows us to address the universe in some very interesting ways as we look at quantum fuzz and singularity in real-time histories. If this were true, then the universe, as it collapsed through this initial minute wormhole, would be able to cascade into a developing universe. All matter would follow certain laws. The laws of transition of the initial stage of the universe would then possibly be echoed in the development of the quantization of biology. To this end, the rest of this chapter will be dedicated to the concept of a quantization of the initial stages of the universe, to develop implications for our quantum matrix of biology.

At 225 seconds the universe contained photons, neutrinos, anti-neutrinos, nucleons and electrons. The photon to neutron to proton was in a ratio of approximately 1011:13:87. The approximate number of electrons to protons was equal, thus allowing for neutrality. Now the photons have dispersed, as the universe has expanded, cooled, and dispersed.

Different protons and neutrons have combined to produce nuclei (a process called *nucleosynthesis*). There is some nucleosynthesis that occurs in the first couple of seconds, but the vast majority of nucleosynthesis happens one million years later in the heart of the different stars that form, as the hydrogen starts to collect through gravitation, and thus ignites into the nuclear furnaces that we call stars. The development of these materials conforms to a pattern. This pattern or process follows the laws of physics. We will now briefly analyze the mathematics of the formation of the elements. This will be of great importance in our development of biophysics and matrices of biological processing.

The coexistence of neutrons and protons adhere to the following formula for nuclear reactions:
n + p → d + (+ 2.22 MeV. d stands for the deuteron; n, the neutron; p, the proton. (is a reflection of heat released. (is a ratio of heat at a constant pressure to a constant volume. Thus

$$(\text{= heat} \quad \frac{\text{) Pressure}}{\text{) Volume}}$$

(= Photon
D = Deuteron, not D quark

Before the first 225 seconds, the temperature was so high that every time a deuteron was formed, it disintegrated immediately. Thus nothing heavier could be formed. After the first 225 seconds it is supposed that the following formula could be used, where p + d → gives He + (+ 5.49 MeV and n + d → t + (+ 6.26 MeV. Here the deuteron plus the proton yields helium and energy, or the neutron plus the deuteron can combine to form kinetic energy. t is the value of the heavy hydrogen nucleus, the combination of neutron and deuteron. The helium nucleus and the heavy hydrogen nucleus at this point are not in danger of disintegration.

Once the deuteron restriction is surpassed, the following reactions can occur involving helium:

P + D → Fe + Y + 5.49 MeV

⬇

D + N → $^{3}_{1}$H + Y + 6.26 MeV

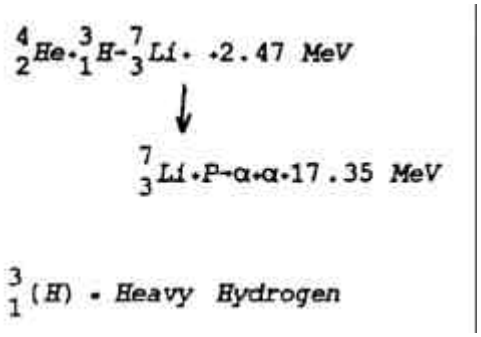
Heavy hydrogen + p 6 “-particle + (+ 19.81 MeV.
Helium + n → “-particle + (+ 20.58 MeV
Heavy hydrogen + d → “-particle + n + 17.59 MeV
d + d → “-particle + (+ 23.85 MeV

The distinction of this pattern shows that it follows a quantum precision, not a statistical randomness. This pattern could be echoed later in biology in our metabolism and reproduction matrix.

After this process the density is sufficiently low to prevent the reactions which jump across the gap caused by the absence of stable nuclei. The necessary conditions to allow this to happen for formation of higher nuclei will only happen inside the stars, when there is enough pressure and energy necessary to produce other elements. The precise pathway of this process will follow the quantum laws of the universe. These laws will also appear later in biological structure.

Only one nucleus heavier than helium might survive the age of the big implosion, and that is the nucleus of lithium, but only in very small amounts, as a result of the equation
$^{4}_{2}$ He + t → $^{7}_{5}$ Lithium + (+ 2.47 MeV. But this could readily decay to lithium + p → “ + “ + 17.35 MeP.

Lithium will later be found to be an excellent stabilizer of neurological function.



Thus thirty minutes after the initial 225 seconds, the universe has a temperature of 3 x 108E K, has a density of approximately 30 kilograms per cubic meter, and the nuclear particles are 76% proton and 24% alpha, and have traces of deuterons, small amounts of helium and trace amounts of lithium.

One million years later the temperature falls off sufficiently to about 2,000E K. This allows the combination of electrons and nuclei into neutral atoms. The dispersion of matter makes for the generation of space, and thus, gravity. Gravity now plays the part in the formation of the galaxies and stars. The number of photons to nucleons is now one trillion to one.

The matter in the universe now is 76% hydrogen and 24% helium by mass. The rest of the various elements are produced in the heart of the stars, in the process of the nuclear furnace.

Just prior to the big implosion all of mass is crowded into one spot, and there are no particles or forms. After the implosion this tremendous burst of energy starts to condense into mass, producing various electrons, neutrons, protons, neutrinos and other factors. As these various processes start to form the mass, the way that they proceed follows a certain set of laws, which will be the basics of all physics. It was pointed out first by Dr. Isaacs that this formula of the laws of physics was established in the first seconds following the big implosion. Biophysics could be a reflection of the universe’s evolution.

Thus matter was programmed to be able to be compatible with all the other matter in the universe, as it went through this implosion sieve. The laws of this process would later become the laws of physics and quantum physics. As Dr. Isaacs points out, the human system might be the solution for this system of physics. The programming of the DNA of the human being might be the solution for the universe. Perhaps the complexity of human genetic coding might contain a memory of the universe itself; not a moment-to-moment memory, but a memory of process, or a record of how it happened.

In other words, perhaps all of the mathematical laws of the universe could be expressed in the human DNA. And the process of life and consciousness in all space and subspace is accessible to humans. We must recognize the vastness of what we are saying and just how little of human potential humans have achieved. More on this later as we now return to the formation of the universe.

After the existence of this hydrogen, helium and lithium mixture, along with the backdrop of the various pho-

tons, neutrinos and other factors, it cycles off into the universe, setting up space as it separates, and the universe starts to cool down. The cycling of the hydrogen starts to pull into circular areas which then are swept into gravitational fields that start to congeal, and thus form stars.

So the star starts its life as a cool cloud of hydrogen and helium. As gravitation condenses this process it starts to heat up, and later ignites. This is a consequence of the Virial theorem, which relates gravitational bonding systems. Thus the time average of the internal kinetic energy and the gravitational potential energy are related by the formula, where 2T plus the gravitation potential energy equals 0. The total energy is that of the kinetic energy, T, plus the gravitational energy.

2T + (Grav. Pot. Eng.) = 0
(Internal Kinetic Energy) + (Gravitational Potential Energy)
= Total Energy

For the system to be binding, the total energy must be negative and the binding energy must equal the negative total energy. For the hydrogen mass to start to ignite, it must reach the hydrogen burning point, 107E K, and have a mass of 1.99 x 1030 kilograms. The radius will be 6.96 x 108 meters. The luminosity will be 3.83 x 1026 joules per second, and the density will be 1.41 x 103 kilograms per meter3. When the hydrogen starts to burn, then 4 protons + 4 electrons → yield 1 alpha particle + 2 electrons + 2 neutrons + 26.7 MeV.

Electrons allow us to keep track of the charge in the interior plasma of this star. As the mass gets larger, and 108E K. temperature is achieved, then helium burning starts into the core, where 3 alpha particles → yield carbon + 7.27 MeV. Thus the inside of the star will start to burn, contract, and burn again, in a continuing process. When the process hits 6 x 108E K., helium leads to oxygen, neon and magnesium. At 2 x 109E K the oxygen will burn to silicon, and even then cleave different nuclei to produce iron at 4 x 109E K.

Dr. Scott Powell found in his Nobel Prize-winning process the chain of events that would be needed inside the star to produce this type of mass. He had the most difficulty in trying to find out the process that would allow for the existence of boron, because of its irregularity. Only through the combination of the chance reaction of three particles, lithium and two hydrogens, could boron be accounted for. Thus it was not a two-body interaction problem, but a three-body interaction problem. All the processes yielding all the different elements follow set laws of quantum physics, and happen in the furnaces of the stars.

(1a) $p+p \rightarrow d+e^{+}+\nu_e+0.42\ MeV,$

(1b) $p+d \rightarrow {}^{3}_{2}He+\gamma+5.49\ MeV,$

(1c) ${}^{3}_{2}He+{}^{3}_{2}He \rightarrow p+p+\alpha+12.86\ MeV,$

(1d) $e^{+}+e^{-} \rightarrow \gamma+\gamma+1.02\ MeV.$

$${}^{12}_{6}C \rightarrow {}^{13}_{7}N \rightarrow {}^{13}_{6}C \rightarrow {}^{14}_{7}N \rightarrow {}^{15}_{7}O \rightarrow {}^{12}_{6}C.$$

pp chain

(a) $p+p \rightarrow d+e^{+}+\nu_e+0.42\ MeV,$

(b) $p+d \rightarrow {}^{3}_{2}He+\gamma+5.49\ MeV,$

(c) ${}^{3}_{2}He+{}^{3}_{2}He \rightarrow \alpha+p+p+12.86\ MeV,$

(d) $e^{+}+e^{-} \rightarrow \gamma+\gamma+1.02\ MeV.$

Net effect of $2(a)+2(b)+(c)+2(d)$ **is**

$$4p+2e^{-} \rightarrow \alpha+2\nu_e+26.72\ MeV$$

Average neutrino loss per α-particle produced = 0.52 MeV.

α-particle catalyzed chains: reactions (a) and (b) provide $^{3}_{2}He$ for

$^{3}_{2}He + \alpha \rightarrow {}^{7}_{4}Be + \gamma + 1.59\ MeV$

$^{7}_{4}Be + e^{-} \rightarrow {}^{7}_{3}Li + \nu_{e} + 0.861\ MeV,$

$^{7}_{3}Li + p \rightarrow \alpha + \alpha + 17.35\ MeV.$

Average neutrino loss = 0.80 MeV

$^{7}_{4}Be + p \rightarrow {}^{8}_{5}B + \gamma + 0.135\ MeV,$

$^{8}_{5}B \rightarrow {}^{8}_{4}Be^{*} + e^{+} + \nu_{e} + 14.02\ MeV,$

$^{8}_{4}Be^{*} \rightarrow \alpha + \alpha + 3.03\ MeV,$

$e^{-} + e^{+} \rightarrow \gamma + \gamma + 1.02\ MeV.$

Average neutrino loss = 7.2 MeV

Net effect is

$$p + {}^{3}_{2}He + e^{-} \rightarrow \alpha$$

[$^{8}_{4Be}$ here means the excited state of $^{8}_{4Be}$ at 2.94 MeV which is the daughter in 93% of the $+ - decays of $^{8}_{5}$B
The remaining 75% of the decays go to an excited state of stack $^{8}_{4}$Be at 16.63 MeV.]

The nuclear reactions of the CNO stellar cycle.

$p + {}^{12}_{6}C \rightarrow {}^{13}_{7}N + \gamma + 1.94\ MeV,$

$^{13}_{7}N \rightarrow {}^{13}_{6}C + e^{+} + \nu_{e} + 1.20\ MeV,$

$p + {}^{13}_{6}C \rightarrow {}^{14}_{7}N + \gamma + 7.55\ MeV,$

$p + {}^{14}_{7}N \rightarrow {}^{15}_{8}O + \gamma + 7.29\ MeV,$

$^{15}_{8}O \rightarrow {}^{15}_{7}N + e^{+} + \nu_{e} + 1.74\ MeV,$

$p + {}^{15}_{7}N \rightarrow {}^{12}_{6}C + \alpha + 4.96\ MeV.$

Net effect: 4 protons Y 1 “-particle + 2 electron neutrinos. Average neutrino energy loss per “-particle produced = 1.71 MeV. We have omitted the positron-electron annihilations that occur.

The dynamics of this process in the photon dependency of the quantic interchanges allows all of the different elements to now take part in biology, and have specific and exacting photon and electron dynamics.

The neutrino must also be discussed. As hydrogen burns in the star, four protons become one alpha particle, and that must include at least two steps. The proton must become a neutron by what is essentially either proton → neutron + E+ + V, or its equivalent: electron e + p → n + V, V being the neutrino.

$$e + p \rightarrow n + V$$

These electron neutrinos escape rather easily and immediately from the core of the star. This is part of the energy loss of the star. The average energy loss of neutrinos is .52 MeV out of a total 26.72 MeV that is generated for every alpha particle produced. In the CNO cycle the loss is 1.71 MeV. Thus three percent of the energy produced in the sun is approximately removed by neutrinos.

There is a neutrino flux which is left over from the production of the Big Implosion, and whenever this neutrino flux passes over the earth there seems to be a development of a new virus A type. Virus as crystalline DNA or RNA like entities might be radically altered or produced by organisms effected by neutrinos.

Neutrinos are very penetrating; in fact, they penetrate through the earth rather easily. To produce a neutrino shield, you would need a light year's thickness of lead. These left over neutrinos that cycle through the universe produce fluctuations. But even these neutrinos that seem to pass through the planet and the body so easily must have some effect on biology, and they might set up the need for a new information component that might be carried through a virus. The effect can only be understood in a subspace connection of a premordial consciousness. DNA senses the neutrinos and recognizes the beginning of the universe and replicates a viral component.

The approximate values of the theoretical total cross-sections for elastic scattering and reactions of neutrinos and antineutrinos with electrons, protons, neutrons and complex nuclei. We assume $m_\nu = 0$ and $E_\nu \gg m_e c^2$, where E_ν is the neutrino energy.

Elastic scattering reactions	σ/E_ν ($fm^2\ MeV^{-1}$)
$\nu_e + e^- \rightarrow \nu_e + e^-$	9.4×10^{-19}
$\bar{\nu}_e + e^- \rightarrow \bar{\nu}_e + e^-$	3.9×10^{-19}
$\nu_l + e^- \rightarrow \nu_l + e^-$ (l = μ or τ)	1.6×10^{-19}
$\bar{\nu}_l + e^- \rightarrow \bar{\nu}_l + e^-$	$1.3\ 10^{-19}$

Coherent nuclear elastic scattering (all neutrinos and anti-neutrinos)	σ/E_ν^2 ($fm^2\ MeV^{-2}$)
$\nu + (Z,A) \rightarrow \nu + (Z,A)$	$8.8\ A_2 \times 10^{-20}$

Neutrino absorption	$\sigma/(E_\nu + Q)^2$ ($fm^2\ MeV^{-2}$)
$\bar{\nu}_e + p \rightarrow n + e^+ - 1.80\ MeV$ $\bar{\nu}_e + n \rightarrow p + e^- + 0.78\ MeV$	-6.7×10^{-19}

In Chapter 11 similar mathematical patterns are classified for a new biophysics. This chapter was designed to show how exacting a process quantum chemistry and physics can be. Thus in setting up our quantum biology matrix, we needed to briefly review the quantum principles of the universe and the development of chemistry.

SUMMARY

1. In this chapter we outlined how the universe has a quantic action, initiated through a quantum pathway. The quantic development of the universe can be expressed in a quantic matrix.

2. We have shown how this quantum pathway could possibly be the matrix for biology which accounts for the interchanges and the laws of biological interaction.The Quantum Matrix of Biological molecular and submolecular interchanges could be an expression of the development matrix of the universe.

3. A basic interchange in matrices of the relationship of minerals in development is also related as a possible framework for our biological matrices.

Chapter 2

MODERN MEDICINE MUST WALK THE PLANCK'S CONSTANT
(Why is biology dependent on quantum physics?)

The advent of quantum physics has allowed for an explanation and an understanding of electronic science. Transistor theory and all other examples of electronic components depend to some degree upon quantum theory. This book is an analysis of such a theory for biology. As this theory develops, it will explain more of biology than previous chemical explanations. Biology is incompatible and unexplainable using classical dynamics or chemical explanations.

All living organisms are made of molecules and atoms. So it is only possible to explain some biological process by using quantum theory.

As science tries to understand more of its environment, it brings into existence physical theories that try to establish relationships between fundamental concepts. Subcellular functions will be found to fall under quantum dynamics rather than classical physics.

This development of laws of interaction often introduces constants, which show a direct relationship of one phenomenon to another. Such is the case of B, in its relationship between the diameter of a circle and its circumference. This constant is an irrational number that is always the same when we look at the mathematical relationship of these factors in a circle. Many physical interrelationships will produce such irrational consequences. Biology might have a few undiscovered ones as well.

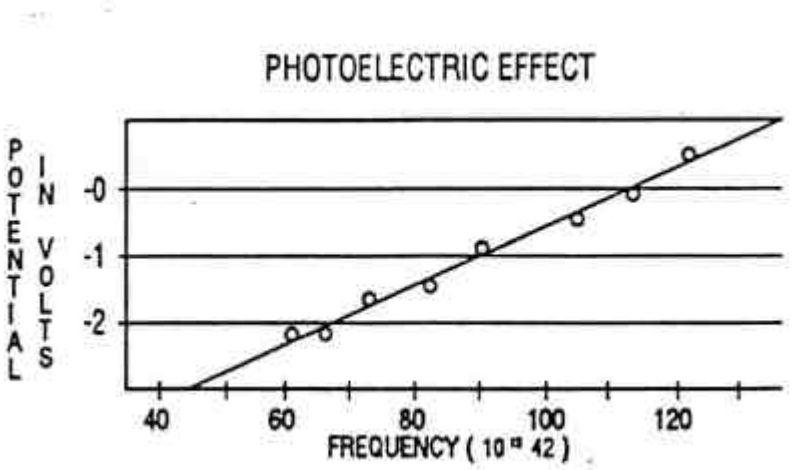
In developing a statistical mechanic theory, Boltzmann developed a constant, k, which tells us about the relationship of energy and temperature. Einstein found that the speed of light, c, was also a constant, and used it in developing the relationship

$E = mc2$.

Some would say that the path of science is the path of developing these constant interactions between phenomena and their interactive measures. Planck had developed a constant as he looked at the development of an electronic phenomenon in black-body radiation. This is known as *Planck's constant*, and is the hallmark and pinnacle of quantum dynamics.

Einstein's first major paper was on the photo-electric effect: how light could have a particle-like nature and could dislodge electrons. This photo-electric effect presented an insurmountable problem to classical physics. Classical physics could not explain its actions. When a photon, or light beam, struck metal, it could dislodge electrons. The kinetic energy of these electrons depended on the frequency, or pulsation, of the original photon beam. If we increased the amount of photons, there would be an increase in the amount of dislodged electrons. But the kinetic energy of the electrons was always dependent on the angular frequency, or pulsations, of the original photon radiation.

Planck set out a relationship of the volts versus the frequency of the photons. Various types of light produced various energies in the electron.



As he plotted this relationship he was able to determine a specific relationship between the photon, its frequency, and the kinetic energy of the electron that was dislodged.

Quantum physics was thus born, with the idea of a *quanta*, or packet, of energy that was allowed by the frequency of the photon.

S = (1.054592 ± .000006) TIMES 10^{-34} MKSA units
S = 2 B S
S = 6.625 x 10^{-34} MKSA units

In analyzing light as a particle and as a wave, Planck's constant allows us to associate both. There is a limitation to the waveform of matter, and this is the limitation of Planck's constant. So light is wave and particle, and the limitation in the white light being wave and particle is that Planck's constant determines the relationship. These factors are not contradictory, but synergistic. The dualistic nature of physics embodies a multi-function nature of the universe.

The law governing the photo-electric effect is stackalign

E = Quantum of energy of radiation
E = Sw = 2BSV = SV w = Wave length
V = Frequency

We now can find the dimensions of the equation of the constant S. The basic dimensions that can be utilized are mass, length and time. We will find that

S = M x L^2 x T^{-1}

Since momentum is mass times length divided by time, we can substitute into this equation, and arrive at an estimate of a relationship

S = Momentum x Length (Position)

If we substitute for energy, we will now find that

S = Energy x Time

Looking at the combination of the energy/time relationship in momentum/length, we also can come up to another unique perspective in quantum physics, in which

S = Angular Momentum x Angle

So early quantum physicists developed these relationships that were dictated by the constant S. Heisenberg thus surmised that the limitation of our uncertainty about an item would be dictated also by this relationship to S. As we analyzed energy or time, we would be uncertain about one or the other related to S, just as we are uncertain as to whether light is particle or wave, related to S. We are also uncertain as to momentum and position (position can be varied as to length). So we can see that a relationship of momentum to length can also be outlined as

S~ = Momentum TIMES Position

We also know that there is an uncertainty in the angular momentum versus the angle.

So these three relationships deal with the interaction of one to the other. Heisenberg found that we were uncertain as to what was what, once we got below dimensions set by Planck's constant.

Thus the measures of mass, length and time are related to action, with the equation

Action^2 = Energy x Mass x Length^2
Action of the order of S - Quantum Physics

For our treatise in biology we must point out that this relationship is an inequality, and in certain quantum cases actions greater than S can imply quantum physics.

Wherein the analysis of these different interactions of our constants gets small enough, so that they fall underneath the relationship of Planck's constant, we now are best expressed with quantum physics. *Classical physics does not dictate, and cannot be used in the analysis once we get below the limitations of S.* It is also remarkable to note that the variables in these equations can form other mathematical relations.

Momentum divided by position indicates potential energy, energy divided by time indicates power, and angular momentum divided by the angle indicates spin potential and direction. These factors of power, potential, and spin are easily plotted on our Isaacsonian matrix (see *Quantum Biology section*). This outline shows conservation of energy and momentum through time. Thus biology would develop a method of cybernetic balancing of forces to

allow growth and metabolism as a variance through changes in power and potential (see *Quantum Biology section*). Spin is controlled by conservation of momentum and directs changes in the biological atom. Spin has been related to detox versus growth or anabolic versus catabolic by many researchers.

Let us return to Heisenberg.

Heisenberg outlined that the relationship of these factors (momentum, position, energy, time, and angular momentum) *to* S was also an inequality, and that under certain conditions the actions of even greater amounts would fall under quantum dynamics. So if the action is larger than Planck's constant, classical theory might be sufficient to analyze, but if the dimensions fall underneath Planck's constant in these relationships, then we will need a quantic understanding in order to surmise what the possibilities are in the system. In this latter example total knowledge of a system is prohibited.

As an example, if we observe a watch manufacturer who works with very small mechanical parts in the development of a time-keeping piece, we will find that typically the size of these parts is approximately equal to 10-4 meters (distance), where the mass is approximately equal to 10-4 kilograms. We are setting times sequences of approximately one second, so T is approximately one second.

Thus if we put these into our equation, where action is approximately equal to mass times distance2 divided by time, we will see that 10-4 meters2 times 10-4 kilograms leaves us with 10-12, and since 10-12 is not small enough to get to our 10-27 limitation of S, we will see that watchmakers do not need to study quantum theory.

Action . Mass (Distance right)^2 / Time
$10^{-4}{}^2$ / 1 = 10^{-4} @ 10^{-8} = 10^{-12}

Classical physics will be more than enough for watch makers to assemble and develop a good time-keeping piece within the limitations. If they were to try to make smaller components for smaller and smaller watches, at a certain level Planck's constant would interfere, and they would not be able to use classical physics to develop a watch; they would have to use a quantic, electronic dynamics, which would be dictated by the laws of quantum physics. Thus in developing microprocessing transistor watches, in which the interaction of the electrons falls under very small areas, quantum theory might be used.

In the analysis of neurology we would take a synaptic cleft at approximately one hundred angstrom thickness (1 angstrom is 10-8 meters x 100), or 10-6; use the molecular weight of a neural transmitter such as acetyl choline, with a molecular weight of 200; and find that with Avogadro's number (6,023 x 1023) setting the amount of matter that there could be in a mole of substance; a mole of acetyl choline would weigh 200 grams. So a single molecule of acetyl choline would weigh approximately 1.2 x 10-20.

Finding the interaction of time to be in the millisecond area, or 10-3, we can now put these into relationship of mass times distance2 over time, and see that the action inside the synaptic cleft is approximately 1029 ergs per second, which means that the neurobiologist will need to understand quantum dynamics. The watchmaker does not.

Action . Mass Distance^2 / Time
(1.2 x 10^{-20}) 10^{-12} / 10^{-3} . 10^{-29}

Modern neurology does not use quantum theory, and thus allows synthetic compound use. Since we cannot place the neurotransmitter in the synaptic cleft at its receptor site on the receptor neuron, classical or statistical dynamics cannot be used to understand *natural* neurological phenomena.

Another example is that of a radio antenna with a power output of Power equals 1 kilowatt. This is emitted at a frequency which equals 1 megahertz. The angular frequency, then, is 2 pi times the frequency, which will equal 6 times 106 per second. Since

P (Power) = Mass x Length^2 + Time^3,

and the frequency is Time-1, it is easy to obtain the characteristic action. The action is thus

Action = P+ Frequency^2 . 3 x 10^{-11}

In this case the 1 kilowatt divided by 6 times 10 hertz6 will give us an action of 1011 or 12. This is far greater than our 1034 level to calculate for quantum physics. Thus making a radio antenna and charting out the electrical circuit, classical physics will do; we do not need to know quantum physics for this type of level.

But in an example we will see later, in looking at the dynamics of the radio or the electromagnetic broadcast capacities of the cell, we will see that the power in the cell to generate this type of phenomenon is around 10-9 or -10 watts. The frequency of the visible light put out by the mitogenic radiation inside the cell has, at its greatest wavelength, 1012 hertz. If we put this back into our equation, where we can calculate the action by multiplying the power times the wavelength-2, we will now see that the action of 10-9 watts divided by 1012 2 will come out to approximately 10-33 or -34 at the high end of the spectrum, thus showing that the mitogenic radiation factors of the cell will fall under quantum theory. We will have to understand and know quantum action to be able to calculate and deal with this mitogenic radiation.

Action = Power / Freq.^{2}
$10^9 / 10^{24} = 10^{-33}$

Another example is that of an oscillating electrical current in a dynamic circuitry. Here, where the capacitance is 10-10 farads, the inductance is 10-4 henries. This is transversed by a current, which is that of 10-3 amps. Since inductance times the current2 is an energy, and the square root of the inductance times the capacitance is a time, we can now calculate the action, knowing energy times time, where we now find that the action is approximately equal to inductance3/2 times capacitance1/2 times the amperage or current^2.

Action = (Inductance)$^{3/2}$ (Capacitance)$^{1/2}$ Current)^2
= $(10^{-4})^{3/2}$ $(10^{-10})^{1/2}$ $(10^{-3})^2$
=10^{-17}

Now we can see that the action is that of 10-17, which again is under classical physics. In developing an oscillating electrical circuit, we can study classical dynamics to make the predictive circuitry.

As another example, studying an oscillating electrical circuit of a much smaller dynamics, that of the oscillating electrical circuitry of the cell, we will now see that we have to use the same formula to calculate this, but with a different result. Here the amperage of a cell is in the micro-amp range, or 10-6. The capacitance of the cell is in the 10-12 area, and the inductance at 10-10. Taking these categories and putting them into our formula, we will now see that the action

Action = (Inductance)$^{3/2}$ (Capacitance)$^{1/2}$ (Amps)^2 $(10^{-10})^{3/2}$ $10^{-12})^{1/2}$ $(10^{-6})^2$
Action =10^{-32}

is that of 10^{-32}, so that in studying the electrical circuitry of a cell, we will have to leave classical physics behind and develop a quantum dynamics.

Let us consider the example of atomic hydrogen. The known ionization energy of the hydrogen atom is that of 13.6 electron volts, which is approximately equal to 2 times 10-18 joules. The minimal wavelength of a spectrum is approximately equal to 103 angstroms. This is in the ultraviolet range. Thus the maximal angular frequency is 2 times 1016 per second. From this characteristic action we can determine the action of it by calculating the energy in joules divided by the wavelength, which calculates out to be 10^{-34}, which is the action

* = 10^3 A
w = 2 x 10^{16} s^{-1}

E = 13.6 eV = 2 x 10^{18} J
A = E/W = 10^{-34}

L approximates S

Therefore to understand the hydrogen atom, we will need to take an extensive course in quantic phenomena.

Another example is that of crystalline structure. In a typical solid crystalline substance such as salt, we will find that there is a regular cubic lattice of atoms. The distance between these atoms can be calculated, using x-ray diffraction experiments. The results have been calculated at a distance of 2.81 angstroms. The binding energy can be calculated from measuring the dissociation of the crystal in water. This has been calculated as 180 kilo-calories per molecule, or 8 electron volts per molecule. The atomic weight of sodium is 20, and the atomic weight of chlorine is 35, calculated in atomic units. Thus the mass is approximately 5 times 10^{-26} kilograms, using Avogadro's number in our calculation. Thus for calculating the mass, momentum and distance, we can find an action of 7 times 10^{-32}, which places us in the range of the possibility of dropping into quantic phenomena. And now, rather than placing the nuclei of the sodium and chlorine, if we substitute in for the electron and try to determine the electron's position in this lattice, we will find that, since there are 1,836 electrons by weight to make up one proton, this will slip us to 10-34 and beyond. So in placing the sodium and chlorine within the crystalline lattice, it is barely within the realm of classical physics, but placing the electron within the lattice is within the realm of quantum dynamics.

As such, if we apply the same theory to the dynamics of the DNA crystalline structures, or the viral crystalline structures, we can see that, by calculating the nuclei of the different elements, they will possibly fall within the realm of classical physics. But placing the electrons, or the electron transport chain, will definitely fall under quantum dynamics. So to totally understand the phenomena of DNA replication in intercellular activity, we will have to understand classical and quantum dynamics. If medicine cannot embrace quantum dynamics soon, it might just destroy life on this planet.

The Anderson-Higgs-Kibble mechanism of the electric dipole in a biological system shows a distinct lack of symmetry. The cells of an organism manifest a self-focusing electromagnetic field inside a biological system. This non-symmetrical, non-focused field is responsible for cell development, and in a large system can account for an acupuncture system. Focused cyclic electromagnetic fields could thus explain acupuncture as a medical phenomenon.

In a 1990 *Journal of Bioelectricity 9(1), pp. 1 - 7* we find an article on the quantum mechanical model for bioelectromagnetic resonance phenomena, presented by Francis X. Hart. (Refer to copy of this article included in *New Biology II.*) In this article Hart proposed that a quantum mechanical model could be used to describe the low-fre-

quency magnetic field with an ion bound loosely to membrane surfaces. This is in the presence of a static magnetic field that creates additional substates. These substates, along with harmonic oscillators, will show preexisting local binding states. An alternating field, thus, will induce transitions from the local states to the substates. This will allow for further information transfer through bioelectromagnetic resonance. The model produced in this article will show the possible existence of narrow residences at odd multiples of the psychotron frequencies. Resonant excitation can be balanced at the sublevels of nonequilibrium processing. Ion membrane coupling can lead to correlated response of the applied fields, and can provide an efficient emptying mechanism for this bioelectromagnetic resonance phenomenon.

Classical physics will not be a proper explanation to the phenomenon of neurology or cell dynamics; quantum physics will. The prospect of the quanton should be reviewed. This will allow us to drop duality in our biology of intercellular processes and set forth to develop a superior medicine.

As we proceed through the *Quantum Biology* series, we will bring in many other examples to show that much of biology, and thus medicine, requires a quantic understanding. Through this quantic understanding we will find that the indeterminacy principle will show us that, since we cannot know with the human mind the interaction of certain places, we will have to depend on natural development of pharmaceuticals and natural therapies, thus proving that naturopathy and homeopathy will be a superior type of medicine. We will also find that electrical, magnetic and photonic analysis of the body is absolutely needed in an understanding of medical dynamics.

Also the photon in its relationship to energy and information transfer will be discussed, as we look at the quantic interchange of information and photons from one cell to another.

In a recent paper published in the "Physical Review" letters of August 1988, Emilio Del Giudicee, along with Giuiano Preparata and Giueseppee Vitiello, proposed that water can function as a free electric dipole laser. Isaacs developed the idea that water, with its refractive index, can allow for the focusing of mitogenic radiation to occur for a cell. This is a receptive mode. In the paper Giudicee, Preparata and Vitiello proposed that water can also participate in the consideration of the development of an electromagnetic radiation. They drew a conclusion between the interaction of the electric dipole of the water molecule and the quantized electromagnetic radiation field. This is treated in this paper via a quantum field theoretical formulation of collective dynamics. They proposed the emergence of collective modes and the appearance of permanent electric polarization for an electrically-polarized impurity.

In the paper they said, "It is well known that liquid water is a very complicated system, and that it may show significant departures from its average bulk behavior in the presence of macro molecules, colloidal particles and polarized impurities. In addition there are experimental indications of the important role in the dynamics of macro molecules. In recent times very remarkable progress has been made through detailed dynamical calculations in the framework of a model which describes water as a network of H-bonded molecules. However, it seems legitimate to wonder what effect on the structure of liquid water the quantized electromagnetic field might have. That our question might be totally nontrivial is suggested by the surprisingly close analogy that one can establish with the free electron laser. There the undulator field induces on free electrons an oscillating electric dipole transversed through their motion, which gets coherently coupled to the appropriate modes of the electromagnetic radiation. On the other hand, it is well known that water molecules possess a considerable electric dipole."

This landmark paper investigated the suitable conditions where the dipole of the water molecules coherently produce such modes of radiation field, as happens in the free electron laser. (A copy of this article is supplied in *New Biology II*.)

Finally, organization of the anti-entropy or organized state of biology will be analyzed to further validate our criticism of modern allopathy. Many of these factors and others will be brought up, to analyze the new dynamics of medicine in biology.

Now that we have shown how intercellular phenomena will fall under the dynamics of quantum theory, and we have shown some of the simple ramifications, we now need to introduce a more complex ramification. This is that of the hermitian matrix, allowing for the interchanges. By taking any two of the measurable entities, such as position and momentum, or energy and time, or angular momentum and angle, we can now use a quantum hermitian matrix to classify a possible procedure to understand the dynamics of intercellular phenomena. (The author realizes that some people drop the angle out of the angular momentum and angle combination, thinking that it means nothing. Thus the simple measure of angular momentum is all that is used in the determination of its relationship to Planck's constant. This author has left in the angle to allow for the simplicity of developing a Hamiltonian dynamics).

As we take these conjoined measures, we will now generate a Hamiltonian pair that will be in brackets, allowing us to realize that the more we know about one, the less we know about the other, and that total determinacy is out of the question in our quantum dynamics.

As we plot these Hamiltonian possibilities of interchanges, on a so-called checkerboard we will generate a hermitian matrix of the different Hamiltonian factors. In simple terms we are generating a graph on a matrix that will enable us chart the different energetic factors of the quantum dynamics. In charting this hermitian matrix we will need to understand that it is discrete, quantic, noncontinuous, and will have a degree of indeterminacy. The basis of this hermitian matrix will need to be mathematical in its relationship. Isaacs has made a guess at the mathematical relationship, which we will reveal in the next chapter.

Developing a hermitian plotting of the Hamiltonian possibilities will allow us to analyze the level of molecular excitations that biology will use in its collective dynamics. Quantum field theory, thus, is utilized to balance the oscillations between two different areas. One area is characterized by the Bose condensation of the quanta that is localized. The other area is the homogeneous condensation with long-range force correlations. These two areas will blend and share information between different vacua.

Let us now review a paper presented by Del Giudicee, Doglia and Vitiello, entitled “A Quantum Field Theoretical Approach to the Collective Behavior of Biological Systems” (published in “Nuclear Physics” 1985, B 251 (FS13), pp. 375 - 400). In this approach they summarized living matter as an assembly of water molecules in electrical dipoles which are tied together into macro molecules. Their summary includes:

1. Fields are introduced to describe the molecular excitations.

2. Collective properties of the set of dipoles are derived in a quantum field theory (QFT) framework.

3. Such properties must be compared with the macroscopic requirements of living mat ter, derived in the framework of the global point of view mentioned in the beginning of their article.

4. Such a scheme is compared with the observed behavior.

The basic symmetry of dipole interaction is the rotational symmetry. Otherwise, the existence of a direction in the ground state of the system would break the symmetry and induce the appearance of massless bosons, like the goldstone boson.

These goldstone bosons are used as carriers of a long-range information transfer among the participants in our matrices. The goldstone bosons are collective modes, and in the article they are identified with Fröehlich coherent waves. This is demonstrated in Davydov solitons. These solitons are fractal groupings of various collections of energy or mass that accumulate and transfer as a wave. It is supposed that the existance of such solitons are a vital expression of biology.

These Davydov solitons occur as a result of metabolic activity of the macro molecule chains, and happen in the absence of interaction among the macro molecules. The article proposes that this is the way biology can link together spontaneous appearance of order and organization that is opposed by living matter on itself with microscopic symmetry.

The bridging between microscopic and macroscopic levels in living matter has been proposed by Davydov and Fröehlich to be an integrating, conservative, and dissipative mechanism. Thus the metabolic reaction energy output is supplied to the macro-molecular chain, such as large proteins, RNA, DNA and the like, that allow information to propagate along the chain as a Davydov soliton (reviewed in *Quantum Biology*, “Fractals”). The solitons can induce a displacement of vibration levels through the surrounding water structure. This allows residence between the levels of the macro molecule and the surrounding water. When residence is achieved, the transition between charge and discharge takes place. The energy previously stored in the macro molecules from the soliton has now dissipated into the water via a Fröehlich polarization wave. This wave is increased in the face of metabolic reaction, and the wave will travel through the cell, affecting the organization of the rest of the matrix. Thus the proposition of this book is to allow for this process to be understood in a quantum mathematical model. Our observations of the procedures fit this theory.

Now that we understand a little of cellular phenomena, we can also intuit and interpose the cellular proposition into the multicellular organism, as the multicellular organism also needs to have similar quantic processing in its ability to transfer and control the flow of information, mass, momentum, energy and charge. These different forces can also provide the energy to induce the vibrational soliton transfer. A review of Davydov would also provide the quantum theory for the classical transition of these solitons. Likewise, the discharge of energy and the creation of order inside living matter which fights against entropy can be described in terms of Fröehlich electric dipole waves.

This is in direct analogy to what Schrödinger called *neg-entropy*. Neg-entropy was proposed by Fröehlich as the dipole provided in an externally supplied flow of energy which could exceed thresholds via vibrational modalities. A giant electric polarization wave could then sweep through the biological living matter, which would produce a long-range correlation. This could provide the ordering inside the system to defend against entropy.

The mechanisms proposed by our Bose condensation and coherence can be explained through the Davydov solitons and the Fröehlich waves. The solitons are thus localized Bose condensations of quanta. Our model provides for an oscillation between two different collective regimes. One regime is that of the localized condensation, and the other is characterized by a homogeneous condensation.

Del Giudicee’s paper further shows the idea of transition between two vacua; one being that of water at low organization surrounding the macro molecules of the soliton regime, and the second vacuum is the highly organized water which is involved in the Fröehlich regime. The quantum field theory also allows us to understand some recently detected zero-frequency modes.

These two descriptions of force give us an understanding of another mechanism wherein possible information can be transferred through our Isaacsonian matrices. (Refer to copy of this article supplied in *New Biology II*.)

On a side note, we can now challenge the processes of medicine and modern science that have used their thermodynamic revelations to produce man-made entities. AIDS might be such an entity as a possible biological and chemical warfare experiment gone awry. Even if AIDS is not such, we must now see that to even fund or direct any such biological weapons is a dramatic example of inadequate mental processing. In short, who could possibly be so dumb as to let anybody tinker with our planet so? Who else, but patent-driven synthetic chemistry. These irreverent people in 1989 released a man-made bacteria on the planet. It was released on strawberry fields in northern California to control frost. What might this bacteria do? A worse horror story was recently released: a synthetic

researcher was given a patent on a new life form. This is a cross between pig and human. This genetic experiment has developed a pig with some human genes, so that these pigs produce human-compatible blood. The plus is that less blood might be needed from humans, but what is the minus? These pig/man creatures may develop speech and consciousness, and this could result in a "planet of the pigs", not apes.

Do we know enough to play God? The smartest day of my life was when I realized that I do not know enough to play God. Reverence for His handiwork is the smartest approach a person can take. I only hope that our science and medicine can be so smart. I also hope it's not too late.

This book is dedicated to the proposition of developing the rationale for the Isaacsonian matrices and developing quantum field theory. We propose a unified field theory in the book *Quantum Biophysics*. This book is designed to take some of these theories into more medical aspects, and to produce quantum energetic theories which will be much more practical for medicine. *Quantum Biophysics* also includes a chapter on the proposal for biology as the solution for the unified field theory.

Fundamental interactions.

Interaction			Range	Strength (coupling constant)	Examples (in microphysics)
Grand unification?	Strongs	Chromic	Very short ($\sim 10^{-2}$ F)	$\blacktriangleright 1$	Constitution of hadrons by binding between quarks
		Hadronic	Short (~ 1 F)	A few units	Binding between hadrons (nuclear forces)
	Electro- weak	Electromagnetic	Long ($1/r$)	10^{-2}	Constitution of atoms and molecules (electron–nuclear binding)
		Van der Waals	Medium ($1/r^6$)	–	Intermolecular forces
		Weak	Very short ($\blacktriangleleft 1$ F)	10^{-6}	Radioactive beta decay
		Gravitational	Long ($1/r$)	10^{-38}	?

SUMMARY

1. In this chapter we have offered mathematical proof that quantum dynamics must be involved in intercellular biology. We have shown this proof in several ways as to relations of the energetics and size of the cell as well as the photon communication capacity of the cell.

2. This chapter also proposed possible communication modalities for the dynamics of the cell to other cells through the process of Davydov solutions and Fröhlich waves. The accountability of this transfer must also be maintained in quantum dynamics under quantum dynamics, thus further demonstrating the need for quantum dynamics in biology and medicine.

3. This proof dynamically shows how allopathy and 'in vitro' medicine is inappropriate for biology and medicine, and that only through the science of naturopathy and homeopathy can medicine possibly proceed correctly.

4. Medicine has been changed forever. A bifurcation point has arrived.

Chapter 3

THE QUANTUM PROCEDURE OF AN OPEN THERMODYNAMIC SYSTEM

Let us now pursue an understanding of a variance between classic open or closed systems. We sill use analogies of living versus nonliving systems in our discussion. Open versus closed will display thermodynamic versus intracellular functioning. The rods and balls analogy used to teach chemistry is an inapropriate one as that in reality the subatomic particles are not hard objects but quasi energetic fields. These fields interact in mathematical ways.

A stationary state system (as defined by Yourgrau) is found when the parameters of temperature, pressure, composition and entropy do not depend on the time of the macroscopic parameters or macroscopic dynamics. The parameters of concern, though invariant in time, will alter from point to point throughout the system, but will attain a degree of stability. For example, if we add heat at a constant rate to one end of a metal rod, and withdraw heat at an equal rate from the other end, the temperature at each point of the bar will approach a time-independent value. The temperature will vary along the length of the rod, and entropy will be continuously produced as a result of the conduction of heat Another example follows: if an electric current flows through a metal wire embedded in a hot object, the temperature of the wire as a whole and the electrical potential at each point will remain constant, although each point will be different Entropy is predictable: energy in, energy out, stability of flow.

The stationary states and their macroscopic, measurable variables can lose their dependence on position, and sometimes will become uniform throughout the system. This is common of a thermostatic equilibrium, and therefore constitutes a subclass within the class of stationary states. This is an example of an adababc flow. An equilibrium state can only be obtained in an isolated system, or a system in contact with a consistent environment Non-equilibrium stationary states only exist if the entropy-producing processes are continued by a constant change of energy. Turbulent fluctuations result in chaotic pools, as in chaos theory. This change in matter or energy between the system and its surroundings produces the non-equilibrium stationary state process. Fractal dynamics shows that even turbulent chaos follows some consistency. The interplay of predictability allows for stability. However, intercellular biology must to be extremely responsive to external fluctuations. The environment on Earth is a very inconsistent and unstable situation.

Let's take a stationary state system with N types of positions, and evaluate them at X_1,X_2,... to X_n. If we let a number of them have a fixed value, then the system will sooner or later find a stage in which the remaining forces will remain constant with the passage of time. This will produce an equilibrium stationary state in the order of n. Stability through independence can occur without feedback in a stable entropic system if the external environment is remarkably consistent This is typical of a Newtonian dynamics, which allows for classical thermodynamic systems to work.

Laws of Thermodynamics

0. Zeroeth Law:

There is a factor known as temperature, which can be measured.

1. First Law:

Energy cannot be created or destroyed. Kinetic Energy + Potential Energy = Total Energy.

2. Second Law:

Heat tends to pass from a hot body to a cold body in a process of entropy.

$$dS = d_{es}+d_i \quad \text{and} \quad d_iS \geq 0$$
$$S \geq 0$$

3. Third Law:

Entropy can be reduced in a closed system through reduction in heat.

Entropy$_A$ (T, P) + EntropyB (T,P) - as T $\rightarrow$ 0.

4. Fourth Law:

Osager's reciprocity theorem: Entropy can be resisted in an open situation by boundary interaction, micro-steps and symmetry.

$$L_{Ij} = L_{jI}(I, j = 1, 2, \ldots N)$$

$$\frac{\partial J_i}{\partial X_j} X_{k \neq j} = \frac{\partial J_j}{\partial K_i} X_{k \neq i}$$

This works on microscopic reversibility, fluctuation theory, and regression of fluctuation.

A stationary state of the first order can result when a constant temperature is maintained. If energy is allowed to flow in matter, and the chemical potential gradient is allowed to adjust itself and cause the flow of mass, but not of energy, then a stationary state of the first order will result But ff the external environment fluctuates, disorder will ensue. Disorder will follow fractal dynamics.

A stationary state of the zero order is identical with the state of thermostatic equilibrium, and this is where there is no change of mass or of energy. Thus a stationary state represents a very stable situation. This type of external stable system is rare in the real world. Biology would need much more responsiveness. Thermostatic equilibrium in a state occurs when entropy reaches its maximum value in relationship to the adiabatic independence. Flow in being stable will produce flow out of a stable nature if the mid current system is capable of resisting the turbulent breakdown.

The following formula of describes such an equilibrium.

(1)

$$\sigma = \sum \sum L_{ij} X_i X_j \geq 0$$

This is an example of a uniform system under thermodynamic statistical control.

When a positive quadratic form of the forces of x exists so that the solution is 0, then all the x's must be 0 (they must have 0 or a positive number), which would result in

(2)

$$0 = \frac{\partial \sigma}{\partial X_i} = \sum_j (L_{ij} + L_{ji}) X_j \qquad \partial = \textit{Boundary Influence}$$

$$= 2\sum_j L_{ij} X_j = 2J_i, \qquad (i = k+1, k+2, \ldots, n)$$

Here we see the extreme stationary state, which can only occur in a highly stable external environment. L, in this case, expresses the reciprocity relation of statistical stability. Without cybernetic control or feedback, subtle changes amplify and eventually destroy such systems, pushing them to fractal turbulence and chaos. But even chaos yields to some fractal predictability.

So we find that there is minimum entropy production when the stationary states are of the order K. This theorem was proven by Prigogine, and later de Groot So entropy can be reduced in a small number of events (which is our hypothesis in quantum biology). (See Quantum Biology section).

Yourgrau, Merwe and Raw report that there can be stationary states of minimum entropy production. This can be put into a graph, which will be elliptic paraboloid, referring to

(3)

$$\sigma = L_{11}X_1^2 + 2L_{12}X_1X_2 + L_{22}X_2^2 \geq 0$$

As we can see, the vertex is at the origin, where X_1 and $X_2 = 0$. As the poisson distribution of X_1 and X_2 fluctuates, we will generate the rest of this verapoloid graph. Here we can see that at minimum entropy . this will result from a small number of events that will allow for a quantic type of control that might be used in this minimum state.

In 1932 Van Bertalanffy put forth a hypothesis that a living organism in cells should be treated as an open thermodynamic system. In this open thermodynamic system states of minimum entropy must be achieved. Schrodinger later advanced the term neg-entropy. Here we would not have a minimum amount of entropy, but actually a negative entropy, which causes order rather than entropy, or thermodynamic entropy in the cell. This violates the law of thermodynamics in which entropy $ 0.

In 1946 Prigogine and Warne further reinforced this theory of Bertalanffy's open thermodynamic systems. Their conclusions were:

1. This theory of open thermodynamics would explain many facts of the features of life which were inconsistent with the laws of classical physics.

2. An open system theory would allow quantitative laws that would regulate basic biological phenomena, such as metabolism and growth.

When a nonliving thing is placed in uniform surroundings, the system will gradually attain a stability in thermodynamic ways which will then be equalled out All of the permissible chemical reactions will proceed and finally reach a point of adiabatic stability at which the internal energy will be balanced. All the different systems will come to a stable, observable end, and thus a maximum entropy is achieved. This maximum entropy can also be seen as a maximum disorder in the system, which has now gone to an adiabatic stability, not a turbulent flux, as with fractals.

In quantic systems something of a different nature happens: systems will yield to quantum dynamics and not follow the dynamics of an isolated system, but will have that of an open thermodynamic system as proposed by Bertalanffy. A variation of Osager's theorem might allow for such a system.

In the living cell the transition states do not proceed towards disorder, but towards order. Each of these fluctuations of the external environment are reacted upon and dealt with by the organism, which leads into a steady state of equilibrium and proceeds against entropy. Bertalanffy said that if the system could be treated as an open system of thermodynamics, he could explain some of these phenomena. It is the treatise of this book that the open system of dynamics can be applied to intracellular, or interstitial, fluids between the cells of the human body.

But within the system we have to proceed to an even greater system of control than that proposed by Bertalanffy's open system. Here we need to move to a system of quantic understanding of intercellular phenomena. The system will have to produce a negative entropy; in other words, as Schradinger pointed out, the system will have to resist entropy, not in a passive process, but with an active resistance to the entropy in a neg-entropic way.

Of course, it must be pointed out that the external environment around a cell will still have its high and low parameters that will determine the healthy range in which it can live. There are certain pH levels

that cells cannot tolerate; certain temperatures, either in the low or high range, that the cell cannot tolerate; and many other values that can impose destruction on the cell. This sets up the torus by our fractal dynamics of the range of activity in which the cell can live. Within this torus of destruction of high and low there is also a central torus, where the cell is most optimum in its ability to find health and cellular stability. The cellular stability will allow for ease of flow in metabolism and reproduction.

When the steady-state system is established, neg-entropy can be at its peak. Schr6dinger had the idea that humans and other living organisms needed to eat other living organisms because they needed to feed on the neg-

entropic factors within these living things, and that actually organisms would feed upon negative entropy rather than feeding on energy. In other words, the human being would need to eat food so that he could maintain his fight against entropy, rather than trying to generate energy.

We quote from Schrddinger, “Since negative entropy may be considered a measure of order, it is legitimate to say that an organism maintains a steady state by continually extracting order from its surroundings. In the case of human beings and higher animals, it is clear how this process is realized. Food stuff consisting of highly-organized, entropy-poor organic molecules are taken in by the body. Their energy is partially utilized, and finally returned to the environment in a highly-disorganized, or entropy-rich, form. Organisms, thus, will feed on negative entropy, rather than on energy.”

So in the SchrOdinger theory, the essential purpose of eating, drinking and breathing is not to provide energy for the functions, but perhaps to rid the system of the entropy it cannot avoid producing while alive (see Quantum Biology). Here we can see the need for not using synthetic compounds in our foods, as these compounds by definition are entropic. The move towards natural foods and entities will receive a real boost from this quantic type of understanding.

We must argue with Schrddinger, in the fact that we do need to eat, at least in some ranges, for energy. A minimum amount of energy must be attained in order to play football, or any heavy-duty sport or extreme activity.

The case of breathadans must also be dealt with in our biology. SchrOdinger has put it into a theory that allows for us to understand the breatharian event in biology. As we have pointed out in Quantum Biology, there are well over five thousand documented cases of people who have lived for over ten years without eating. These breatharians are able to achieve the needed neg-entropy from a stability of spirit and mind, and also by breathing good air and maintaining a healthy lifestyle. All of the breathariians report that spiritual, heavy negative emotions such as anger, lust, and so on disturb their ability to be breatharians. Negative entropy could also result from a high degree of spiritual purity. Positive emotions could possibly fight against such entropy.

So we can see that Schr6dinger was perhaps correct in the fact that neg-entropy, if achieved, could produce a type of condition in which a person would no longer even need to eat. This situation would have to come from an extreme spiritual stability. Negative emotions would be toxic, and could produce disease and instability.

But even these breatharians cannot maintain high degrees of metabolic activity. They couldn’t play on the offensive line of the Green Bay Packers. These people would need to eat also for energy, as well as neg-entropy. We have found from the production of synthetic products that nobody can live totally on
synthetic products for very long; we still need active plants and animals in our diet. If we were to give a person just the inorganic minerals and synthetic compounds that would supply all the chemistry for life, we would find that the person could not live on this or be healthy for long. So SchrOdinger could perhaps be correct about our neg-entropic needs. This might explain the breatharians in our society’s history who have been able to achieve neg-entropy through the powers of the spirit and mind. This will further push the idea of fresh and raw vegetables and other living food stuffs as being a mainstay in the diet if one wants to be healthy and productive.

Prigogine and Wiame put forth a little bit more of an explanation on this process when they used this type of negative entropy to explain some of the following observations:

1. That when we take a look at animals’ sizes versus their metabolisms, we will see that the intensity of metabolism per unit mass diminishes as the size of the animal increases

2. That migrating animals usually settle in conditions that provide them the ability to function with minimum amounts of metabolism

3. That bacteria will have a tendency to develop in the direction of states of minimum metabolism

This was used to further provide proof for neg-entropy, and also the conditions of the open thermodynamic systems of Bertalanffy. If biology is to become an exact science, we must understand these proceedings in more in-depth terms.

Let us now consider the ergodic problem (of self-imposed reactive stability). In nonliving systems of closed thermodynamic relations the system’s phase orbit can lie completely on the surface H(q,p) = E in phase space. This is consistent with the atomic theory of matter. All the properties can be measured in a nonliving system as it falls outside the quantic rule. Living systems, however, require a more complicated approach. Momentum and position are known as the phase functions, and can be measured in this
system. This will fall into the formula

(4)

$$F_\tau = \frac{1}{\tau} \int_{t_0}^{t_0+\tau} F(q^0, p^0, t)\, dt$$

In a system of equilibrium we assume that FT can be replaced by the time average $\overline{F}$ of F(q,p), defined by

(5)

$$\bar{F} = \lim_{\tau \to \infty} F_\tau = \lim_{\tau \to \infty} F_\tau .$$

Finally,

(6) $$\bar{F}_{MEN} = F$$

The shape of orbits and imposed dynamics is recreated here.

In an open situation, such as the living system, a different type of mathematics will have to be utilized. Life must be responsive to a wide variety of stimuli. This responsiveness can be achieved by a large number of possible energy states in our metabolism matrix.

Dr. Isaacs poses the condition of the ergodite in his matrices. This is a compound that can contact or help many situations. Thus water becomes an ergodite, phosphorous or oxygen, because they can occupy many different spots and involve many different actions. In a thermodynamic system these ergodites can affect every situation. They can thus help control the overall condition. In a quantic system they have the probability of interaction. Ergodites might have hundreds to millions of functions and levels of activity.

The study of reductionistic biology could not grasp the concept of an ergodfte, because in reductionistic philosophy we try to reduce complex situations to simple, reductionistic terms. In other words, an organism might be reduced to simply his blood pressure. This type of simplistic, reductionistic philosophy is contrary to understanding an item when we have such a thing as an ergodite. How can we possibly reduce an ergodite's utilization if it is involved in millions of processes? Thus to study water's effect on biology would be nearly impossible with reductionistic techniques. We might reduce the organism to simple things, such as satiation of thirst drives, or the quantity of water drank, and perhaps counter that even with water dispelled through urination or perspiration. But even this type of over-simplistic approach would not make it possible for us to understand water's true potential, because of its ergodic type processes. So here again the factors of reductionistic studies and statistical protocols do not seem to fit our new parameters of a quantic philosophy of biology.

The ergodic problem, which has been posed to physicists and mathematicians for some time, offers some intriguing answers for biology. It was first advanced by Bottzmann in 1887. He asserted that the orbit of a phase point must transverse each point on the surface. ("Ergodic" is a combination of the Greek words for "energy" and "path").

First, with only one orbit passing through any point in the Hilbert space, the ergodic hypothesis implies that the surface of constant energy consists of a single-phase orbit. All image points will thus be in approximate closeness to the same trajectory, and systems will differ from one another solely in relation to the time that the point will transcend a particular phase space. So the average time dependent on the orbit, not on the value of the initial time, will be the same for all members of the group. The start of the time sequence is irrelevant and the process must have symmetry. Second, we will be dealing with a stationary group. The average time of the space is the same as the phase average at an arbitrary time. Third, we will make an assumption that it is irrelevant whether the averaging over time precedes or succeeds the averaging over phase. Our measured properties are measurable in at least one degree.

1. Single phase orbit
2. Stationary ensembles (groups)
3. Average of time or phase is irrelevant (both proceed simultaneously)

Since no trajectory can cross itself, but a trajectory is quite capable of filling the whole space, Ehrenfest suggested a quasi-ergodic hypothesis. This hypothesis was that the trajectory approaches closely each point of the energy surface, H(q, p) = E, without actually transversing each point.

Von Neumann and Birkhoff had a new idea of the ergodic problem in 1932. They related the position to the surface and also the constant energy of the system. Constraints on both occur, as in the Pauli exclusion principle. This prohibits two quantic bodies from occupying the same quantum levels simultaneously.

The ergodic problem cannot be solved using any type of statistical dynamics. It can only be solved through an Isaacsonian type of hermitian matrix, in which certain items can have ergodic relationships. These items can do many, many functions.

A combination of Planck's constant and the DeBroglie wave theorem, relating the orbitals and k values of quantum biology, allows us to more closely approximate a condition to solve the ergodic problem. Planck's constant sets the limit of our understanding or approximation as we estimate whether we know the position or momentum of an item, whether we know the angular momentum versus the angle, or whether we know the energy versus the time. This is the limitation of our knowledge.

As we try to develop a hermitian matrix, we encounter the k values developed in quantum biology by the

researchers from the Santa Bell island. They found that there was an ionizing layer of electrons around items such as ubiquinone, vitamin C, cytochrome and the like. This type of outer shell could be used for electron transfer, and is the key of the krebs cycle and the photosynthesis cycle allowing for plant life. This will be further espoused in Chapter 10. In that chapter and others we will see that electron transport chains will need to be sensitive to allow the electron to transfer through these ionization pathways. Ubiquinone, cytochrome, and a lot of other compounds having ergodic properties can occupy many different parts of this cycle.

The transfer of energy from glucose to ATP must involve such a cycle and be sensitive to the various quantum transfer items, which can be measured for various k values. Like transferring a golf ball down a set of stairs, there is a distinct jump with each stair that has an implication of energy imposed by gravity onto the golf ball. This is a similar type of process allowing for the transfer of energy from one item to another; instead of the stairs we have items that have various quantic energy states. These quantic energy states have an ionization potential, developed through their outer shells, which will be plotted on an item of radii, which now involves n. Planck's constant will come in, telling us that we cannot precisely know this energy versus its time, nor can we know the angular momentum of these radii versus the angle, nor the position versus the momentum.

Thus in developing our science we must involve both Planck's constant and the DeBroglie wave theorem, utilizing and understanding the k values. This will generate our hermitian matrices found in Chapter 11. The ergodic problem can only be solved through indeterminacy as items can be involved in multiple processes simultaneously (ergodic by definition).

Quantum mechanics relates that the state of any system which has n points should property be represented by a continuous, finite, and single-valued function that generalized coordinates with the time.

But a hermitian matrix is needed to display changes in the system. The Hamiltonian eigenvalues can only be understood in such fashion.

The wavefunction, sometimes known as the state function, obeys the SchrOdinger wave equation. This is key to understanding quantum dynamics. The Schr6dinger wave equation will be a wavefunction undetermined to its numerical factors.

The Schrddinger wave equation, for any state function, will have an infinite number of solutions (dramatic responsiveness of metabolism). These possible types of solutions can be called eigenvalues. In a Hamiltonian equation, H(q,p) the Schrodinger wave equation will allow us to discover a possible set of these eigenvalues, or the energy levels of the system. These are frequently represented in hermitian matrices with horizontal lines and distances proportional to the energy differences (see Chapter 10). Any measurable quantity is said to be quantized if it falls into the matrix. For biology a possible hermitian matrix would help in approximating energy shifts. The system is confined to a physical, finite volume. If the volume grows indefinitely, the density levels of the high-energy ranges would increase and give rise to powerful increases in energy. The quantum of energy of any electromagnetic radiation is determined by Planck's constant times the wavelength (see Chapter 5).

Biology consists of microstates that can have an astronomically large number of energy packets in these quantum energy states. This is usually reflected in a given set of macroscopic parameters, which define the macro appearance of the thermo-physical system, but are actually a reflection of the multitude of micro states.

Thus there are literally millions, if not millions of millions, of guesses we can make as to the dynamics of a quantic hermitian matrix for biology, and since macro observations seem to parallel micro state values, we will use some observations of the mathematics of nature in choosing our best guess for a hermitian matrix. This will relate to all matter, and will use the quantic laws of interaction. The mathematics of the "big suck" (see Chapter 1) will be echoed in all things. Biology is the ultimate display of the beauty of quantum mathematics.

Our system must be cyclic in order for it to be of any use. In fact, in 1890 Poincaré stated a theorem of periodicity, which simply says that any finite isolated mechanical system must be very nearly periodic to be precise. Poincaré talked about the recurrence time of the Poincar6 cycle, which in some values would be extremely long, and in others, extremely short. This describes a lot of the periodicity observations that we see in biology, such as cyclic reproduction, pituitary/pineal performance, the reaction of circadian rhythm, and even reactivity to the change of the seasons of the year. There are several other periodicities, which might even be expressed in longer periods. The army ants of South America band together and attack once every twelve years, locusts come out every seven years, etc. There are an infinite number of micro periods that cycle and recycle information, energy, and matter. All things are in cycles, all things are in a state of flux, and all things are ultimately vibration.

So our matrix system must have a built-in periodicity at many levels (micro and macro), as energy that enters and leaves requires several opportunities for cyclic behavior, a radically large number for metabolism, and a small stable number for reproduction.

We must be able to control the wide variety of quantic energy states reflected in quantum numbers. The first three quantum numbers are: N, the large original quantum number; L, the magnitude, and M, the angular(azmuthal) momentum. Other quantum numbers are that of spin and spin angular momentum, and total angular momentum. Particles with integer spin numbers are named bosons, after Bose, and those with half integer spin numbers are known as ferrnions, after Fermi. Other quantum numbers will reflect magnetic moment and static moment as well, and must be reflected in our matrices.

The second law of thermodynamics comes into play when Boltzmann's equation of $S = k \log w$ is taken in conjunction with the H theorem. S in this equation is entropy, k is the Boltzmann constant, w is the work done by the system.

The change in S will be greater than or equal to 0. Then the state of the system will develop from small values of w to more large probable states, with larger values of w. The equilibrium occurs at the state in which w attains its maximum value. w is the work done by the system, as well as potential thermodynamic probability.

In our Boltzmann equation we see that for S to produce a neg-entropy, we would need the log of w to be a negative number, which can happen when w is the inverse and when w involves i, which is an irrational number of a complex series. Thus for biology to stabilize and produce neg-entropy in light of the Boltzmann equation, biology will have to involve this complex, or imaginary, number. This could only be done by some type of magical system of biology.

For ease in analyzing large super-systems of interaction, Hamiltonian relations can be laid out in a hermitian matrix. This matrix, if expanded, could be used to plot possible interchanges of all biology.

(7)

$$\begin{vmatrix} E_1(0), E_2(0), \dots \\ E_1(1), E_2(1), \dots \\ \dots\dots\dots \\ E_1(n'), E_2(n'), \dots \end{vmatrix}$$

This matrix (the Isaacs matrix) could be the basis of a periodic table for biology.

(8)

$E_1(0),\ E_2(0),\ E_3(0),\ E_4(0),\ E_5(0),\ E_6(0),\ E_7(0),\ E_8(0),\ E_9(0), E_{10}(0),\ E_{11}(0),\ E_{12}(0)$

$E_1(1),\ E_2(1),\ E_3(1),\ E_4(1),\ E_5(1),\ E_6(1),\ E_7(1),\ E_8(1),\ E_9(1), E_{10}(1),\ E_{11}(1),\ E_{12}(1)$

$E_1(2),\ E_2(2),\ E_3(2),\ E_4(2),\ E_5(2),\ E_6(2),\ E_7(2),\ E_8(2),\ E_9(2), E_10(2),\ E_{11}(2),\ E_{12}(2)$

$E_1(3),\ E_2(3),\ E_3(3),\ E_4(3),\ E_5(3),\ E_6(3),\ E_7(3),\ E_8(3),\ E_9(3), E_{10}(3),\ E_{11}(3),\ E_{12}(3)$

$E_1(4),\ E_2(4),\ E_3(4),\ E_4(4),\ E_5(4),\ E_6(4),\ E_7(4),\ E_8(4),\ E_9(4), E_{10}(4),\ E_{11}(4),\ E_{12}(4)$

$E_1(5),\ E_2(5),\ E_3(5),\ E_4(5),\ E_5(5),\ E_6(5),\ E_7(5),\ E_8(5),\ E_9(5), E_{10}(5),\ E_{11}(5),\ E_{12}(5)$

$E_1(6),\ E_2(6),\ E_3(6),\ E_4(6),\ E_5(6),\ E_6(6),\ E_7(6),\ E_8(6),\ E_9(6), E_{10}(6),\ E_{11}(6),\ E_{12}(6)$

$E_1(7),\ E_2(7),\ E_3(7),\ E_4(7),\ E_5(7),\ E_6(7),\ E_7(7),\ E_8(7),\ E_9(7), E_{10}(7),\ E_{11}(7),\ E_{12}(7)$

$E_1(8),\ E_2(8),\ E_3(8),\ E_4(8),\ E_5(8),\ E_6(8),\ E_7(8),\ E_8(8),\ E_9(8), E_{10}(8),\ E_{11}(8),\ E_{12}(8)$

$E_1(9),\ E_2(9),\ E_3(9),\ E_4(9),\ E_5(9),\ E_6(9),\ E_7(9),\ E_8(9),\ E_9(9), E_{10}(9),\ E_{11}(9),\ E_{12}(9)$

$E_1(10), E_2(10), E_3(10), E_4(10), E_5(10), E_6(10), E_7(10), E_8(10), E_9(10), E_{10}(10), E_{11}(10), E_{12}(10)$

E1(11), E2(11), E3(11), E4(11), E5(11), E6(11), E7(11), E8(11), E9(11), E10(11), E11(11), E12(11)

$E_1(12), E_2(12), E_3(12), E_4(12), E_5(12), E_6(12), E_7(12), E_8(12), E_9(12), E_{10}(12), E_{11}(12), E_{12}(12)$

As shown, the different eigenvalues in a two-dimensional array are portrayed in matrix form. This description of the processes contains n number of molecules found in this super-system. We can solve this if we obey the following set of criteria:

(9)

$$\sum_j \sum_N N_j^*(N) = N^*,$$

(10)

$$\sum_j \sum_N N_j^*(N) E_j(N) = E^*,$$

(11)

$$\sum_j \sum_N N_j^*(N) N = n^*,$$

N = Number of particles

N* = Number of systems

E* = Constant energy of the system

If biology needs six hundred protein interactions, then an N of 600 would fit our matrix.

This last formula restricts the number of quantum states in the super-system. So biology has its limits and torus of attraction. This leads to

(12)

$$\sum_j \sum_N N_j^{*'}(N) N = N_1^*(0) + N_2^*(0) \cdots [N_k^*(N) - 1] N \cdots = n = N.$$

Ω^* = Number of super-systems status given for E*, N*.

(13)

$$\log \frac{\bar{N}_k^*(N)}{N^*} = -\frac{\partial \log \Omega^*}{\partial E^*} E_k - \frac{\partial \log \Omega^*}{\partial N^*} - \frac{\partial \log \Omega^*}{\partial n^*} N.$$

So biology would set upper and lower limits or constraints on needs interaction pathways.

n* = Number of particles in the super-system

M = Boundary operator

(14)

$$a = \left(\frac{\partial \log \Omega^*}{\partial N^*} \right)_{n^*, E^*} = \textit{Onsager coordinates}$$

(15)

$$\beta = \left(\frac{\partial \log \Omega^*}{\partial E^*} \right)_{N^*, n^*} = \frac{1}{kt} = \textit{Reciprocal of Boltzmann Constant} \times \textit{Kinetic Energy}$$

(16)

$$\alpha = \left(\frac{\partial \log \Omega^*}{\partial n^*} \right)_{E^*, N^*} = \textit{Fraction of radiant energy Absorbed by surface}$$

To eliminate the Osager coordinate assume

(17)

$$\bar{N}_k^*(N) = N^* e^{-\beta E_k(N) - \alpha N}$$

(18)

$$\frac{\bar{N}_k^*(N)}{N^*} = \frac{e^{-\beta E_k(N) - \alpha N}}{\sum_j \sum_N e^{-\beta E_j(N) - \alpha N}}$$

As we prove in Chapter 5, the Boltzmann relation gives us a predictor as to the amount of energy that can be developed by the cell. We calculated this for a small cell at normal body temperatures to be 4.59 x 10-5 watts. By placing it into equation (15), we can now see that the boundary of the natural type of cell will now come out to be the log of the number of super-system states, provided that we know the amount of energy determined from the space and temperature. Since we are dealing with one supersystem, we would say that N = 1. So we would now come to the fact that since the Boltzmann constant is equal to the energy (E'), we will see that this is the Boltzmann constant times the temperature to the fourth power. (3 in this formula equals the inverse of the Boltzmann constant times the temperature. We will cross out the temperature and the Boltzmann constants, as we multiply both sides of equation (15) by E', leaving us with the boundary of the log of the number of super states needed, being equal to 27 times 108, which is the temperature to the third power. There is a dramatically large number of possible quantic states that a cell can occupy in response to a very large changing type of environment.

The relative deviation of the occupation matrix numbers from their average values tend to zero as N grows indefinitely. At a certain level of growth, control would be lost. This would be the upper limit of sae. Thus sae extremes are set by the quantum numbers.

As we have shown before, we are able to calculate the amount of radiant energy brought out by the surface. If we adapt equation (16) with this, and insert instead of a, 4.59 x 1V watts, this will be equal to

the boundary operator log of the number of super-systems divided by the number of particles in the system. Knowing that the number of particles in an average cell can be as large as 10a, we now multiply both sides by 10°, giving us 4.59 times 10', which equals the log of the amount of super-system states needed for the cell. We can see that this is still a tremendously large number.

We find that there are limits to the factors of biology such that the end can only get so big before we start to get into the closed system of thermodynamics. External interaction rips into the cell and prohibits control. Thus the torus of temperature extremes is set. In setting the extremes of temperature, we can look at the graph below and see where the possibilities of temperature allowance can be set.

Energy Boltzmann Equation

Ceiling Temp.	75° C Deg. Centigrade		167° F Deg. Fahrenheit		358° K Deg. Kelvin
Base Temperature To Destroy Life	62.5° C	=	144.5° F	=	346° K
Hot Comfort Zone For Animals	50° C	=	122° F	=	333° K
Average Body Temp. For Animals	37.5° C	=	99° F	=	320° K
Cold for Cold-Blooded Animals	25° C	=	77° F	=	308° F
Comfort Zone for Warm-Blooded Animals	12.5° C	=	54.5° C	=	296° K
Freezing of Water	0° C	=	32° F	=	283° K
Extreme Cold No Life Can Withstand	-12.5° C	=	-9.5° F	=	270° K

In the graph of temperature we can see that something unusual happens at every 12.5° C on the scale. At 37.5° C we see the normal body temperature for mammals. If we go up 12.5° at 50° C, we will find that this is 122°, and that this type of excess temperature is about as hot as the planet Earth gets in certain locales, and if it gets beyond 122°, any life will have a hard time existing. This excludes certain types of specifically developed bacteria that can live in high thermal zones inside different parts of the ocean, but even these will have much difficulty past 122°. Going up another 12.5° we will find that 144° is a temperature that can destroy enzymes and bacteria. We must start our process of homogenization and pasteurization at 144° F. Going up one more 12.5° factor will take us to the point of total pasteurization at 167°. At this temperature any life can be destroyed.

Going down 12.5° from the norm of 37.5°, we see that at 77° F or 25° C cold-blooded animals will start to react, to huddle up and go into a variation of hibernation. Going down another degree we see that 54.5° F, or 12.5° C, is a comfort zone for mammals. Below this, heavier clothing will be needed for protection. Going down another 12.5° we now get to 32° F, which is the freezing point of water; another significant point for biology. Going down another 12.5° to -12.5° C, we can find the extreme cold temperatures in which animals can live.

This extent of temperature is one factor that sets the limit for the size of biology and its temperature ranges. We can see that at certain temperatures the environment gets too warm, starts to disrupt enzyme action, and pulls at the factors of the cell membrane.

Using the Boltzmann constant, we can convert any of these temperatures and find out the amount of energy life can withstand. By putting it into these formulas, we can see just why the temperature factors are set in biology; they have effects on quantum dynamics.

(19)

and

$$P_k(N) = \frac{N_j^*(N)}{N^*}$$

(20)

$$\mathfrak{Z} = \sum_j \sum_N e^{-\beta E_j(N) - \alpha N}$$

Equation (20) can be written concisely as

(21)

$$P_k(N) = \mathfrak{Z}^{-1} e^{-\beta E_k(N) - \alpha N}$$

Variations of this hypothesis can be used to calculate biology. Life has a beautiful, indeterminate, magical mathematics in all its activity. God's grace is extremely profound in its complexity. This last equation displays to us the grand canonical ensemble. Such an ensemble, as we have shown, is descriptive of some of the thermo-physical systems in biology.

Gibbs started the idea of "pent" and "grand" ensembles to describe two types of ensembles.

(22)

$$\mathfrak{Z}(T, V, \mu) = \sum_N e^{-\alpha N} \sum_j e^{-\beta E_j(N)} = \sum_N Z(T, V, N) e^{-\alpha N}$$

We now introduce the constants l3, a and y by the distribution law contained in our last equation. The grand canonical equation allows us to correlate these quantities, and we propose that the energy of a system can be described by

(23)

$$U = \sum_j \sum_N P_j(N) E_j(N)$$

Thus the energy of a cell has limitations. Too much or too little energy disrupts control. We have now set the torus of energy for biology. We can see by setting this limitation on biology that biology was able to define the environment in which it could best live. The planet Earth offered the beautiful environment for life as it provided opportunities in many ways. The factors of energy, mass, momentum, charge, and electromagnetic radiation would all have their own toruses set in this dynamics.

The limitation of mass was set as a limitation of size, which also involved the limitations of the electromagnetic radiation spectrum. As we pointed out in Chapter 8 of Quantum Biology, the actual size limitation was set by the factors of mitogenic radiation, which occurred at 10^{-5} -10^{-2} centimeters. This limitation of the wavelength set the limitation on the mass. Another factor that set the limitation on charge is the factor of the limitation of capacitance

and inductance, and their limitations, in the amount of capacitance and inductance that could be tolerated by a cell. This set the dynamics of charge and magnetics; the charge being through the capacitance and magnetic limitations of the inductance.

Momentum has its limitations in the viscosity, which is set by the dynamics of the flow of the fluid. As fluid becomes increasingly thick through the accumulation of protomorphogens, aging might ensue. This factor is dealt with in Chapter 14 of Quantum Biology.

The differential of equation (23) is

$$dU = \sum_j \sum_N [E_j(N)\, dP_j(N) + P_j(N)\, dE_j(N)] \tag{24}$$

Using reversibility in the process, we arrive at

$$dU = \beta^{-1}\left\{-d\left[\sum \sum P_j(N) \log P_j(N)\right] - \alpha d\bar{N}\right\} - pdV \tag{25}$$

Using system average

$$\bar{N} = \sum_j \sum_N P_j(N) N \tag{26}$$

Equation **(25)** may be compared with the fundamental thermodynamic equation for an open system

$$dU = TdS - pdV + \mu d\bar{N} \tag{27}$$

Between equations (25) and (27) agreement can be established by positing

$$\beta = \frac{1}{kT} = \textit{Reciprocal of } kT \tag{28}$$

$$\alpha = -\frac{\mu}{kT} = \begin{array}{l}\textit{Fraction of incident radiating}\\ \textit{Energy absorbed by surface}\end{array} \tag{29}$$

and

$$S = -k\sum_j \sum_N P_j(N) \log P_j(N) \tag{30}$$

k is the Boltzmann constant in all of these cases.

So photon release is not a mere byproduct, but a useful communication (see Quantum Biology, Chapter 8).

Lastly Gibbs defines the free energy equation.

$$pV = kT \log \mathfrak{Z} \tag{31}$$

$\mathfrak{Z}$ = Grand Partition Function

So we can see from our analysis that by calculating the extremes of biology: temperature, energy, momentum, heat, and charge, we can now predict the capacities or limits of the Isaacsonian matrix, and we can set the limits through the quantic factors needed to handle the extremes of this utilization for metabolism and reproduction. We are faced with the difficulty of finding out just how complex biology really is. Any attempts to duplicate it synthetically, without complete knowledge of the various quantic factors, would be extremely irregular, and would produce vast disruption on biology. Such an event has happened in the wildly increasing iatrogenic diseases that have been generated by the synthetic chemical companies. It is hoped that the understanding of biology in this book will direct us back to research in homeopathy and naturopathy, and push the development of natural protocols greatly needed for understanding the factors of life. Only through increasing our understanding of life and biology can medicine shed its iatrogenic disturbances and start to cure, not drug, the patients.

So what have we described in so enigmatic a treatise? Simply put, using a hermitian matrix makes sense in biology.

(32)

$$8 \cdot \sum_{j} \sum_{N} e^{-\beta E_j(N) - \alpha N}$$

As we see from this chapter, the extreme complexity presented in biology still offers alight at the end of the tunnel, as we can explore more and more of the capacitance, inductance, voltage, amperage, temperature, resistance, electromagnetic factors, as well as the other dynamics; and find out many more secrets about health and disease. Since we are dealing with quantic levels, we are dealing with an indeterminate perspective, which will give us the ability to explore for generations to come.

Now that we've shown the tremendous complexity of this system, we now need to point out that in this chapter we dealt with a completely thermodynamic, statistical system which depended on a consistent external environment. This consistent external environment would produce predictable flow rates through a thermodynamic system. These are the laws of death, not the laws of life. When we get into an analysis of life, we must drop our system of statistical thermodynamic analysis and go into a more quantic system, which is the purpose of this chapter. The quantic system will need to have subtle energy states that will be responsive to changes in the external environment. Thus this system is now open, not closed.

In this chapter we have proven that biology must have such a radically open system with large numbers of possible energy states capable of making wide responses for metabolism and growth.

The extreme complexity of this intricate cybernetic feedback system should induce reverence in the reader at this time, a reverence that we hope will dispel any thoughts of using, or participating in, any types of synthetic pharmaceuticals that do not match this type of complexity. If we use synthetic, allopathic pharmaceuticals to mask symptoms, to induce or over-stimulate processes in the body, or to sedate and cover up pain and symptoms (like shooting the messenger), we can see how much of a strain we are putting on a system, such as this complicated cybernetic feedback system we call life. Synthetic technology is contradictory to nature.

A better system choice of medicine would be that of homeopathy, in which we are looking at minute factors of control and trying to reestablish control within this system. Thus the human body might be given a homeopathic in response to disease, which could encourage the overall system to gently restore itself to full functioning. Naturopathy should be the pinnacle of medicine, not the doormat

In homeopathy we are working with subtle thermostats. We can see that the number of thermostats needed for the system of life is extremely complex; well beyond our understanding at this time. Thus homeopathy offers a very gentle, noninvasive system with much fewer mistakes, and results in much less insurance, malpractice, or iatrogenic damage.

In allopathy the simple use of an anti-histamine can have serious deleterious effects in the long run. It can upset this subtle cybernetic flow that we've described in this chapter. The presence of a large amount of synthetic anti-histamine would be very complicated for such a system to understand. As it would try to pattern itself and deal with it, a lot of other subtle systems would be affected.

As we can show in our theory of quantum biology, changing one factor in any part of our matrix will result in changes in many others. Thus the large amount of anti-histamine could possibly induce some type of other iatrogenic damage. In the case of a homeopathic we would be using a small compound, such as Allium Sepa (homeopathic onion), which would help to trigger the system to balance in just a small, gentle way. The small, gentle pathway dealing with these subtle symptoms in homeopathic terms is much more attuned to the quantic, biological system we have described in this chapter.

We also can see that the amount of complexity of the pathway of energies that must be allowed accounts for a quantic understanding. There are long-range force transfers through the body, and there are quantic actions

that can be felt throughout the system; small changes at certain foci points. In a large system, such as the human body, where there are many cells locked in an overall quantic pattern. We can see that there would be lines of communication drawn along these quantic factors. Such communication would be one possible understanding for the acupuncture meridian system.

Modern science has attributed the acupuncture system to be simply an endorphin release, provoked by the use of a needle. We can now see that this is just a small, small part of the overall system, even though the endorphin release might still be true; but actually acupuncture is a system of subtle communication factors, allowing for our cybernetic system to maintain and share information and maintain control.

In the theory of acupuncture, sometimes a point might not be able to carry the information properly. By using a needle, pressure, or something destructive, we can bring the life force attention to that point to help the body to dispel the blockage and release the transfer of information, to allow the body to return back to control, balance, and health.

Our analysis of quantum physics in light of biology has given us a new dimension, which will now tell us that acupuncture, homeopathy, naturopathy and many other alternative sciences are a much deeper rationale to follow than any type of allopathic-driven concept.

SUMMARY

1. The basic problem comes from a misguided concept taught by the balls and rod chemistry. The concept of this system misleads one to see the chemical interchanges as hard unyeilding objects like billiard balls, when in fact the subatomic particles are indeed quasi energetic fields of vibration , angular, spin, orbital etc. energy. The interaction of a substance with the cell wall of an organism is an encounter of energy probability fields encountering each other. The billiard ball concept was good for instruction but deceived the thought from truth. The concept of the quasi particle is introduced in the book 'A guide to Feynman Diagrams in the Many-Body Problem' by Richard Mattuck (Dover Press). The mathematical laws of the interaction of these energetic quasi particles could be expressed in a matrix.

2. **WE HAVE SEEN FURTHER EVIDENCE OF THE COMPARISON BETWEEN A STATISTICAL THERMODYNAMIC ANALYSIS OF NONLIVING ENTITIES AND THE NEED FOR A QUANTUM SYSTEM IN LIVING ENTITIES. THE DEVELOPMENT OF SUCH A QUANTUM SYSTEM IS OUTLINED IN THIS CHAPTER TO BE FURTHER DEVELOPED FOR BIOLOGY AND MEDICINE.**

3. **FURTHER PROOF OF THE NEED FOR A HERMITIAN MATRIX AND HOW THIS MATRIX COULD BE UTILIZED FOR BIOLOGY AND MEDICINE WERE DISCUSSED IN THIS CHAPTER.**
4. **MATHEMATICAL RELATIONS SHOWING THE CAPACITIES OF THE MATRICES TO HANDLE BOTH THE ENVIRONMENTAL AND GENETIC CHANGES WERE OUTLINED AS A BASIS FOR QUANTUM BIOLOGY.**
5. **FURTHER EVIDENCE AGAINST SYNTHETIC ALLOPATHY WAS OFFERED WITHIN THIS CHAPTER, AND SUPPORTIVE DEMONSTRATIONS FOR HOMEOPATHY AND NATUROPATHY AS A MECHANISM WERE ALSO SUPPLIED.**

Chapter 4

QUANTIFYING BIOLOGY (can we transfer the work done on thermodynamic biology to quantum?)

In quantum theory the energy, E, the angular frequency of a light quantum, w, and the circular frequency, v, are all related by the formula E = h x v, which also equals: S x w/2B. S is Planck's constant.

Since the energy of light equals the momentum times the speed of light, E = *p* x *c*, where the wavelength is *wl*, and we can derive the following equation: *p* = S/*wl*. If *k* equals the wave number, and the wave number equals 2B divided by *wl*, the *p*, which is the momentum, is Planck's constant divided by 2B times the wave number, or *k*.

$$S\ k / 2 = P$$

Via Planck's distribution formula, for the electromagnetic energy density per unit angular frequency range, within a specific cavity at a specific temperature, *t*, and allowing where *k* is the Boltzmann constant, we arrive at the following formula of classic physics:

(1)

$$\frac{S\ T\ 3}{B^2\ c^3\ (e^{S\ T\ /kT}\ -\ 1)}$$

The Bohr-Wilson-Summerfield quantization rule for a cyclic variable, such as cube, labeling the momentum as *p*, with *n* as a positive integer, always referring to a quantic number, we find that the integral of *pdq* will always equal *n* times Planck's constant.

(2)

$$\check{S}\ pdq = nh$$

The Compton effect tells us about the amount of energy that is needed to separate an electron of mass, *m*, from an atom or molecule. Knowing the wavelength, *wl*, at an angle 2, the wavelength after separation from the Compton effect equation, we will find that the new wavelength will equal the old wavelength plus Planck's constant over *mc* times 1 minus the co-sine of the angle.

(3)

$$8\mathbb{N} = 8 + h / mc\ (1 - \cos\ 2)$$

The position of an item will be listed as its coordinate, *q*. The momentum is listed as *p*. Under the value of the Heisenberg uncertainty principle we cannot know *q* exactly, or *p* exactly at any time. This is related to Planck's constant, in which *q* times *p* is greater than or equal to Planck's constant divided by 2B.

Biology will also need to produce and control such energy to ionize certain compounds and control the handling of such ions. Every cell uses such energy in similar fashion. The great skill and expertise that biology and life require to operate such a system is awesome. No thermodynamic system could duplicate the effects of life in its profound complexity. A quantic matrix could produce such effects. Even a quantic matrix must have its indeterminate values guided for control and accounting. Thus we now must accept the proof that some force must affect control on this indeterminacy. The question is: Is this force internal, or produced by biology itself; is this force external, produced by a God consciousness; or is this indeterminate force a combination of both? I believe the latter. The effect appears to be transferred through some subspace dimension. As we have described in the first section the space we think in is but one dimension of many. We think and live in a four dimensional world. There are at least 6 other dimensions. These dimensions can be felt and experienced with training. These dimensions offer a polymorphic constriction effect on the shape and flow of items in biology. The joined effect of these mulitdimensions is the unified field theory of consciousness. Let's return to quantum.

Planck's constant is 6.67 x 10^{-27} ergs per second.

Returning to the quanta trail, there are similar relationships involving this uncertainty principle that are related to angular momentum in the angular coordinate. The angular coordinate is N and the angular momentum is *J*. Thus we also have the equation: phi times *J* is greater than or equal to Planck's constant divided by 2B.

(4)

$$N\ J\ \$\ S / 2\ B$$

Another such mechanism is that of time of an observation, and energy of the system observed. We cannot know both of these, either. Time, *t*, times energy, *E*, will be greater than or equal to Planck's constant divided by 2B.

(5)

$$T E \$ S / 2B$$

The space wave packet number, *k*, and the time packet of angular frequency, *w*, forms another relationship. Substituting into the equation above, we now find that *w* times *k* is greater than or equal to 1 and that *t* times *w* is greater than or equal to 1.

(6)

$$T k \$ 1 ; t \T \$ 1$$

In dealing with an electron, $E = p2$ divided by 2B. The DeBroglie relation is: $p = h/2B$ times *k*, as stated before.

(7)

$$P = S / 2B$$

The kinetic energy is: $p2$ divided by $2u$, and the potential energy is the velocity (r,t) The particle mass *u* can be transcribed into a quantum mechanical statement showing the following equations evolving the Schrödinger wave equation.

(8)

$$E \rightarrow iS * / *t, \qquad p \rightarrow iS \ grad$$

(9)

$$iS *R / *t = -S^2 / 2: \ddot{I}^2 R + V(r, t) R$$

(10)

$$iS *R / *t = HR$$

(11)

$$P(r, t) = * R(r, t)^{*2}, \ S(r, t) = S / 2i: (R \ grad \ R - R \ grad \ R)$$

S here is the Hamiltonian of the system. The wave function is the VRT in the Schrödinger equation. The probability current density is *S*, and the probability density is *P*.

Since they obey the continual equation, we will find

(12)

$$*P / *t + div \ S = 0$$

(13)

$$(F) = \text{I} \ RFRdt$$

The uncertainty of *x* can be defined as the root mean square deviation of *x*. In adapting the uncertainty relationship of Heisenberg to the *x* and *p* values, we can attain the wave packet of the *x* dependents.

(14)

$$(\hat{I}x)^2 = ((x - (x))^2) = (x^2) - (x)^2$$

(15)

$$\hat{I}x \ \hat{I}p_x \$ 1 / 2 S$$

(16)

$$R(x) = [2B(\hat{I}x)^2]^{-1/4} \exp\left| -(x - (x))^2 / 4(\hat{I}x)^2 + ix(px) / S \right|$$

Using a Fourier transform of the quantum wave function, we can specify the momentum probability density, which is defined, and the probability of those momentum components will rely on a relationship that will yield

(17)

$$R(r, t) = (8B^3)^{-1/2} \text{IN}(k, t) e^{ik \cdot r} dt_k$$

$$N(k, t) = (8B^3)^{-1/2} \text{I} R(r, t) e^{ik \cdot r} dt$$

$$P(k, t) = |N(k, t)|^2$$

"An operator, Omega, will have the eigenfunction of *u*, which will correspond to the eigenvalue, T."

(18)

$$T u_n = T_n u_n$$

The energy eigenfunctions will exist if *V* is independent of *t*.

(19)

$$N(r, t) = u(r)\, e^{-iEt/S} \quad , \quad -S^2 / 2 : \ddot{I}^2 u + Vu = Eu$$

Wherever *V* is finite, *u* and grad *u* must be finite and continuous. *u* must remain finite or vanish, as *R* approaches infinity. If *V* approaches infinity, and *R* approaches infinity, solutions will exist only for discrete values of *E*. If *V* approaches 0 as *R* approaches infinity, well-behaved solutions will exist for all values of *E* greater than *V*0. If they exist for *E* less than *V*0, it is only for discrete values of *E*. Energy eigenfunctions that correspond to different energy eigenvalues are thus orthogonal. Biology can use this as an internal on-board computer to remember events. How many events can biology remember?

(20)

$$\sqrt{u_e}\,(r)\, u_e\,(r)\, dt = 0, \text{ if } E + E'$$

Energy eigenfunctions that are discrete can be normalized by setting the integral of $ur^2dt = 0$. Continuous energy eigenfunctions cannot be normalized in this way. We can normalize in a large cubical box of volume L^3 by imposing periodic boundary conditions at the walls, in which case the continuous energy levels become discrete with very close spacing. For example, the box-normalized momentum of the eigenfunctions are

(21)

$$u_k(r) = L^{-3/2} \exp(ik \cdot r) \text{ , where } k_x = 2Bn_x \mid L \text{ , etc}$$

and *n*x, *n*y, *n*z are positive or negative integers of zero. Then

(22)

$$\sqrt{u_k}(r)\, u_1(r)\, dt = *_{kz1z}\, *_{ky1y}\, *_{kz1z}$$

where *nm = 1 if *n* = *m* and zero otherwise (Kroneker * symbol.)

Alternatively, we can normalize in an infinite region by using the Dirac * function, defined by

(23)

$$* (x) = 0 \text{ if } x \neq 0, \qquad \int * (x)\, dx = 1$$

or by

(24)

$$* (x) = 1/2B \int e^{ikx} dx$$

Then $u_k(\boldsymbol{r}) = (8B^3)^{-1/2} \exp(i\boldsymbol{k} \cdot \boldsymbol{r})$, and

(25)

$$\int \overline{u}_k(x)\, u_1(x)\, d\tau = \delta(k_x - l_x)\, \delta(k_y - l_y)\, \delta(k_z - l_z)$$

For both normalizations, the momentum eigenfunctions have the closure property

(26)

$$\sum_k \overline{u}_k(x)\, u_k(x') = \delta(x - x')\, \delta(y - y')\, \delta(z - z')$$

(box normalization)

(box normalization)

(27)

$$\overline{u}_k(x)\, u_k(x')\, d\tau_k = \delta(x - x')\, \delta(y - y')\, \delta(z - z')$$

(* function normalization)

(δ function normalization)

Complete sets of eigenfunctions of other operators have properties analogous to the above properties of the momentum eigenfunctions.

The * function has the additional properties

(28)

$$\delta(x) = \delta(-x), \quad \delta'(x) = -\delta'(-x), \quad x\delta(x) = 0, \quad x\delta'(x) = -\delta(x)$$
$$\delta(ax) = a^{-1}\delta(x) \quad (a > 0)$$
$$\delta(x^2 - a^2) = (2a)^{-1}[\delta(x - a) + a)], \quad (a > 0)$$
$$\int \delta(a - x)\delta(x - b)\,dx = \delta(a - b)$$
$$f(x)\delta(x - a) = f(a)\delta(x - a)$$

In each case, a subsequent integration over the argument of the * functions is implied; a prime denotes differentiation with respect to the argument. It must be pointed out that there is a difference between genetic memory capacity and metabolic activity.

The limits of intercellular memory will be that of " log S* for systems involving S* number of super states allowing for intercellular memory. This implies that S* = 1023, which shows that enormous memory a cell might possess. Thus one cell might have a memory capacity of over 1012 gigabits, which is more than all the computers on our planet times one million. With this capacity, can we ignore the observable medium concept of miasm much longer? We should now see that genetic memory might even include a memory of the diseases our ancestors had, maybe even in minute fashion. This memory of our ancestors' diseases might show itself as a tendency of a repulsion to certain behaviors or susceptibility to patterns of disease. The miasm now becomes more important in medicine.

The equations in this book can be used for our description of the processes within the volume of the cell.

Hermitian and unitary matrices are very important in quantum mechanics. These types of matrices often have an infinite number of rows and columns that can display very large sets of potential operators and ortho-normal eigenfunctions for every dynamic variable that can be represented by an operator.

If we had two quantum function operators, with ortho-normal eigenfunctions set at u_n and $L_{S,}$ then

(29)

$$\Omega u_n = \omega_n u_{n'}, \quad \Omega' v_s = \omega'_s v_s$$

and four matrices can be displayed as integrals from this relationship.

(30)

$$\begin{vmatrix} \int \overline{u}_s \Omega u_n d\tau = \omega_n \delta_{ss'} & \int \overline{u}_s \Omega' u_n d\tau = \Omega'_{ss} \\ \int \overline{v}_r \Omega v_s d\tau = \Omega_{rs'} & \int \overline{v}_r \Omega' v_s d\tau = \omega'_s \Omega_{rs} \end{vmatrix}$$

The upper left and lower right of these elements make up the diagonal representation. This function can be converted into an easy matrix. The eigenvalues are real, and have physical counterparts. The operators in matrices will be hermitian. The matrix connection of the quantum can be written as *R*/omega/*S*. A transformation from the nondiagonal to the diagonal representation of the omega then can be affected by means of the unitary matrix.

(31)

$$\sum_r \sum_s U_{sr}\Omega_{rs}(U^{-1})_{sn} = \omega_n \delta_{sn}$$

This unitary property of *U* means that

(32)

$$(U^{-1})_{sn} = (\tilde{U})_{sn} = \tilde{U}_{ns}$$

where U^{-1} is the reciprocal of *U*, is the Hermitian conjugate of *U*, ns is the complex conjugate of the matrix element *U*ns.

Heisenberg's form of the equations of motion of quantum mechanics expresses the change in dynamical variables with time without explicit use of wave functions, and hence are valid in any matrix representation. If *H* is the Hamiltonian, the equation of motion for any dynamical variable S is

(33)

$$\frac{dQ}{dt} = \frac{\partial Q}{\partial t} + \frac{1}{i\hbar}(QH - HQ)$$

Here the term *d*S/*DT* indicates the time derivative of a typical matrix element of S, the term MSM/*dt* indicates the corresponding matrix element of the partial derivative of S with respect to *t* (which is zero if S does not depend explicitly on the time), and the parenthesis is calculated according to the rules for matrix multiplication. If S does not depend explicitly on the time, and if it commutes with the Hamiltonian (S*H* = *H*S, then *d*S/*dt* = 0 and S is a constant of the motion.

In general, to quantize a classical system replace Poisson brackets by commutator brackets in the following way.

(34)

$$\{A,B\} = \sum_i \left(\frac{\partial A}{\partial qi}\frac{\partial B}{\partial pi} - \frac{\partial B}{\partial qi}\frac{\partial A}{\partial pi} \right) \rightarrow \frac{1}{i\hbar}[A,B] = \frac{1}{i\hbar}(AB - BA)$$

Thus for canonical coordinates and moments *q*i, *p*i, we get the quantum conditions (see *Quantum Biology*).

(35)

$$[q_i, p_j] = i\hbar\delta_{ij}, \quad [q_i, q_i] = 0, \quad [p_i, p_j] = 0$$

A particular representation for these quantum conditions is to write down the Schrödinger wave equation

(36)

$$q_i = q_i, \quad p_i = -i\hbar\frac{\partial}{\partial q_i}$$

Many particle systems. The Schrödinger wave function for many particles depends on the coordinates of all the particles, and the Hamiltonian is the sum of their kinetic, potential, and interaction energies. If the particles are identical, the wave function must be either symmetrical or antisymmetrical with respect to an interchange of all the coordinates of any two particles (including in the interchange both space and spin coordinates). Particles that obey Einstein-Bose statistics are described by symmetrical wave functions, and particles that obey Fermi-Dirac statistics, or (equivalently) the Pauli exclusion principle, are described by antisymmetrical wave functions.

In the special case in which the particle interaction energies can be neglected, the wave function can be written as a sum of products of one-particle wave functions like

(37)

$$u_\alpha(1) = u_\beta(2) \ldots u_\nu(n)$$

where <"(1) denotes that particle 1 is in the state " with energy *E*". The total energy is then *E*" + *E*ß + ... + *E*v. A symmetrical wave function is the sum of all distinct terms that arise from permuting the numbers 1, ..., *n* among the functions. An antisymmetrical wave function can be written as a determinant

(38)

$$\begin{vmatrix} u_\alpha(1) & u_\alpha(2) & \ldots & u_\alpha(n) \\ u_\beta(1) & u_\beta(2) & \ldots & u_\beta(n) \\ \ldots & \ldots & \ldots & \ldots \\ u_\nu(1) & u_\nu(2) & \ldots & u_\nu(n) \end{vmatrix}$$

and vanishes if any two of the states ", ß, ... < are the same.

Spin angular momentum. A particle, like an electron, proton, or neutron, that has spin angular momentum ½*S*, can be described nonrelativistically by a two-component wave function. The spin angular momentum operator *S* = ½SF operates on these two-component functions, and can be expressed in terms of the two-row, two-column Pauli spin matrices.

(39)

$$\sigma_x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}, \quad \sigma_y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}, \quad \sigma_z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

The two spin states may be chosen to be eigenfunctions of *S*z as well as of *S*2, in which case they may be written

(40)

It then follows that

(41)

$$u_{1/2}(x) = \begin{pmatrix} 1 \\ 0 \end{pmatrix} v(x), \quad u_{1/2}(x) = \begin{pmatrix} 0 \\ 1 \end{pmatrix} w(x)$$

$$S_z u_{1/2} = \tfrac{1}{2}\hbar u_{1/2}, \quad S_z u_{-1/2} = -\tfrac{1}{2}\hbar u_{-1/2}$$
$$S^2 u_{1/2} = \tfrac{3}{4}\hbar^2 u_{1/2}, \quad S^2 u_{1/2} = \tfrac{3}{4}\hbar^2 u_{1/2}$$

For a particle of spin *s*, which can be one of the numbers 0, 1/2, 1, 3/2..., the spin matrix has 2*s* + 1 rows and columns, and the wave functions have 2*s* + 1 components. These wave functions may be chosen to be eigenfunctions of *S*2 with eigenvalues *sS*, (*s* - 1)*S*, ... -*sS*, and all are eigenfunctions of *S*2 with eigenvalue *s*(*s* + 1)*S*2. Cellular biology also manages a spin like criteria which is epigenesis (see *Quantum Biology*).

If *s* = 0,1,2, ..., the particles obey Einstein-Bose statistics; if *s* = 1/2, 3/2, 5/2, ..., they obey Fermi-Dirac statistics.

In both cases the differential scattering cross section for a collision of two identical particles in the center-of-mass coordinate system may be written in terms of the scattered amplitude *f*(2) as

(42)

$$\sigma(\theta) = |f(\theta)|^2 + |f(\pi - \theta)|^2 + \frac{(-1)^{2s}}{2s+1} 2Re[f(\theta) f(\pi-\theta)]$$

Biology differs from cations to anions.

Relativistic wave equations. A scalar particle (spin 0) of mass *m* is described relativistically by the Schrödinger relativistic wave equation

(43)

$$E^2\psi = c^2 p^2 \psi + m^2 c^4 \psi$$

or

(44)

$$-\hbar^2 \frac{\partial^2 \psi}{\partial t^2} = -\hbar^2 c^2 \nabla^2 \psi + m^2 c^2 \psi$$

If the particle has charge *e*, the electric charge and current densities are

(45)

$$P = \frac{ie\hbar}{2mc^2}\left(\bar{\psi}\frac{\partial\psi}{\partial t} - \psi\frac{\partial\bar{\psi}}{\partial t}\right)$$

$$S = \frac{e\hbar}{\partial im}\,(\bar{\psi}\ \mathbf{grad}\ \psi - \psi\ \mathbf{grad}\ \bar{\psi})$$

and satisfy the conservation law

$$\frac{\partial P}{\partial t} + div\ \mathbf{s} = 0$$

(46)

When electromagnetic fields described by the potentials *A*, N are present, the substitutions *E* 6 *E* - *ey* and *p* 6 *p* - (*e*/*c*)*A* can be made in the wave equation above. The energy levels in a Coulomb field (*A* = 0, *e*R = - *Ze*2/*r*), including the rest energy *mc*2, are given by

(47)

$$E = mc^2\left[1 + \frac{\alpha^2}{\left(n - l - \frac{1}{2} + \left[\left(l + \frac{1}{2}\right)^2 - \alpha^2\right]^{1/2}\right)^2}\right]^{-1/2}$$

$$(l = 0,\ 1,\ \ldots,\ n-1;\quad n = 1,2,3,\ \ldots)$$

This formula disagrees with the Summerfield fine-structure formula, derived on the basis of the old quantum theory.

An electron (spin ½S) is described relativistically by Dirac's relativistic wave equation

(48)

$$E\psi + c(\alpha \cdot \mathbf{p})\psi + mc^2\beta\psi = 0$$

or

(49)

$$i\hbar\frac{\partial\psi}{\partial t} - i\hbar c\alpha \cdot grad\ \psi + mc^2\beta\psi = 0$$

where

(50)

$$\alpha_x^2 = \alpha_y^2 = \alpha_z^2 = \beta^2 = 1$$
$$\alpha_x\alpha_y + \alpha_y\alpha_x = \alpha_y\alpha_z + \alpha_z\alpha_y = \alpha_z\alpha_x + \alpha_x\alpha_z = 0$$
$$\alpha_x\beta + \beta\alpha_x = \alpha_y\beta + \beta\alpha_y = \alpha_z\beta + \beta\alpha_z = 0$$

Here ß and " can be expressed as four-row, four-column matrices.

(51)

$$\beta = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ & & & 0 \\ 0 & 0 & -1 & \\ 0 & 0 & 0 & -1 \end{bmatrix} \qquad \alpha_x = \begin{bmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{bmatrix}$$

$$\alpha_y = \begin{bmatrix} 0 & 0 & 0 & -i \\ 0 & 0 & i & 0 \\ 0 & -I & 0 & 0 \\ I & 0 & 0 & 0 \end{bmatrix} \qquad \alpha_z = \begin{bmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{bmatrix}$$

The wave function has four components.

(52)

$$\psi(x,t) = \begin{bmatrix} \psi_1(x,t) \\ \psi_2(x,t) \\ \psi_3(x,t) \\ \psi_4(x,t) \end{bmatrix}$$

The electric charge and current densities are $P = e\bar{\psi}\psi, \quad S = -ce\bar{\psi}\alpha\psi$

(53)

$$P = e\bar{R}R, \; S = ce\bar{R}\text{“}R$$

where is the Hermitian conjugate matrix to R; *P* and *S* satisfy the usual conservation law. Biology needs a similar matrix to regulate voltage and amperage through selective resistance, inductance, capacitance and oscillation to become ever more important through quantum biology.

Electromagnetic fields can be included by making the substitution $E \rightarrow E - e\text{N}$ and $p \rightarrow p - (e/c)A$. In the nonrelativistic limit with N = 0 and *A* constant in time, the Schrödinger wave equation is obtained with an extra term in the Hamiltonian $-(eS/2mc)\text{F} \cdot H$; this is the energy of the electron's magnetic moment of magnitude $eS/2mc$ in a magnetic field *H*. In this limit, the F's are the Pauli spin matrices, and the wave function has two components.

In a central field [*A* = 0, *e*N = *V*(*r*)], the nonrelativistic limit gives the Schrödinger wave equation with an extra term that is the spin orbit energy

(54)

$$\frac{1}{2mc^2 r} \cdot \frac{dV}{dr} S \cdot M$$

added to the Hamiltonian. Here the wave function has two components, *S* = ½SF is the spin angular momentum, and *M* = *r* x *p* is the orbital angular momentum.

(55)

$$S = \frac{1}{2}\hbar\sigma$$

$$M = R \times P$$

The relativistic energy levels in a Coulomb field (*A* = 0, *e*N = -*Ze*2/*r*), including the rest energy *mc*2, are given by

(56)

$$E = mc^2 \left[1 + \frac{\alpha^2}{[n - k + (k^2 - \alpha^2)^{1/2}]^2} \right]^{-1/2}, \quad \begin{matrix} (k = 1, 2, \ldots, n) \\ (n = 1, 2, \ldots) \end{matrix}$$

where “ = $Ze^2 * Sc$. This formula is the same as the Summerfield fine-structure formula, and is in good agreement with experiment. More on converting biology to quantum in the section on Biophysics.

Applying this system to intercellular biology will take years to perfect. Applying it to multi-cellular organisms such as the human being will take decades. At the end, however, medicine will possibly reach its ultimate effectiveness and lead the world into a millennium or more of peace, health, and compassion. Thus the prediction of the Maitreya will come true through this system of biology and medicine. Only then will man learn to revere life and respect the planet instead of raping it with synthetic technology and profiteering motives.

SUMMARY

1. In this chapter we outlined some of the quantum numbers that will be put into our matrices. These numbers reflect energy states of orbitals, spin, momentum, magnetics, etc.

2. We further proved the need for the matrices and the development of the different mathematical precepts that will control the interactions of these matrices and their niches.

3. The further analysis engenders more proof for the need of a quantum mechanical biology philosophy. And the need for our subspace connectivity principle.

4. Synthetic allopathic chemistry takes it on the chin once again.

Chapter 5

QUANTUM ENERGY *(ENERGY REGULATION)*

Anything above 0E K will transmit electromagnetic waves at certain wavelengths. According to Wien's law the wavelength of maximum intensity is inversely proportional to the absolute temperature of the emitting body. The warmer the body, the shorter the wavelength.

The Stefan-Boltzmann law states that the total rate of emissions of energy of all wavelengths is directly proportional to the fourth power of the absolute temperature. This equation involves a constant, where the energy equals 5.67 x 10-8 x T4 W ÷ Meters^2.

(1)

$$E = \frac{5.67 \times 10^{-8} \times T^4 W}{\text{Meters}^2}$$

In the case of the body, where body temperature is approximately 37E C, or 300E K, we put 300E K into the formula, and get 81 x 108 as a factor of the temperature to the fourth power. The 108 crosses off, leaving 459.27 watts per meter^2. If we convert this to watts per centimeter^2, we get .45927. In the case of the smallest cell in biology, at 10^{-5} centimeters, we will find that this converts to 4.59 x 10^{-6} watts per surface area of the cell, allowing for the surface area. The surface area would be increased by a factor of over ten, meaning that we would have 4.59 x 10^{-5} watts produced by any of these very small cells. The frequencies and wavelengths of the emission of these cells will vary, but they will be primarily involved in the infrared area of the spectrum, and also a touch of the visible and a touch of the UV. This helps support the hypothesis of the photon's effect in biology.

The energy of any photon is directly proportional to its frequency. This was discovered by Planck, and involves Planck's constant, an extremely valuable number in quantum theory, where the energy of a photon equals Planck's constant times the frequency.

(2)

$$E = 6.63 \times 10^{-27} \text{ erg. sec. x (Freq.)}$$

Planck's constant has a value of 6.63 x 10^{-27} erg seconds, or 6.63 x 10^{-34} joule seconds.

Another factor that must be dealt with here is that of the photoelectric effect of a photon producing energy in terms of electron mobilization. There are several observations that can be made concerning experimental results regarding these photons. Since we can demonstrate that there is photon release in biology, let us now pursue some photon control factors of minerals. This is one reason that various minerals are needed in biology to stabilize the photon bath (see *Quantum Biology*).

1. For a given frequency the number of electrons produced by the photoelectric effect is directly pro portional to the intensity of the radiation. The velocity of the emitted electrons remains the same, no matter what the intensity of the radiation.

2. When radiation of varying frequencies is measured, the energy of the emitted electrons increases in frequency. This has a direct relationship. As we increase the frequency we increase the kinetic energy.

3. When various metals are used, they might have the same slope of their direct relationship, but each metal will have a different threshold frequency in which they will start to emit the electrons.

There are three general and basic types of electrical conductive properties that we can divide compounds into: *insulators*, *conductors*, and *semiconductors*. Metals usually have a high conductivity, lying in the range of 10^6 ohms per cm. The conductivity of these metals is usually only slightly temperature-dependent, falling slowly if the temperature is raised. Insulators have low conductivities, usually in the area of 10^{-12} ohms per cm. Intermediate values are found in semiconductors.

As we have shown, the conductivity of these various compounds can be changed not only from temperature but also from light, or photoconductivity. These types of photons, found in temperature and light, can change the conductivity of a compound, and allow it to increase or decrease the ability to conduct electrons. This is the phenomenon of the tran-

sistor, and the ability to have different types of semiconductors. Silicon Valley owes its existence to this theory.

These compounds also have optical properties. They will have refractive indexes, as they can help to shape the photons flowing through them. They will have photo-dependence, and also activation energy, or the energy needed to allow changes in the item.

Metals have high absorption coefficients of the optical property, from the ultraviolet to very long wavelengths. Metals are generally opaque, and are often very good reflectors. Insulators are generally transparent in the visible region, or at least part of it; but possess some strong selective absorption bands at shorter, and sometimes longer, wavelengths. These insulators will often have low reflection coefficients. The semiconductors are in the middle, are generally opaque in the visible, but are transparent at the infrared region of the spectrum (see Chapter 14). Thus biology would use all of these phenomena in developing an ability to control not only heat, but visible, ultraviolet, and the electron conductivity bands.

The impurity levels in mixing these in various compounds makes studying them in biological situations very difficult because of our indeterminacy principle. But we will try to analyze some of the procedures in developing our matrices, so that we can understand some of the factors that these various elements involve.

In the semiconductor field there are *intrinsic*, or full-band systems, or *extrinsic*, where impurity centers can come along and localize the energy, often into a forbidden zone.

Two kinds of impurity levels are possible: *donor* and *acceptor*. At zero temperature, donor levels are occupied by electrons, which can be excited in the conduction band if the temperature is raised. Acceptor levels are empty at zero temperature, but electrons may be excited thermally to these levels from the full band of positive Halls, thus creating a Hall conductivity.

The Hall effect is when the transverse voltage can be produced when a current is passed through a conductor lying in a magnetic field at right angles to the current. Both conductivity and Hall effect will come into play in development of our semiconductor. The activation energy follows the formula

(3)

$$\text{Activation Energy} = Y = 2(2\ \text{Bmk}T)^{3/2} / h^3$$

m in this formula is the effective mass of the electron in the conduction band, *T* is the temperature.

Thus we can see in many compounds that there are also effects on the magnetic ability, so that the entities of metals, conductors and insulators all have different effects from light, magnetic, resistance, and conductivity, as well as dielectric refractive index and inductance effects.

Impurity centers which provide donor and acceptor levels are likely to be one of the following types: a) substitutional impurities of valency different from the valency of the main lattice atoms; for example, phosphorous or boron in germanium. b) vacant lattice sites— these can occur in both valence and ionic crystals. In the latter, either anions or cations may be missing. A missing anion, an electron bound to the valency, is known as an *F* center. c) interstitial ions. In zinc oxide, for example, an excess of zinc is taken up interstitially. d) crystal dislocations.

There are two types of photoconductive crystals: *idiochromatic* crystals, whose properties are determined by the basic material alone, and not by artificially introduced impurities; and *allochromatic* crystals, which are not photoconductive when pure, but become so when four atoms or particles are introduced into the crystal. There are also differences in these primary and secondary currents.

Primary Currents	*Secondary Currents Found in Biology*
a. `Instantaneous' with illumination	*Appreciable time lag*
b. Little temperature dependence	*Marked temperature dependence*
c. Quantum efficiency unity	*May exceed unity*
d. Occur in perfect crystals	*Usually larger in less perfect crystals*
e. Proportional to light intensity	*Often hysteresis effects*
f. Current initially proportional to applied field, finally saturating	*No simple function of applied field*

If a crystal is exposed to light at a certain wavelength, electrons inside a crystal will be raised into conduction levels. They will then be able to freely move about in the crystal lattice under an applied field. The positive charges may also be mobile, and if so, they also may contribute to the primary photo current. All of the photoelectrons do not in general succeed in reaching the anode. After traveling some irregular paths in the crystals, some electrons become trapped at crystal imperfections, but by recombination with a positive hole. Thus the total distance that an electron can travel in a primary crystal may be very large, sometimes on the order of 1 cm, but unless the applied field is very high, that movement towards the anode is often only a small fraction of this distance. In biology interstitial electrons in the body can gravitate to larger distances, as in neuronal conduction or lymphatic dipole cascade.

The liquid crystal effects of both water and the biology of the cells can come into play here, and affect the photoconductivity of the different items we measure. Any electron transfer involves photon release and absorption. All biology is photon- and electron-dependent.

We will graph out some of the categories of atoms, insulators, metals, etc., in a basic ability to understand some of their variances. This chart is very simplistic, and usually can only tell the averages, as there are very subtle differences and control factors which all of these atoms will show in a biological system. Thus the refractive index can change in light of temperature. The magnetic effect can change in light of photoconductivity. Temperature has a great effect on all of

these different entities. What we have reported in this chart are merely some of the averages as a way of a base understanding in our development towards the matrix (see Chapter 14).

Platinum's threshold frequency is 1.51 x 10^{15} Hz, or a wavelength of 1,980 angstroms. Silver is 1.13 x 10^{15} Hz, or 2,640 angstroms. Potassium has a threshold frequency of 4.2 x 10^{14} Hz and a wavelength of 7,100 angstroms. Zinc has a frequency of .96 x 10^{15} Hz.

Average Resistivity

	Resistance	Activation Energy	Threshold Wave Length	Refractive Index	Comment
Boron	$10^{6}\Omega$ cm at 23° C	1.25 EV (OP) 1.05 EV (TH)	.98μ		Stabilizes neurowave function. Key as an impurity for biology, helps with thermal adjustment
Crystal Carbon	$10^{14}\Omega$ cm at 23° C	5.3 EV (OP)	.231μ .436μ	2.46 - 2.40 .3974 - .759	Red with U.V. doubles photo current energy essential
Silicon	30Ω cm 23° C	1.12 EV (TH	.6μ	3.55 - 3.94 1.1μ - 2.6μ	Severe temperature dependence of activation energy stabilizes many biological --
Germanium	1 to 10Ω cm	.72 EV (OP)	1.72μ	4.14 - 4.07 1.8μ - 2.6	Phototransistor effects, regulates oxygenation, key as an impurity for biology
Tin (grey)	Variation 2500 - 5,000Ω cm	.1 EV (OP)	12μ		Magnetic susceptibility makes it responsive for heart
Phosphorous (many forms)	3 x $10^{10}\Omega$ cm at 34° C to 10^{15}	2.6 (OP) to 1.56 EB (TH)	.49μ to .86μ	2.19 to 2.90 .434μ to .656μ	Essential for all cellular, widely responsive function, contains information states, optically widely responsive
Arsenic	$10^{7}\Omega$ cm	1.14 EV (TH)	.97μ to 1.0μ	3μ to 8μ 3.35	Triple response curves, very good photo & temp. response stabilizes adrenal
Antimony	2Ω cm	.07 EV (TH) .055 EV (OP)	11μ to 18μ		Activates easily to stabilize brain function
Sulphur	$10^{16}\Omega$ cm dark	2.5 EV (OP) (TH)	40μ to 50μ	2.32 - 1.93 3969 Å to 6869 Å	Electron stable substitutes for oxygen in life matrix
Selenium	$10^{12}\Omega$ cm	2.5 (OP) 1.7 EV (TH)	.6μ	9.97 - 40.6μ	Dielectric constant makes it essential for body's regulation of capacitance
Tellurium	3/Ω cm	.37 EV	3.15 μ - 3.45		Allows easy conduction of electrons
Iodine	$10^{8}\Omega$ cm at 25° C	2.3 EV (OP to 1.33 EV (TH)	6μ	3.34 to .589μ	Very light- & heat-responsive through dielectric variance

The effects of these and other metals account for why these trace minerals are needed in the cells. They help to modulate these different types of frequencies that mobilize electrons. The energy of the quantum photon is Planck's constant times the frequency, which is expressed in watts. If one half the mass times the velocity2 is the kinetic energy of the electron as it leaves, then we will see from the following equation that Planck's constant times the frequency minus *w* equals 1/2 mass velocity2.

(4)

$$8 \times R - w = \frac{mV^2}{2}$$

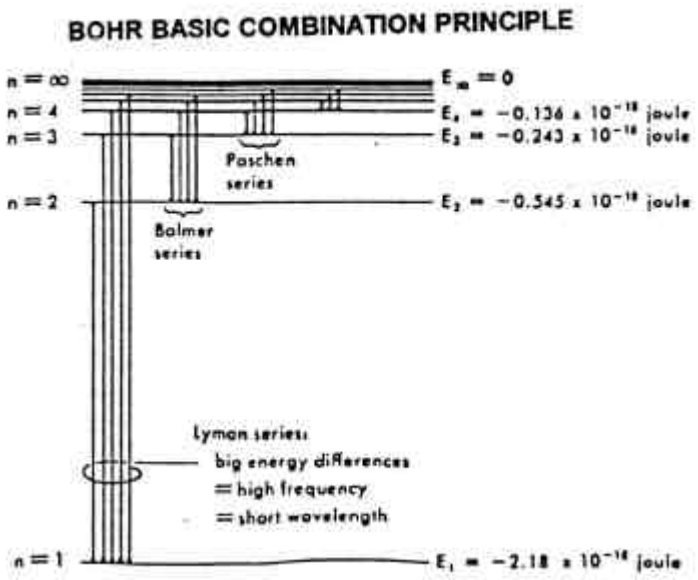
The size of these various atoms is what makes the variant type of frequency needed as threshold frequency to pull off an electron and give it kinetic energy. The energy must be absorbed from a single photon. If the radiation wavelengths are longer, they will not have sufficient energy quanta to pull the electron free; thus none will be admitted. If the shorter wavelengths are used, there will be enough energy, and the excess energy will result in excess kinetic energy in the electron emitted. This is why certain short wavelengths such as x-ray and gamma rays are very ionizing, in that they can pop off electrons and leave ions. This ionizing radiation has mutagenic or metabolic effects on biology. If ionizing radiation such as x-ray strikes a gene, it can have dramatic, negative consequences.

Bohr laid out some classical laws of quantum mechanics and electrodynamics. We deal with three of them now in our description of the atomic process.

1. Of the infinite number of possible mechanical orbits for an electron revolving about a nucle us, only a few are permitted. These are the orbits in which the angular momentum of the electron is an integral multiple of *h* + 2 pi.

2. While circling around these permitted orbits the electrons do not emit any electromagnetic radiation.

3. Electrons may jump from one orbit to another, in which case the difference in energy between the two states in motion is radiated as a photon whose frequency is determined by the quantum rule:) *E* = *h* x *f.*



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BOHR BASIC COMBINATION PRINCIPLE

$$\overline{V} = \left(\frac{E_1 - E_2}{S}\right) \sec^{-9}$$

$\overline{V}$ = Freq. (Hz) of emitted spectral line

E_1 + E = Atomic Energies in ergs giving spectral lines

S = Planck's Constant

$$V = \frac{V}{c} = \frac{1}{8} = \left(\frac{E_1}{hc} - \frac{E_2}{hc}\right) cm^{-1}$$

8 = Wawelenght of the observed line in cm

V = Wawe number of the observed 1 Kayser spectral line in cm^{-1}

$\frac{E}{hc}$ = Spectroscopic energy levels

Ryberg Equation

$$V_N = V \text{ infinity} - \frac{R}{(N + :)^2}$$

VN = Wave number of observed line
V infinity = Asymotope of limit of series
: = Constant

R = Ryberg Constant
N = Integral

Lyman series

$$V_n = R\left|\frac{1}{1^2} - \frac{1}{N_2^2}\right| \quad ; \; N_2 = 2, 3, 4, 5, ...$$

Balmer series

$$V_n = R\left|\frac{1}{2^2} - \frac{1}{N_2^2}\right| \quad ; \; N_2 = 3, 4, 5, 6, ...$$

Paschen series

$$V_n = R\left|\frac{1}{3^2} - \frac{1}{N_2^2}\right| \quad ; \; N_2 = 4, 5, 6, 7, ...$$

1Ryberg = 1 Ry = 3.6 eV

Bohr was thus able to determine the various electron shells that might be possible within the hydrogen atom. Several other researchers such as Balmer, Lyman, and Paschen found other possible places where the hydrogen atom might orbit. These are outlined in the frequencies below.

$$3.29 \times 10^{15} \left(\frac{1}{2^2} - \frac{1}{3^2} \right) = 3.29 \times 10^{15} \left(\frac{1}{4} - \frac{1}{9} \right) = 4.57 \times 10^{14} \text{ Hz}$$

$$3.29 \times 10^{15} \left(\frac{1}{2^2} - \frac{1}{4^2} \right) = 3.29 \times 10^{15} \left(\frac{1}{4} - \frac{1}{16} \right) = 4.57 \times 10^{14} \text{ Hz}$$

$$3.29 \times 10^{15} \left(\frac{1}{2^2} - \frac{1}{5^2} \right) = 3.29 \times 10^{15} \left(\frac{1}{4} - \frac{1}{25} \right) = 4.57 \times 10^{14} \text{ Hz}$$

$$3.29 \times 10^{15} \left(\frac{1}{2^2} - \frac{1}{6^2} \right) = 3.29 \times 10^{15} \left(\frac{1}{4} - \frac{1}{36} \right) = 4.57 \times 10^{14} \text{ Hz}$$

$$f \text{ (Lyman)} = 3.29 \times 10^{15} \times \left| \frac{1}{1^2} - \frac{1}{n^2} \right|$$

in which n took on successive integral values of 2, 3, 4,...

$$f \text{ (Paschen)} = 3.29 \times 10^{15} \times \left| \frac{1}{3^2} - \frac{1}{n^2} \right|$$

in which n took on successive integral values of 4, 5, 6,...

There are forces that pull the electron towards the center of the nucleus, the attractive forces between the proton and electron. There is also centrifugal action that pulls the electron away. As an electron travels, it produces magnetic and static fields. This requires energy. But in the atomic orbits it is different. There are certain shells in which the electron can orbit safely without the expenditure of electrodynamic energy. At this balance point there must be a balance of energy. These balance shells or orbit patterns will follow precise laws known to quantum dynamics. There are many more laws of spin, angular momentum, etc. Biology will thus be influenced by these laws and reflect these patterns. This new study of biology offers dramatic new frontiers, and exciting new discoveries await us in our new energetic medicine field. The computer memory chip of biology might be the molecular quantic energy of the energy states in an atom, molecule, or system.

These numbers also fall out of the Isaacs matrix, showing that biology must have integral knowledge of hydrogen. Hydrogen nucleus or a free proton is fundamental for biology. The energy stored in these atomic orbitals is essential for biological life in the interaction, storage and retrieval process, and to handle information, mass energy, charge, and momentum. This part of biology is ignored completely by synthetic chemical concerns. This glaring error is due to their lack of quantic sophistication, and has continued to promote iatrogenic disease due to this inappropriate simulation.

The balance that must be met between the electron's attraction to the nucleus and the centrifugal force forcing it out must be of quantum dynamics and common to all matter entering this universe.

One such law is

(1)

$$\frac{ke^2}{r^2} = \frac{mv^2}{r} \quad ; \; r = \frac{ke^2}{mu^2}$$

In fixing the equation for Bohr's quantum numbers and Planck's constant, we get the second equation

(2)

$$mvr = \frac{nh}{2B} \quad ; \; r = \frac{nh}{2Bmu}$$

leading us to the third equation

(3)

$$\frac{ke^2}{mu^2} = \frac{nh}{2Bmu}$$

$$u = \frac{2Bke^2}{nh} \text{ or } \frac{1}{n} \text{ x } \frac{2Bke^2}{h}$$

and finally, solving for *r* with the fourth equation

(4)

$$r = \frac{nh \text{ x } nh}{2Bm \text{ x } 2Bke^2} = n^2 \text{ x } \frac{h^2}{4B^2kme^2}$$

with *n* = 1, Planck's constant being 6.63 x 10-34 joule seconds, *k* with a value of 9 x 109, the mass of an electron as 9.1 x 10-31 kilograms, and the electron charge always 1.602 x 10-19 coulombs. Then the value of the Bohr radius will be

(5)

$$r = \frac{(1)^2 \times (6.63 \times 10^{-34})^2}{4B^2 \times 9 \times 10^9 \times 9.11 \times 10^{-31} \times (1.602 \times 10^{-19})^2}$$

$$= 5.3 \times 10^{-11} \text{ m} = 0.53 \text{ D}$$

This is important for biology in calculating the exchange energies of our electron transport chain.

The velocity of the electron inside the atom will be

(6)

$$V_8 = \frac{e^2}{S} \quad - 2 \times 10^6 \text{ M/sec}$$

This is about 400 miles a second, or one tenth the speed of light. To supply energy we speak of electron potential. The electron volt is a microscopic measure of molecular binding energy. An electrical volt in macroscopic terms is expressed by the ratio

(7)

$$\text{Volt} = \frac{\text{Electron Volt}}{\text{Charge of the electron}} = \frac{\text{EV}}{\text{Coulumb}}$$

$$\text{Since a Coulumb} = \left(\frac{1}{4BE_0} \text{ QQ } \mathbb{N} / \text{ R}^2 \right),$$

which in quantic terms yields e2 Qe2/4BE0. e^2 has dimensions mass length3 time3. Thus

(8)

$$1 \text{ Volt} = \left| \frac{1}{25} \quad \frac{1}{4BE_0} \right|^2 \quad \frac{MQe^2}{S^2} = \frac{Qe}{100BE_0A_0}$$

with $1 / 4BE_0$ relating to the constant of electromagnetism. Thus the macro world owes its existence to its deeper quantum nature, just as biology owes its existence to its deeper quantum nature.

With larger orbits we find that there are different quantum numbers.

(10)

$$r_2 = 4r_1, \qquad r_3 = 9r_1, \qquad r_4 = 16r_1, \text{ etc.}$$

So our matrix for biology will need a quadratic series.

It would be useful to solve for the kinetic energy of the electron in its orbits, using the formula

(11)

$$KE = {}^1/_2\, mv^2 = \frac{m}{2} \times \left| \frac{2Bke^2}{nh} \right|^2$$

$$= \frac{2B^2k^2me^4}{n^2h^2}, \text{ or } \frac{2B^2k^2me^4}{n^2h^2} \times 2$$

Calculating the potential energy we use the formula

(12)

$$PE = \frac{-ke^2}{r} = -ke^2 \times \frac{4B^2kme^2}{n^2h^2}$$

$$= \frac{-4B^2k^2me^4}{n^2h^2}, \text{ or } \frac{B^2k^2me^4}{n^2h^2} \times (-4)$$

The total energy is supplied by kinetic energy plus potential energy.

$$\frac{B^2k^2me^4}{n^2h^2} \times (-2)$$

$$= -\frac{1}{n^2} \times 2B^2k^2 \frac{me^2}{h^2}$$

(13)

$$= -\frac{1}{n^2} \times \frac{2B^2 \times (9 \times 10^9)^2 \times 9.11 \times 10^{-31} \times (1.6002 \times 10^{-19})^4}{(6.63 \times 10^{-34})^2}$$

$$= -\frac{1}{n^2} \times 2.18 \times 10^{-18} \text{ J}$$

(Our biological matrix will have to perform this calculation in many ways for conservation and stabilization of kinetic versus potential energy.)

Potential energy was a bit irregular in the way this was chosen to be manipulated. For time and space considerations it was necessary.

In the third postulate of Bohr we find that as the electron jumps from level to level there is a change in the energy, and this is radiated as a photon. All electron charge transfer and electron transport are photonic. The mitogenic energy phenomenon is a reflection of photon control at its finest.

$$)E = E_4 - E_2$$

$$= -\frac{1}{4^2} \times 2.18 \times 10^{-18} - \left| \frac{1}{2^2} \times 2.18 \times 10^{-18} \right|$$

(14)

$$= -\frac{1}{16} \times 2.18 \times 10^{-18} + \frac{1}{4} \times 2.18 \times 10^{-18}$$

$$= 2.18 \times 10^{-18} \times \left| \frac{1}{4} - \frac{1}{16} \right|$$

$$f = \frac{)E}{h} = \frac{2.18 \times 10^{-18}}{6.63 \times 10^{-34}} \times \left| \frac{1}{4} - \frac{1}{16} \right|$$

$$= (3.29 \times 10^{15}) \times 0.1875 = 6.17 \times 10^{14} \text{ Hz}$$

(15)

$$f = 3.29\ 3.29 \times 10^{15} \times \left| \frac{1}{n_1^2} - \frac{1}{n_2^2} \right|$$

This formula tells us about the possibilities in the hydrogen spectrum of potential photons that might fall out. Our analysis of hydrogen is basic to our understanding of biological phenomena.

Understanding of this simplest atom and its quantic secrets is basic to our next step of maneuvering our mathematical constructs to plot other atoms, molecules, vions, cells, multi-cell structures, organs, organ systems, organisms, societies, environments and beyond.

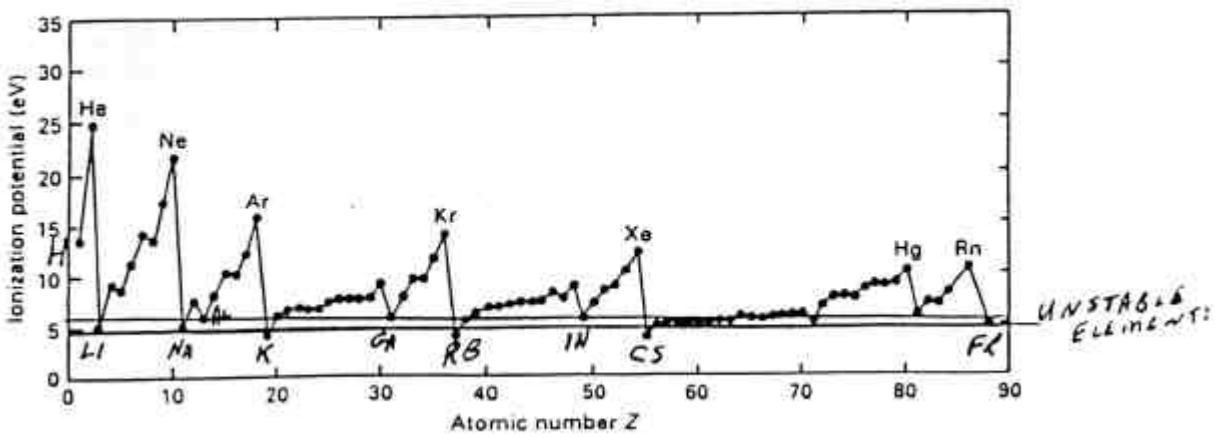
The complexity of each new step will involve new multiplicities of dogma that will blossom into new studies and new fields of study previously unthought of. By including all our present physics in our life science, we can see that biology was indeed economical in its development.

Present medical and biological thought has not included photons, electrons, EMR, inductance, capacitance,

or indeterminacy, to name just a few. Present medicine's clinging to chemical process by exclusion of other data and philosophy serves only chemical profiteering motives. As medicine grows up, perhaps it can meet this new challenge.

In our analysis for biology let us approach some nuclear models and briefly work with the magic numbers of atomic physics. These well-known magic numbers are 2, 10, 18, 36, 54, 80 and 86. This shows stable amounts of electrons around atoms that produce nuclear stability. These correspond to the elements of helium, neon, argon, krypton, zion, mercury, and radon. Apart from mercury all of these are noble gasses. We know that their electronic structure is characterized either by a closed shell of two electrons such as helium, or by one or more closed shells.

This is perhaps one of the problems with mercury; that it has become so stable that it will interfere with biology, and have a toxic occurrence because of its large size and its stability. Its large size will allow it to interfere with any cellular processing, and its stability causes difficulty in liver and kidney to detoxification. Similar problems are expressed with radon. Of particular importance here also are the unstable elements that fall out from these magic numbers. This is shown in the figure below.



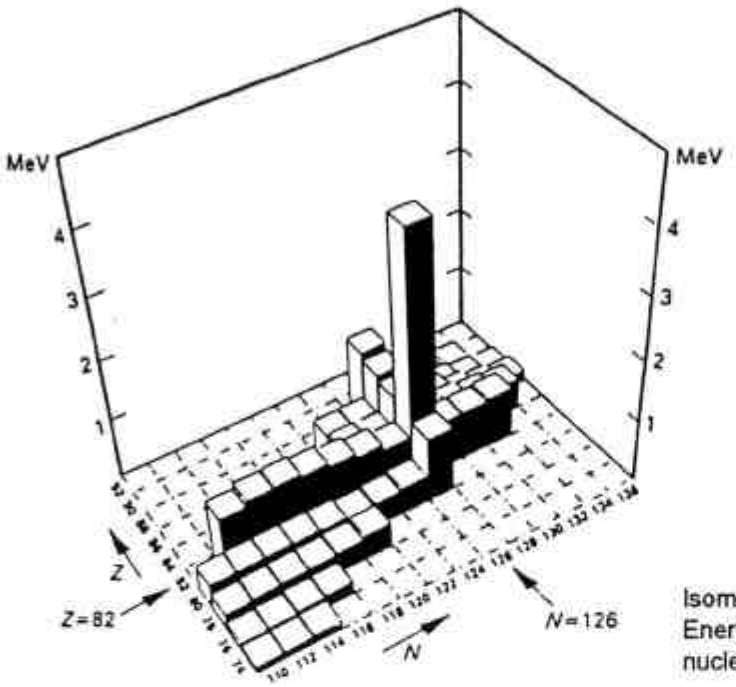
Here in the unstable element section we can see some of the elements which have the most attraction to electrons, and repulsion forces as well. These are the elements which will have the most particular effect on the processing of biological material.

From this figure we can see that the peaks indicate the magic stability numbers, whereas the valleys indicate the unstable entities.

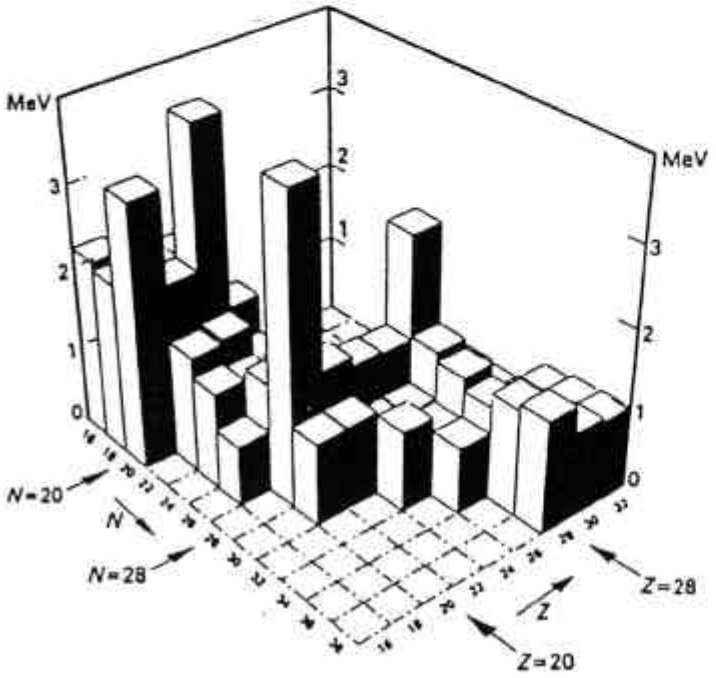
Nuclear Magic Numbers: 2, 8, 20, 28, 50, 82, 126

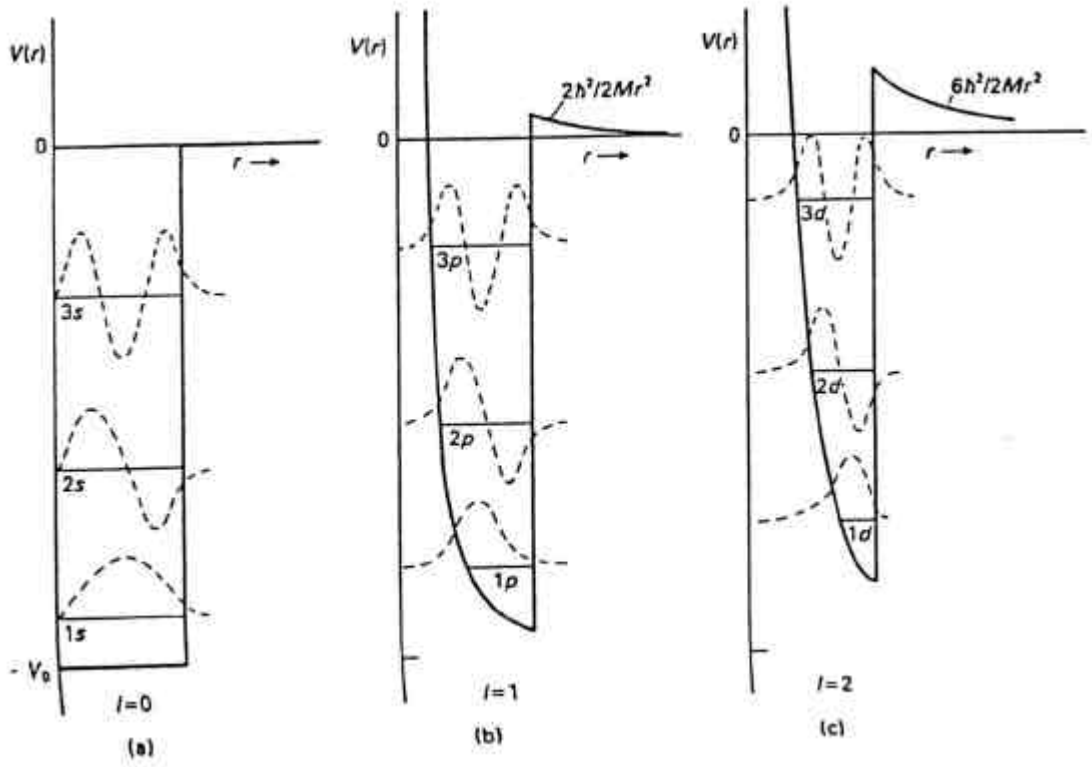
1. Deviations in nuclear binding energy near magic number
2. Neutron (proton) separation energies have peak where N(Z) in magic
3. Elements with Z(N) magic have more isotopes
4. Elements with Z(N) magic have natural abundances greater than other elements
5. N Magic nuclei have slow neutron absorption cross section very much longer than others
6. The first 2+ excited state of even-even nuclei has exceptionally large excitation energies
7. The existence of islands of isomerism

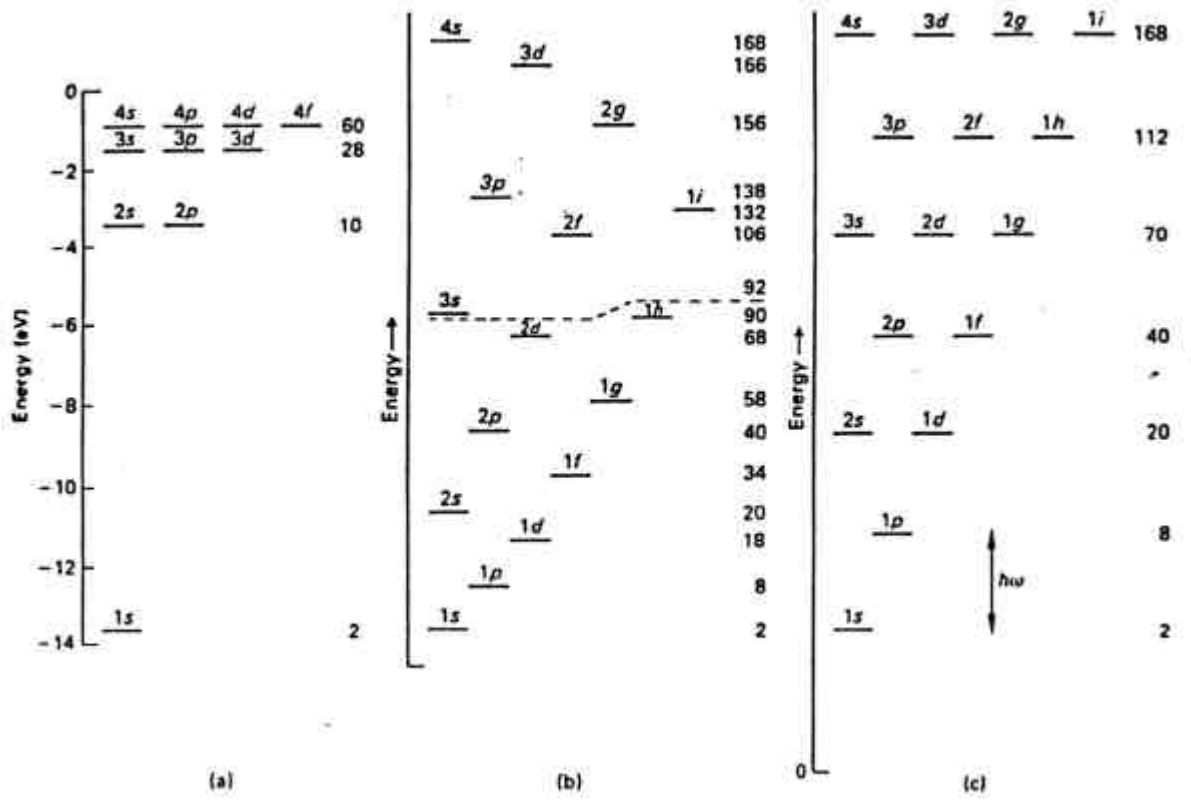
The above table supplies some evidence for the nuclear magic numbers.



Isometric Representation of the Excitation Energies for the First 2⁺ state of known even nuclei peaks at magic numbers




V(r)
0
r
3s
2s
1s
- V0
l=0
(a)
V(r)
2ħ²/2Mr²
0
r
3p
2p
1p
l=1
(b)
V(r)
6ħ²/2Mr²
0
r
3d
2d
1d
l=2
(c)


Energy (eV)
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−6
−8
−10
−12
−14
4s
4p
4d
4f
3s
3p
3d
2s
2p
1s
60
28
10
2
Energy
4s
3d
2g
3p
1i
2f
3s
1h
2d
1g
2p
1f
2s
1d
1p
1s
168
166
156
138
132
106
92
90
68
58
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20
18
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Energy
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3d
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3p
2f
1h
3s
2d
1g
2p
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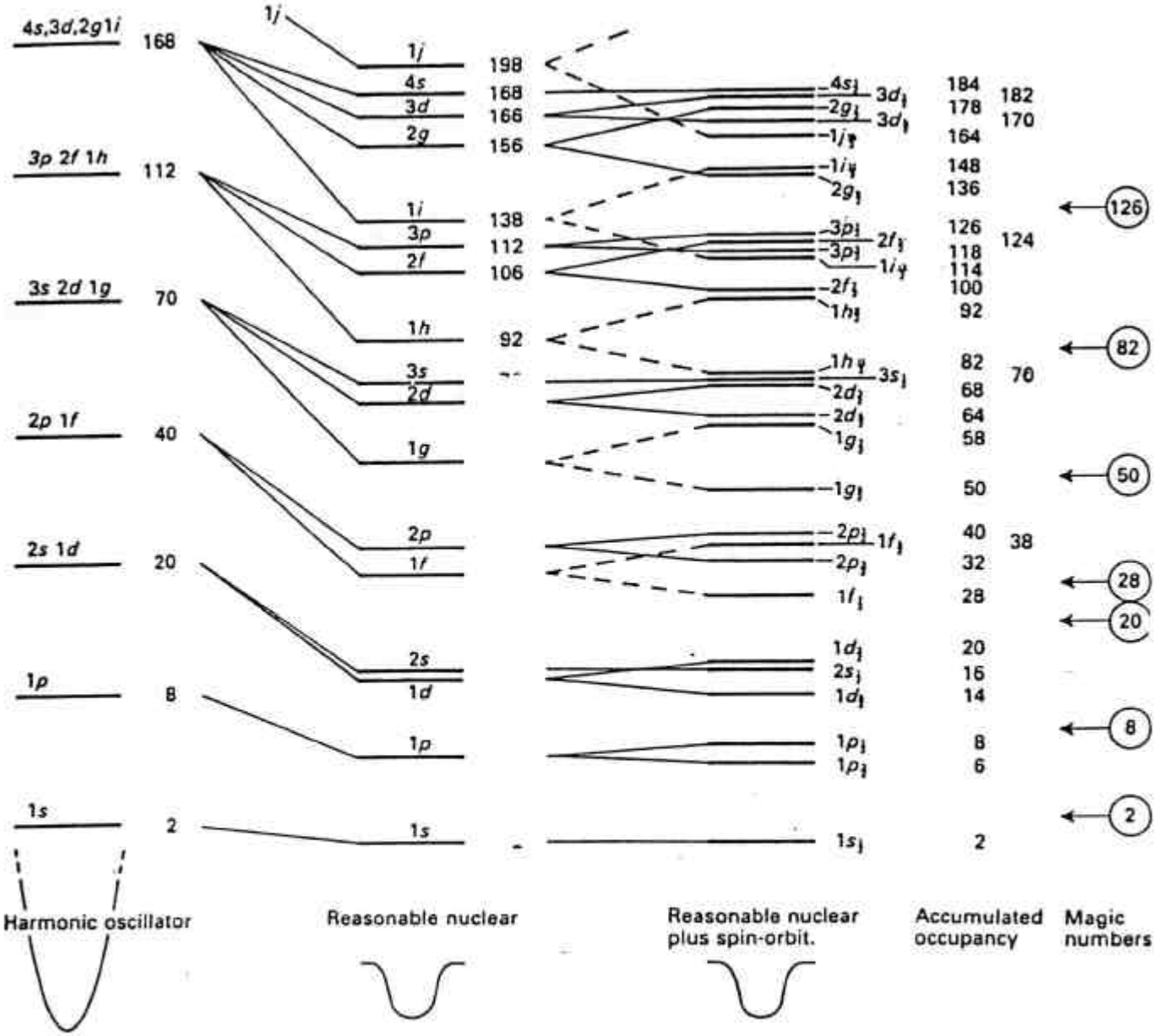
2
0
(a)
(b)
(c)



A schematic representation of the change in single-particle level ordering in moving from (a) the harmonic oscillator to (b) a reasonable nuclear potential to (c) the same with an inverted spin-orbit interaction added. On the right of each are shown the accumulated occupancy numbers. An ordering is given in (c) which gives the magic numbers. Between these numbers the residual interactions between nucleons will alter the ordering as the levels are filled. The splittings caused by the spin–orbit interaction which are vital to the explanation of the observed magic numbers are emphasized by heavy broken lines: they are $1f \rightarrow 1f_{7/2} + 1f_{5/2}$, $1g \rightarrow 1g_{9/2} + 1g_{7/2}$, $1h \rightarrow 1h_{11/2} + 1h_{9/2}$, and $1i \rightarrow 1i_{13/2} + 1i_{11/2}$. These are the splittings mainly responsible for the gaps defining the magic numbers.

From this final diagram we can see the spin orbit interaction which implies different energy states which will need to be handled by our biological matrix. Electromagnetic moments, the magnetic dipole, will also have to be dealt with.

Energy of a Magnetic Dipole M in a Magnetic Field B is

$$E = -\mu B$$

$$\begin{aligned} 1\ Bohr\ Magneton &= 9.274 \times 10^{-24} JT \\ &= 5.788 \times 10^{-11}\ MeVT^{-1} \\ 1\ Nuclear\ Magneton &= 5.051 \times 10^{-27}\ JT^{-1} \\ &= 3.152 \times 10^{-14}\ MeVT^{-1} \end{aligned}$$

The units of magnetic dipole moment

The energy *E* of a magnetic dipole **μ** in a magnetic field **B** is given by

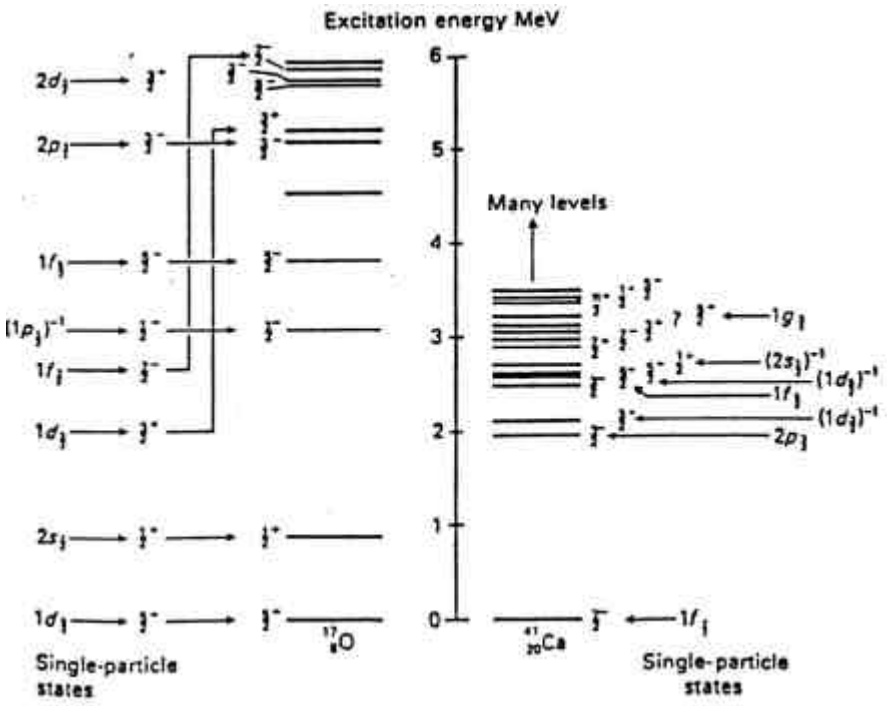
$$E = \mu . B,$$

so that the units of μ are joules per tesla. The magnetic moment of a classical electron (no spin) in an orbit with angular momentum S is $-eS/2m_{e1}$ *e* being the magnitude of the electronic change and me the mass of the electron. The magnitude of this quantity is one **Bohr magneton**. Therefore

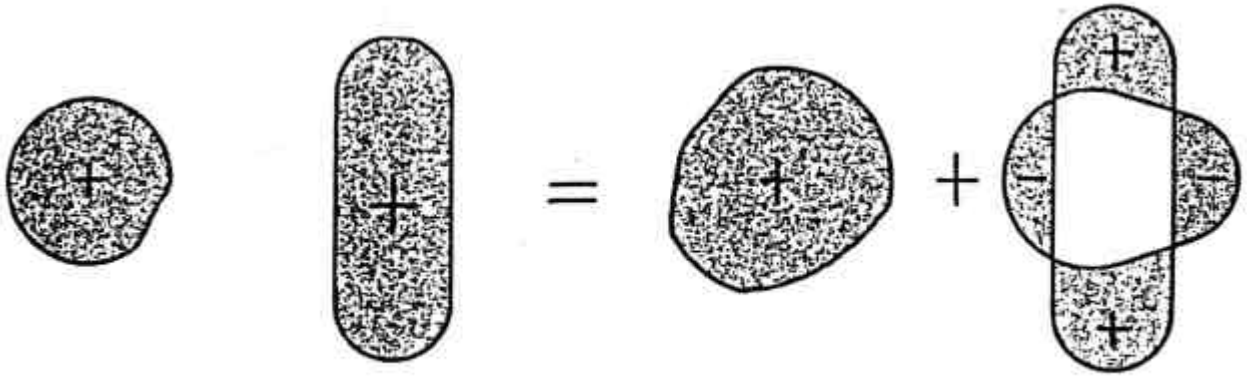
$$\begin{aligned} 1\ Bohr\ magneton &= 9.274 \times 10^{-24}\ JT^{-1}, \\ &= 5.788 \times 10^{-11}\ MeV\,T^{-1}. \end{aligned}$$

In nuclear physics the same quantity for a proton is $eS/2M_{p1}$ which is one nuclear magneton, M_p being the mass of the proton.

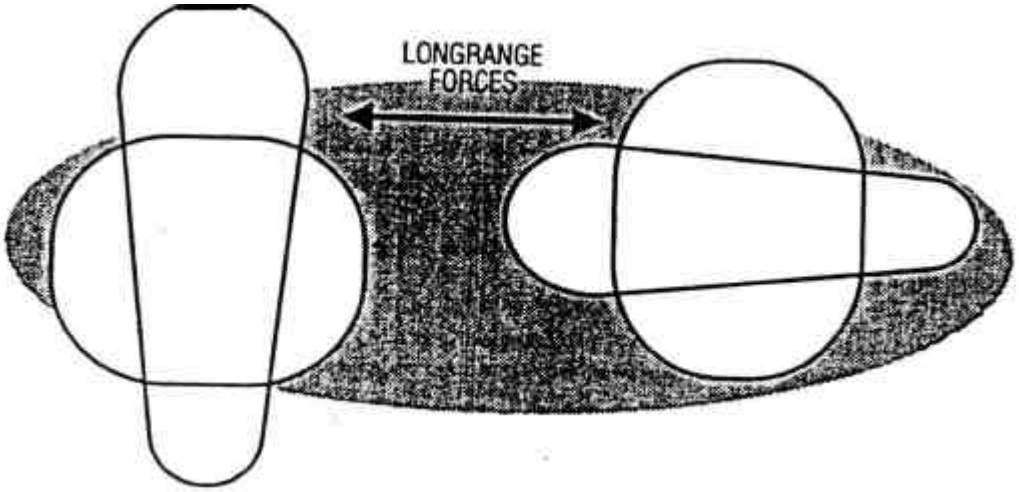
$$\begin{aligned} 1\ nuclear\ magneton &= 5.061 \times 10^{-27}\ JT^{-1} \\ &= 3.152 \times 10^{-14}\ MeV\,T^{-1}. \end{aligned}$$



The electric quadrupole is also of consideration.



Finally, most important for our analysis will be the consideration of the excited states in the shell model.

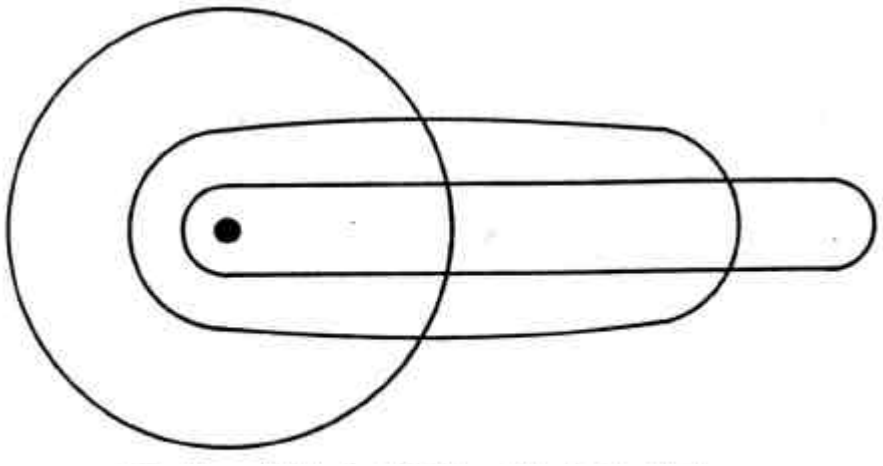


The shifting of energy states within the nucleus and of the orbital electrons allows biology to make information storage processing and retrieval possible. Thus we can see the ability of biology to use a single molecule as a computerized chip to maintain and store information from an electromagnetic transfer of potential.

Let us now return to Bohr.

Bohr introduced the *principle quantum number*, known as *N*. He did this by quantizing and assigning certain specific values to the angular momentum of the electron. This will be the first factor in our biology matrix.

Now we talk about *N* as the principle quantum number, referring to the general energy level of the electron. There are subtle levels inside this *N*, but this *N* refers to general bands of energy levels that the electron might occupy.



Circular and Elliptical Orbits of Nearly Identical Energy But With Different Long-Range Effects

The second quantum number, *L*, is the orbital quantum number reflecting magnitude. This came into existence because of Summerfield's introduction of elliptical orbits. This second number is a measure of the angular momentum of the electron, and it depends on the ellipticity of the orbit. A perfectly circular orbit will have the maximum angular momentum. Our matrix will need an elliptical conversion of harmonic series.

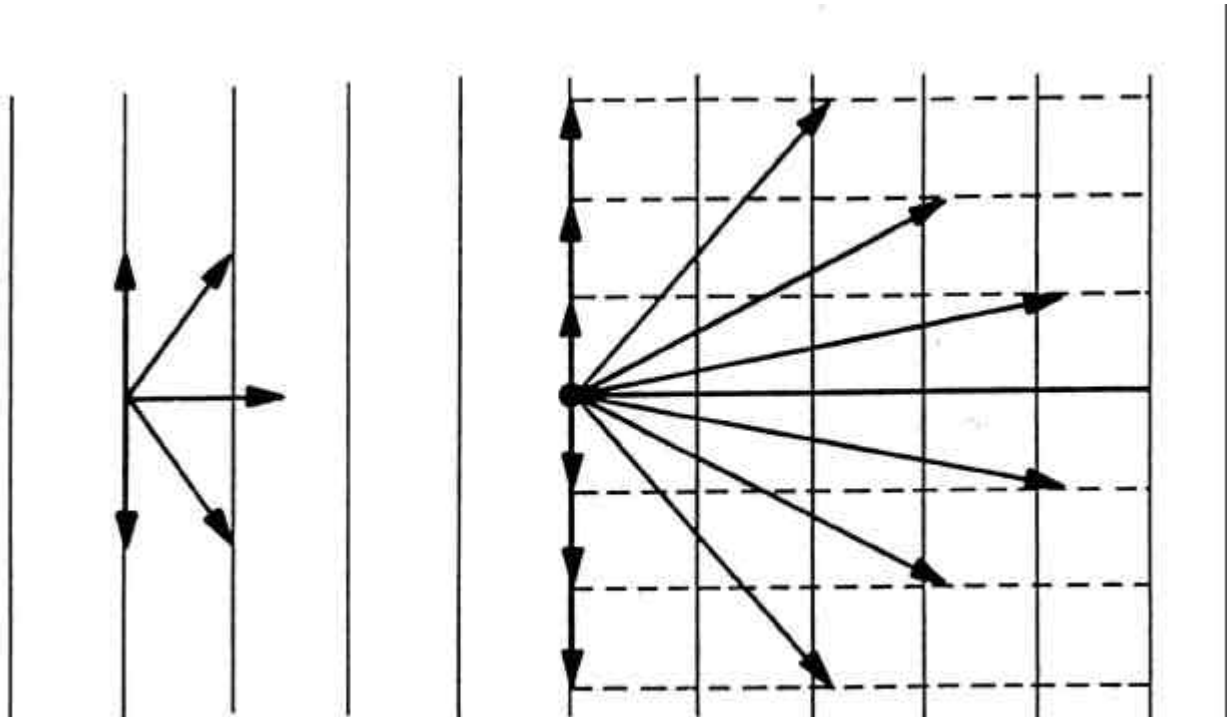
An oscillation along a straight line penetrating the nucleus has 0 angular momentum. *L* can only have integral values ranging from 0 to *N*-*L* for *N* = 1; thus *N* can only have a value of 0. For *N* = 3, *L* can be 0, 1, or 2.

Poor and Summerfield found that the angular momentum of the electron in its orbit will turn out to be the square root of (*L* x *L* + 1) x Planck's constant ÷ 2 pi.

$$\text{Angular Momentum} = \frac{\sqrt{(L \times L + 1)\, h}}{2B}$$

This led to the discovery of another quantum number of *M*. This is the *magnetic momentum*. It is directly proportional to the angular momentum system, and must be quantized in the direction of the magnetic field. Yourgrau subdivides *M* into *M*L and *M*S. *M*L refers to the *Z* component of the angular momentum. *M*S reflects spin coordinate of *M*. Others have referred to *M*S, giving it its own quantum number.

MAGNETIC FIELD



Vectors representing the orientation of an electron's magnetic moment in a magnetic field

Another quantum number is known as *S*, or the *spin quantum number*, which is established by the electron spin. This can have only two values, -1/2 or +1/2.
Thus there are four basic quantum numbers: *N*, *L*, *m* and *S*. There are many more with a more subtle nature. These are *J*, *R*, possibly *G*, and others.
Yourgrau writes:

> "Indeed, an astronomic number of quantum states or of microstates is usually compatible with a given set of macroscopic parameters, defining a macro-state of a thermo-physical system. One then therefore resorts to the use of a virtual quantum mechanical ensemble of systems, which is representative of the real physical system. Each system of the ensemble must replicate the real system with respect to molecular composition, environment, and macroscopic parameters."

Such a representative system is our biological matrix.

The Pauli exclusion principle states that in any atom no two electrons can have the same set of four quantum numbers.

As the elements become more and more complex they start to fall into a periodic chart based on the descriptive processes of these quantum numbers. It was Russian chemist Dimitri Mendeleev (1834 to 1907) who found that there must be a regular periodicity in the natural sequence of elements. He made the bold jump into a periodic table from observations that were later borne out to be proven by quantum numbers. We can at this time extrapolate a biological periodic table based on our understanding to date (see Chapter 12).

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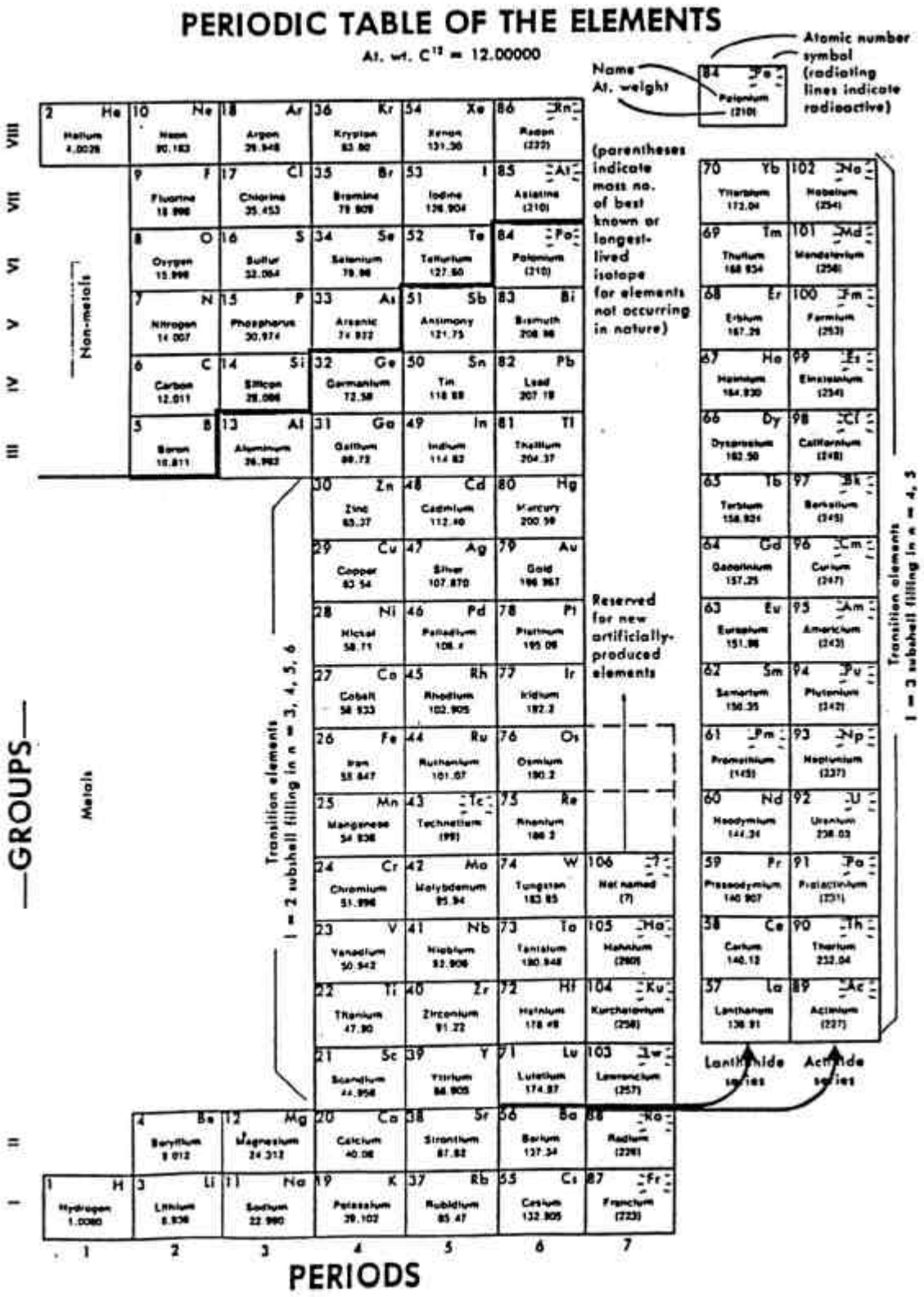
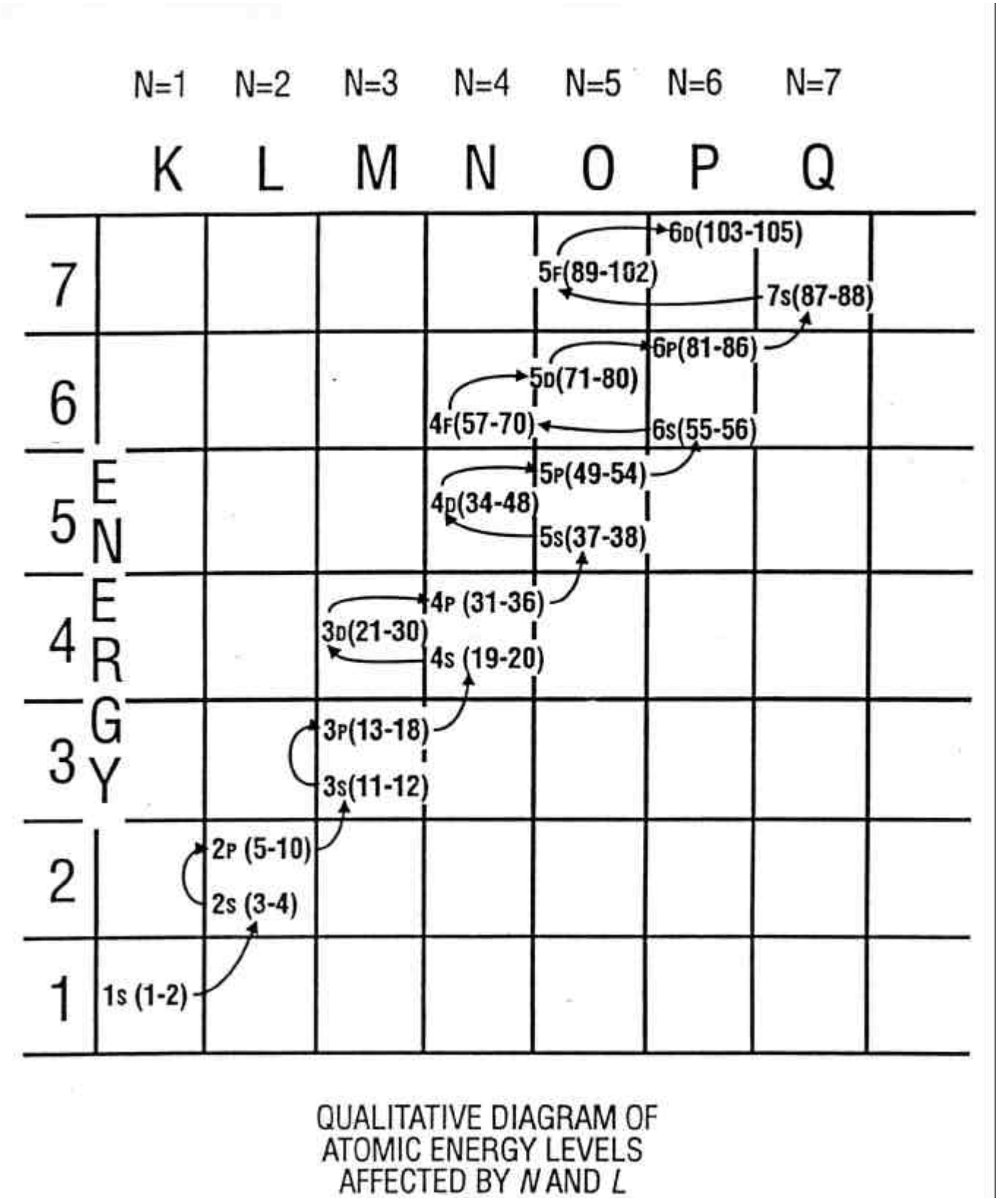




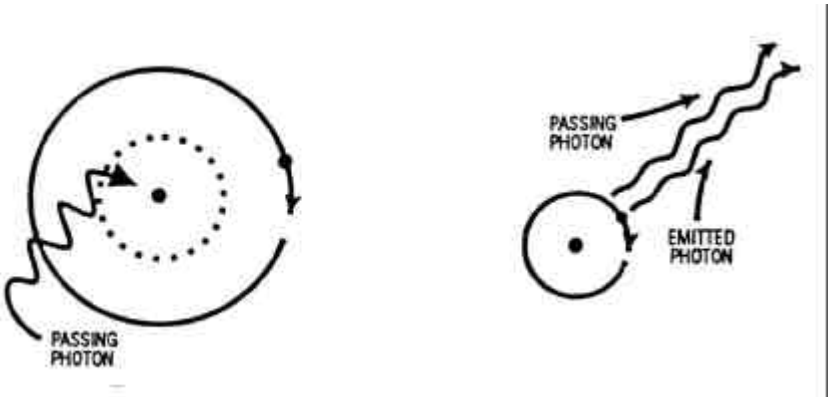
QUALITATIVE DIAGRAM OF ATOMIC ENERGY LEVELS AFFECTED BY *N* AND *L*

In the center of these tables we will find that there are the transition elements that have easily changeable electrons in different shells.

Table 1.

s-electrons: I = 0; subshell holds 2 electrons
p-electrons: I = 1; subshell holds 6 electrons
d-electrons: I = 2; subshell holds 10 electrons
f-electrons: I = 3; subshell holds 14 electrons

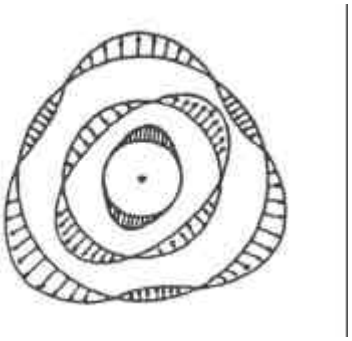
In these atoms that have multiple electrons there are many ways that these quantum shells can be variant as the photons go back and forth in subatomic communication.



This shift in energy shells is one way in which biology's information is stored in transition elements used to regulate and control the process of life.

Dr. Isaacs has developed a guess for a biological periodic table using this type of pathways, so that biology could control the processes of metabolism and reproduction.

The DeBroglie hypothesis came into existence later, stating that the motion of electrons within an atom is associated with a peculiar kind of wave, which DeBroglie called "pilot waves". With an electron orbiting the nucleus DeBroglie hypothesized about the DeBroglie wave phenomena, in which the electron would actually cycle through waves in its orbit.



DeBroglie wave applied to first three orbits in Bohr's hydrogen atomic model

For incomplete wavelengths to fit into orbits, the following relationship must be true:

(1)

$$n\lambda_n = 2\pi r_n$$

In Bohr's theory of the hydrogen atoms he found

(2)

$$r_n = \frac{n^2h^2}{4\pi^2kme^2}$$

After substituting, we find

(3)

$$n\lambda_n = \frac{n^2h^2}{2\pi kme^2}$$

Bohr found from this equation that it was an inverse of the electron velocity

$$v_n = \frac{2\pi ke^2}{nh}$$

$$\lambda_n = \frac{nh^2}{2\pi kme^2} = \frac{h}{m} \times \frac{nh}{2\pi ke^2}$$

(4)

and by dividing and simplifying we find

(5)

$$\lambda_n = \frac{h}{mv_n}$$

DeBroglie's modified hypothesis states that the length of a wave associated with a moving particle is equal to Planck's quantum constant divided by the momentum of the particle.

This wavelength phenomenon allows for the understanding of interference in diffraction patterns that electrons might exert. The wavelength of an item is equal to Planck's constant divided by the mass times the velocity.

This wave phenomenon also brought up the idea of the uncertainty principle. As an item is moving through a wave phenomenon, we cannot be quite sure exactly where it is. In the micro world of subatomic physics the uncertainty principle is very large, and science admits that we cannot completely know an item. The new concept of the *quanton* is an interesting approach to satisfying the dilemma. Subatomic entities can be wave and particle. Duality is in all things. Perhaps now a concept of medicine, such as yin/yang and acupuncture, is understandable. This duality rejects reductionism, and complexity challenges simplicity for science and medicine.

Indeterminacy led to the classic discovery of Heisenberg's uncertainty principle, in which the ability to know momentum times the ability to know position is equal to Planck's constant divided by 2 pi. This became the law, not the limitation, of technology. This formula was later modified to show that it was an inequality relationship, where the uncertainty was greater than or equal to Planck's constant divided by 2 pi. Certain situations allow indeterminacy to expand. Applied to biology, it opens new doors to homeopathy and naturopathy while closing doors on allopathic thought. Only nature knows.

Compensating for mass, we have the following formula:

(6)

$$\Delta x \times \Delta v \geq \frac{h}{2\pi m}$$

If we apply it to a particle, then we come up with

(7)

$$\Delta x \times \Delta v \geq \frac{6.63 \times 10^{-27}}{2\pi \times 10^{-3}} = 10^{-24}$$

This brought into the existence of quantum theory the concept of *probability*, as we are not completely sure of all the variables. Nature seems to use this indeterminacy. In addition there appears to be an ability for nature to influence and control this indeterminacy. Thus a new addition to science must occur; a control factor which life has on subtle indeterminacy.

SUMMARY

1. HERE WE FURTHER PROVED THE RELATIONSHIP OF THE PHOTON IN ELECTRON TRANSFER, OUTLINING HOW THE ELECTRON AND PHOTON INFLUENCE EACH OTHER.

2. WE HAVE SHOWN SOME OF THE BASIC BOHR COMBINATION PRINCIPLES AND THE RYBERG EQUATION, OUTLINING SOME OF THE PROCEDURES OF THE ELECTRONS IN THE HYDROGEN ATOM. THIS SIMPLE SET OF MATHEMATICAL RELATIONSHIPS WILL LATER BE UTILIZED IN MATRICES THAT WE DEVELOP FOR BIOLOGY.

3. WE HAVE SHOWN HOW THE VOLT WAS DEVELOPED FROM ITS QUANTUM TERMS INTO ITS MACROSCOPIC TERMS, ALLOWING IN THE CONNECTION FOR THE ELECTRONICS OF THE BODY TO BE RELATED TO THE MICROSCOPIC, QUANTUM FIELDS OF THE BODY. THIS FURTHER REINFORCES OUR PHILOSOPHY OF THE QUANTUM THEORY CONNECTION INTO THE REALM OF BIOLOGY, BEYOND JUST THE MICROSCOPIC REALM.

4. WE HAVE PROVEN THE MATHEMATICAL RELATIONSHIP THROUGH QUANTUM TERMS WHICH WE WILL NOW USE TO CHART OUR MATHEMATICAL RELATIONSHIPS FOR THE HERMITIAN MATRICES OF BIOLOGY.

5. WE HAVE BROUGHT UP THE CONCEPT OF WAVE FUNCTION, AND ITS RELATIONSHIP TO INDETERMINACY PRINCIPLE. THIS OPENS THE DOOR FOR A VIBRATIONAL MEDICINE, AND GIVES US QUANTUM PROOF FOR IT.

Chapter 6

QUANTUM POSTULATES FOR BIOLOGY

[RTF annotation: This chapter was created on 1/10/92. It is made up of what remained of WB-DOC-2, "Quantum Energy".] Gillespie offers six basic postulates of quantum mechanics. He imposes three simplification restrictions on these. (These restrictions are meant as reductionistic systems for understanding, and are not meant to reinforce reductionism.) In our analysis we will try to make comparisons of quantum theory to biology. These restrictions are:

1. that the system have only one degree of freedom
2. that the operator eigenvalues are entirely discreetly distributed
3. that the operator eigenvalues are non-degenerate

In biology these restrictions qualify the transfer processes of minerals, vitamins, hormones and enzymes, and set limitations on their utilization.

The Postulates

Postulate I states: "Every possible physical state of a given system corresponds to some normed Hilbert space vector. Every normed Hilbert space vector corresponds to a possible physical state of the system. The correspondence between the physical states and normed vectors in a Hilbert space relationship is one to one, except that two normed Hilbert vectors differ only by an overall scalar vector of modulous unity corresponding to the same physical state."

Thus a Hilbert vector called the *state vector* of the system, can be arrived at that corresponds to a time *T*. Then the system is said to be in a certain state. The state of the system is completely described by the state vector. Time *T* can be learned from the function of the Hilbert space vector. This postulate makes three assertions:

1. The possible physical state of a given system stands in one-to-one correspondence with the normal Hilbert vector, which is defined by the overall scalar factor of the modulous unity. If it is normal, then the vector will equal 1.

2. Everything that can possibly be known about the state of the system at a time *T* can be obtained from its state vector. It does not state what can be known or how it can be derived, but it could be known in at least one variable.

3. If we express the state vector at a time *T*, it is implied that the state vector is, in some sense, a function of time. The state vector is sometimes referred to as the state function, or wave function, of the system.

State vectors are processes in biological action. Thus a thought pattern, behavioral tendency, enzyme action, hormonal process, or component cellular metabolism is a state with a vector or directionality. Energy is need to redirect this state vector. Disease is a misdirect state vector.

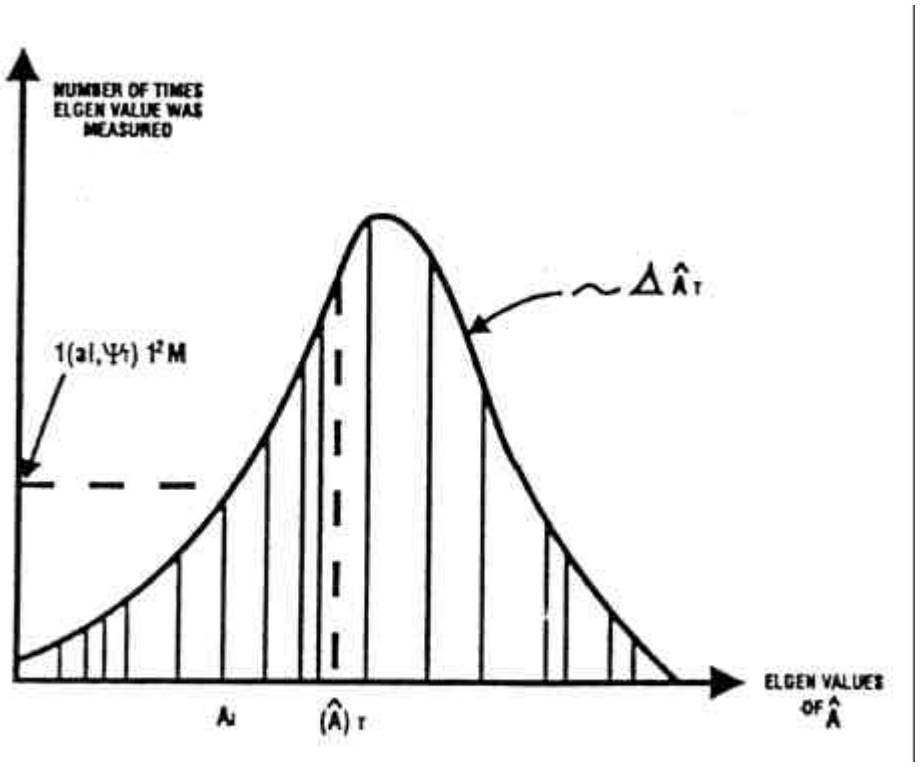
Postulate II states that to each physical, observable space in Hilbert's space there is a linear hermitian operator which possesses a complete ortho-normal set of eigenvectors, and a corresponding set of eigenvalues. For each operator in a Hilbert space there will be a physical observable. These eigenvectors and eigenvalues will be integral numbers, and not fractional. Biology needs matter in forms useable by its system. Biology is an accounting system that balances these eigenvectors and eigenvalues.

Thus the hermitian operators can be described in a hermitian matrix, which can be predictive of the transitional relationships. There must be a matrix of a consistent mathematical nature that allows a degree of predictability for biology.

Postulate III states that if an observable operator, *A*, has an eigen basis of $A_{(X)}$ and an eigenvalue of A_1, and if the corresponding observables of *A* are measured in a system, which immediately prior to the measurement is in a state of the function of $F_{(X)}$, then the strongest predictive statement that can be made concerning the result of the measurement is as follows:

"The probability that the measurement will yield the eigenvalue A_K is (A_K, the quantum value)2."

This postulate is the point in which quantum mechanics diverges radically from classical mechanics. In classical mechanics we know immediately the factors of the system. If the instantaneous state vector of the system is known, then all that can be predicted in the quantic system about the measurement of *A* is that at a time there is a probability that *A*1 will be obtained, and that at a different time there is a probability that *A*2 will be obtained. These are the variables of the eigenvalues of *A*. For biology this means that measurements of cellular processes and even biological processes are only probabilistic, and true knowledge of a system is not attainable. Biology, scientific medicine and mysticism are forever joined, and are not contradictory, unless any one of them takes itself too seriously.



Eigenvalues of versus number of measurements of TH R; (x) state

As doctors we need to give up exactness, and instead make our best guesses using as much data as possible. We must also implement our guesses with gentleness, safety, care, compassion, honesty, humility, dignity, reverence, and above all, brotherly love.

Postulate I tells us that the system is completely defined by the state vector; Postulate III asserts that the knowledge of the state vector is only obtainable through probabilities of the various results in measurement. It is not possible to predict with certainty the outcome of a measurement that is performed on a system of a completely defined state. If the system is subjected to two separate but identical measurements, with due care to insure that the system is in the exact same state prior to measurement, the results of the two measurements will not necessarily coincide. Biology will forever keep its secrets.

Postulate III tells us that there is an unpredictability and non-uniqueness in the measurement process of the manifestation in nature. To some this will imply that medicine cannot know, but this is like saying that a glass is not full when it is ¾ full. We must realize that in medicine a lot can be measured and relevant. We can get eighty percent accurate results from energetic medicine techniques and improve on them by ten percent, or possibly fifteen percent. To get past ninety-five percent accuracy in energetic medicine is for all practical purposes impossible, but as it has been said, "Man's reach should exceed his grasp, or what's a heaven for?"

Postulate IV states that a measurement of an observable generally causes a drastic, uncontrollable alteration in the state vector of the system. Regardless of the form of the state vector, just before the measurement, and immediately after the measurement, it will coincide with an eigenvector corresponding to an eigenvalue obtained in the measurement. Once we make an observation of a system we can drastically change the eigenvectors that are related to it. Once we

make a measurement, the compatibility theorem relates here to the Heisenberg uncertainty situation. So measuring the system itself has effects on it. This would imply that medicine cannot measure a system without affecting it. We can see from several studies that just doing tests on a patient can provoke healing. Care, concern and compassion from a doctor in running tests often provokes a healing process. This is not just a show of caring. From quantum dynamics it could provoke changes. In psychology we refer to the Westinghouse effect, in which any intervention made produces positive effects. If the state vector of a system does not coincide with the eigenvector of *A*, then the corresponding observable cannot be said to have a value in the generally accepted sense of this term.

Postulate V states that in every physical system there exists a linear hermitian operator, which is called a *hamiltonian operator*, and has the following properties:

A. The hamiltonian operator, *H*, is the observable operator corresponding to the total energy of the system; hence *H* possesses a complete ortho-normal set of eigenvectors. *H*, as a function of *x*, then, will relate to the eigenvalues of the potential energy of the system.

$$Hn_k(x) = E_k n_k(x) \qquad k = 1,2,3,...$$

B. The hamiltonian operator, *H*, determines the time evolution of the state vector of the system, in which the quantum mechanic action will be a function of time and the potential energy of the system.

$$i\hbar \frac{\partial}{\partial t} R(x, t) = HR(x, t)$$

Thus we talk about time evolution as a factor that can be measured and has dynamic effects on the values of a system. These can be displayed through a hermitian matrix and hamiltonian operators. Biology will thus need a matrix to control and account for intercellular processes involving metabolism and reproduction (see *Quantum Biology*).

Postulate VI states that a particle confined to the *X* axis with the observable position in momentum can be represented respectively by the operators: $X = x$. $P = -I \times H\, d/dx$. Any observable, which in classical mechanics would have a well-behaved function of position of momentum, in quantum mechanics will be expressed through operators of eigenvalues, since we cannot completely know these. These will fall into a hamiltonian or hermitian matrix. Thus the Isaacsonian matrix as a hermitian matrix is one possible guess as to the system dynamics. This matrix system must be similar for all criteria of biology, such as (but not limited to) minerals, amino acids, proteins, lipids, hormones, enzymes, DNA, etc.

One very useful property of the eigenfunction of the hermitian operator is known as the *ortho-normality*. It is expressed in the following:

(1) $$\int \phi_n^{\bullet} \phi m \, d\tau = \delta nm$$

Here N_n and N_m are eigenfunctions of the hermitian operator, and *nm* is the Kroneker * function, defined by *nm* = 0. *n* does not = *m*.

To prove this we use a hermitian operator, *Q*, with eigenvalues of *qn* and eigenfunctions of N, so that

(2) $$\hat{Q}\phi_n = q_n \phi_n$$

which leads us to

(3) $$\int \phi_m \hat{Q}^{\bullet} \phi_n^{\bullet} d\tau = q_n \int \phi_m \phi_n^{\bullet} d\tau$$

It follows that the hermitian operators on the left hand side are equal. Thus we equate the right-hand sides

(4)

$$\int \phi_m^* \phi_n \, d\tau = 0 \quad or \quad q_m = q_n$$

This leads us to

(5)

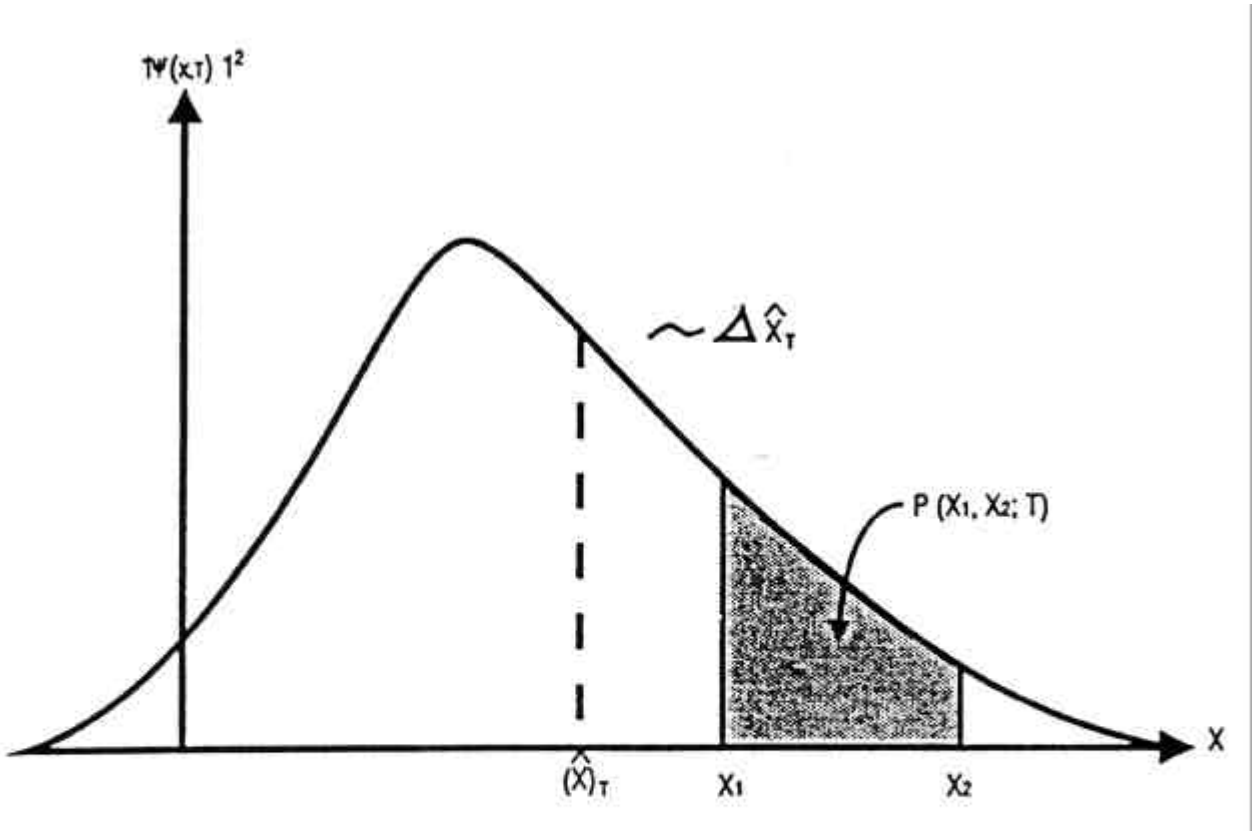
$$\int \phi_n^* \phi_m \, d\tau = 0 \qquad m \neq n$$

and finally to the scaling constant of

(6)

$$\int |\phi_n|^2 \, d\tau = 1$$

The graph of these probabilities can be put into a hermitian matrix, displaying these hermitian operations. This allows us, in an indiscrete, noncontinuous way, to graph the probable shifts of functions within a biological system. Thus biology has a periodic table of entities, just as chemistry has a table of elements. The periodic table of elements allows for the predictability of compounds. The table of biology will thus predict how vions might combine to make cells, or how multicellular organisms might occur.



Position probability density function versus X for a hypothetical state R (X,T)

Total area under curve = 1, (RT, RT) = 1

Shaded area is the probability that a position measurement at time T will produce a value between X_1 and X_2.

We have seen from the example of the jump system of the formation of elements at the beginning of the planet,

and also from the formation of the elements within the stars, that this has been laid out by a quantic rule. This same type of quantic rule will now allow us to understand biology and the flow of its patterns. Dr. Isaacs has put this into a hermitian matrix, which is a guess of the flow of the various eigenvalues within a matrix system; that is, it allows for the accounting of procedures in biology that express the metabolism and reproduction capacities.

Before we present this speculative presentation on biology, let us further explore the matrix representation needed in quantum theory, and also the matrix algebra needed to understand the process.

Our next chapter will perhaps further set up our matrix needs.

SUMMARY

1. IN THE BASIC REVIEW OF THE POSTULATES BEHIND QUANTUM THEORY, WE CAN SEE THE RELATIONSHIP BETWEEN QUANTUM THEORY AND BIOLOGY, AND THUS MEDICINE.

2. SETTING UP THE DYNAMICS FOR THE NEED OF A HERMITIAN EQUATION WAS ALSO FURTHER EXEMPLIFIED IN THIS CHAPTER.

3. UTILIZATION OF QUANTUM DYNAMICS FOR BIOLOGY WAS INTRODUCED IN THIS CHAPTER.

Chapter 7

TUNNELLING, THE WORMHOLE THESIS
(A Possible Explanation for Psychic Phenomena)

The precept of quantum physics allows for a particle to be in two positions or places at the same time. This is a dramatic shift from the idea of classical physics.

The phenomenon of *tunnelling* also occurs in quantum physics wherein a proceeding particle can suddenly skip through time, space and subspace, or other barriers, and appear on the other side. This type of phenomenon is also impossible according to classical physics. Some people have labelled the tunnelling through barriers phenomenon as *leapfrogging*, or an insertion of extra energy within the Heisenberg uncertainty principle, and its ability to leap *over* the energetic barrier. In classic physics, if a particle of a certain potential is proceeding and incurs a barrier of lesser potential, the particle can cross the barrier. The motion of the particle becomes slower during the crossing of the barrier because of the involvement of the various energies.

In classical theory, if we analyze the reflection and transmission, we get the following equations:

(1)

$$\text{ħ} = \frac{\left(\frac{q^2}{2qq'}\right)^2 \sin^2 p'a}{1 + \left(\frac{q^2}{2qq'}\right) \sin^2 p'a},$$

$$\text{ħ} = \frac{1}{1 + \left(\frac{q^2}{2qq'}\right)^2 \sin^2 p'a},$$

(2)

$$p^2 = 2mE,$$

$$p^2 = 2m(E - V_0),$$

$$q^2 = 2mV_0.$$

with ħ being the reflection, ħ being the transmission, and the other variables known.

In classic physics there is still not a probability of transmission across the barrier. In quantum dynamics we will see another equation involving Planck's constant,

(3)

$$\text{ħ} \quad (\kappa')^{-1} = [2m(V_0 - E)]^{-1/2}$$

which allows for the transmission through the barrier. If the barrier has a width of $a < 1/6$ħ, the region in which the probability density $n(x^*)^2$ assumes an appreciable value extends right up to the other extremity of ($x = ½a$). The continuity of the wave function across the second discontinuity in the potential requires that $n(x)$ also be non zero beyond it. Where $x > ½ x a$, the quanton again behaves as a free quanton. Its probability density remains constant, summarizing the quanton has passed right through the barrier.

The wave function of n(x) of the stationary state of the energy E can be written as

(4)

$$\begin{aligned} x < -1/2a: \quad & \varphi(x) = b_+ e^{ipx} + b_- e^{-ipx} \\ -1/2a < x < 1/2a: \quad & \varphi(x) = c_+ e^{-\kappa x} + c_- e^{\kappa x}, \\ x > 1/2a: \quad & \varphi(x) = d_+ e^{ipx}, \end{aligned}$$

where

$$p = (2mE)^{-1/2}, \qquad \kappa' = [2m(V_0 - E)]^{1/2}.$$

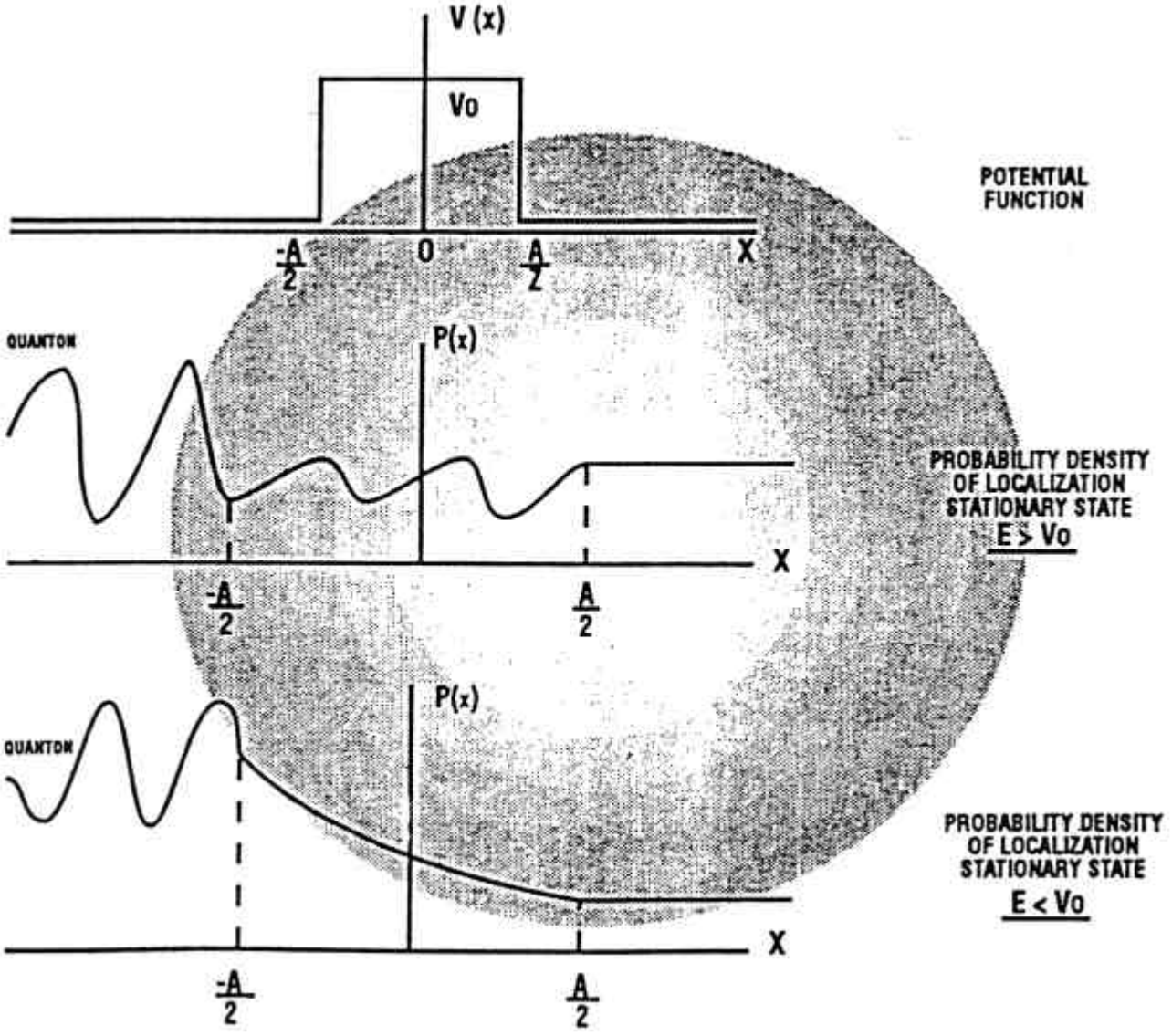
(5)

It is necessary in the analysis to keep the exponentially decreasing solution in the intermediate region, accounting for the barrier and the bounded nature of the barrier.

We will see that there are four sets of linear equations of five unknowns that always allow us to determine four of them as a function of the fifth. Generally we will try to keep b_+, which characterizes the incident wave. Thus the spectrum of the scattering of a quanton by a potential barrier is continuously unquantized, exactly as the spectrum of the scattering by a potential well. The expression obtained for the ratio of d_+ / b_+ is

(6)

$$At = \frac{d_+}{b_+} = \frac{1}{\cosh K'a - i\dfrac{p^2 - K'^2}{2pK'} \sinh K'a}\, e^{-ipa},$$

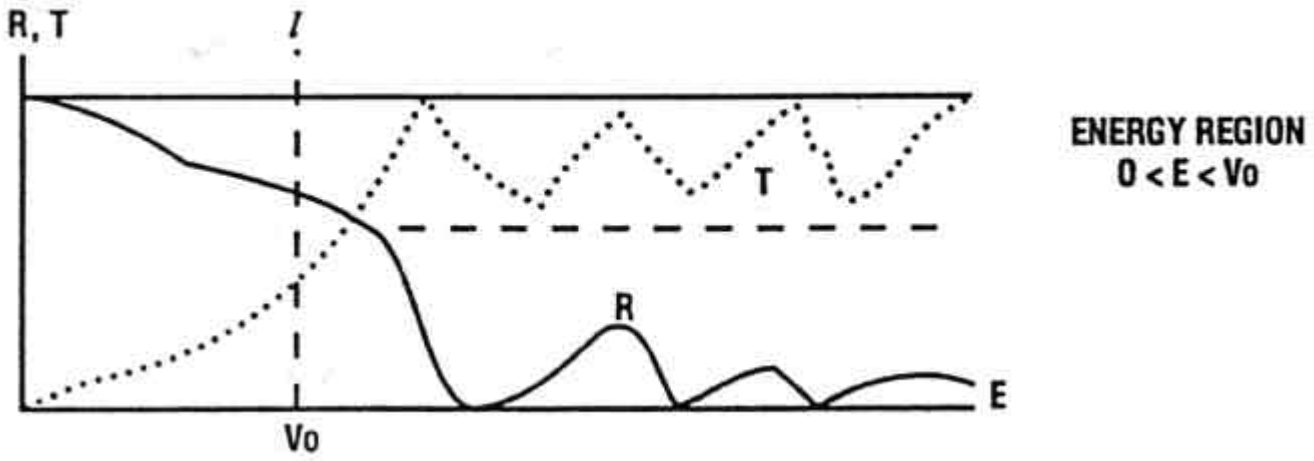


The transmission coefficient in turn can be written as

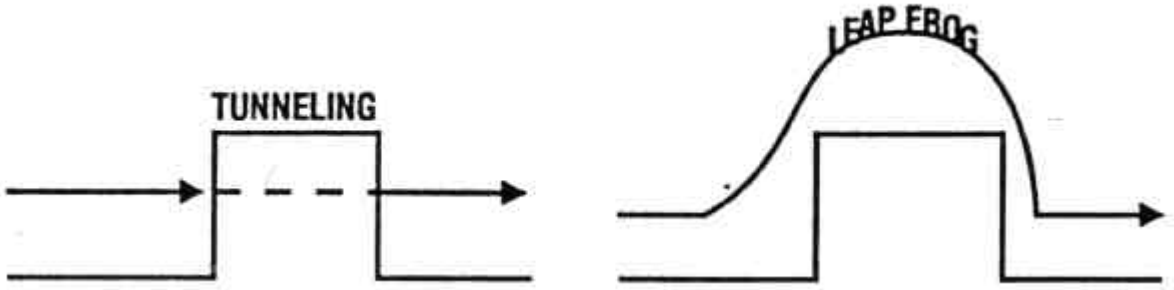
(7)

$$T = |At|^2 = \frac{1}{1 + \left(\frac{q^2}{2pK'}\right)^2 \sin h^2 K'a}$$

This transmission quantity will never disappear, and so the quanton always has the possibility of appearing on the other side of the barrier. Possibly jumping through subspace.



As we have discussed, there is also the possibility of leaping over, or leapfrogging, instead of tunnelling the barrier. This is shown below.



In order to leap over the barrier, enough time must be necessary during the interval of

(8)

to cross the entire width of the barrier with the velocity of V; hence, we have $V)t\ a$, implying

$$\Delta t = \frac{\hbar}{\Delta E},$$

(9)

In our analysis of the left side of the equation we see that the fluctuation of $)E$ passes through a maximum in the order of

$$\left(\frac{2(E + \Delta E - V_0)}{m}\right)^{1/2} \frac{\hbar}{\Delta E} \gtrsim a$$

(10)

Thus this inequality will satisfy the numerical factors

$$\frac{\hbar}{[2m(V_0 - E)]^{1/2}\ a = K'\ a < \hbar}$$

(11)

Thus we have an occasion in which the item might not tunnel *through* the barrier, but perhaps, through a generation of extra energy under the Heisenberg principle, leap *over* the opposing barrier.

$$[2m(V_0 - E)]^{1/2}\ a = \kappa'\ a < \hbar$$

In the case of thick barriers the tunnel effect can be small, and will follow the equation

(12)

$$\hbar \qquad 1 \ll \kappa' a \cdot [2m(V_0 - E)a^2]^{1/2}$$

From this equation we can see that if the mass is reduced, and if the potential energy is very close to the total energy, this would dramatically increase the possibility. Such a case is happening in the biological situation, as we discuss in *Quantum Biology*, where photons can be transmitted across time and space by the endorphin centers of the brain, knowing that this is where the potential energy factors are greatest in relationship to the total energy. Here the kinetic energy developed by the adrenal glands and their release of the catecholamines could complicate the situation and cause difficulties.

So in our analysis of the possibilities of psychic function there is the possibility, if not the probability, that inside the factors of the brain there would be an ability to transmit photons or electrons, or possibly even larger matter, through time and space, to account for the factors of psychic phenomena. The transmission amplitude *A*t follows in

(13)

$$\hbar \qquad At \cdot \frac{d\cdot}{b\cdot} \cdot \frac{4ip\kappa'}{(p+i\kappa')^2} e^{\kappa' a} e^{-ipa},$$

and by introducing imaginary momentum $p\hbar = i \times 6\hbar$, can be written as

(14)

$$\frac{4ip\kappa'}{(p+i\kappa')^2} \cdot \frac{2p}{p+p'} \frac{2p'}{p+p'},$$

the transmission coefficient of the barrier. If we hypothesize that $6\hbar a > 1$, we get

(15)

$$\hbar \qquad \cdot \frac{4E(V_0 - E)}{V_0^2} e^{-2\kappa' a}$$

If we calculate the average value of *E*, the effects of the two discontinuities are small, they almost compensate, and allows us to reduce to

(16)

$$\hbar \qquad \cdot e^{-2\kappa' a}$$

The tunnelling effect is extremely important in quantum theory. It allows for the development of the energy in the stars and in the sun itself. Classical physics cannot explain the ability of a charged particle outside the nucleus to enter the nucleus and provide the effect of thermonuclear fusion. By proceeding with the coefficient of transmission, we introduce again Planck's constant with the formula

(17)

$$\cdot \exp\left(- |\hbar, \qquad \therefore 2\int_{x_1}^{x_2} [2m(Vm(x) - E)]^{1/2} dx.\right.$$

phantomWe see that is a typical magnitude of action. The classical approximation, defined by

(18)

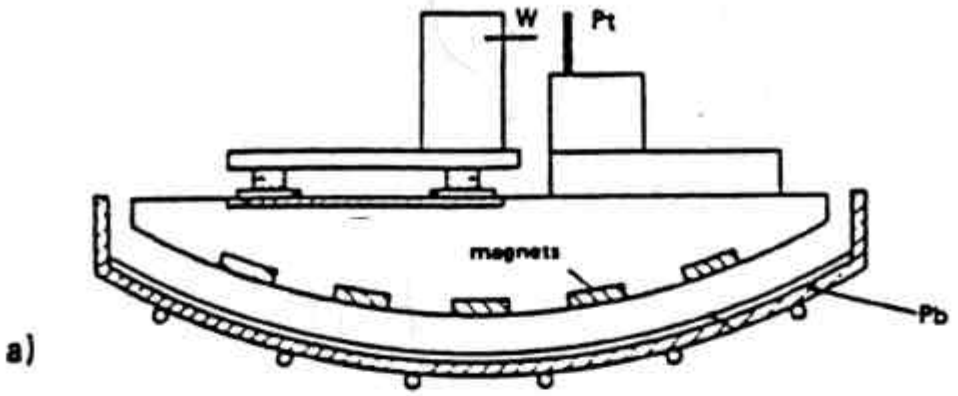
$$\gg \hbar$$

implies therefore,

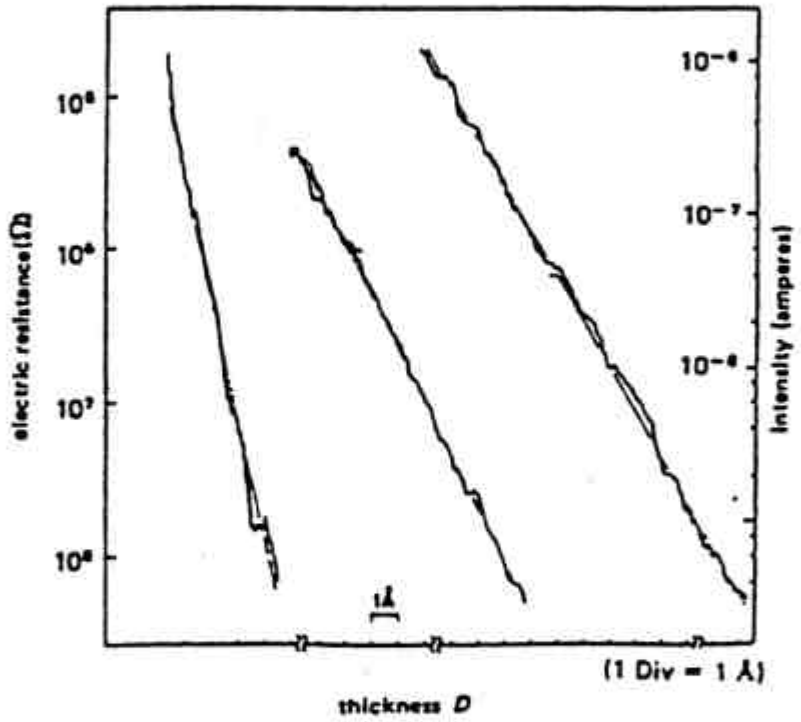
(19)

$$\ll 1.$$

The tunnelling effect also plays an extremely important role in electronics. A vast number of devices including computers depend on the ability of electrons to pass through classically forbidden regions. The exponential dependence on the transmission factor is related to the physical characteristics of these regions. Thus one may control an electronic current very sharply. Only recently have we been able to display the passage of an electronic current across an empty region of space, which is a direct demonstration of the tunnelling effect. In biology much of the hitherto unexplainable portions could be explained and understood through this phenomenon. Henceforth we can name this phenomenon of the wormhole and tunnelling concept in biology as the *Nelson effect*. Inter-dimensional travel, and subspace and time transfer might result from our involvement with biology.



a)



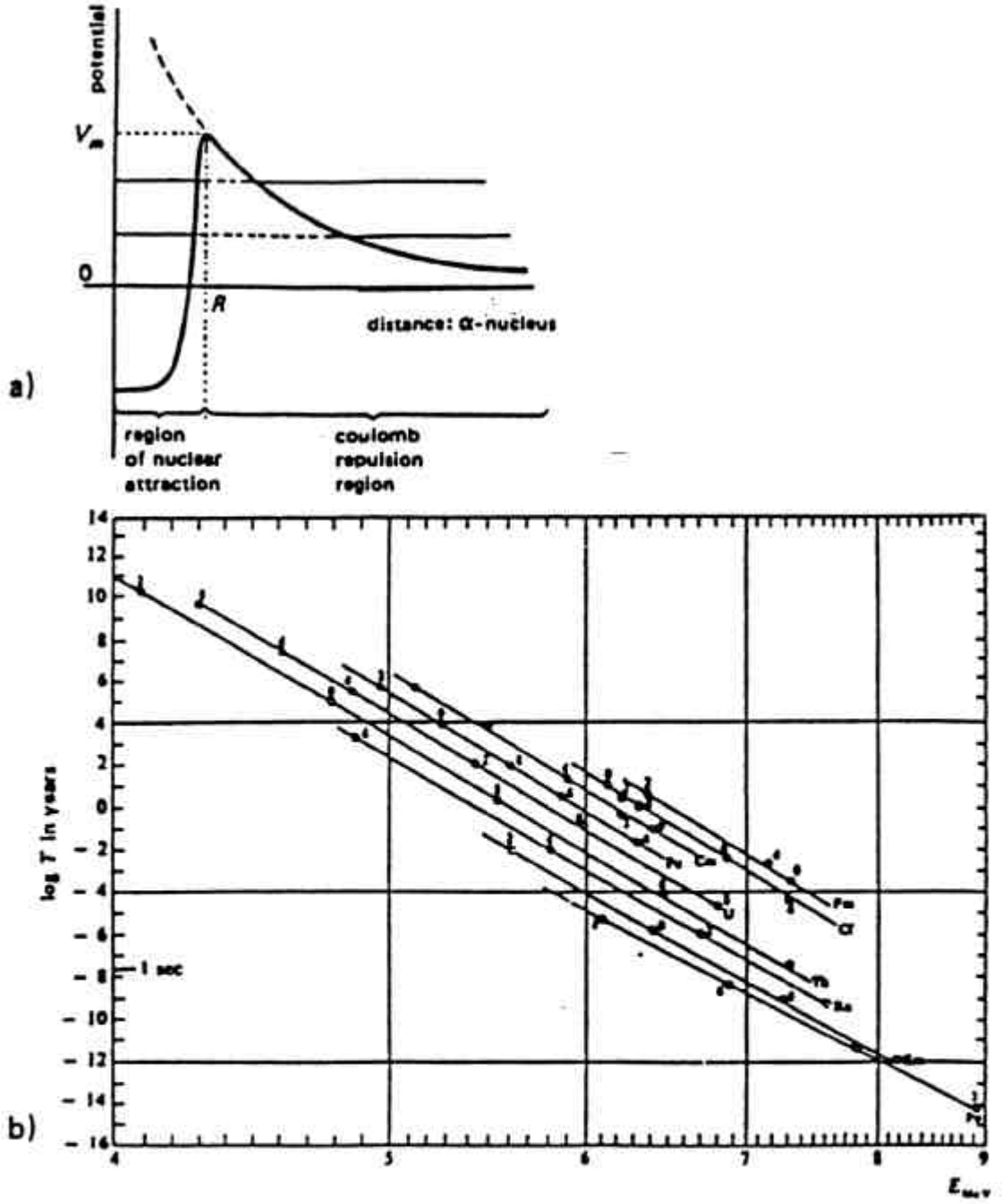
b)

Tunnel effect across empty space

(a) Two metallic electrodes, a tungsten point W and a platinum plate Pt, are separated by a region of empty space. Their distance, of a few angstroms, is controlled by a highly sensitive piezoelectric system. The entire set-up is insulated from any mechanical vibration by magnetic levitation above a section of superconducting lead.

(b) The electric current jumps across the empty space between the two electrodes, the electrons crossing by means of the tunnel effect. The resistance of this space is measured as a function of its thickness *D*. The curves obtained depend upon the state of the surface of the electrodes, which fixes the height of the effective potential barrier. But in all cases, the exponential dependence, characteristic of the tunnel effect, is obtained (see exercise 6.20). [G. Binnig, H. Rohrer, Ch. Gerber, E. Weibel, Appl. Phys. Lett. 40 (2) (1982) 178.]

In the past few years, this cumbersome and delicate device has been improved into a much simpler and sensitive apparatus – the 'tunnel effect microscope' which is now commonly used to explore and observe surfaces with unprecedented accuracy (fractions of an angström).



The Coulomb barrier in radioactivity

(a) The helium nuclei, emitted by α-radioactive nuclei, have energies lower than the height of the Coulomb potential barrier which ought to hold them in. They 'go through' the barrier by the tunnel effect. The effective thickness of the barrier depends very sensitively on the energy. The same is true for the half-life τ of the α-radioactive nuclei.

(b) For the different isotopes of any given type of nucleus (Z fixed), there exists a linear relation between the logarithm of the half-life and the inverse of the square root of the energy of the emitted α-particles (the Gamow–Condon–Gurney law; see exercise 6.21). For each type of nucleus, the number corresponding to the experimental point is the last digit of the mass number and likewise indicates the corresponding isotope (example: the last point at the bottom right of the diagram corresponds to the ^{212}Po nucleus) [L. Valentin, Physique Subatomique (Hermann, Paris, 1975)].

Electronics, nuclear physics and the solar system use this tunnelling effect. Couldn't it be that biology would develop the tunnelling effect to its highest ability, and channel these energies across time, space, and subspace?

Our new quantum physics will indeed embrace the field of psychic phenomena, and more and more research can be done on the indeterminate factors to allow us to understand more of the abilities and secrets of life.

SUMMARY

1. Our precept in quantum biology must allow for the indeterminacy principle, and for tunnelling and perhaps wormhole propositions in biology.

2. This was named the Nelson effect, and may allow for the existence of psychic phenomena as the ability of the human organism to bridge gaps through space and time within the laws of quantum dynamics. Occuring over a consciousness connectivity through subspace, hence the enhancing of the polymorphic relation.

3. Tunnelling can explain many processes in biology that are not accountable under a classic dynamics.

4. This opens the door for a new type of physics for the next millennium.

Chapter 8

THE QUANTIC LINK TO DNA ***(How does DNA function?)***

Probably the father of all quantum theory was Schrödinger. Schrödinger believed that there was a definite link between quantum theory and DNA. As we have reviewed several parts of biological literature in this book, we now would like to cover a brief introduction on quantum theory and genetic coding. Here we see probably the best demonstration of a quantum biological function, as the formation of the DNA code does not utilize half-steps; it makes distinct coding jumps. There are distinct patterns in the DNA code that allow for exacting patterns. In hereditary techniques we can see that there is a preciseness of transfer that yet has some degree of indeterminacy. As we have discussed in the *Quantum Biology* and in this book, we can see that there must be a metabolic side as well as a reproductive side to our matrix, so that the metabolism can respond to a wide variety of environmental conditions. But the genetic coding would have very limited, predictable and distinct types of jumps. It would have to be a more precise and closed process. We have already discussed this in some detail (see *Quantum Biology*). Now let us review some of the literature which has led to our understanding of DNA function.

In the early days there were three categories for living organisms: *oleaginous*, *saccharinous*, and *albuminous*. Later we found that there were fats, carbohydrates, and proteins.

The development of protein was a key factor in the development of life. It is protein that we are analyzing in our treatise on DNA. Berzelius proposed the names of *cysteine* and *glycine* as he was doing research on amino acids. In 1838 he coined the word "protein", which is Greek for primary substance. He found that this was the basic unit of all albuminous material. Mulder, working also in the very early 1800s, continued some of the Berzelius work. He proposed a basic albuminous substance with an empirical formula C40H62N10O12; this combined with many other formulas to produce some of the basic proteins of life.

In the 1890s Emil Fischer, who was at one time a student of Kekule, found that there were dextro and levo types of polymers. He was the first to find that there was a chirality, or "handedness", to nature. He then found that this "handedness" also applied to protein compounds.

In the 1850s Thomas Graham found crystalloids and colloids, and worked with their functions. *Colla* came from the Greek for glue.

Svedberg contributed evidence to the theory that proteins were homogenous. Using Avogadro's number and the weight of the large colloidal particles, he determined their diffusion rate and sedimentation as a constant in the Earth's gravitational field, producing up to five hundred times the force of gravity. He then could separate these colloidal factors that helped to further the concept of homogeneity.

By 1936 Linus Pauling and Mirsky had put forth the idea that polypeptide chains of native proteins could be folded and held together between the N-H group of the oxygen atom and the
C-O group of peptide bonds. Many different scientists, including Corey and Perutz, started working with these large chemicals and proposed some of the various fashions, which led to the discovery of the helix.

Kendrew was the first to find the three-dimensional structure of myoglobin, which has an approximate molecular weight of 17,500. He found that seventy-five percent of myoglobin had a helical polypeptide chain. Thus the helix was further brought into science.

The three-dimensional structure of insulin was solved in 1969 by Dorothy Crowfoot Hodgkin, working at Oxford University. Other bio-molecules were solved, such as cholesterol, calciferol, penicillin, and B-12, using x-ray photographs of the diffusion patterns of the insulin crystal. Dorothy Hodgkin was able to propose the structure of this very complex molecule. Insulin was thus the first native protein to be synthesized.

In 1966 Merrifield developed insulin by means of a machine which was designed to carry out polypeptide synthesis. Synthetic chemistry was well underway, and the precept of synthetic chemistry to this day has been that of placing the calcium, carbon, and hydrogen in the right spots. This was achieved by looking at the x-ray photographs and diffraction patterns, doing spectrographic analysis and other functions. But these were not able to discern the type of energy that existed in the quantic bonds, or of the electrons in their outer rings. Nature still has many secrets.

Thus some of the quantic energy patterns of the *natural* substances were still unknown to these synthetic developers. The synthetic developers sought to develop synthetic compounds, but found that they were not as effective as natural entities. This did not hinder them in the least; they achieved extreme financial success through their synthesis. They were able to develop and manufacture compounds and live off rather rich royalties, because these synthetic compounds were sold as medicines. As they reduced the complex world of natural biology to synthetic components, they developed more and more compounds. Many were to follow after insulin.

Let's take a look at some of the first work done with this insulin. It was found to be only 3.4 percent effective at best in the early crystalline structure designed by Merrifield. Later, in the '60s, scientists started to dispel the idea that organic substances were different from the synthetic matter they were developing. Because of the limits of their thought and the limits of their techniques of measurement, these compounds appeared to be equal. This is not the case in the 1990s. With our sophisticated energy equipment and methods of discerning the energy patterns and electrical responses of compounds, we now find that nature does indeed have some rather complex safeguards and secrets that the synthetic

chemical companies have yet to divine.

In 1986 Carl Popper delivered an address to the Royal Society. In this address he told the attendees, which included many of the fathers of synthetic molecular biology, that biochemical organizations and processes could never be understood in chemical terms alone. Because of this, Popper proposed that organic evolution would never be explained by chemical or Darwinian theory, and that chemical reductionism for the environment proposed several risks to our environment and our bodies. In fact, due to the large number of chemicals that *have* been put into our bodies, perhaps Carl Popper's warning has come too late. Many dramatic problems have resulted from iatrogenic poisoning of this planet and iatrogenic diseases that were caused by synthetic compounds. Dramatic damage has resulted from ignorance and profiteering.

Man's ability to understand is always limited by his ability to measure the results of his work. At every point in science the scientists assume that their measurements are complete, and thus their *knowledge* must be complete. As new discoveries are made and more sophistication of measurement techniques developed, this philosophy and this intrusion of mind open the door to deeper understanding. With the advent of quantum theory and the idea of the Heisenberg uncertainty principle we now realize that true knowledge of nature cannot be attained, and that we cannot in any way manufacture the same compounds developed by life. Our attempts at this are merely our guesses; perhaps often *good* guesses. Still nature holds secrets, as we will explore and explore biology to the end of our days. Only nature truly knows.

In 1893 Cossel, doing physiological research, identified chromatin as a nucleoprotamine. This was found to be a nucleoprotein, and started some of the work in observing RNA and DNA function.

Nucleic acid sugars and their phosphate-bonded brothers were written about by Levene in 1905. Levene, working with Jacobs, classified sugar of yeast nucleic acids as D-Ribose. This is linked to the bases by a glycosidic bond. They termed these *nucleosides*. Adenosine, guanosine, cytidine, and uridine, when esterified by phosphates, became adenylic acid, guanylic acid, cytidylic acid, and uridylic acid. Levene later found that this sugar in RNA and DNA was not a hexose, but a pentose.

Early determinations of the molecular weight of DNA gave values of around 103. In 1938 Segner proposed that its weight was 106. Levene also was able to confirm this new molecular weight in 1938.

In 1944, at the Rockerfeller Institute Hospital, Avery offered the first strong evidence that DNA was really the key to transferring genetic characteristic in microbes. Avery also proposed DNA enzymes, such as DNA depolymerase and deoxyribonuclease. These enzymes were found to deactivate DNA, but were later to be key in the process of unfolding and unwinding the DNA to set genetics in motion.

In 1945 DNA was found to absorb light in the area of 260 nanometers, and was also found to have some mitogenic-like production of UV. These purines and pyrimidines also were found to have strong light relationships; both absorption and production.

Chargraff in 1950 was able to show some of the strong light spectrophoto reaction of the components of DNA and DNA itself. From this, the research finding adenine, guanine, cytosine, and thymine, or A, G, C, and T, led to the discovery of the Chargraff rules. First, the total of purines and pyrimidines are quantitatively equi-molecular; that is, A + G = T + C. Second, the molecular quantities of adenine and thymine individually are equal; A = T. Third, the amounts of guanine and cytosine are molecularly equivalent; G = C. A relation of the preceding rules comes to the final rule, in which A + C = G + T. Later it was found that uracil took the place of thymine in the RNA components of the cell. These rules echo our quantum rules in many ways.

Many people in 1950 were struggling to find ways of understanding this. But it was Crick and Watson at Cambridge (1951 - 1953) who best improved on Pauling's research, using the Chargraff rules and developing a consensus idea of the structure of DNA. They proposed a double helix. This opened the door for dramatic understandings.

The mechanics of this process could be easily understood by the mechanically-minded scientists of the time. Yet, this type of mechanical process did not appear in any other chemical process. Chemical processes were known to be statistical, or involving random development of compounds that were pushed and pulled apart through entropic or thermodynamic processes. This strand of DNA does not do this; it is not a randomized process. It pulls apart and pushes together in a very precise maze. The actual mechanisms of this push and pull were not studies by these scientists; they liked the idea of the chemistry involved. But now we can ask the question: through what processes is DNA pushed/pulled apart? The answer leads into quantum dynamics. Our quantic analysis matrix can be superimposed on the DNA action.

Research blossomed into the concept of the mechanics of DNA. As Isaacs has told us, the E.coli is an example of a type of near-vion from cells, meaning the base amount of matter needed to actually make up a living unit that could metabolize and reproduce on its own. Inside the E.coli is a double-stranded DNA chromosome, which contains 4 x 106 base pairs. It will reproduce at a maximum rate of 750 base pairs per second. This is at a given unwound replicating fork region. So it will take about forty minutes to reproduce a complete chromosome. If the conditions are right, E.coli will divide into two daughter cells every twenty minutes. This is the nature of vionic activity (see Chapter 9 of *Quantum Biology*).

In 1953 Paul Zamecnik, working at Harvard University, tried to put radioactive isotopes from various amino acids into a bacteria colony. This was an attempt to trace the radioactive polypeptides through the various ribosomes. The experiment was a failure because putting in radioactive isotopes would cause the RNA functioning to come to a halt. It could only be brought back by bringing in a fresh, natural selection of the amino acids. Thus DNA has some ability to possibly "know" that the items involved are radioactive. This would be reinforced by our quantum theories; if a radioactive particle were to be put into this process, the biology would soon be able to "know" it and halt its progress. Biology and life operate on many levels including submolecular. Thus the process would be able to notice radioactivity as an irregularity.

This brings us to wondering about the radioactive tracing experiments, in which radioactive iodine was put into the body by experimenters who found that it went to the thyroid. It was then assumed that *all* iodine would go to the thyroid. All we know from that experiment is that radioactive iodine goes to the thyroid. We do not know where non-radioactive

iodine goes. This is another limitation of quantic theory. Tracing experiments have led to many faulty conclusions in biology.

Electron microscopists started to have ideas of the transcription and translation of the ability to handle RNA and DNA. But basically, at normal body temperature E.coli's DNA is transcribed at a rate of around sixteen nucleotides per second, into the messenger RNA strand. The messenger RNA strand has an average length of 2,000 to 3,000 nucleotides. The half-life of the messenger RNA strand is about 90 seconds. So the ten to fifteen ribosomes which are in the process of translating with a given messenger RNA and forming a polyribosome become attached to the strand during the period of transcription from the DNA. Polypeptides formed by each ribosome of a polyribosome system are the same. The formation time of a polypeptide is around ten seconds under certain prime conditions.

The growing E.coli bacteria contains some 15,000 ribosomes. They make up twenty-five percent of the cell mass. The ribosome is approximately 20 nanometers across and has a molecular weight of 2.7 x 106.

By 1966 many the details of genetic code were worked out, 61 out of the total 64 triplet codons.

GENETIC CODING

PERFECT EXAMPLE OF A QUANTIC (NON-RANDOM) BIOLOGICAL EVENT

First Position (Read Down)	Second Position (Read Across)				Third Position (Read Down)
U	PHE	S E R	TYR	CYS	U
	LEU		Stop		C
			Stop	TRP	A
					G
C	LEU	PRO	HIS	ARG	U
			GIN		C
					A
					G
A	ILE	THR	ASN	SER	U
	MET		LYS	ARG	C
					A
					G
G	VAL	ALA	ASP	GLY	U
			GLU		C
					A
					G

From the late 1950s the sequence of amino acids in proteins with a specific function, such as insulin, haemoglobin, or cytochrome *c*, were determined and catalogued by a range of organisms (Dayhoff 1968 - 78), followed a decade later by corresponding determinacies of nucleic acid sequences. In analyzing the sequences then available, Zuckerkandi and Pauling (1965) pointed out that a present-day protein contains its own ancestral history in its quantic organization, and that similarities of homologous polypeptide chains, along with the accepted fossil record, provide evolutionary data of three types:

1. The probable amino acid sequence of the ancestral polypeptide from which the chains compared had diverged.
2. The approximate epoch at which the divergence started.
3. The lines of descent through which the alterations in amino acid sequence proceeded.

The vast extent of data storage and processing that was proved elsewhere easily allows for this process.

Zuckerkandi and Pauling (1962) calculated a mean substitution rate for a haemoglobin polypeptide of one amino acid every 14.5 million years from the 18 residue differences attained in comparison of the horse and the human "-chain. It was known that the "- and ß-chains of the human haemoglobin tetramer ("$_2$ß$_2$) show seventy-eight differences, so we can surmise that the two polypeptides originally split from a common origin, by gene duplication, at least 565 million years ago. Originally the common point was a monomeric haemoglobin consisting of a single polypeptide chain. This chain has a more modern representative in the blood of primitive jawless fishes (the lamprey and the hagfish, which lack the advantage of cooperative oxygen uptake and release that emerged with the evolution of the haemoglobin tetramer).

A similar technique to that of Zuckerkandi and Pauling with their construct of a "molecular evolutionary clock" was put forward by Kimura (1969). They used a Poisson distribution. Thus the events of low probability in a vast population, like the decay of radioactive isotopes used to calibrate the geological evolutionary clock, are mathematically calculated. Kimura posted that, for two homologous polypeptides made of *n* residues with varying amino acids at *d* sites due to bifurcation over a time *t*, the rate of evolutionary amino acid substitution per site per years, k_{aa}, is given by the relation

$$2tk_{aa} = -\ln(1 - d/n) = -2.3\log(1 - d/n).$$

This equation, applied to a series of sequenced polypeptides with a common biochemical role such as the "-chain of vertebrate haemoglobin, will result in a constant value of *k*aa of the order of 10-9 residue replacements per site per year, a unit Kimura termed the *pauling*, or the "molecular evolutionary unit" (MEU). This is allowed for in our bio-quantum matrix. Life must allow for some minute variations to occur in its reproduction accounting system. Varying slightly for a given type of protein, the value of *k*aa varies readily for proteins of contrasting functional types by three orders of magnitude. This ranges from the rapidly evolving fibrinopeptides (8.3 MEU) to the well-conserved histone proteins (0.008 MEU). The fibrinopeptides are key in the building of blood clots, and only a minuscule part of the polypeptide has an essential function. The amino acids of the other segments freely undergo substitution without the benefits of selectional control. This process involved no drastic functional changes. Comparatively, histone polypeptides are essential in the conservation of the genetic material, making up the nucleosome particles where the double-stranded DNA supercoils in the eukaryote nucleus to provide the nucleoprotein chromatin a "string of beads" form.

The MEU, or one Pauling, is a definite quantic type of function. Our bio-quantum matrix must tolerate some limited variations. These variations can result in genetic improvements from genetic bifurcation (see Chapter 4 of *Quantum Biology*). But to last, these variations must result in increased productivity. Increased productivity comes from cooperation with the environment, not superiority. So Darwin was wrong about survival of the fittest. Now we can say that there is survival of the adaptive and cooperative.

The histone proteins are stabilized and conserved. They have only two differences out of about one hundred amino acids in the H4 polypeptide between calf thymus and the pea plant, even though animals and plants split apart some 1.2 billion years ago. Contrasts of the mRNA sequences coding for the histone H4 polypeptide in two sea urchin species demonstrates that the synonymous mutation rate in the DNA transcribed is as high as that of the fast-evolving fibrinopeptides. The degeneracy of the genetic code is eminent for the third position (3'-end) of the coding base triplets. Here the transitional mutations (U/C) or (A/G) are mostly inert. Comparisons of the MRNA sequences coding for the "- and the ß-polypeptide chains of mammalian haemoglobin demonstrate that natural selection has lowered the rates of surviving base changes in the first and second positions of the triplet codons, which are approximately equal to one-quarter or less of the mutational rate found for the third codon position. Quantum theory is consistent with such processing. Schrödinger was right in assuming that genetics is a quantic activity. Genetics, or reproduction, requires an exacting and limited process. Metabolism requires vast responsiveness.

The *archaebacteria* characteristically thrive in extreme environments, hot sulphurous vents, salt marches, or anaerobic organic-rich muds. Archaebacteria are ancient, as the term *archae* implies. They have heterogeneity of their 16S rRNA sequences, due to divergence over aeons. As Isaacs points out, jumps in species and genes must follow quantic law. The indices of those 16S RRNA sequences distinguish three major divisions:

1. The methanogens and halophiles
2. *Thermoplasma*, a group containing a single organism
3. A heterogeneous group of sulphur-dependent thermoacidophiles, probably the most ancient of the prokaryotes.

These bacteria can live under acidic conditions (Ph - 1-6) and at elevated temperatures (- 60-95E C). Some, such as *Sulfolobus*, oxidize sulphur to sulphate while others reduce sulphate to sulphide, like *Archaeoglobus*, which develops small quantities of methane as well. These are some of the extremes of life tori or conditions in which the matrix of life can operate.

The 16S tRNA sequences of the eubacteria indicated that while the Gram positive organisms form a distinct group of related species, Gram negative organisms are much more diverse. The break into nine groups is defined by a common coefficient of 0.2-0.3 within a group. Most Gram negative bacteria belong to the purple bacteria group, which has not only the colored photosynthetic organisms but also many colorless analogues. Samples of these analogues are E.coli and other enteric bacteria. The green photosynthetic bacteria also go into two distinct groups:

1. Sulphur (hydrogen sulphide substrate)
2. Non-sulphur (organic substrate) types

which are not closely related (SAB - 0.18). The cyanobacteria consist of a coherent group, and they are similar to the chloroplast organelles of eukaryotic red and green algae, and green plants (SAB values of 0.25-0.30). If a quantum leap is performed in the genetic code of a bacteria, then this will result in a new type of bacteria.

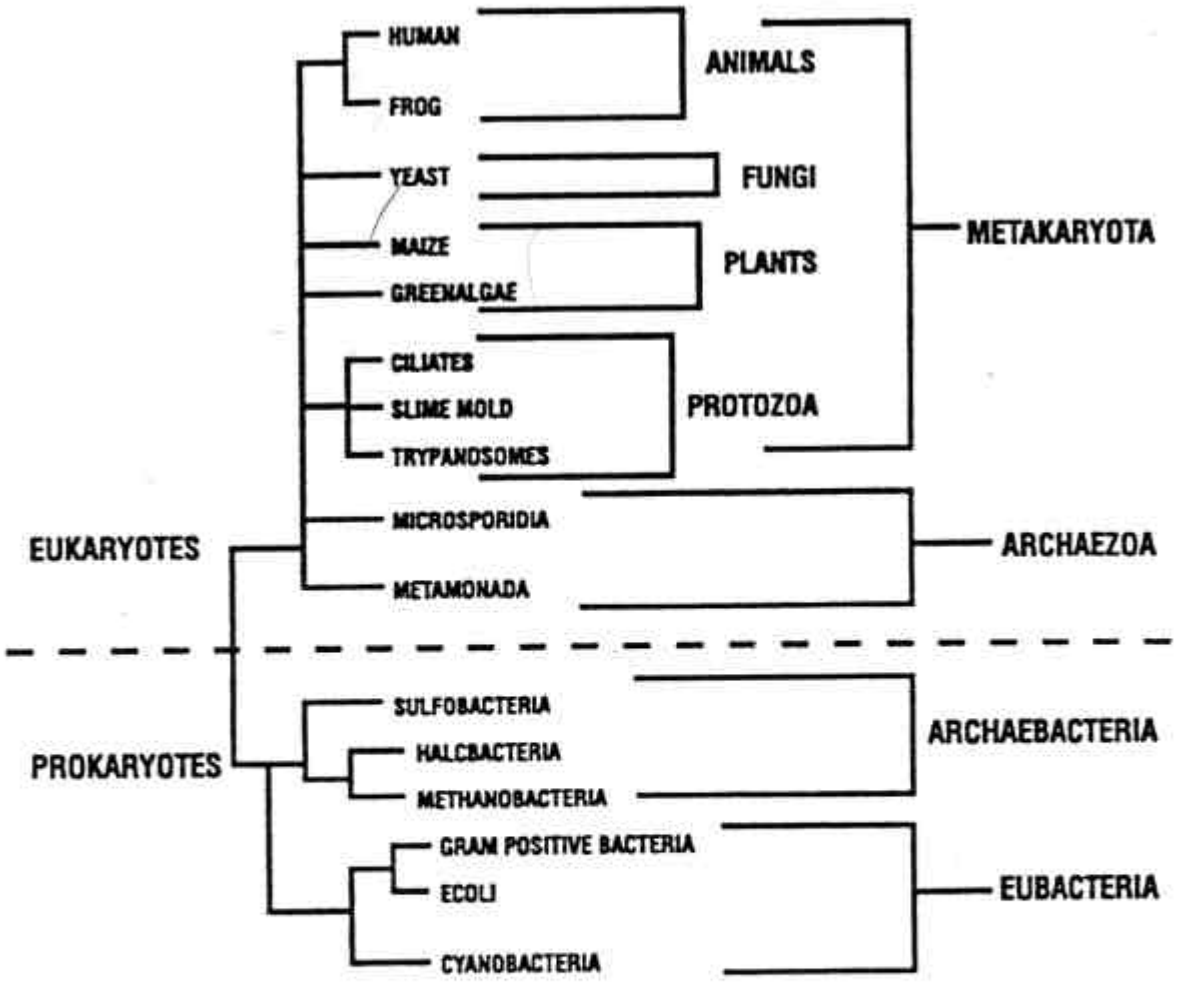
The sulphate-reducing bacteria, which use the oxygen of the sulphate for a primitive form of respiration, comprise a Gram negative eubacterial group. A type of bacteria in this group, *Desulfovibrio sulfodismutans*, can attain free energy from the disproportionation of sulphite or thiosulfate to sulphide and sulphate. This is an `inorganic fermentation' process similar to the redox disproportionation of glucose to ethanol and carbon dioxide (Bak and Cypionka 1987).

Thus we can plot genetic changes on a hermitian matrix. This allows us to develop new energetic laws for biology.

The eukaryote organelles, the mitochondrion and the chloroplast all share a prokaryote size (~ 1 µm). They are vions that contain their own DNA. These vions also have a circular double strand as in bacteria, and ribosomes of the bacterial type. The 165 rRNA sequences of the organelles tell us that the mitochondria belong to the purple group of eubacteria, and the chloroplasts to the group of cyanobacteria. Indigenous DNA in the organelles and the sameness of their 16S rRNA sequences to those of extant eubacteria led to the theory that mitochondria and chloroplasts evolved by a process of endosymbiosis. This theory hypothesized that ancestral eukaryote, with a vacuole nutrient method of securing nutrients into a membrane-bounded vacuole, once engulfed a purple-group aerobic bacterium generating ATP through the respiratory chain. As the guest supplied ATP, the host archae-eukaryote provided back to the guest proto-mitochondrion the materials required for its maintenance and ATP production. So mutual vionic patterns merged for symbiotic cooperation. The phagocytosis of a cyanobacterium into a vacuole led to the development of the chloroplast, which supplied carbohydrate to its host. In return the cyanobacteria supplied a life-support system. The two membranes around the organelle are leftovers of the endosymbiotic beginnings. The inner membrane represents the cytoplasmic membrane of the eubacterial guest. The outer membrane corresponds to that lining supplied from the vacuole of the host eukaryote. In vionic coupling sometimes functions can be presented dually. Quantum laws can still be obeyed. Backup systems are abounding in biology.

Possible relatives of the ancestral eukaryote, as many as a thousand species, have no mitochondria or other organelles. These species split from vion tendency to form the *archaezoa* subdivision of the eukaryotes, just as the *metakaryota*, which contain mitochondria, is an example of a vion. Sequenced representatives of the archaezoa are minute parasites, and are the *metamonada* and the *microsporidia*. These vions contain bacterial-sized ribosomes with 16S rRNA in the smaller subunit. They don't have the 18S rRNA found in the higher eukaryotes. The 16S rRNA sequences of a microsporidia and a metamonada species differs greatly from mitochondrion-containing eukaryotes, the metakaryota. This suggests an early vionic divergence. The archaezoa and the metakaryota split before the age (~ 1.4 billion years) of the larger microfossils (~ 10 µm) which, on account of their size, probably represent the remains of organelle-equipped eukaryotes (Cavalier-Smith 1989). We can see this vionic divergence in our matrix.

Biochemically the eukaryotes share similarities with both the eubacteria and the archaebacteria. The translation of mRNA into a polypeptide starts with methionine in the eukaryotes as it does in the archaebacteria. But translation starts with N-formylmethionine in the eubacteria. Elongation of the polypeptide chain is stopped by dipthera toxin in the eukaryotes and the archaebacteria but not in the eubacteria. Chloramphenicol stops the elongation in eubacteria but not in eukaryotes or archaebacteria. The lipids of the cytoplasmic membrane in both eubacteria and eukaryotes contain the diesters of L-glycerophosphate with straight-chain fatty acids. In contrast the archaebacterial lipids are composed of the diethers of D-glycerophosphate with phytanol and other branched-chain alcohols. This points out the variance of vionic technique in metabolism responsiveness. The quantic interchange of environmental forces can have a wide range of activity.



Evolutionary tree based on nucleotide sequences of rRNA in the small subunit of the ribosome. Scale length (0.1) relates to ten differences for each set of one hundred nucleotides (Cavalier-Smith 1989).

The analysis of DNA and its function has received extreme scrutiny from the scientific community over the last twenty-five years. Many abilities of DNA have been described and experimentally ascertained.

One of the most recent advances in DNA is that of *gene splicing*, in which genetic engineering can be accomplished by taking out a bad gene and splicing a healthy gene into the DNA. This dramatic new research offers great potential for medicine in correcting metabolic or genetic disorders. For a complete treatise on genetic disorders we can look to the *Natural Repertory*'s chapter on DNA and chromosomal therapy to find a list of all types of genetic diseases and how they might be treated through genetic homeopathy.

Modern medicine has also developed the technique of splicing the gene into a virus and allowing the virus to penetrate into the cell membrane, and then creating a new gene code that will replace the diseased code with a healthy genetic code. This was revealed in 1992 in recent experiments, allowing this viral transmission of proper genetic coding.

But with all this dramatic research being done with DNA, scientists have done little to account for the phenomenon of how the transmission of genetic data can be accomplished. For this we can follow Schrödinger in his description of the quantum abilities of DNA. This we have outlined in the chapters of his book, to allow for a basic understanding of this functioning.

So our description of the quantum philosophy and the quantum dynamics will allow us to find and be predictive of the long-range forces in biology that account for the function of DNA. The development of the matrices will also help explain some of the DNA functioning.

A hallmark group of studies were done in the early nineties by Glen Rein on DNA functioning. He found that DNA was sensitive to emotions and could receive directed thoughts and produce changes in the electrostructure of the DNA. Glen proved the existance of the subspace transfer effect from the quantic system of a persons thoughts to the quantic system of DNA. Separated inert humand DNA was found to produce electical pattern changes when thought about in a certain specified way. This electrical effect was described as piezoelectric by Rein. The same phenomena was used in developing the peizoelectric test kit used by the Quantum Med C.I. By placing thousnds of homeopathic remedies into a test kit in actual form with a DNA peizoelectric sorter the needed remedy can be made accessible when needed by the DNA. Into this test kit is also included all of the DNA chromosomes. The chromosomes can be used for genetic therapy.

For a further description of the homeopathic process of chromosome intervention please read the article in the *Natural Repertory*. For an understanding of the photon and wave form function, see *Biophysics*.

The DNA chromosomes have distinct electrical patterns. Each chromosome has a trivector signature of voltage amperage and resistance profile. This sets up a band of capacitance and inductance bands for each chromosome. These chromosomes act as electron, static, magnetic, and subspace transport systems for communicating energy, mass(amino acids) and information. The genes are distinct control areas for the flow. Within the band of electrical,magnetic ,and static dynamics of a chromosome the genes act with more distinct electrical signatures. Thus if chromosome 1p has a reactance band of 150,000 to 175,000 siemens, the simple gene might have a reactance band of 151,000 . The resonant frequency of the gene will also thus be more specific for each gene versus the more general pattern of the chromosome.

To measure these patterns we need to first measure the overall electrical pattern of the patient. This includes the resistance , impedance, voltage, amperage, capacitance, inductance, resonant and harmonic frequencies, ph, eh, reactance, polarity ,evoked potential, etc. Evoked potential is the reactance pattern of a subject to an applied stimulus. Also we must measure the trivector patterns of the chromosome and genes. Then we measure the individual reactionsof these patients in the context of the individual patterns. Then the specific genes versus the chromosomes can be measured in the same fashion. Attempts to measure just one parameter such as resistance or resonant frequency will be grossly inaccurate. Instead a fractal dynamics of non linear data analysis must be used for the best results. Then thousands of subjects need to be analyzed for pattern similarity. After 12 years of analysis a computer program capable of performing the vast numbers of individual analysis has been developed.

The end resulting computer program can now analyze and chromosomes and genes. Only by systemic analysis of the electrical trivector signature can the patterns be best analyzed. The computer can set up an interactive handshake analysis. A cybernetic link can be established where the computer can treat check and retreat in a consistent loop till the energetic imperfection is abolished, corrected, or till the system refuses to respond. Any more therapy would be unwise. The old style systems where just one way therapies without cybernetic feedback. Simply put this computer can interact during therapy with the patient to adjust the therapy for individual needs.

SUMMARY

1. We reviewed the literature and thought processes that arrived at the philosophical understanding of DNA, leading to today's use of chromosomal therapy in medicine.

2. We outlined the possible ways that Schrödinger was right about DNA working on quantum levels. Genetic transfer of DNA is accomplished by quantum dynamics.

3. We outlined a basic mathematical precept to understand this quantic link to DNA. Thus we attempt to explain genetics through quantum theory.

4. We outlined a proposition on how DNA function can be further analyzed, not just from chemical dynamics, but also from an energetic, quantum dynamics to allow us to further understand how to correct these situations in the future. A possible new DNA therapy is hinted at by using chromosomal homeopathy.

Chapter 9

ACUPUNCTURE EXPLAINED IN QUANTIC TERMS *(Energetic Interchanges cycled through Meridians)*

Acupuncture, as we have stated over and over again, is a system of medicine that has lasted for thousands of years, withstanding the test of time. War prone cultures that don't like to agree on anything agree about acupuncture. In fact, they all agree on the location of the meridians. Everyone in all of these ancient cultures who has studied acupuncture agrees on the observation that the points on the thumb relate to the lung meridian. The agreement on the morphous of the points is astonishing. Acupuncture must have a consistent structure to have produced such agreement for so long.

Even today acupuncture as a medicine is used by a large percentage of the world's population. To dismiss acupuncture as simply an endorphin-releasing mechanism without a deeper look might be inappropriate. Let us now take a look at some of the modalities of acupuncture, and discuss how they might fit into quantic terms.

Later, in Chapter 11, we find that there are certain qualities of the environment that produce ranges of health, and also of existence. As we will show, there is a range in which too much heat or cold destroys life. The healthy torus of life sets up a situation wherein there is a boundary, or an attraction, as described in Chapter 4 of *Quantum Biology*. This great attractor of life seeks its balance, and the organism of the human body has set certain extremes that it can deal with (see Chapter 11).

In the ancient acupuncture philosophy much is made of *perverse energy*. This perverse energy exists as different energies that affect the body adversely, and thus cause disease. To the ancient Chinese wind and cold are known to affect the kidney, exposure to wind and cold is known to affect the liver, exposure to heat is known to affect the heart, exposure to humidity is known to affect the spleen, and exposure to dryness is known to affect the lungs. These various exposures affect meridians, as well as internal organs, and the meridians are known to carry energy in and away from the different parts of the body. So in an acupuncture sense, we must realize that talking of the spleen meridian is not always talking of the *spleen*. But if the spleen meridian is continuously overburdened, then the situation will eventually reach the spleen, and cause organic dysfunction. It must be pointed out that sometimes it is initially just the meridian that is involved, and the internal organs are involved with increasing exposure time.

In *Quantum Biology* we found that mass, charge, electromagnetic radiation and viscosity were the only ways to actually transfer energies or information in physics. Heat (infared) is a form of electromagnetic radiation, and falls under that category. Information is a fifth transport that utilizes the first four.

So these four channels of treatment can be described. We can take the acupuncturist's idea of perverse energy and apply it to a quantic theory. If we explore the idea of heat and cold in the acupuncturist's philosophy, we can see that there is a torus of how much heat and cold the human body can tolerate. Also, individual organisms will set a toleration on the time of exposure to cold and heat without adverse effects. This is a variation of electromagnetic radiation theory.

In looking at how heat is conducted we will see that heat can be conducted through three means: radiation, which falls into our electromagnetic radiation criteria; convection, which falls into the acupuncturist's theory on wind and how it might convey this heat; and conduction, which has to do with the acceleration in vibration of various atoms and molecules, as they pass on their heat to other nearby atoms. This falls into the category of viscosity. Adrenaline produces a drop in viscosity and the autonomic system controls viscosity.

In the Chinese description we find humidity and dryness, which are also contradictory, as heat is to cold. Humidity and dryness are also tori which can be set up. We find that there is a susceptibility threshold of too much humidity that might produce a problem and create illness for a patient. As well, there may also be a too-dry situation, which causes a different set of problems. Since humidity and dryness are a measure of the active water in the system, we can see that this is effective in the mass of the water transfer, the viscosity, and the charge of the various ions that might be conducted in the water. Water, being a dipole, can easily carry charges. So humidity could be reflected in a torus, as well. Water is an ergodite substance that accomplishes thousands of varying functions for biology. So its excess or absence can have dramatic consequences. In our treatise on *Quantum Biology* we see the tremendous importance of water, and how it can be used to transfer information.

Finally, we come now to wind, which also can have perverse energy effects. Wind can be a conveyor of the heat, the cold, the dryness or the humidity. As well, wind also picks up an ionic charge, in a positive or negative mode. If wind blows over water such as oceans, waterfalls, or other bodies of water, it will tend to pick up negative ions, which have been shown more and more in our literature to have positive effects on the human body. Many people have negative ion generators in their homes, and negative ions have shown positive effects on brain function, mood, and many illnesses; sometimes healing them. If the wind blows over land masses, it has a tendency to pick up positive ions, such as the Santa Anna winds which are known to cause disturbances in health in the California area. Even in the I Ching, the great book of wisdom, this is talked about in many places; how wind which blows up a mountain and back down can have a rotting effect on vegetation and people. This is largely because of the positive ions that it picks up while blowing over land masses twice.

So wind has some effect in charge transport, and can have an effect in carrying the viscosity of humidity, the mass effect of wind, and also some of the EMR which can be carried on wind, heat and cold. Here we point out how the acupuncture system of analyzing perverse energy is totally apropos to a system of medicine that is developed on quantum theory. Now we can see how a patient could be exposed to one of these perverse energies that causes adverse effects to the body (see *Quantum Biology*).

Often we speak colloquially about how a patient might not be smart enough to come in from the rain. That would be an exposure to humidity, and possibly exposure to wind and cold, all of which could be causing an energetic tendency for sickness. We know also that people who sometimes move into extremely dry and hot climates can provoke sickness. Exposure is a type of sickness which is the result of too much cold or heat exposure, causing the disease.

In our idea of the torus, we can also set statistically some of the ideal situations that push and pull biological factors, such as the *great attractor*. If we envision an attractor in the human body as something which attracts us to a quality of health, and disease as a situation which occurs when we get *away* from the attractor, what would be the great attractor of the perverse energies which constitute an idea of weather? We can see in what is called "paradise" (Hawaii, tropical islands, other vacation resorts) a certain set of criteria that makes these areas idyllic. We usually find that there is a lack of cold, and no excessive heat. If it does get excessively hot, such as in Arizona, people will need to employ air conditioners, because the excessive heat could cause adverse problems.

So our paradises usually have the common factor of moderation of temperature; the contrast of heat and cold. Often times patients who live in cold areas will seek areas that have rebound effect (excess heat), which can attribute to the popularity of places such as Arizona. Usually paradise has a gentle wind blowing through it, such as Hawaii, where the negative ions that blow over the water accumulate with the gentle winds. The winds are rarely excessive, but when they are, people go indoors to protect themselves. But most of the time, the gentle winds bring in a negative ion sweep. There is a moderation of humidity and dryness in such paradises, where it never gets too humid or too dry. Places that get humid, such as New Orleans, are seldom thought of as paradises, although they might be popular vacation spots. We find that there are biological complications involving humidity that can be adverse. But for people to find a place to live and increase their health, Hawaii offers an interesting example of a place where wind, cold, heat, humidity and dryness seem to be balanced and temperate. This could be a reason why the Hawaiian life span is the longest of all the people in the United States, and also why the Hawaiian health seems far greater than any place in the United States. This might bring another understanding as to some of the positive effects of paradise.

In Chapter 12 of *Quantum Biology* we see another example in which acupuncture can be explained; that of using the various tastes to affect the various meridians. As we analyzed in that system, foods of different flavors; salty, pungent, bitter, sour, or sweet reflect different energetic patterns in their ions, their oxidation and their viscosity. These also can fit into our mass charge, EMR and viscosity labelling. It is our quantic idea of biology.

Disorders can result when people predominate to one type of food in any of these five categories. Often they might need to switch to a different category and be drawn toward a type of food they have not eaten, which might offer a type of organic complex to help bring them back into balance. Societies in which many different types of flavors are used in the foods seem to do better in their health systems, as well. In France we see a situation that is moderate in heat and wind, a flow of ions with the increase of shoreline; and also a selection of bitter and pungent as primary flavors in the food. Here we see that of all the different flavors, the one that is most akin to the central torus is that of pungent, which is often discouraged in most American diets; American diets tend toward sweet, and often salty.

The Chinese, in their treatment of acupuncture, also found that there were conditions of sour, sweet, salty, bitter, and pungent.These factors each have distinct electrical patterns which can be detected with our Quantum Med C.I. device. Thus the factors of The major organs have electrical signitures that reflect flavors.

Flavor		**Corresponding Organ**
	T	
Salty	*	Kidney, bladder
Sweet	*	Spleen, pancreas
Sour	*	Liver, gallbladder
Bitter	*	Heart, small intestine
Pungent	*	Lung, large intestine
	R	

The type of flavoring and cooking used in French cuisine and drinks reflects a more pungent flavor. This type of pungency might contribute to much of the good health displayed by the French. The acupuncturists found that at certain times these flavors and foods in those different taste criteria could be good treatment for varying conditions. They found that the sweet flavor was the treatment for people with spleen conditions (spleen meridian deficiencies). Saltiness favored kidney and bladder meridian dysfunction. The bitter flavor was around heart and pericardium meridian problems.

Thus some metabolic conditions might require the treatment of a taste modality, which is reflected through RH2 and pH criteria. The entire field of Chinese acupuncture nutrition is centered around these five different classifications of foods, and finding patients who are needful of these criteria as indicated by their symptom profile, patient history, and acupuncture diagnosis.

In acupuncture we can see some other factors that are employed in the analysis of psychological endeavors. Practitioners have the construct that fear, anger, sadness, worry and anxiety also affect the biological matrix. These emotional states can be a cause of disruption, and thus, disease. Fear, they say, attacks the kidney; anger, the liver; sadness, the heart; worry, the spleen; anxiety, the lungs. So we can see here the beginning of a physiological, psychological intervention, which allows us to bring another modality of intervention into the system of acupuncture.

These various emotional states are coupled with various hormonal releases. These hormonal releases can cause problems with organic components. So if we look into the analysis of these hormones, we can see that fear does have effects on the kidney, anger on the liver, sadness on the heart, etc.

The system of acupuncture is a system of communication between the cells that allows for a quantic interchange. As we have quantic dependence and quantic interchanges of information intercellularly, the entire organism, as it grows up

to be a body, will also have quantic interchange channels as well. These are the systems of acupuncture and acupuncture points.

So science is starting to uncover more and more of the secrets of acupuncture, and how this age-old medicine truly was and still is an earnest healing endeavor. We must also realize that the actual insertion of needles was not just folklore, not just mythology; but a healing mechanism that can be explained through our new science of quantic interaction.

Medicine took off into chemical and synthetic pharmacology. Practitioners now must realize, as medicine grows in more dramatic ways into an age of nuclear-magnetic resonance, quantum theory, homeopathy, and the like, that acupuncture and perhaps electroacupuncture will inevitably be woven deeper and deeper into the fabric of modern medicine.

	Acupuncture	Synthetic Allopathy
Test of Time	5,000 + years	100 years
Test of Popularity	Largest system of medicine on planet 85% return	Most profitable system of medicine on planet 20% return
Test of Philosophy	Energetically sound	Energetically unsound
Test of Damages	Very little dissatisfaction damages in thousands of dollars each year	Great dissatisfaction damages in multiple billions of dollars each year
Test of How Many Helped	Millions helped each year	Millions helped each year
Statistical Validity	Long-term	Short-term
Cost	Very inexpensive	Very costly
Paranoia Test	Very open to new endeavors	Highly afraid of new and often old forms of medicine that threaten its profitability
Attitude	Humble Reveres nature	Arrogant Feels superior to nature

The acupuncture meridians have distinct electrical patterns. Each meridian has a trivector signature of voltage amperage and resistance profile. This sets up a band of capacitance and inductance bands for each meridian. These meridians act as electron and subspace transport systems for communicating energy and information. The acupuncture points are distinct control areas for the flow. Within the band of electrical dynamics of a meridian the points act with more distinct electrical signatures. Thus if the lung meridian has a reactance band of 1500 to 1750 siemens, the point lung 1 might have a reactance band of 1500 to 1525. The resonant frequency of the point will also thus be more specific for each point versus the more general pattern of the meridian.

To measure these patterns we need to first measure the overall electrical pattern of the patient. This includes the resistance , impedance, voltage, amperage, capacitance, inductance, resonant and harmonic frequencies, ph, eh, reactance, polarity ,evoked potential, etc. Evoked potential is the reactance pattern of a subject to an applied stimulus. Then we measure the individual meridians of these patients in the context of the individual patterns. Then the specific points on the meridians can be measured in the same fashion. Attempts to measure just one parameter such as resistance or resonant frequency will be grossly inaccurate. Instead a fractal dynamics of non linear data analysis must be used for the best results. Then thousands of subjects need to be analyzed for pattern similarity. After 12 years of analysis a computer program capable of performing the vast numbers of individual analysis has been developed.

The end resulting computer program can now analyze and treat meridians and specific points. Only by systemic analysis of the electrical trivector signature can the patterns be best analyzed. The computer can set up an interactive handshake analysis. A cybernetic link can be established where the computer can treat check and retreat in a consistent loop till the energetic imperfection is abolished, corrected, or till the system refuses to respond. Any more therapy would be unwise. The old style systems where just one way therapies without cybernetic feedback. Simply put this computer can interact during therapy with the patient to adjust the therapy for individual needs.

To accomplish this task in just twelve years took tremendous dedication and extreme sacrifice. When others were out enjoying the weekend , I worked on electrical parameter testing. The nonlinear systems of fuzzy mathematical analysis and fourier dynamics had to be learned and some new systems developed. A trinary system of subspace interaction had to be developed with very little help. A quantic matrix of energetic relations and frequencies had to be posited, tested, refined retested, etc. Clinical evaluation, governmental registration, crooked business partners, back stabbing competition, federal prosecution, and others road blocks made the process more tedious. But after development of the test and therapy cybernetics in subspace and trivector analysis, many people will want to shortcut the process and steal the technology. To this I can say that everything they need is already offered in this book. This book has all of the theories, postulates, and criteria. Read, enjoy and interact.

SUMMARY

1. In this chapter we have seen how acupuncture as a system of medicine is really more of an energetic mechanism than a chemical mechanism, and that the ideas of modern American medicine have been so based in chemical analysis that its practitioners have been unable to understand the energetic capacities of acupuncture. Now with an understanding of the energetic capacities, we can see that the acupuncture system of medicine is a very fine one indeed. In fact, it proves to be a superior form of medicine when compared to modern chemical modalities.

2. We have seen through a review of the acupuncture literature that acupuncture, which has existed for five thousand years, is indeed a large and viable form of medicine; it must become part of any medical education.

3. We have shown how the acupuncture system of analysis of weather capacities can produce an idea of where the most healthy environment might be, which we often call “paradise”.

4. An electrical cybernetic interactive Handshake device can be developed for acupucture diagnosis and therapy.

5. Acupuncture is also compared to the system of the Torus analysis, discussed in Chapter 11.

Chapter 10

PSYCHOLOGICAL EVOLUTION, PHILOSOPHY DEVELOPMENT, AND THE CHANGING PICTURE OF SCIENCE

(The Evolving Consciousness of Mankind, or the History of Sinthetic drugs)

The mind is the filter of experience. All scientific thought proceeds through this filter. The mind effects all science. The evolution of science must be analyzed through the evolution of the mind.

The history and development of science must be intrinsically linked to the psychology and intent of the experimenters. It has been demonstrated that observer interference is a basic part of quantum theory. As man develops into deeper knowledge about his environment, the constructs and background of his knowledge allow for deeper insights. A person's perception and interpretation of an experience will always be limited and shaped by the background and filtered by his present knowledge base. Science is shaped by sociology, psychology, and religion, among other philosophies.

As people look into biology, they develop certain ideas that are a reflection of their knowledge and the psychological intent in developing any experiment. Now with this book, and by bringing biology into quantum theory, we can offer a new explanation. The philosophy of quantum theory helps to explain biological function better than previous theories have. But now let us review some of the psychology and the scientific developments of history's past biological experimenters.

Science has developed in many ways. A remarkable thing happened in the eighteenth century, when Antoine van Leeuwenhoek developed the microscope. Using a series of lenses he constructed over 247 different microscopes. Analyzing samples from bodies of water, such as rivers, ponds and oceans, Leeuwenhoek could observe "little creatures" that were in almost everything he analyzed. Beer, saliva, dental plaque, feces, and some urine samples contained these "little creatures". Everywhere he looked he saw micro life.

A series of letters starting in 1673 to the Royal Society of London showed Leeuwenhoek's discoveries. These discoveries seemed to amplify an age-old belief of spontaneous generation, wherein life could be produced from organic material, or every-day matter at large.

Stahl had several theories concerning the principle of phlogiston. He proposed the existence of a subtle breathing capacity of life. J. B. Van Helmont expressed that there was a release of what he termed "gas" (from the Greek word "chaos"), that gasses were active and energetic, and also that gasses were needed for the respiration, fermentation, and spontaneous generation of life.

Joseph Priestley, then studying the pneumatic chemistry of the time, eliminated the idea of the spiritual model behind these entities in relationship to gas, and started doing experiments in which he tried to reduce the experiments to simple chemical analysis. This was the ultimate beginning of chemical reductionism as it entered into biology. This type of thought (that complex situations could be analyzed in simple chemical experiments) propagated for the next several centuries the study of medicine and biology. Only now in the 90s is reductionism being challenged by fractal and chaos dynamics. All of scince and mathematics now recognized nonreductionistic systems. Only medicine (the most nonlinear system) clings to reductionism.

Lavoisier then added to this work. He proposed that this vital gas was contained in the products of combustion and calcination. Lavoisier put forth the idea that the products of combustion were always acidic. He termed this vital gas *oxygen*, which is from the Greek for "acid generator".

Lavoisier employed the help of Pierre Simon Laplace, who was a famous mathematician of the time. With the help of Laplace, Lavoisier designed an experiment using a calorimeter suspended in ice to show that the respiration of a guinea pig produced nearly the same ratio of heat to carbon dioxide as the combustion of charcoal when burned. Organic chemistry was

reduced to combustion by the similarity of these experiments. Reductionistic thought was revealed in this discovery.

We quote Lavoisier when we say, "Respiration is thus a combustion; very slow, it is true, but perfectly similar to that of carbon. It occurs in the interior of the lungs without disengagement of visible light, since the matter of fire which becomes free is at once absorbed by the humidity of the organs." Ah, if only Lavoisier had known of photonic radiation.

Lavoisier later introduced an Arabic term, "alkohol", to replace the traditional name "spirit of wine". Lavoisier found this to be related in many cases to yeast, and he coined the term *catalytic*. Catalysis was the variation of a Greek word meaning "down loosening", for decomposition.

Lavoisier started studying the idea of a catalyst that could assist two different compounds in combining or producing a third compound, and yet it would lower the amount of energy needed for these entities. This was the beginning of an understanding of enzymes.

The school of chemical reductionism was well under way, pushed by Berzelius, Mitscherlich and Wohler. Wohler produced the first synthetic type of urea without the aid of a kidney, in a process of isomerization of ammonium cyanate. This was done in 1828, and the synthetic generation was born.

The production of these synthetics was justified by the Germans under the guise of a search for fertilizer. Actually, many believed that it was a search for the development of synthetic sodium nitrates, which could be used in the production of bombs, and would limit the German dependence on Argentina for these nitrate sources and other natural deposits.

Another leader in the development of this synthetic craze of organic chemistry was Liebig. Liebig was a strong biochemical reductionist, and spent the end of his days attacking the micro-biological chemistry of Louis Pasteur.

In Paris, Pasteur had another major opponent in Marcelin Berthelot. Berthelot sought "to banish life force from all explanations relative to organic chemistry". From 1855 forward he showed that the development of simple organic molecules

could be synthetically derived from carbon in inorganic substances. The mistake of reductionism produced the mistake of synthetic chemistry.

Pasteur was working on the germ theory and development of studies into the microflora of life. As he studied the microflora in fermenting fluids, he found that "fermentation is life without oxygen". Pasteur resisted synthetics and studied micro flora as a natural phenomenon.

The spoiling of different alcoholic fermentations could be avoided through a process he developed, called *pasteurization*, by heating it to certain temperatures that would destroy the bacteria. Pasteur found that sugar solutions could remain unchanged if they were in contact with air filtered through extremely tight asbestos, which would remove any of the exposure of the various microbes. Pasteur had the idea that microbes were ever-present in all our atmosphere. This he termed the doctrine of *panspermia*. Spontaneous generation, although never witnessed, might be possible. Lack of observation does not preclude existence.

Priestley was also concerned with what he perceived as the decay of the atmosphere. Our atmosphere, which provides the breath of life, was being spoiled through combustion, fermentation, and pollution, as Priestley saw it in the 1700's. Priestley then discovered that a pigment in plants, known as *chlorophyll*, was capable of producing oxygen, and thus the atmosphere was not decaying. This discovery led to the cyclic theory of environmental interdependence. The organic results of such production were usually found to be glucose polymers. Starch was the most likely, and the botanist Sacks found that plants in the dark respire normally, taking up oxygen and producing carbon dioxide, at the expense of their starch reserves.

Stokes found that the spectrum of chlorophyll showed that the pigments of light absorbed were in the red and blue areas of the visible spectrum, which then would allow for a transmission of the green light; hence the green color, and thus the first location of the photon, giving birth to biology.

Engelmann showed that the red and blue wavelengths were the active ones for photosynthesis. The green wavelength was relatively inactive in energy (but decades later was found to carry information). Engelmann determined that in irradiating chloroplasts of the algae spiro gyra, with various types of light, the green was largely inactive, and that most of the activity was in the red and blue ends of the spectrum. The amount of oxygen produced was directly related to the amount of light of different colors to which these entities were exposed.

Engelmann also found that other types of bacteria might absorb carbon dioxide, but would not put out oxygen. Thus he found two groups of photosynthetic bacteria:

1) **non-oxygenic**,

2) **oxygenic**. One was green, the other, purple. The purple pigment was later found to be *bacterio-chlorophyll*, which is based upon a tetrahydroporphin, which was different from the dihydroporphin photo pigment of chlorophyll found in the oxygenic organisms. These light-sensitive bacteria would use reducing equivalents from organic materials, and sometimes inorganic substances, such as hydrogen or hydrogen sulphide, for the photo reduction of carbon dioxide to carbohydrate and to utilize ATP to drive metabolic turnover and reproduction.

Little was known of the philosophy of the photon and the ability to check such photons in any type of quantic law. Thus the psychology of the people developing these experiments was locked into the chemistry, and could not see some of the more energetic connections. Chemical synthetic companies dominated the research and funding. Energetics is still unknown in biology.

Microbiologist Cornelius van Neil, working in California in the 1930s, found an expression to reclassify our master equation of life. As we discussed in the *Quantum Biology*, we have found a certain type of master equation, which we now may express in more eloquent terms.

$$CO_2 + 2H_2\,A + \text{Light} \rightarrow (CHOH) + 2A + H_2\,O.$$

The CHOH refers to generalized carbohydrate, the A may be oxygen if the hydrogen donor is water; the A may be sulphur or hydrogen sulphide, or absent if hydrogen is taken directly up.

Thus this master formula proposed by Neil showed that light was an integral part of living biology, and studies of light had come to a point to allow for this step in science. Thus Neil found that there were two distinct and separate processes for the assimilation of carbon dioxide, which allowed for the production of oxygen.

It was found in the late 1880s that the production of oxygen was proportional to the light intensity at low radiation levels. But at high levels of radiation exposure there was a constant rate of oxygen production. A temperature coefficient indicated that there was a thermal enzyme operating in the dark, which provided a type of activation energy to allow the photo reaction to occur. At the start of the 1900s, Emerson and others looked into the quantic nature of this photosynthesis. Now, with the skills of understanding the photon, they could find some very excellent quantic ways of revealing this process.

The pathway of another type of theory, that of the lock and key, started with the introduction of the idea of the enzyme. Kuhne introduced the term *enzyme*, taken from the Greek for "in yeast". Kuhne felt that all plants and animals, as well as microbes, could be involved with organized fermentation, and sought to study enzymes. Enzymes lowered the energy needed for a chemical process, and were essential for living tissue. Kedule had a dream one night about a snake biting its own tail. This gave him the insight on the phenyl ring theory of certain organic compounds.

As Kekule proposed some of the three-dimensional molecular structures of aromatic substance, other people started to learn an appreciation for the complexity of enzyme substrates. Emil Fischer proposed a lock-and-key type of philosophy, in which an enzyme substrate could be used to grab compounds with a subtle shape-reception process. This would then allow for the development of a new reaction, taking much less energy than the original process.

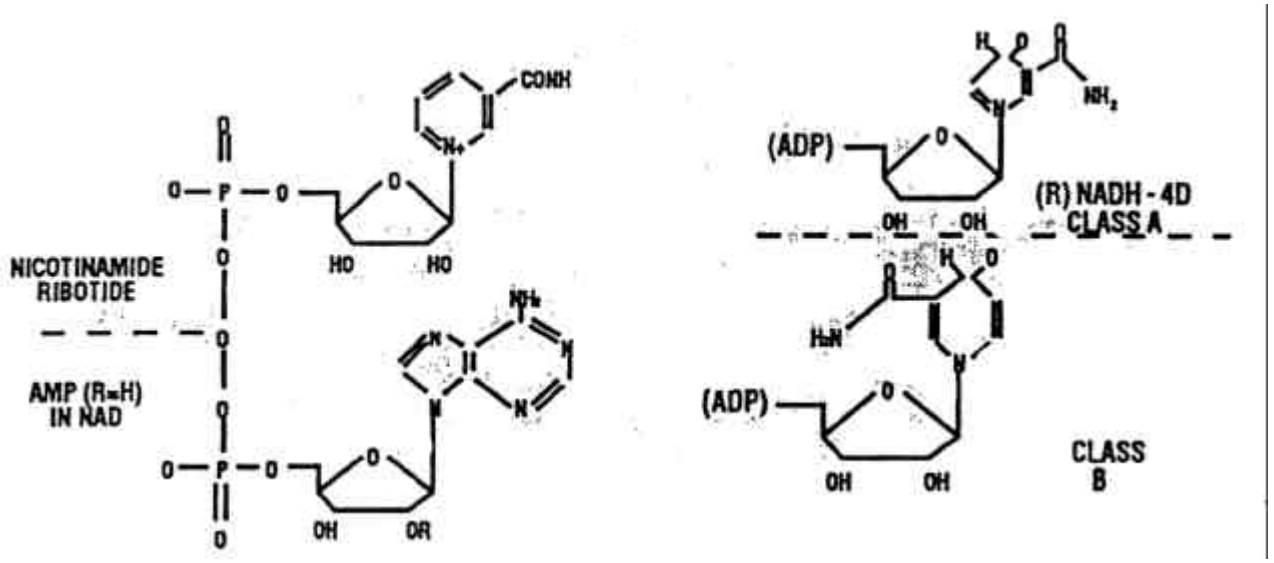
Buchner found a single free fermentation enzyme, which he termed *zymase*. Buchner's alcoholic enzyme was the first to cause changes in carbon chains and produce rearrangement of groups.

In 1906 Harden and Young studied different glycolysis and fermentation processes. Warburg experimentally isolated co-fermentation compounds required for the oxidative metabolism of glucose. This work was done using red blood cells

in 1934. They found substances that were composed of nicotinamide and adenine, plus two pentose components as well as two phosphate groups. Hardin and Young first presented these as co-enzyme 1 and co-enzyme 2. Later they developed the name *NAD*, or nicotinamide adenine dinucleotide, and *NADP*, for nicotinamide adenine dinucleotide phosphate. Chemical reductionism got a big boost from its mechanistic description of energy production.

Warburg hypothesized that these nicotinamide factors were active in the enzymatic reduction of various biological energy reactions. Life required NAD and NADP. These reactions could be monitored using spectrophotometers, and absorption bands near 340 nanometers would appear in the electric spectrum from the nicotinamide when the pyridine ring is transformed to a dehydro form in the reduced co-factors *NADH* or *NADPH*.

So Warburg could show experimentally that the reduction of acetyl aldehyde to ethanol during fermentation requires the oxidation of NADH to NAD.



Warburg also isolated an enzyme known as *yeast alcohol dehydrogenase*, which would be used to convert acetyl aldehyde to acetic acid in the process of fermentation.

X-ray diffraction studies in crystalline theory also led to a change in the psychology of the mind set of these chemists, wherein the lock-and-key hypothesis of Fischer could explain certain parts of the enzyme catalyst. Linus Pauling and Haldane developed other concepts, where Haldane proposed that sometimes, even if the lock were not perfect for the key, it might exert a certain strain on the components allowing for some activity. Pauling then proposed a theory in which enzymes, even if they didn't completely fit, could impose changes on different structures and systems. This "elastic" enzyme theory boosted biology and reductionistic synthetic chemistry. It allowed a flexible quality to reductionism that made errors less evident.

Hardin and Young in 1906 isolated a substance known as *phosphagen*, an organic phosphate. This was found in certain muscle preparations and appeared to store cellular energy. Phosphagen disappeared during muscular contraction, and was restored quite rapidly when the muscle was at rest. Harden speculated that this was through an oxygen-consuming reaction.

In 1929 Lohmann discovered, while tracking back an organic pyrophosphate, $H_4P_2O_7$. This was found in muscle and yeast tissue. Then another organic phosphate ($H_4P_3O_8$), which contained adenine, was discovered. Six years later he characterized the substance as *adenine triphosphate (ATP)*. Lohmann had also isolated *adenine diphosphate (ADP)*, which was later shown to be key in the developments of ATP and AMP (adenosine monophosphate). Phosphorous's amazing ability to store energy was utilized. Its valent flexibility also allowed a wide variety of chemical utilization.

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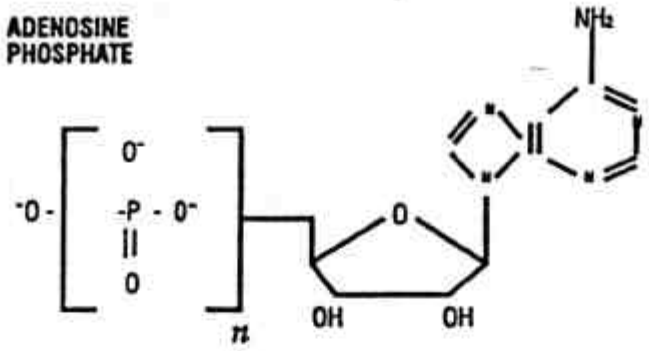
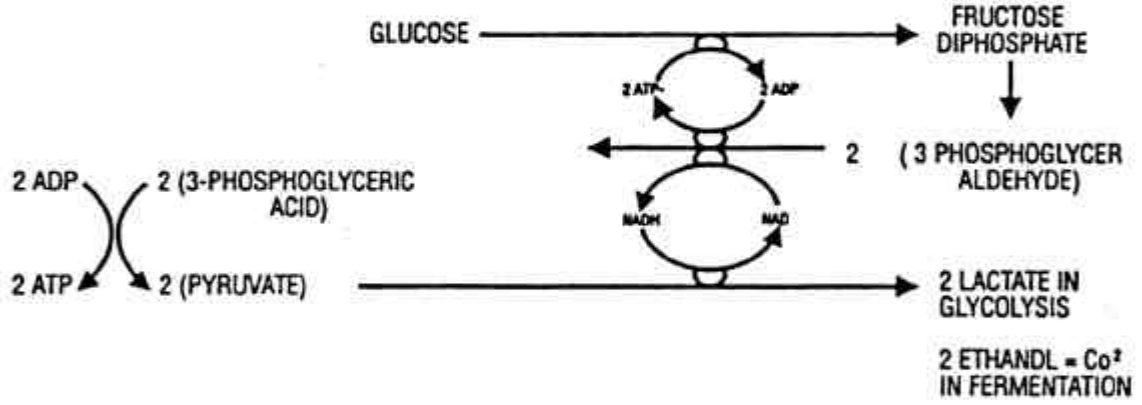
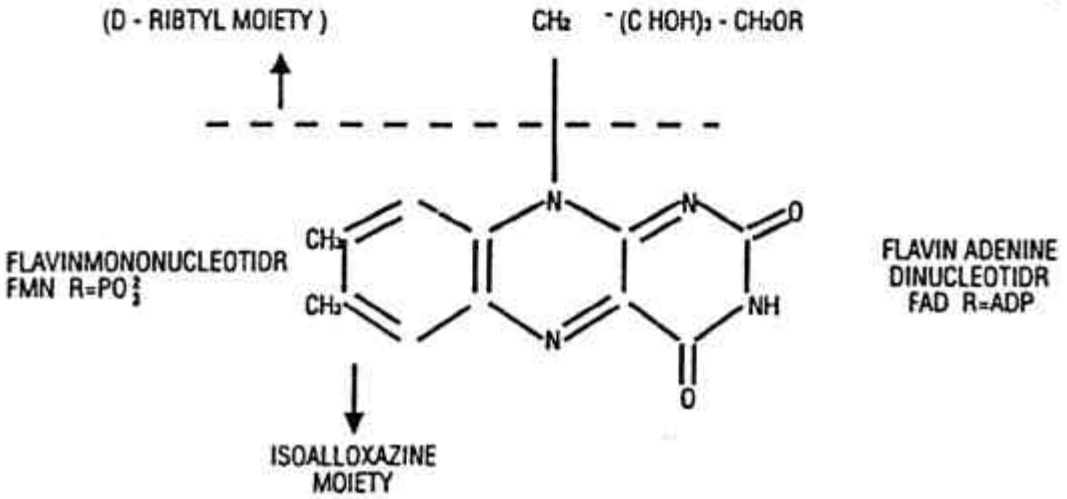
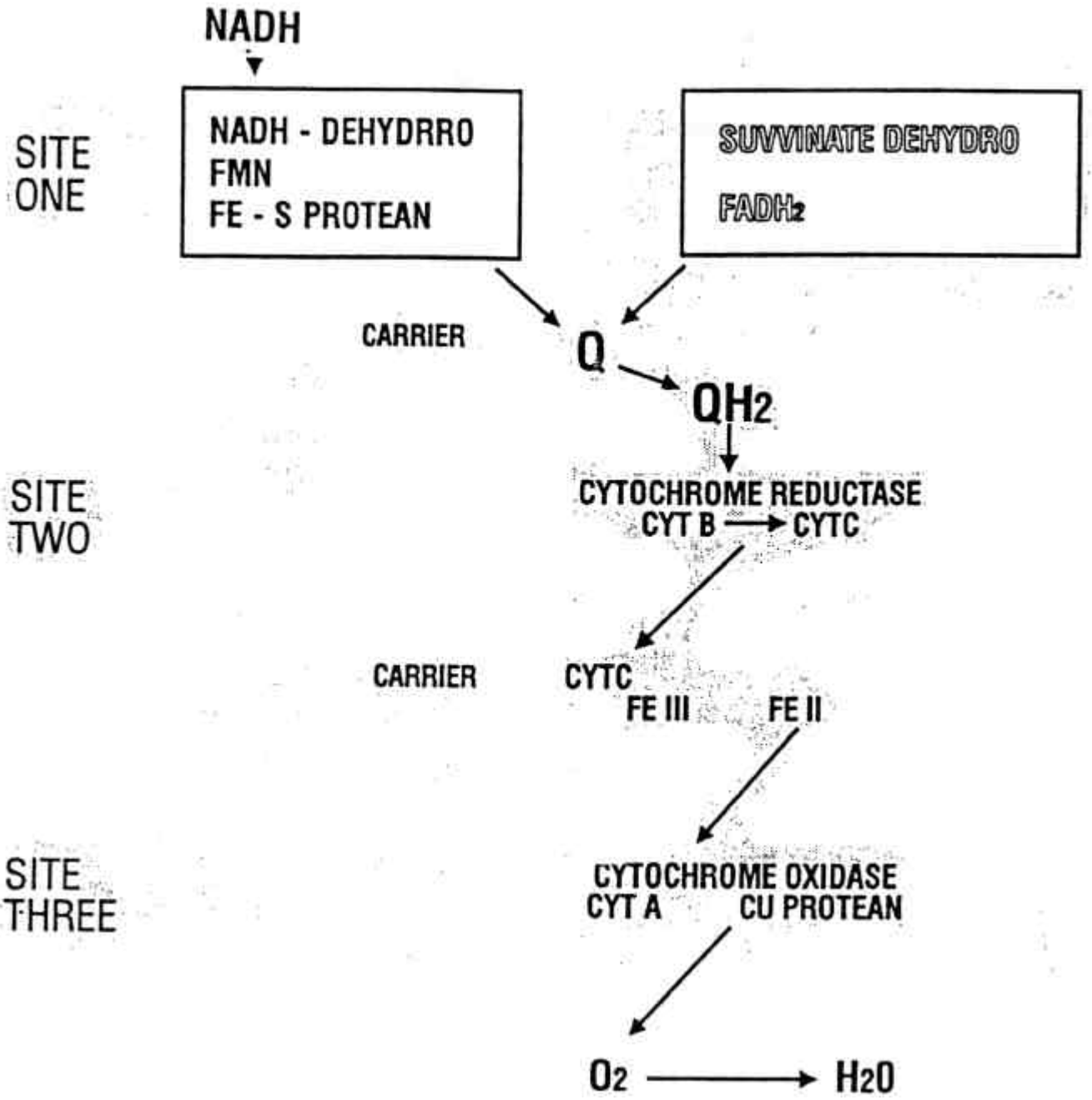


n = Number of Phosphates

1 = Amp 2 = ADP 3= ATP







Louis Pasteur contributed the opinion that glucose could be converted to ATP through two different processes: one, in the presence of oxygen, which would convert thirty-eight molecules of ATP per molecule of glucose. This was part of the carbon dioxide process of respiration. Two, if there was no oxygen, and the ATP was in an anaerobic state, only two molecules of ATP were developed per molecule of glucose. This was later named the *Embden-Meyerhof* process. Two types of respiratory process were so analyzed: one, the chemical investigation showing catalyst mediating electron transfer of molecular oxygen. This was investigated through a spectro-chemical investigation, which looked at the different colors of the catalyst. The second was a biochemical characterization of in-between links of respiratory production of carbon dioxide. Carbon dioxide back to glycolysis and pyruvate was shown to be the cyclic steady state completion of the energy circle.

Lucasian found that there were two types of hemoglobin: one that was scarlet (oxygenated) and another that was purple (deoxygenated). This was found in the difference between arteries and veins. Oxygen had stepped into biology in a big way. Oxidation and reduction had become the mainstay of biology.

Stokes, in his experiments, saw that the oxyhemoglobin, which was red or scarlet in color, was characterized by two very distinctly clear absorption bands in the visible wavelength region, while the purple hemoglobin had only one visible band. Stokes termed this *chromatology*, and studied the different bands and colors of this hemoglobin-oxygen effect. Photon absorption was also brought into the mainstream of medical thought, but it was not related to information transfer because of the chemical, not energetic, dominance of medical philosophy. Later it was found that part of this effect could be linked to cytochrome A, B and C; each having effects at different parts of the spectra in the visible wavelength region. All have a common band at 520 nanometers and separate bands at 605, 565, and 550 nanometers.

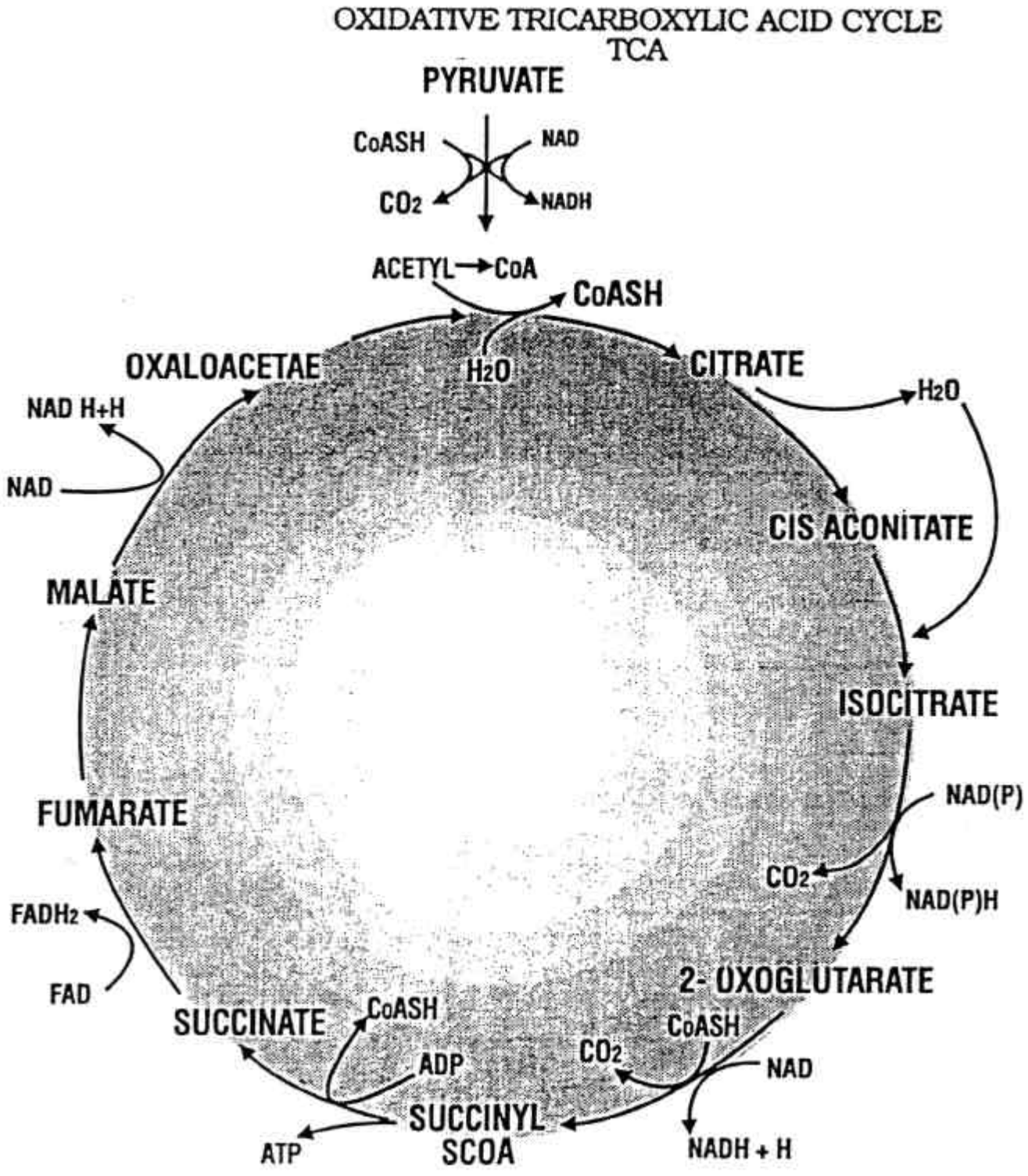
As was pointed out in *Quantum Biology*, cytochrome is very important in several ways, as it works for ferrous 1, 2 and 3 to allow for the oxidation and the various redox potentials, allowing for life itself.

An interesting thing in the 1930s and 1940s was the connection of light, and the spectrophotometer and its ability to find nanometer settings of either absorptive or productive at this type of chain. Light absorption and release had come to chemistry, but the electromagnetic connection has yet to be explored.

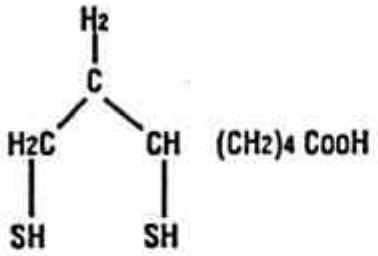
In the 1950s three sets of enzyme systems were found that were membrane-specific and able to carry electrons. The first one of these systems was that of NADH dehydrogenase, and succinate dehydrogenase systems. This was linked to the second system of cytochrome reductionase. This involved the co-enzyme Q, also known as ubiquinone, so named for its ubiquitous reduction process enhancing ability.

The third site offers a place for the final reduction of oxygen to water. This was complicated at the cytochrome oxidase complex. This allows the acceptance of four electrons in a one-by-one donation process from the mobile cytochrome C after reduction from ferric forms. The third complex also contains cytochrome A and cytochrome A3, both of which are protein-bound to copper. The soluble carrier of cytochrome C transports electrons from the second to the third site, and the cytochrome oxidase compounds, which react directly with molecular oxygen.

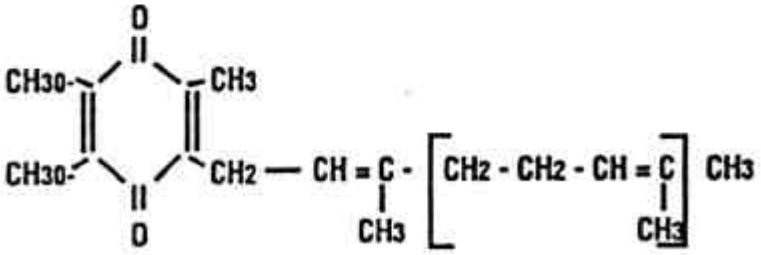
Our source of NADH that is fed from the respiratory chain results from the tricarboxylic acid cycle. This was found by Hans Kreb, a German biochemist, who developed the krebs cycle.



ALIPONIC ACID COVACTOR OF PYRUVATE DECARBOXYLAS



UBI QUINONE CO-ENZYME Q



Albert Szent-Gyorgyi contributed somewhat to this, showing that succinate, fumarate, malate, and oxaloacetate promote the oxidations of the carbohydrates. The dicarboxylic acids Szent-Gyorgyi proposed are composed of hydrogen transport chains from carbohydrate and molecular oxygen; oxaloacetate, which can be reduced to malate, which is then dehydrated to form fumarate, which then is reduced to succinate.

This very complex cycle of the krebs cycle shows the conversion of carbohydrate (glucose) into ATP. The very sophistication of this cycle was discovered largely by people doing isolation reduction experiments, and then Kreb put it into a very holistic pattern.

Reckeweg, in Germany, speculated in a book called “Kreb’s Problem”, on how this process was incomplete until it could be internally regulated. Johnson found that the completion of this cycle could be accomplished by the regeneration of citrate from oxaloacetate by the incorporation of a two-carbon residue from pyruvate, provided by the glycolysis of carbohydrate. Two carbon atoms will provide the molecules for the carbon dioxide, which is evolved in the d-carboxylation stage.

Lipman found a very interesting co-enzyme A (acetylation) factor while investigating the phosphate esters that proceed the glycolysis of the Meyerhof group. Lipman found that an immediate process of oxidation of pyruvate provided the acetyl phosphate. Animal tissue experiments showed that the phosphate was not of a general form of active acetate. So he found a subtle difference between plant and animal tissue involving the co-enzyme A. Animals needed an active thio-ester of the co-enzyme A, which was combined with a fatty acid; thus co-enzyme A + S + COCH. Plants with an abundance of fatty acids did not need such a crutch.

The oxidative metabolism of fats and proteins, as well as sugars, was found to proceed through a tricarboxylic acid cycle with acetyl co-enzyme A as the transfer medium. The reducing equivalents of the complete oxidation of one molecule of pyruvate and two carbon dioxide can be fed into a membrane-directed electron transfer chain of cytochrome complexes also used in the respiratory chain. This can allow production of an optimum formation of fifteen molecules of ATP.

Eukarotic microbes like yeast, which can be produced in an anaerobic cycle, can only obtain a maximum of two ATP in a fermentative breakdown of glucose. Oxygen-rich metabolism will obtained over thirty molecules of ATP from the two pyruvate molecules, supplied at the end stage of glycolysis.

Another six ATP molecules can be released from the two NADH molecules with similar results to those of Pasteur. This was developed by Lipman, working at Cornell University in the United States. Reductionists thought they had figured out biology and energy.

In the book, “Thermodynamics”, Louis and Randall pointed out that the atmosphere of the Earth, in theory, should balance thermodynamically the nitric acid. Nitrogen fixing bacteria and fungus possibly could produce the loss of all free molecular oxygen through a nitrogen-related depletion. “It is hoped that nature will not discover a catalyst for this reaction,” Louis and Randall write in their book.

The best catalyst nature has to offer for this reaction is a nitrogen-fixing bacteria. Luckily for us, it has limited performance in its ability to bind nitrogen into the soil.

These nitrogen-fixing bacteria will require approximately sixteen molecules of ATP for every molecule of nitrogen reduced to ammonia. This would produce a byproduct of at least one molecule of hydrogen. The acid buildup is one control factor of the operation. This type of bacteria will have a very low yield of ATP, producing roughly one molecule of ATP for every molecule of ammonia that is oxidized later to nitrite.

ATP can be hydrolysides *in vivo* to two widely distributed processes: one, a catalysis of the pyrophosphate produced

with AMP in the hydrolytic route; and two, a fast phosphate transfer between two molecules of ATP, to form one molecule of ATP and one of AMP. It must be pointed out that this is only an *in vivo* process; it does not happen *in vitro*.

Membrane transfer allows for an enzyme transfer system, which involves the tricarboxylic acid cycle. This respiratory chain, using a wide variety of organic and inorganic compounds will concentrate substances substantially different from those prevailing in the external medium. Trace mineral metabolism and concentrations are superbly important in process regulation and control.

In the 1950s a theory was derived by reorientation of thought that free energy, which can be accumulated in high-energy confirmations of the proteins, could be channeled through the phospholipid bilayer of the plasma membrane. The membrane-bound respiratory chain of the redox electron has a semi-permeable nature, just as the mitochondria or cytoplasmic membranes. The electrical potential developed across all membranes, due to the concentration of ionic minerals on each side of the membrane. This allows for the electron flow process and the respiratory chain, which involves reduction enzymes of molecular oxygen.

This proton push-and-pull sets up a pH balance which produces a potential difference across the cell boundary. This membrane potential is achieved. The potassium pump, the sodium pump, and other mechanisms of cellular and extra-cellular balancing can now proceed.

It was the theory of the time that this process could happen in organic or inorganic terms. It is our hypothesis, shown in the book *Quantum Biology*, that this is a *guided* process that happens through guided quantic activity, which has very definite non-thermodynamic, or non-entropic, factors (see *Quantum Biology*).

In 1961 Peter Mitchell proposed a physio-chemical mechanism ATP generation, finding that membrane transfer, through redox electron carriers, must depend on a semi-permeable membrane, and a semi-permeable membrane must occur also at the mitochondria inside a plastic membrane.

The proton push-pull process provide a pH stabilizing difference, known as the *electro-membranepotential boundary*. It was found that there is *isotropy*, or balance of the homogenous solution, when developed in an anaerobic metabolism. However, the development of an oxidative metabolism was *anisotropic*.

As we look at a development of this two-dimensional anisotropic reaction, quantum theory allow us to have a new appreciation for an electron transfer chain between the two surfaces of the membrane. Electron transfer chains will be embedded in a phospholipid layer, head from one side and drain from the other, providing a source of energy and nutrition to the intercellular processes.

Lipman proposed a scaler group that would transfer the potential. This was represented by the free energy of hydrolysis of phosphate intermediates and complicated to the oxidative metabolism. Mitchell provided a vectorial analysis of the proton mode of potential, which he will call)P, orientated perpendicular to the membrane surface.

$$\Delta p = \Delta\psi - Z\Delta pH \qquad \Delta p = \text{Proton motive potential}$$

$$\Delta\psi = \text{Potential difference}$$

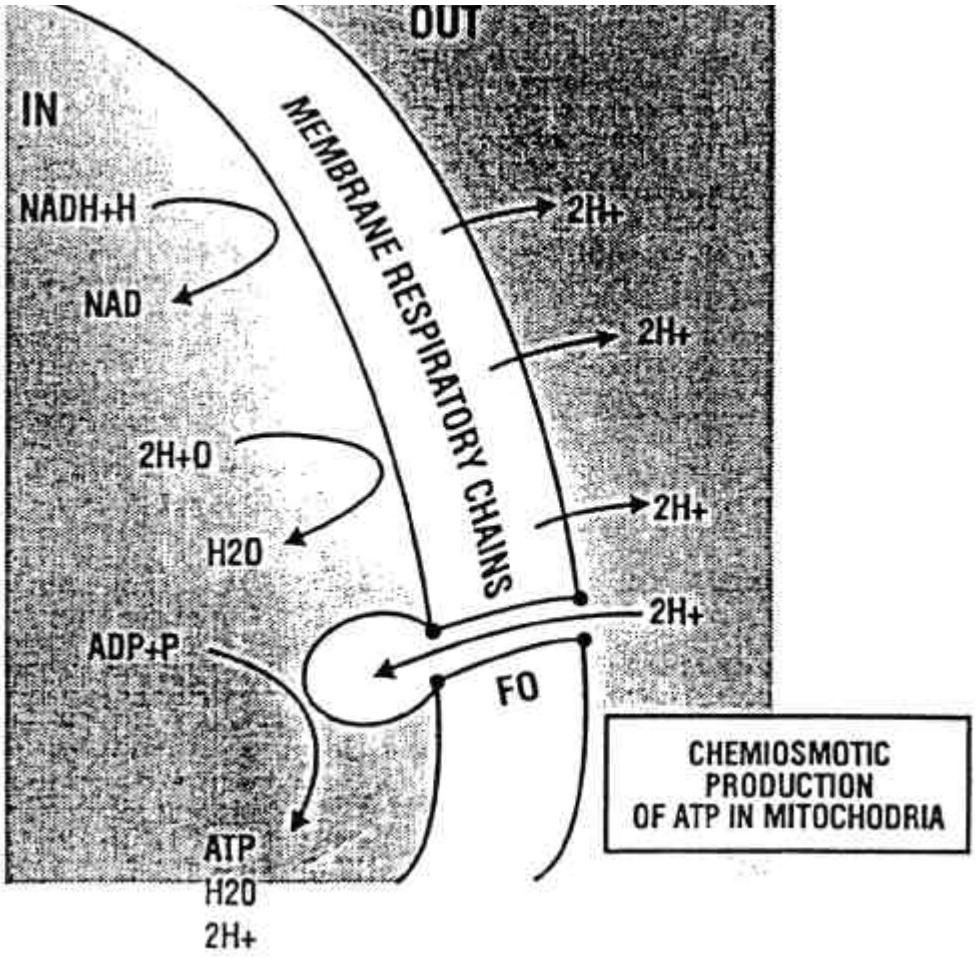
$$\Delta pH = \text{Concentration gradient of hydrogen ion} = pH(\text{OUTER}) - pH(\text{INNER})$$

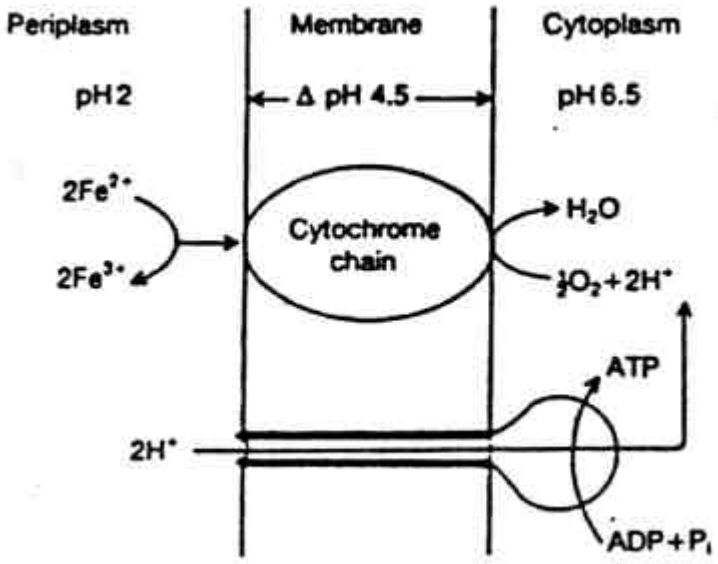
$$Z = \text{Conversion factor} = 2.303\,\frac{RT}{F}$$

$$Z = 60\ \text{mV at } 25\,^{\circ}C$$

Z is the basic conversion factor of 2.303 RT ÷ F. This is a value of approximately 60 millivolts at twenty-five degrees Centigrade, so the potentials that can be expressed in 60 millivolts will affect temperature as well as pH, and cause an inner-outer difference. The change in delta pH will refer to the differences of pH outer minus pH inner.

Thus the definition of the osmotic hypothesis will provide a range of probable outcomes directed at our knowledge of cells.

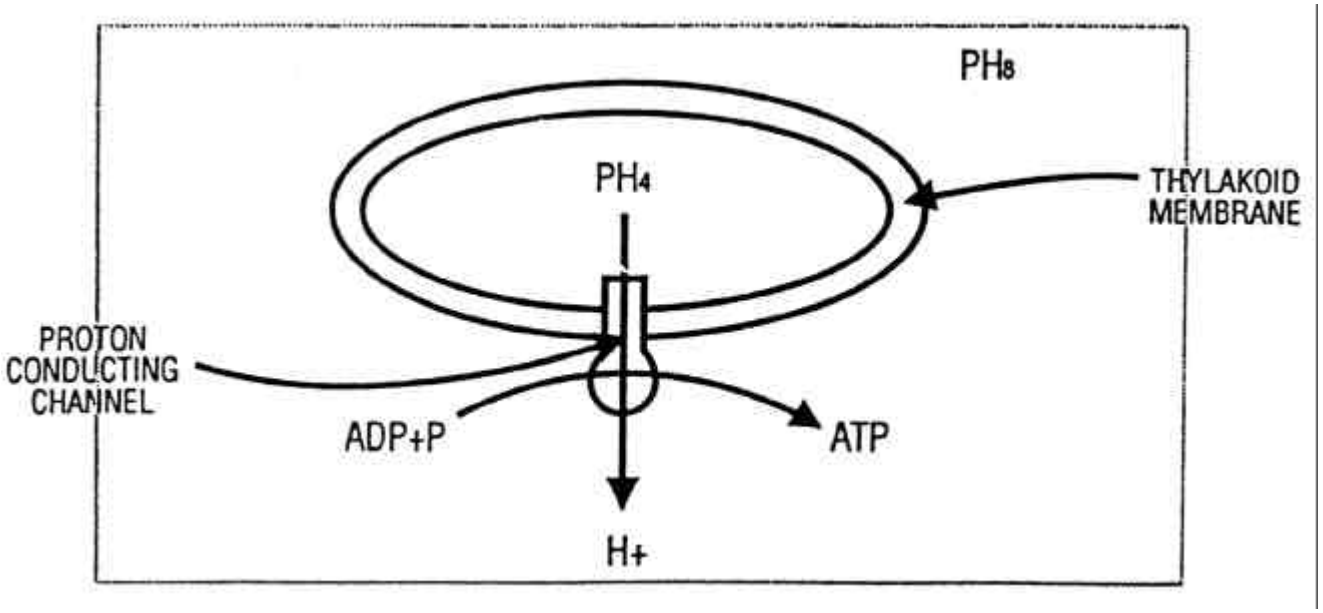




The change of pH value cascading to potentially more negative can occur for an organism that flourishes in an acetic environment, such as pH of 2. Such an organism is the *thermoplasma acidophilum*. This bacterium is bound solely at its plasma membrane, because it lacks a cell wall. This bacterium was first isolated from coal waste tips. The thio-bacillus ferro-oxidans would generate ATP in an oxidating ferrous-to-ferric iron oscillation. Thus this thermal type of bacteria can help to regulate temperature and pH in conditions such as that of the large and small intestine.

The photosynthetic membrane is like the thylakoid membrane found in the chloroplast organelle. Here, not only protons are conducted, but in the presence of a photon bath, the cell could set up the criteria needed for membrane transfer.

The famous 1966 chemosmotic theory was further reinforced by an acid bath experiment, wherein the chloroplasts were incorporated in the dark at a pH of 4.



E.coli is often known as the “work horse” of molecular biology, because it is such an organism that does not have cytochrome C or cytochrome reduction sites. These E.coli bacteria are structured to have only two energy coupling sites in the oxidated metabolism process. Only four protons for each oxygen atom can be reduced to water. In their mitochondria, each molecule of NADH produced by the degradation of pyruvate to carbon dioxide and tricarboxylic acid cycle generating on oxidation of NAD will produce three molecules of ATP. One molecule of ATP can be synthesized from ADP and P for an influx of two hydrogen ions through a proton-conducting channel of an ATP synthetase unit located at the inner surface of the mitochondrial membrane.

Emerson developed two types of photosynthesis that could be analyzed in his 1947 experiments. In 1937 Emerson was the first to find a quantum yield of photosynthesis, showing that eight photons are required for each molecule of carbon dioxide assimilated and for each molecule of oxygen evolved. The quantum yield of the chlorophyll to oxygen ratio was found to be that of 300 chlorophyll molecules. This was the basic necessity to produce at least one quantum of chlorophyll molecule production. These two systems would absorb various wavelengths, and would be active in various oxygenic photosynthesis stages.

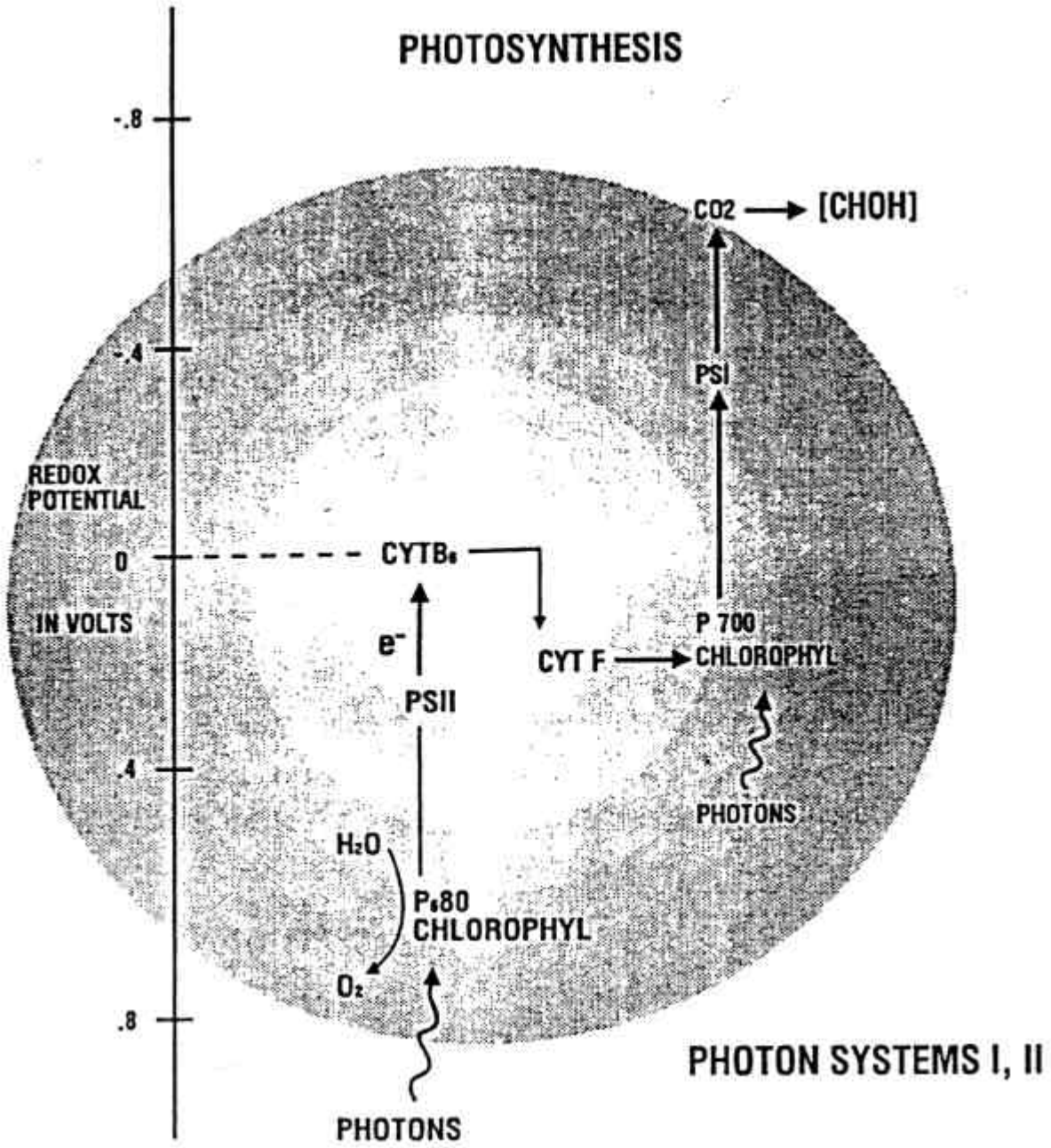
Green algae was found to fall on a radiation scheme at a long wavelength that would be 685 nanometers, which would involve the chlorophyll type a. Chlorophyll still has a very appreciable absorption of light at this point. But when irradiated at 700 nanometers, chlorophyll a would show much less absorption of light. There was a second type of absorption, which provided at a lower wavelength below 650 nanometers. Thus nature would have a backup of two major systems of photon absorption.

Robert Hill, working at Cambridge in the late 1930s, also found two separate systems of 650 or shorter and 660 or longer. Bendal found that these two systems would produce a type of redox potential variance, and would provide a connective series through dark reaction that was supplied through the cytochromes.

Hill and Bendal proposed the *Z scheme*, in which numerous oxidative photosynthesis observations supported the idea that photo-system 1, governing the photo reaction of carbon dioxide to carbohydrate, is made up largely of chlorophyll a and a little bit of chlorophyll b, with the reaction center composed of the specialized photo pigment. Photo-system 2 would liberate oxygen by the photo transfer of electrons from water and a composition of a different type of chlorophyll, mostly using chlorophyll b. We might have a peak at a maximum light absorption of 680 nanometers. The ground electronic state of the photosynthesis 2 process will be found close to a mid-redox potential of .82 volts of the water/oxygen cycle.

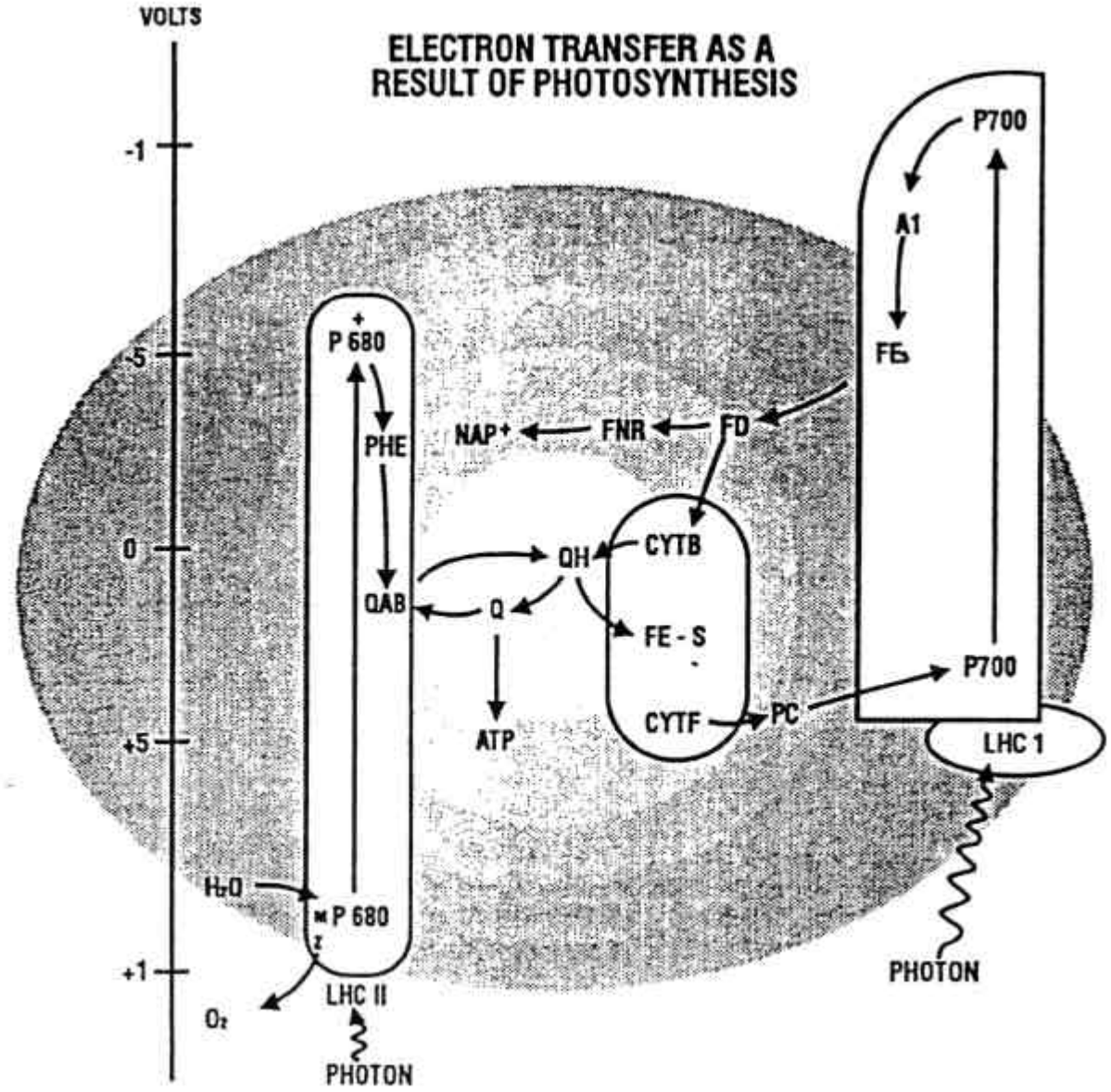
Light, when brought into the PS 2 cycle at 680 nanometers, will produce an excited state, allowing the negative redox potential to appropriate electrons donated from the cytochrome series of the PS 1 cycle. Thus photosynthesis 1 and 2 can both be utilized in the system at the same time to produce balance. But as the wavelengths shift with the change of the seasons, this would produce the need for a different type of pigment, such as that of the xanthophyll, or other pigments that account for the turning of the colors in fall.

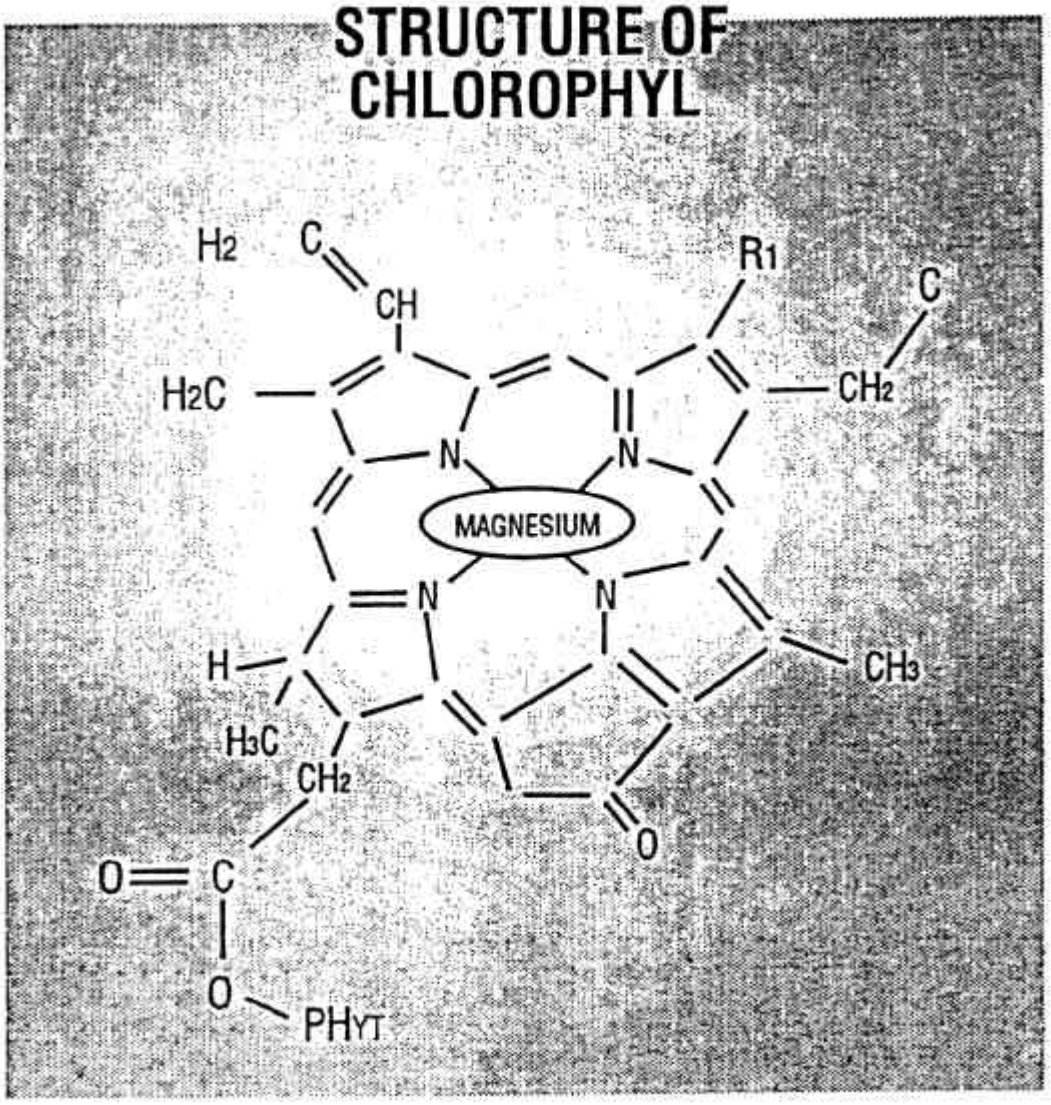
Photosynthesis 1 and 2 will contain a very extensive light harvesting complex and provide for a few hundred chlorophyll molecules with other antenna pigments organized around the reaction. Photons of the range 400 - 700 nanometers can be cycled into this reactive center.



So chlorophyll a is the ultimate trap of the photo excitation energy gathered by the antenna pigments. Chlorophyll b is a superb additional process to allow for stability and also provide utilization of changing light wavelengths.

So we can see that three molecules of ATP and two of NADPH are required to reduce carbon dioxide to the level of carbohydrate. The energy needed for this reaction of carbon dioxide to carbohydrates and water is approximately 480 killi-joules per molecule. This was derived from a coupled oxidation of the two NADPH molecules to NADP. So our three ATP molecules make up the residual free energy requirement and provide a small overall excess.



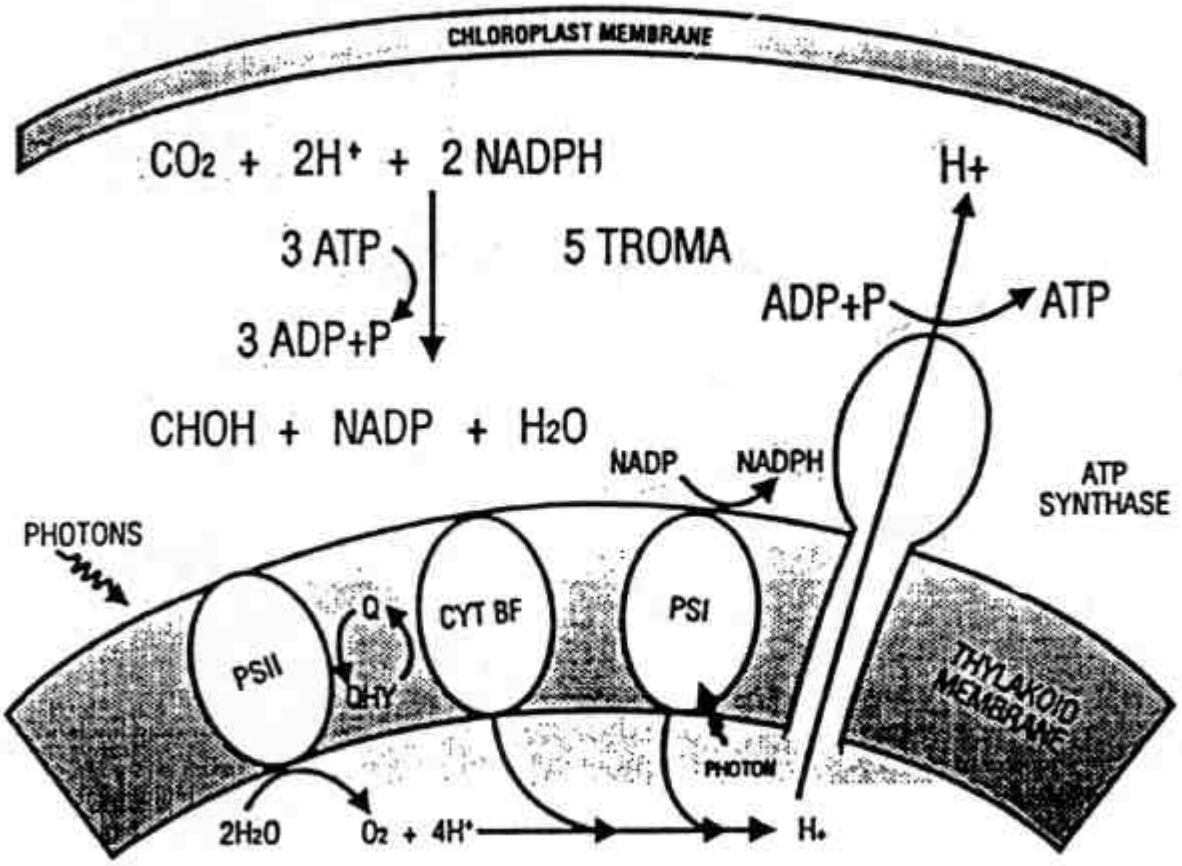


So this photo-chemical process of carbon dioxide fixation and photosynthesis is less efficient than the dark enzyme reactions. So the combined energy of the three photons of visible radiation in the red region, around 680 nanometers, will produce about a ten percent excess. This can be used to drive the reduction of the carbon dioxide molecule in water.

It can be found that the quanta of eight such photons are needed to produce NADPH and ATP in their reduction. It takes eight quanta of red light photon to fix one molecule of carbon dioxide, and it takes eight quanta of red light photons to liberate one molecule of oxygen, through the same process. So the efficiency rating can come out to around thirty percent.

There are, however, a minimum of three types of colored bacteria, which have different pigments that allow for the harnessing of sunlight for metabolism and biosynthesis without evolving oxygen. The green and purple photosynthetic bacteria can use a pigment known as *bacterio-chlorophyll*, which is a dehydro analog of the chlorophyll molecule. This can trap photons in a reaction which is centered into electron transfer and a chain of redox carriers. Electron transport back to the photo-pigment through a chain that translocates hydrogen ions allows for the production of ATP through an osmotic reactivity that reduces NAD to NADH, by taking electrons from a terminal donor with a less positive reduction potential than water.

Sulphide disulfate, or perhaps even some other organic substrates of this kind, can be used. This is the type of remarkable production that can happen in the fungus growth.



Another possible type is the hallo bacteria, which has developed a different type of pigment; a *bacteriorhodopsin*, which is a proline bound to a certain protein. This has a remarkable similarity to some of the purple pigments found in the human eye. This hallo bacteria belongs to a kingdom called *archae* bacteria, which is taken from other prokaryote bacteria.

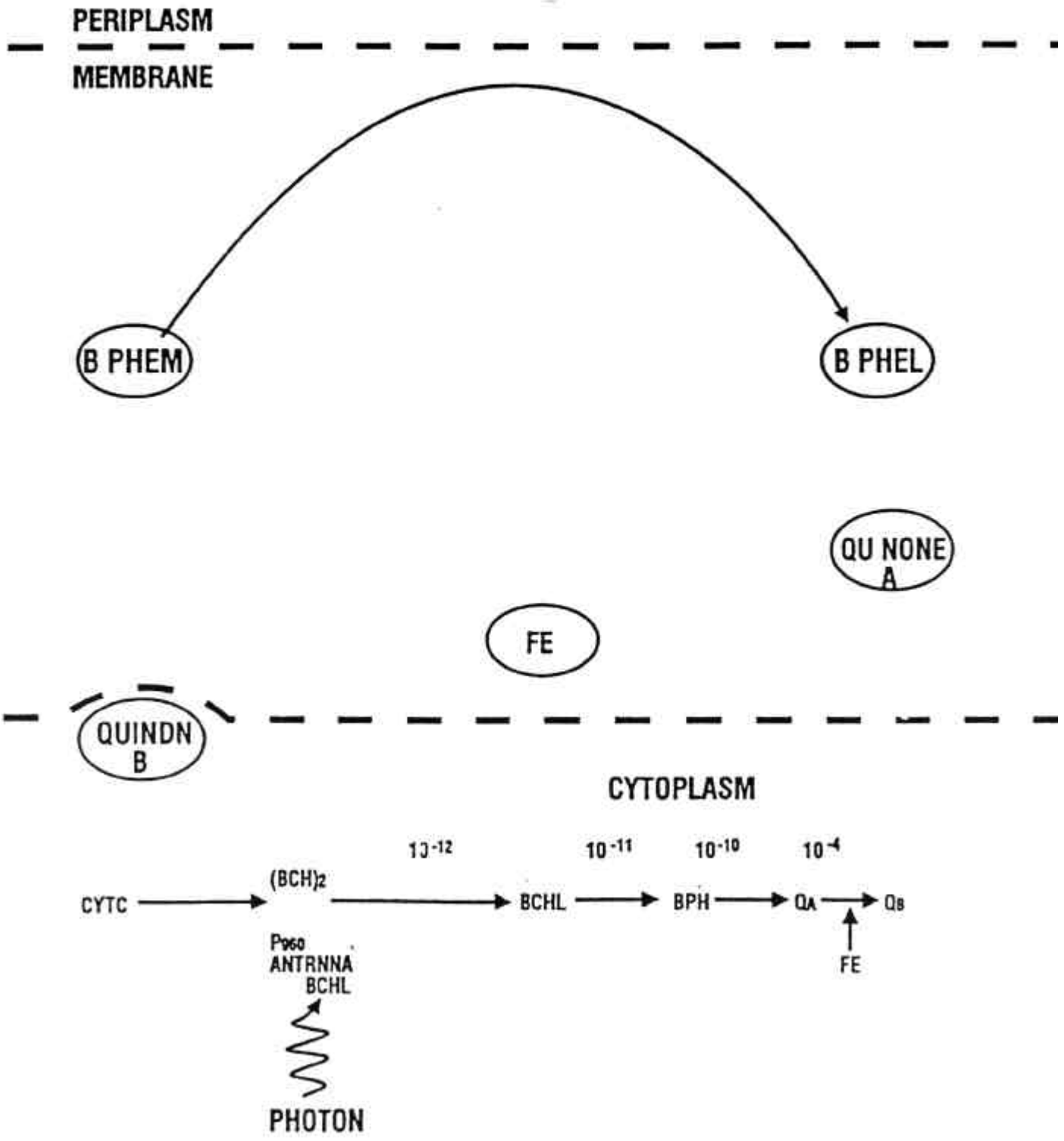
The archae bacteria is made of a cytoplasmic membrane of distinctive lipid layers composed of a diether formed by diglycerol 1 phosphate, with a branch chain alcohol. This alcohol is usually phytanol, a derivative of phytol. By forming on the hydrocarbon side of chlorophylls, this will allow for the lipids to capture the various types of photons and produce a variety of energy states.

The hallo bacteria can grow in aerobic environments of high salinity, such as the great Salt Lake, marshes, and often marine estuaries. Where there is low oxygen of very partial pressure and high light, these organisms can develop purple patches on their bacteria, covering a large part of their membrane surface. Light photonic energy will be absorbed by the pigment, and produce a flow of the hydrogen ions across the cytoplasm interior, to produce a proton motive potential across the membrane. This produces a respiratory chain, and allows for ATP production. The ATP required for metabolism and reproduction is generated by an influx of the hydrogen ions back into the cytoplasm through proton-conducting channels.

So we can see that life had to develop an aerobic and anaerobic mechanism. But central to each mechanism is the key of photons.

The absorption of light can be in the yellow region of 568 nanometers, which can transform the chromophore to excited intermediaries. This produces a loss in hydrogen ions,

ELECTRON TRANSFER
OF PURPLE PHOTOSYNTHESIS BACTERIA

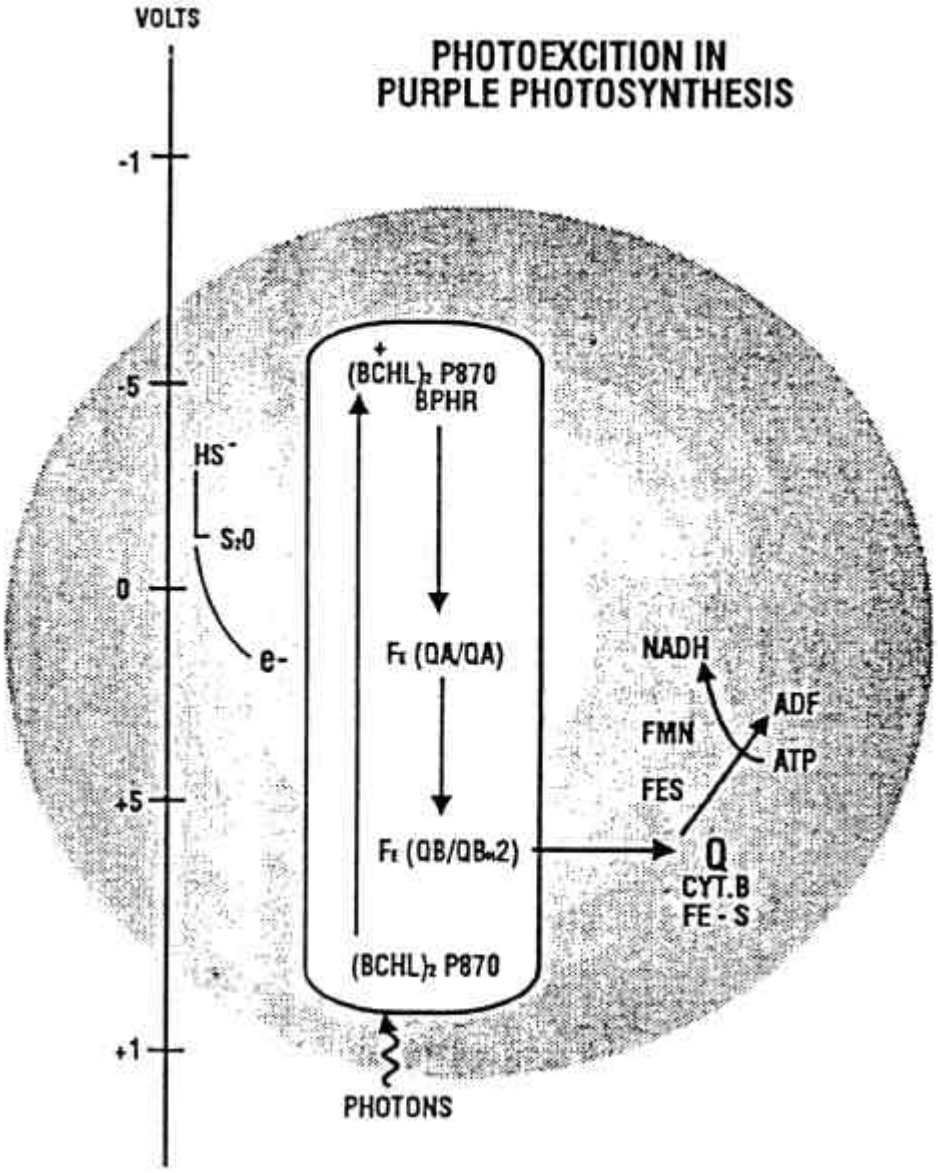


which is extruded from the outer surface of the plasma membrane of the bacteria. At 412 nanometers, which is an infrared frequency, this produces a relaxation of the thermal network and allows another uptake of the hydrogen ion to the cytoplasm, to reform the pronated chromophore.

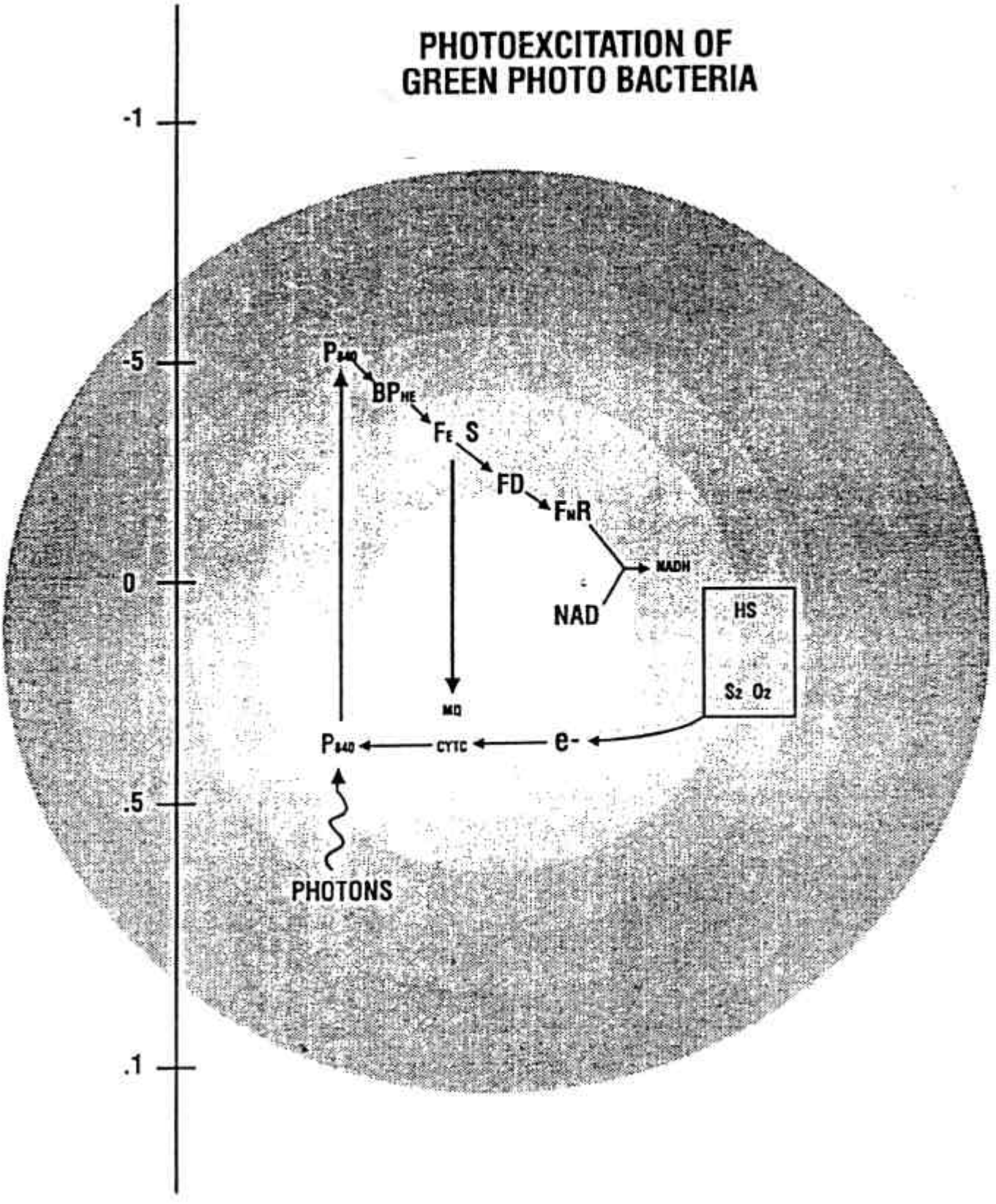
The ionic dissociation constant (pK value) of many organic acids is substantially changed through the excitation of photons. Thus the ability of any cell to control pH and ionic displacement is affected and controlled by photon ranges. This reinforces the idea of the photon control that accounts for medication testing in biology.

The caratenoids of the hallo bacteria will allow the organism protection from ultraviolet radiation. They do not transfer their photo-excitation energy to the bacteria at those UV levels. But the caratenoids of the green and purple photosynthetic bacteria are part of the light attaining and utilizing development of the cell. They pass on their photo-excitation energy through antenna pigments, which in turn cause radiation energy in the center of the bacterial photo-system.

Non-oxygenic photosynthetic bacteria usually posses a single photo-system, and show no enhancement of quantum yield with two-wave length irradiation, unlike oxygenic cyano bacteria, which have *two* photo-systems, and display the Emerson Enhancement effect.



PHOTOEXCITATION OF GREEN PHOTO BACTERIA



The light-harvesting complex of green photosynthetic bacteria will consist of a membrane enclosed in a vesicle contained inside a cytoplasm. This membrane will be approximately 40 nanometers in diameter and 140 nanometers long. It will contain various types of chlorophyll and utilize the absorption patterns of the photons. The base plate of the complex of the green photosynthetic species make up five percent of the total antenna assembly, which can be crystallized and characterized chemically, as well as through optic classification.

The great influx of photons from the sun made plant life possible. The photon bath of infrared nature from the average temperature of the earth made animal life possible. Animals give off photons which plants take in. Until now the excess heat (infrared photons) from animals has been thought to be a useless byproduct.

In chlorophyll the soluble base plate antenna complex will consist of a tremor containing three identical subunits, rated by a threefold rotational symmetry that insures the isotropic absorption of light incident parallel to the trigonal access normal to the symmetry plain of the plasma membrane surface. Each subunit is made up of a polypeptide, with a molecular weight of about 50,000, and seven molecules of chlorophyll a. Maximum light absorption is at 809 nanometers, and this is not in itself photo-chemically active, but transfers its own photon energy through the chlorosphere antenna.

In many writings it is perceived that life started anaerobically, and that oxygen was actually a cataclysm to life on the planet. As is was produced in plant chains, it was toxic to anaerobic activity.

Some of the earliest forms of life, thus, were anaerobic and heterotrophic bacteria. These life forms fermented and developed very little ATP; two molecules per molecule of glucose or starch. Then an oxygenic bacteria was developed, and a plant membrane that allowed for the development of oxygen into the system. As oxygen was generated by these bacteria, it produced a cataclysm, or bifurcation point, for all biology on the planet Earth.

When oxygen proliferated an anaerobic bacteria environment, this produced more energetic tendencies, because it could develop thirty plus molecules of ATP per molecule of glucose. Melanin was one of the first molecules in this chain that allowed for a type of metabolism and a type of reproduction. Melanin could mutate into 247 energetic forms, and thus had a wide enough diversity to store transmission data or provide reactive data. Our pineal gland and its light regulation abilities are a leftover of this melanin pathway. Proper human physiology is dependent on a healthy pineal gland.

Life can develop with oxidizing compounds other than oxygen. Sulphur sits on the same periodic column as oxygen. Assimilation of sulphur allows for various types of bacteria. Sulphur can be accounted for in a divergence in the typical reductive TCA cycle. This may be an ancient pathway of carbon dioxide fixation. The new Calvin cycle could be a nuevo approach for biology to handle energy conversion.

Thus after the oxygen crisis in the environment, the Calvin cycle might have been developed to subjugate the TCA cycle to a more subordinate role. Sections of this TCA cycle were probably evolved by some of the first forms of aerobic bacteria. This cycle allowed them to increase fermentation and handle it effectively.

The reduction capacities of the TCA cycle, which were activated by solar radiation, gave way to the development of green photosynthesis bacteria. Normally glucose splits into two molecules of pyruvate, and then produces two molecules of NADH. The balance of the redox is completed by the further reduction of the pyruvate to lactate. This is the normal process of energy transfer, known as *glycolysis*.

This also allows us to understand the need for the carbohydrate metabolism index utilized by the LTBM* device, which takes in the values of blood pyruvate and blood lactate. Even though many blood laboratories do not do this test, we recommend that it be added to the SMAC inventory, because it gives us so much indication of the carbohydrate efficiency ratio of the human being, and also gives us an indicator of B vitamin utilization.

In the product of glycolysis one of the two molecules of the pyruvate is conserved for biosynthesis and reproduction. This attaches electrons to the lactate by the conversion of NADH back to NAD. Conservation is attained by changing the other pyruvate molecule to an oxaloacetate. This is accomplished through the assimilation of carbon dioxide. The two NADH molecules that are left over from the breakdown of glucose are generated to NAD. This happens through a continuous reduction of oxaloacetate to malate, to fumarate, then to succinate. The reductive sequence is

$$CO_2 + \text{Pyruvate} \rightarrow \text{Oxaloacetate} \rightarrow \text{Malate} \rightarrow \text{Fumarate} \rightarrow \text{Succinate}$$

So we can see that this is actually a reversal of the oxidative C4 dicarboxylic acid chain. This was discovered by Szent-Gyorgyi. It was incorporated in the krebs cycle, and also into the oxidative TCA cycle.

Some of the modern fermenting bacteria get their ATP by the process of breaking down glucose through an enzyme catalyst. Some generate addition ATP from a membrane bound electron transfer chain, involving iron sulphur proteins, quinones and cytochrome B. NADH can donate electrons to this chain, as it begins restoring and redeveloping NAD. The output of the chain is accepted by fumarate, which is then reduced to succinate.

The process of chemosmotic transfer allows for NADH to generate one more ATP molecule. Hydrogen ions extruded through the cytoplasmic membrane during the transfer of electrons produce a proton motive potential, using energetic control to channel these various protons. Hydrogen ions then return through the proton-selective channels, which terminate the inner membrane surface by an ATP enzyme system. This transforms ADP, an inorganic phosphate, to ATP.

Chemosmotic energy has a vectorial component evolving through three stages:

Stage 1. Where the ferments are acetic and the maintenance of a neutral pH in the bacteria cell require a mechanism for the removal of excess hydrogen ions

Here the proteins will cause a selective transfer across the lipid bi-layer membrane. This allows for the inflow of nutrients, and also the outflow of wastes including some of the excess hydrogen ions. This inflow and outflow happens through a process of passive diffusion governed by the gradients in the concentration.

Stage 2. As the diffusion of the hydrogen ions becomes a limiting factor on the fermentation rate, active proton pump, now using soluble enzyme hydrolysing polyphosphates, will develop on the inner surface of the membrane at the terminus of the proton-conducting channel.

The energy of hydrolysis achieved from the ATP is coupled to the extrusion of protons through these specific channels. This allows for a more flexible and efficient mechanism than the passive diffusion in the disposal of the excess hydrogen ions.

Stage 3. Where translocation of the hydrogen atoms from the cell will start to have a higher concentration outside the cell than inside the cytoplasmic membrane.

Here there is an inversion of the pH gradient which has been transformed by the proton pump. The proton pump, being driven by ATP, allows for the hydrolysis of the system to synthesize ATP and drive the osmotic proton motive push. The return of hydrogen ions into the cell through the proton clearing channel, the ATPase enzyme, acts on the inner terminus, now promoted the synthesis of ATP from ADP in the inorganic phosphates; the reverse of the hydrolytic reaction catalyzed under the former conditions of excess internal elucidity. Photosynthesis becomes a large part of controlling and pushing this system as well. In the animal system there is a photon release that occurs upon metabolism and reproduction.

Science has seen the dramatic intake of photons of plants. The outgo of photons for energy and information of animals is more subtle, because it operates with exchange in the photon bath of our thermal world (See *Quantum Biology* section). The photon now must be appreciated as an integral part of *all* biological functions.

A interesting bifurcation point in history occured in London in the early 19th century. A cholera epedemic had broken out and was devastating the city. Years ago Poincare had developed statistics when Napoleon commissioned him to try to break the gammming tables in Monaco. Statistics sat unused for years,but now they were used to analyze the cholera epidemic. Low and behold an exciting finding had been developed. The closer you lived to the Thames the better the chance of getting cholera. Statisics had triumphed and medicine was forever changed. Statistical anlaysis was now to be the hallmark of medicine. Lister, Fleming and others were developing antibiotics to fight the deadly bugs, Antibiotics were born. Something else was born of much greater significance to medicine. Something else that would spread around the world and humble many diseases. This great discovery was sewage. The city of London started to develop sewage systems. People were living with their own refuse. Antibiotics hurt people. The effects of these compounds are derogratory to people. But because they coattailed on sewage they spread around the world. Everywhere taking credit for helping disease when sewage was more responsible. The antibiotic revolution was a farce. The positve effects were completely outweighted by the negative effects on bowel flora and immuno supression. Sewage did the work and antibiotics got the credit. Antibiotics had a better marketing staff and got better press.

SUMMARY

1. In this brief review of the energetic history of biology, we can see the development of psychological trends in the philosophy of science. This is to say that as man's psychology improved through his ability to have greater perspective and develop more intricate abilities of thought, he imposed these thinking processes into his interpretation of biology. Early man developed very simplistic ideas of biology based on simple systems of analysis as thought patterns grew and shifted to better and better perspectives. Philosophies of science are always a product of the philosophy of the world. Now as we enter into the world of quantum dynamics, we are imposed with yet another awesome challenge of mental adaptation. As biology adapts to the precepts of quantum theory, we will now need to see the need of photon, electron, proton, and thus the energetic nature of biology. As the energetic nature of biology adopts more of the quantum frame work, we will also integrate many of the quantum dynamics, and eventually develop a new form of medicine.

2. We have shown how the development of the photon and electron has been brought into biology, and how it was first analyzed in its grossest nature; that of photosynthesis in plants.

3. This chapter is a review of some past literature. Some of the new literature can be found in Quantum Biology, in which we expound on the theories of the photon and energetic medicine to a greater degree.

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Chapter 11

THE GREAT SUBSPACE ATTRACTOR OF LIFE
(What sets the Limits of Biology ?)

In *Quantum Biology* we discuss the possibility of attractors in certain energetic or cybernetic systems which create stability by attracting the subtle energies of the system towards balance. As items are attracted towards balance, and often have subtle controls so that they can be in the plus or minus, they will be involved in producing what is known as a *torus* in fractal geometry. A simple example would be the thermostat in your house, which, if set at 70E, will often warm the room to 71E or 72E before it turns off. The room must cool down to 69E or 68E before the thermostat turns back on. Thus the thermostat is set at 70E, but sets a torus of a range between 68E and 72E. Often a person in the room might feel cold at 68E and thus turn the thermostat up; whereas if he would be patient, and wait an extra minute or two, the thermostat would likely kick on and warm the room to the appropriate temperature. Now that this person has reset the thermostat to a new temperature of 72E, the room heats up to 74E, and thus a new torus is developed.

elab 1 In our room thermostat, if we also have a humidifier that will add humidity if it gets too dry; and a dehumidifier that will take away humidity if it gets too humid; we now have a second torus affecting the room. In addition the room might also have a regulator of ionic forces, so that positive and negative ions could be controlled. If the room gets too many positive ions, the negative ion generator could kick in, until the room gets too saturated with negative ions, whereupon it would turn off. A very sophisticated room might have control factors for oxygen, and help to control the amount of oxygen versus CO_2 in a room. As we can see, every time we add a new torus, there will be interaction with the old tori, making the room more and more sophisticated.

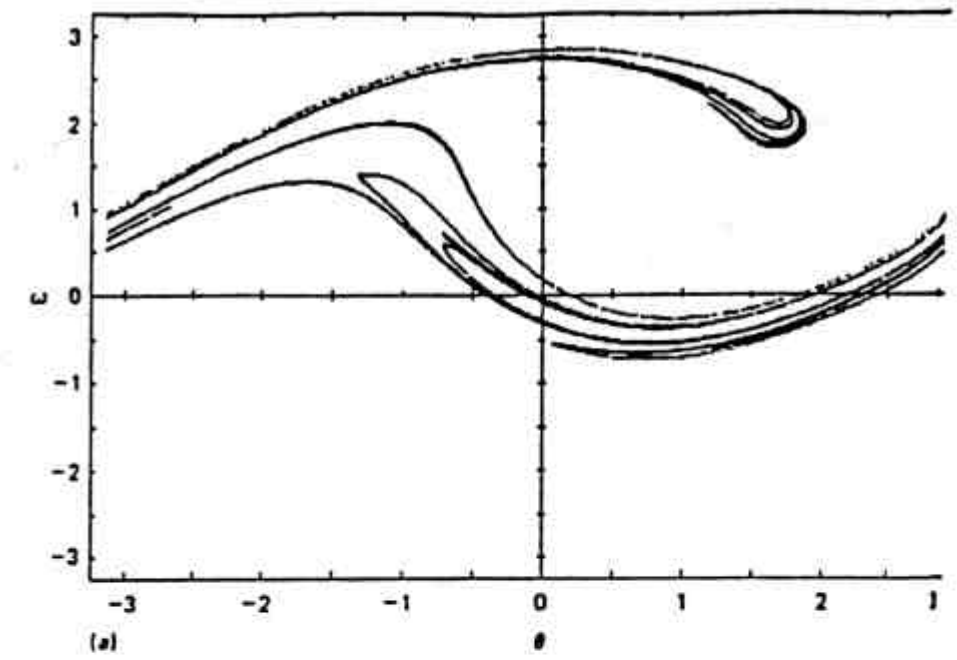
When we get to the phenomenon of the unicellular organism, we must understand that there must be a minimum of 600 factors that need to be regulated on just a simple cell. Each of these is interactive in its ability to act on the others. This collective effect adds to the general torus of the cell. In the multicellular organism of the body there are thousands, if not millions, of regulatory events known to medical science, and many that are not known.

Thus the torus of the human body is a very complicated factor, and every little change made to every regulatory factor has an effect on the rest of the system.

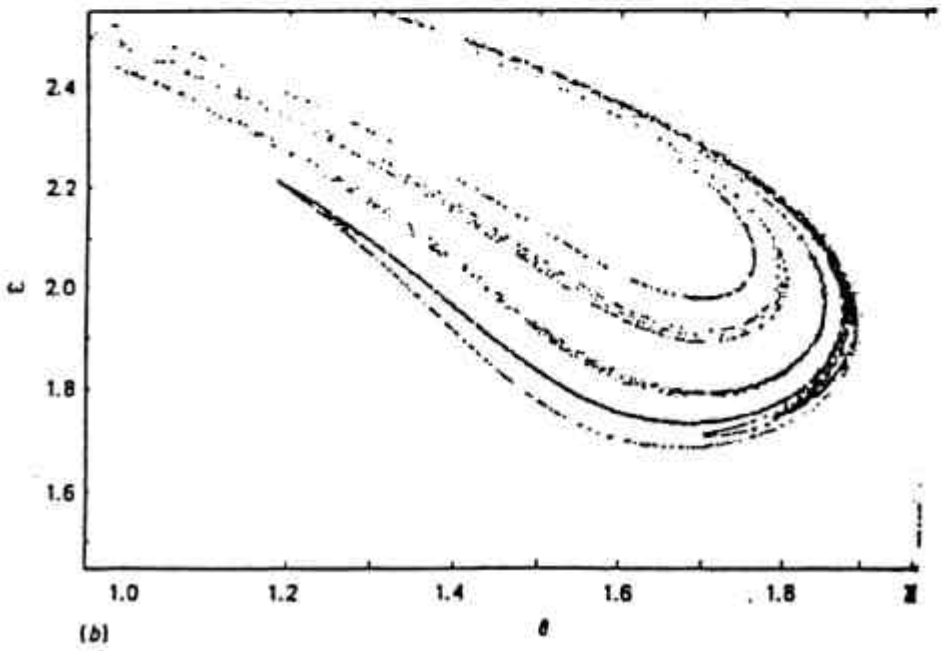
Such an analogy can be applied to the human body, where millions, if not millions of millions, of entities must have subtle thermostat controls. Often when a patient is at the low or high end of a certain range, he might feel uncomfortable, and thus take some type of synthetic pharmaceutical drug that can interfere and create a new torus. Often sickness can merely be a perceived value of the body trying to adapt to some type of environmental situation, such as increased stress and the like. This increased stress might move the patient towards greater susceptibility to colds and flues. If the patient seeks allopathic treatment, he might get anti-histamines or acyclovir, or other compounds that might then upset the torus by allopathic control. The principle of homeopathy is one of using the torus to create balance. Thus when there is a sickness, those symptoms are seen in homeopathy to be not the problem, but a messenger of the modality of cure, so that the subtle thermostats can be balanced.

After looking at the torus of the human body, we must become aware that reductionism of simple values can produce statistical irregularities.

elab 2 When practitioners of medicine attempt to reduce a group of patients to one value such as blood pressure, temperature, or whatever, as they do in clinical trials, they are totally robbing the patient of the individuality that the true organism presents. In order to do a true statistical study, we would need to know all the modalities involved in our torus, measure them, and find the most subtle activities that these compounds exhibit. Then we would have to study the compounds and



(a)



(b)

how they effect the human body for generations to totally know what the effects of synthetic compounds would be.

Thus the technology outlined in our books on quantum biology will severely challenge the limited technology presented by synthetic chemical companies in their pharmaceutical and allopathic approach.end elab 2

In our analogy of homeopathy from *Quantum Biology*, we can see that if a room's temperature is set at 70E, and the room starts to get down to 67E or 66E and becomes too cold, sometimes the thermostat may be stuck, and need some type of gentle movement. Allopathic intervention would come in with an outside heater, through a pharmacological intervention which would then attempt to heat the body from an outside source. This would upset the cybernetic regulatory mechanisms. Classically homeopathy would either try to find a subtle heater in a minimal dose that would help to gently jog the body thermostat back on, or the homeopath might choose a compound that would produce coldness in the body, use it in a minute dose, and turn on the heater of the body by activating the thermostat. This produces balance in the torus and returns the patient to self-regulated, internal thermostatic and cybernetic control.

Elsewhere in this book we analyze various mechanisms of the torus as we have looked at heat and cold, and how they can set limits on the amount of thermal activity to which the human body can be exposed. This thermal activity can either be in the form of lack (in the case of cold) or excess (in the case of heat). Earlier we compared values of humidity, dryness, ionic activity through wind, and other climate conditions that help to set tori of the healthy range that the human body needs for maximum health (see Chapter 9).

From the Merck manual we have indices of the normal values of various blood chemistry ranges. We provide them below. Also from the Merck manual, we show the ranges of the types of diseases that may result in disturbances that could produce highs or lows in these ranges.

PITUITARY AND HYPOTHALAMUS AS
PART OF THE GREAT ATTRACTOR

CONDITIONS IN WHICH VARIATIONS FROM SELECTED NORMAL CHEMISTRY VALUES MAY OCCUR

Analyte	Increase	Decrease
Alanine Aminotransferase (ALT or SGPT)	Hepatitis, cirrhosis, liver metastases, obstruc- tive jaundice, infectious mono, hepatic congestion	Pyridoxine (vitamin B6) deficiency
Albumin	Dehydration, diabetes insipidus	Overhydration, malnutrition, malabsorption, nephrosis, hepatic failure, burns, multiple myeloma, metastatic carcinomas

Alkaline phosphatase	Bone growth, bone metastases, Paget's disease, rickets, healing fracture, hyperparathyroidism, hepatic disease, obstructive jaundice, hepatic metastases, pulmonary infarction, heart failure, pregnancy	Pernicious anemia, hypoparathyroidism, hypophosphatasia
Aspartate aminotransferase (AST or SGOT)	Myocardial infarction, heart failure, myocarditis, pericarditis, myositis, muscular dystrophy, trauma, hepatic disease, pancreatitis, renal infarct, eclampsia, neoplasia, cerebral damage, seizures, hemolysis, alcohol	Pyridoxine (vitamin B6) deficiency, terminal stages of liver disease
Bilirubin	Hepatic disease, obstructive jaundice, hemolytic anemia, pulmonary infarct, Gilbert's disease, Dubin-Johnson syndrome, neonatal jaundice	
Calcium	Hyperparathyroidism, bone metastases, myeloma, sarcoid, hyperthyroidism, hypervitaminosis D	Hypoparathyroidism, renal failure, malabsorption pancreatitis, hypoalbuminemia, vitamin D deficiency, overhydration
Cholesterol	Hypothyroidism, obstructive jaundice, nephrosis, diabetes mellitus, familial, pancreatitis	Hyperthyroidism, infection, malnutrition, heart failure, malignancies
Creatinine	Renal failure, urinary obstruction, dehydration, hyperthyroidism	
Glucose	Diabetes mellitus, IV glucose, thiazides, corticosteroids, pheochromocytoma, hyperthyroidism, Cushing's syndrome, acromegaly, brain damage, hepatic disease, nephrosis	Excess insulin, insulinoma, Addison's disease, myxedema, hepatic, failure, malabsorption
Lactate dehydrogenase (LDH)	Myocardial infarction, pulmonary infarction, hemo- lytic anemia, pernicious anemia, leukemia, lym- phoma, malignancies, hepatic disease, renal in-farction, seizures, cerebral damage, trauma, sprue	Phosphorus
Phosphorus	Renal failure, hypoparathyroidism, diabetic acidosis, acromegaly	Hyperparathyroidism, osteomalacia, rickets, Fanconi syndrome, cirrhosis, hypokalemia, excess IV glucose
Potassium	Hyperkalemic acidosis, cardiac arrhythmia, diabetic acidosis, hypoadrenalism, hereditary hyperkalemia	Cirrhosis, malnutrition, vomiting, metabolic alkalosis, diarrhea, nephrosis diuretics, hyperadrenalism, familial periodic paralysis
Sodium	Dehydration, diabetes insipidus, excessive salt ingestion	Excess antidiuretic hormone, nephrosis, hypoadrenalism, myxedema, congestive heart failure, diarrhea, vomiting, diabetic acidosis, diuretics
Total protein	Multiple myeloma, myxedema, lupus, sarcoidosis, diabetes insipidus, dehydration, collagen disease	Burns, cirrhosis, malnutrition, nephrosis, malabsorption, overhydration
Triglyceride	Hereditary, nephrosis, cholestasis, pancreatitis, cirrhosis, diabetes mellitus, hepatitis, dietary	Malnutrition
Uric acid	Gout, renal failure, diuretic therapy, leukemia, lymphoma, polycythemia, acidosis, psoriasis, hypothyroidism, eclampsia, multiple myeloma, pernicious anemia, tissue necrosis, inflammation	Uricosuric drugs, allopurinol, Wilson's Disease, large doses of vitamin C
Urea nitrogen	Renal disease, dehydration, G.I. bleeding, leukemia, heart failure	Hepatic failure, overhydration, pregnancy

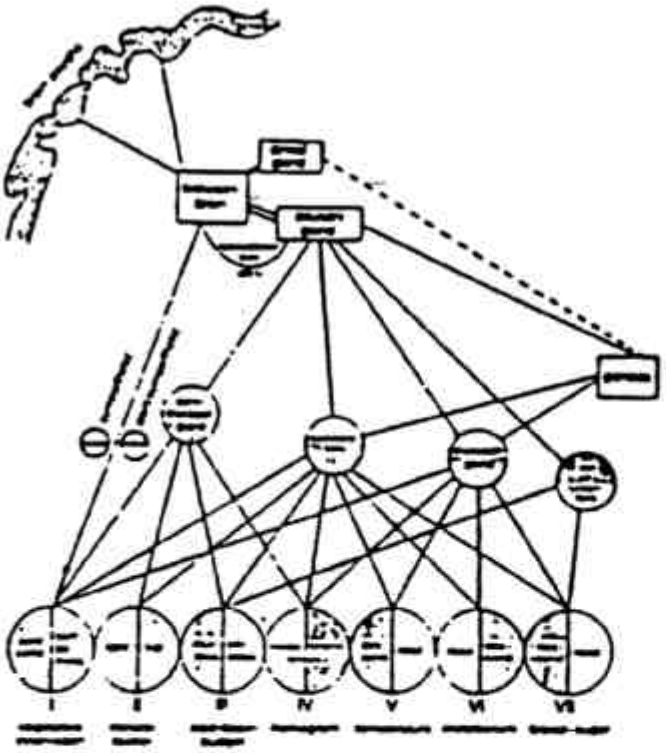
SELECTED CLINICAL LABORATORY TESTS– REFERENCE VALUES

Reference Values for Blood (B), Plasma (P), and Serum (S)		
Test	Normal Adult Range	
	Conventional Units	SI Units

Acetoacetate plus acetone (B)	Negative	
Aldolase (S)	1.0-8.0 u./L	16.6-135 nkat/L*
Aminotransferase (S)		
Alanine (ALT, SGPT)	5-30 u./L	83-500 nkat/L*
Aspartate (AST, SGOT)	5-25 u./L	83-415 nkat/L*
Ammonia (B)	11-35 µmol/L	11-35 µmol/L
Amylase (S)	60-160 u./dL	111-296 u./L
Ascorbic Acid (B)	0.4-1.5 mg/dL	23-85 µmol/L
Bilirubin (S)		
Direct (Conjugated)	0.1-0.4 mg/dL	1.7-6.8 µmol/L
Total	0.3-1.1 mg/dL	5.1-19.0 µmol/L
Blood volume	8.5-9.0% of body weight (kg)	80-85mL/kg
Calcium (S)		
Ionized	2.1-2.6 mEq/L 4.25-5.25 mg/dL	1.05-1.30 mmol/L
Total	4.6-5.5 mEq/L 9.2-11.0 mg/dL	2.3-2.75 mmol/L
Carbamazepine (P)	3.12 µg/mL	12.75-51.0 µmol/L
CO_2 content (S)	24-30 mEq/L	24-30 mmol/L
CO (B)	<5% of total Hb	
Carotenoids (S)	0.5-3.0 µg/mL	0.9-5.6 µmol/L
Ceruloplasmin (S)	27-37 mg/dL	1.8-2.5 µmol/L
Chloride (S)	96-106 mEq/L	96-106 mmol/L
Cholesterol (S)	120-220 mg/dL	3.1-5.68 mmol/L
CK (S)		
Female	10-70 u./L	166-1167 nkat/L*
Male	25-90 u./L	416-1500 nkat/L*
CK isoenzymes (S)	5% MB or less	
Copper (S)	70-155 µg/dL	11-24 µmol/L
Creatinine (S)	<1.5 mg/dL	<133 µmol/L
Digoxin (S)		
Therapeutic	0.8-2.0 ng/mL	1.0-2.6 nmol/L
Toxic	>2.5 ng/mL	>3.2 nmol/L
Ethanol (B)	Negative	
Glucose, fasting (P)	75-105 mg/dL	4.2-5.8 mmol/L
Iron (S)		
Total	50-150 µg/dL	9-27 µmol/L
Binding capacity	250-410 µg/dL	45-73 µmol/L
Lactate (B)		
Venous	4.5-20 mg/dL	0.5-2.2 mmol/L
Arterial	4.5-14.4 mg/dL	0.5-1.6 mmol/L
Lactic dehydrogenase (S)	50-115 u./L	833-1917 nkat/L*
Lead (B)	0-50 µg/dL	0-2.4 µmol/L
Lipase (S)	0-1.5 u. (Cherry-Crandall)	0.1.5 u. (Cherry-Crandall)
Lithium (S)		
Therapeutic	0.5-1.4 mEq/L	0.5-1.4 mmol/L
Toxic	2.0 mEq/L	> 2.0 mmol/L

SELECTED CLINICAL LABORATORY TESTS— REFERENCE VALUES (Cont'd)

Reference Values for Blood (B), Plasma (P), and Serum (S)		
Test	Normal Adult Range	
	Conventional Units	SI Units



. Diagram of the Vegetative Commutation (according to Hoff, 1934, Klinische Physiologie and Pathologie, 2. Auflage 1952. Thieme-Verlag, page 501) When one factor of the vegetative function commutates, corresponding factors also commutate, depending on whether Phase A or Phase B is present.

Position A is sympathetic phase. Position B is parasympathetic phase with all accompanying, consecutive relay functions. Hormone functions must be mentioned, also mineral proportioning during the acid-base-flood; blood picture corresponding to myeloic or lymphatic tendency; increase and decrease of body temperature, basal metabolism, and blood dextrose

I. phase of the vegetative general commutation
Adrenaline I, II, III, IV, OV, VI, VII
Thyroxine I, II, III, IV, V, VI, VII
parathyreoideal hormone I, II, III, IV
emergency reaction of Cannon I, II, III, IV, V, VI, VII

II phase of vegetative general commutation

Insuline I, III, VII
I (III acidosis) IV, V, VI, VII

Addison

Simmonds IV, V, VI, VII
Tetany I, II, III, IV
Myxoedema I, III, IV, V, VI, VII

According to Hoff, F., Klin. Physiol. u. Pathol. 2 Aufl. 1952, Thieme Verlag S. 501

Magnesium (S)	1.3-2.1 mEq/L 1.8-3.0 mg/dL	0.7-1.1 mmol/L
5'-Nucleotidase (S)	1-12 u./L	16.6-200 nkat/L*
Osmolality (S)	280-295 mOsm/kg serum water	280-295 mmol/kg serum water
Oxygen saturation (B)		
Arterial	96-100%	0.96-1.00
Pco_2 (B)	35-45 mm Hg	4.7-6.0 kPa
pH (B)	7.35-7.45	7.35-7.45
Po_2 (B)	75-100 mm Hg	10.0-13.3 kPa
Phenobarbital (S)		
Therapeutic	15-50 µg/mL	65-215 µmol/L
Toxic	> 50 µg/mL	> 215 µmol/L
Phenytoin (S)		
Therapeutic	5-20 µg/mL	20-79 µmol/L
Toxic	> 20 µg/mL	> 79 µmol/L
Phosphatase, acid (S)	0.2-1.8 IU/L	3.3-30 nkat/L
Phosphatase, alkaline (S)	23-71 IU/L	383-1185 nkat/L
Phosphorus, inorganic (S)	3-4.5 mg/dL 1-1.5 mEq/L	1.0-1.5 mmol/L
Potassium (S)	3.5-5.0 mEq/L	3.5-5.0 mmol/L
Primidone (S)		
Therapeutic	5-12 µg/mL	23-55 µmol/L
Toxic	> 15 µg/mL	> 69 µmol/L
Procainamide (S)		
Therapeutic	4-10 µg/mL	17-42 µmol/L
Toxic	> 16 µg/mL	> 68 µmol/L
Protein (S)		
Total	6.0-8.0 gm/dL	60-80 gm/L
Albumin	3.5-5.5 gm/dL	35-55 gm/L
Globulin	2.0-3.5 gm/dL	20-35 gm/L
Electrophoresis		
Globulin	0.1-0.4 gm/dL	1-4 gm/L
α_1	0.4-1.1 gm/dL	4-11 gm/L
α_2	0.5-1.6 gm/dL	5-16 gm/L
ß	0.5-1.4 gm/dL	5-14 gm/L
γ		
Pyruvic acid (B)	0.3-0.9 mg/dL	0.03-0.10 mmol/L
Quinidine (S)		
Therapeutic	1.2-4.0 µg/mL	3.7-12.3 µmol/L
Toxic	> 10 µg/mL	> 30 µmol/L
Salicylate (P)		
Analgesic	20-100 µg/mL	145-724 µmol/L
Anti-inflammatory	150-300 µg/mL	1086-2172 µmol/L
Toxic	> 300 µg/mL	> 2172 µmol/L
Sodium (S)	135-145 mEq/L	135-145 mmol/L
Sulfate (S)	2.9-3.5 mg/dL	0.3-0.36 µmol/L
Triglycerides (S)	35-160 mg/dL	0.40-1.81 mmol/L
Urea nitrogen (S)	8-23 mg/dL	2.9-8.2 mmol/L
Uric acid (S)	3-7 mg/dL	0.18-0.42 mmol/L
Vitamin A (S)	20-60 µg/dL	0.7-2.1 µmol/L
Vitamin D derivatives (S)		
1.25 dihydroxy	20-45 pg/mL	48-108 pmol/L
25-hydroxy	25-40 ng/mL	62.5-100 nmol/L

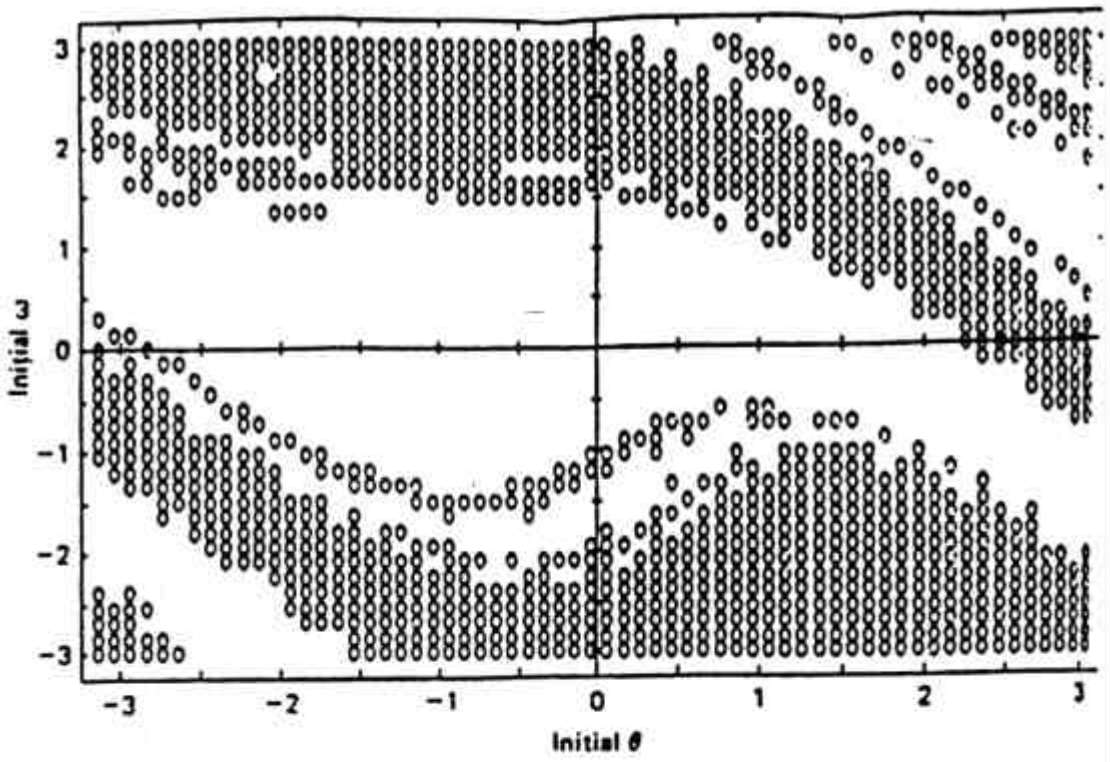
SELECTED CLINICAL LABORATORY TESTS— REFERENCE VALUES (Cont'd)

Reference Values for Blood (B), Plasma (P), and Serum (S)		
Test	Normal Adult Range	
	Conventional Units	SI Units
Acetone plus acetoacetate	Negative	
Amylase	1-17 u./h	1-17 u./h
Calcium	< 300 mg/day	< 7.5 mmol/day
Catecholamines		
Epinephrine	< 10 µg/day	< 55 nmol/day
Norepinephrine	< 100 µg/day	< 590 nmol/day
Chorionic gonadotropin	Negative	
Copper	0-50 µg/day	0-0.8 µmol/day
Coproporphyrin	30-250 µg/day	46-380 nmol/day
Creatine		
Females	< 100 mg/day	< 0.76 mmol/day
Males	< 40 mg/day	< 0.30 mmol/day
Creatinine	14-26 mg/kg/day	0.12-0.23 mmol/kg/day
Cystine or cysteine	Negative	
Hemoglobin and myoglobin	Negative	
17-Hydroxycorticosteroids	2-9 mg/day	5.5-25 µmol/day
5-Hydroxyindoleacetic acid	2-9 mg/day	10-47 µmol/day
17-Ketosteroids	4-18 mg/day	14-62 µmol/day
	< 0.08 µg/mL or	
Lead	< 120 µg/day	< 0.39 µmol/L
Phosphorus, inorganic	0.4-1.3 gm/day	13-42 mmol/day
Porphobilinogen	negative	
Protein	< 150 mg/day	< 150 mg/day
Sugar, quantitative glucose	Negative	
	0.1-0.8 EU/2h	0.1-0.8 EU/2h
Urobilinogen	0.5-4.0 EU/day	0.5-4.0 EU/day
Uroporphyrin	< 50 µg/day	< 60 nmol/day
Vanillylmandelic acid (VMA)	1-9 mg/day	5-45 µmol/day

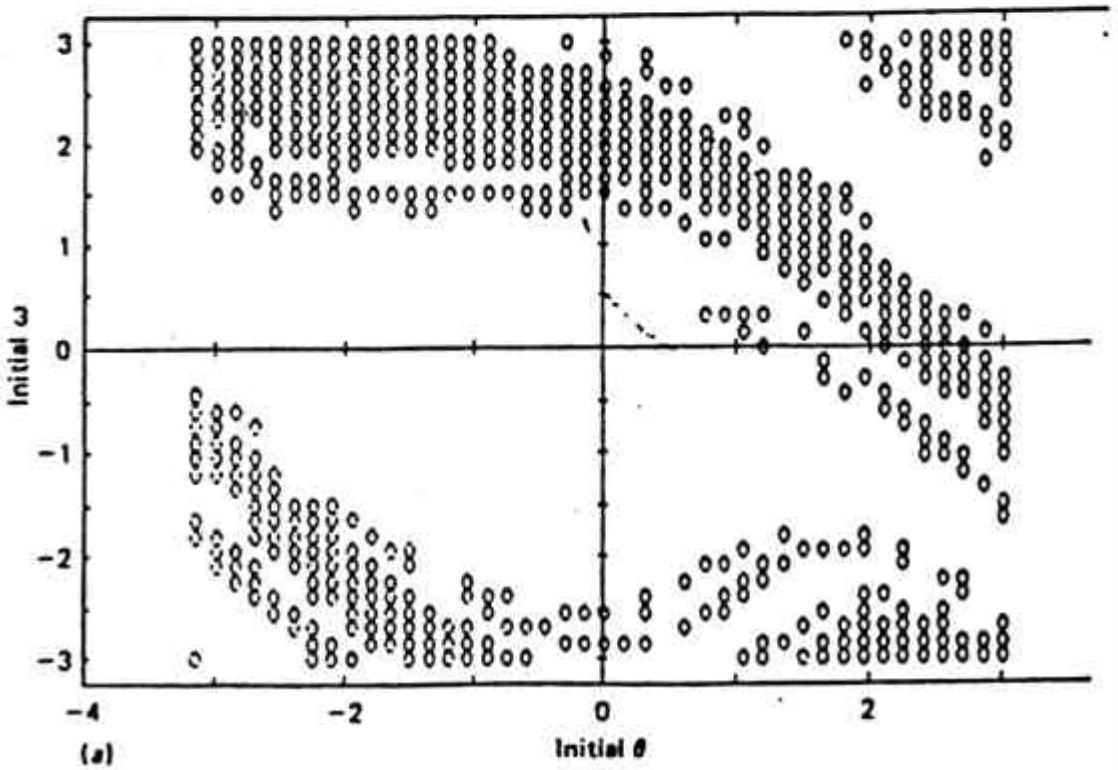
This is just a subtle representation of some of the primary values the body needs in balancing its blood chemistry. The little thermostat controls often involve hormone or chemical regulation factors that are activated through the endocrine system. But there are many energetic factors that help this endocrine system to regulate these hormonal and other blood values.

elab 3 Through its matrices every cell must maintain the torus needed to produce metabolism and reproduction consistently. In multicellular organisms we need other controls that still have quantic types of channels. Thus the human body would need an endocrine channel and a hypothalamus gland as thermostats to help control the various interactions. The dramatic vastness and interaction of the torus of the human body makes study of the human body for medical purposes very difficult.end elab 3

Thus we might see that there are many tori that can be used in biology. If these are accumulated in the precept of the human body and looked at in a holistic fashion, we will see that the body responds as a whole; there is one simple great attractor that dictates the healthy ranges of these blood values. If any one of these values becomes too high or too low, the entire organism tries to make responses towards healing. Adaptation is the highest function in biology. Thus it is not a system-by-system response that dictates biology as far as medical health is concerned. In other words, there is a holistic reactivity to the organism in response to any value that becomes out of touch. Deficiency of calcium, potassium, vitamin C, vitamin A, and so on affects every cell of the body.

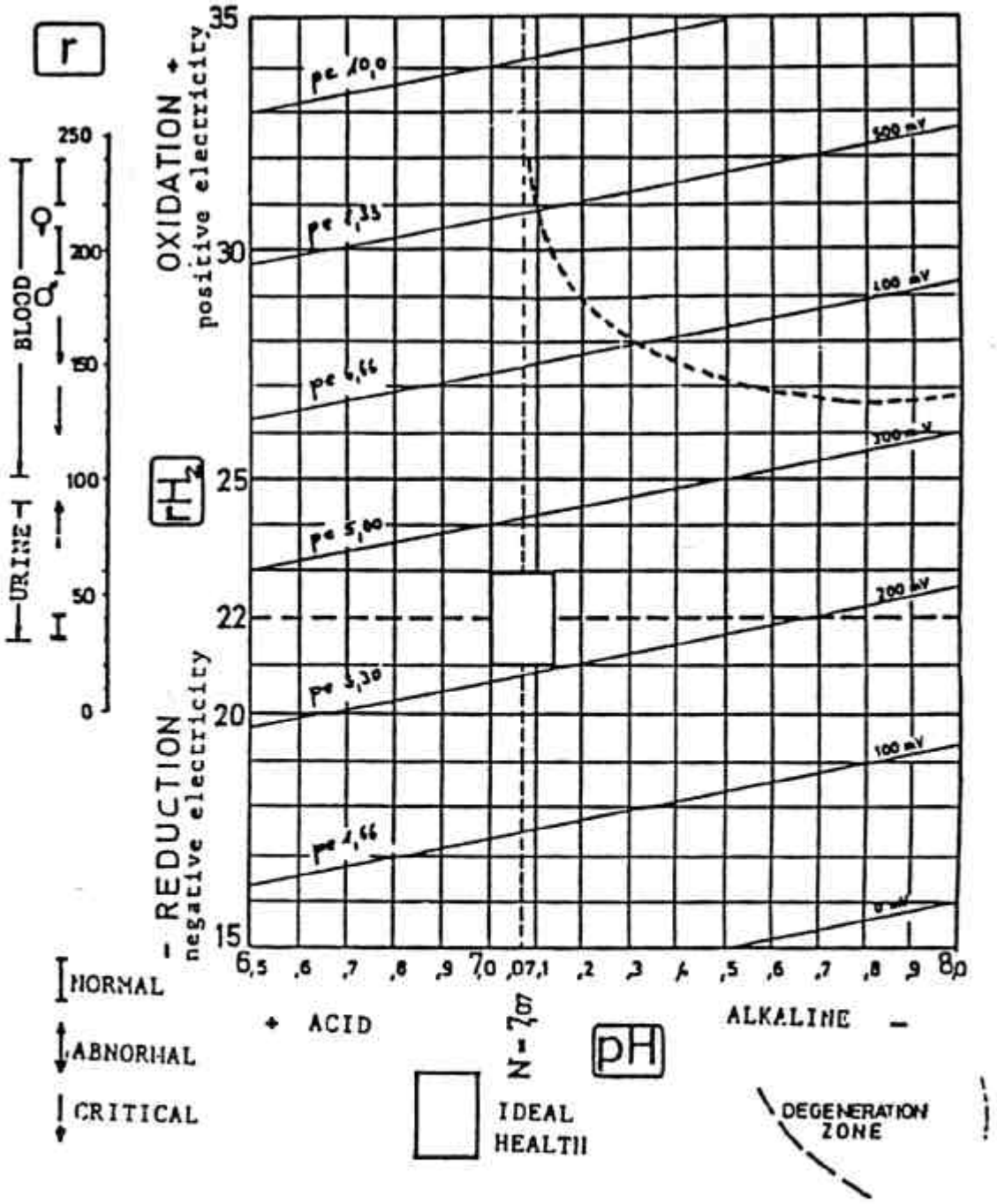


Basin of attraction for $g = 1.3$, a state of periodic motion. The circles indicate positive drift of the angular velocity. The blank regions correspond to negative average angular velocity. The basins are intertwined.

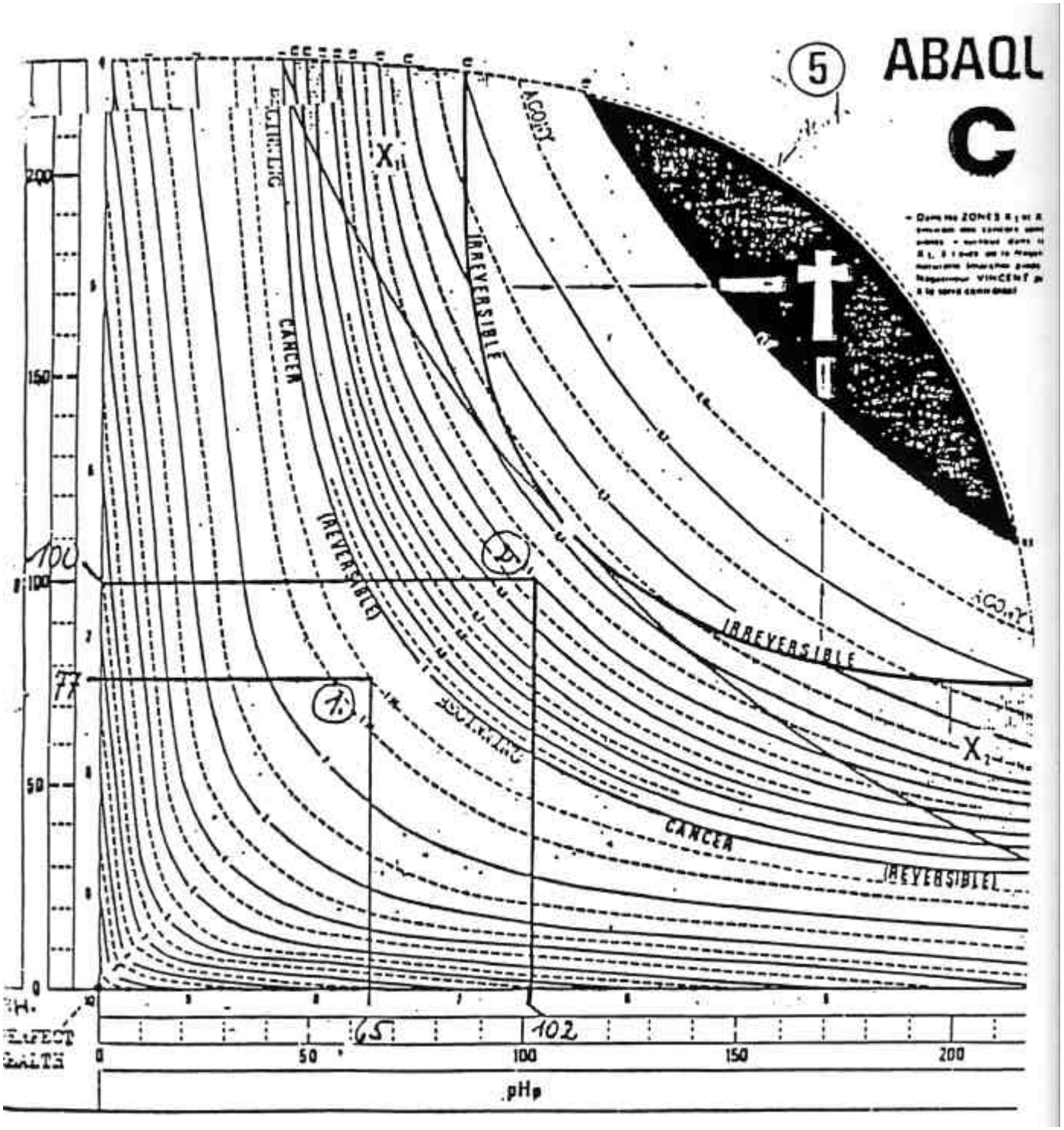


Basins of attraction with the superposed Poincaré sections. The open circles indicate a positive average $\langle\omega\rangle$. (*a*) The Poincaré section consists of sm clusters of points when $g = 1.47$. (*b*) The attractors have spread toward the bas

Modern science with its reductionistic philosophy has refused to accept this basic dictum of holism. In other words, each and every value, high or low, is treated on an individual level by most modern medical thinkers. This system of reductionism has resulted in the development of many synthetic chemicals from their natural or herbal counterparts. People have tried to reduce these herbs and glandulars to their simplest active ingredients via the theories of chemical reductionism. Since these formulas work in short-term reductionistic studies, they are released to society. Perhaps more consideration will be applied in the future.



. Bioelectronigram according to Vincent. - In the coordinate system the pH values are inserted on the horizontal abscissa and the rH_2 on the vertical ordinate. The diagonal lines give the redox potential in millivolts. The graphics correspond to formula 3: $E_h = 30 \cdot (rH_2 - 3pH)$. The normal, abnormal and critical values of the specific resistance are shown in ohms/cm/cm² beside the illustration. As an alternative to rH_2 the electron activity pe may also be used for graphic representation. The point of intersection between pH 7.1, rH_2 22 and E 234 mV - or pH 7.1 and pe 3.9 - shows the terrain of ideal health. pH 7.5, rH_2 28 and E 390 mV or pe 6.5 give a point of intersection that lies within the degeneration zone. The r value, when measured, supplements the definition.


5
ABAQU
C
CANCER
IRREVERSIBLE
IRREVERSIBLE
CANCER
IRREVERSIBLE
200
150
100
50
0
77
65
102
0
50
100
150
200
pHp

The theories of chemical reductionism have thus been developed in the system of medicine and doctors' attempts to reduce their patients to simply one or two measurements, rather than looking at the entire reactivity of the organism. The science of homeopathy attempts to deal with the entire holistic organism rather than with simple types of systems. Early homeopaths would spend four hours going over symptoms and signs. Many homeopaths practice reductionism in that they look for certain symptoms, and then often rely on only one homeopathic remedy to restore the patient to balance. Although the existence of one remedy is possible, it is highly unlikely in today's world, considering the weight of toxic activities that have resulted within our environment from the overload of insecticides, petro-chemicals, and other synthetically-made compounds. These compounds have become prevalent on the scene in the last hundred years or so. Many have come within the last couple of years. This has resulted in a series of compounds for which nature has not produced proper channels of handling.

Thus in dealing with the causes and factors of disease, homeopathy, done in a holistic fashion with a complete nutritional and energetic approach (as outlined in *Quantum Biology* and the *RWC Book*), can become a very powerful means of bringing patients back to balance and a healthy torus of peak performance. This torus or great attractor system, along with its cybernetic control factors, is part of a new science of fractal dynamics and chaos theory in which we can now understand how many different systems can meld into different reactivities.

The stiffest challenge for biology and medicine is yet to come, as we start to realize that there are many ways of seeing the body, and that nature has many more secrets than those originally supposed.

elab 4 Mitchell Feigenbaum wrote a landmark paper on "The Qualitative Universality for a Class of Nonlinear Transformations". This was presented to the *Journal of Statistical Physics*, Vol. 19, #1 in 1978. This set up the major intellectual point that led into fractal and chaotic theories, which have now come to challenge reductionistic and deterministic theories of mathematics.

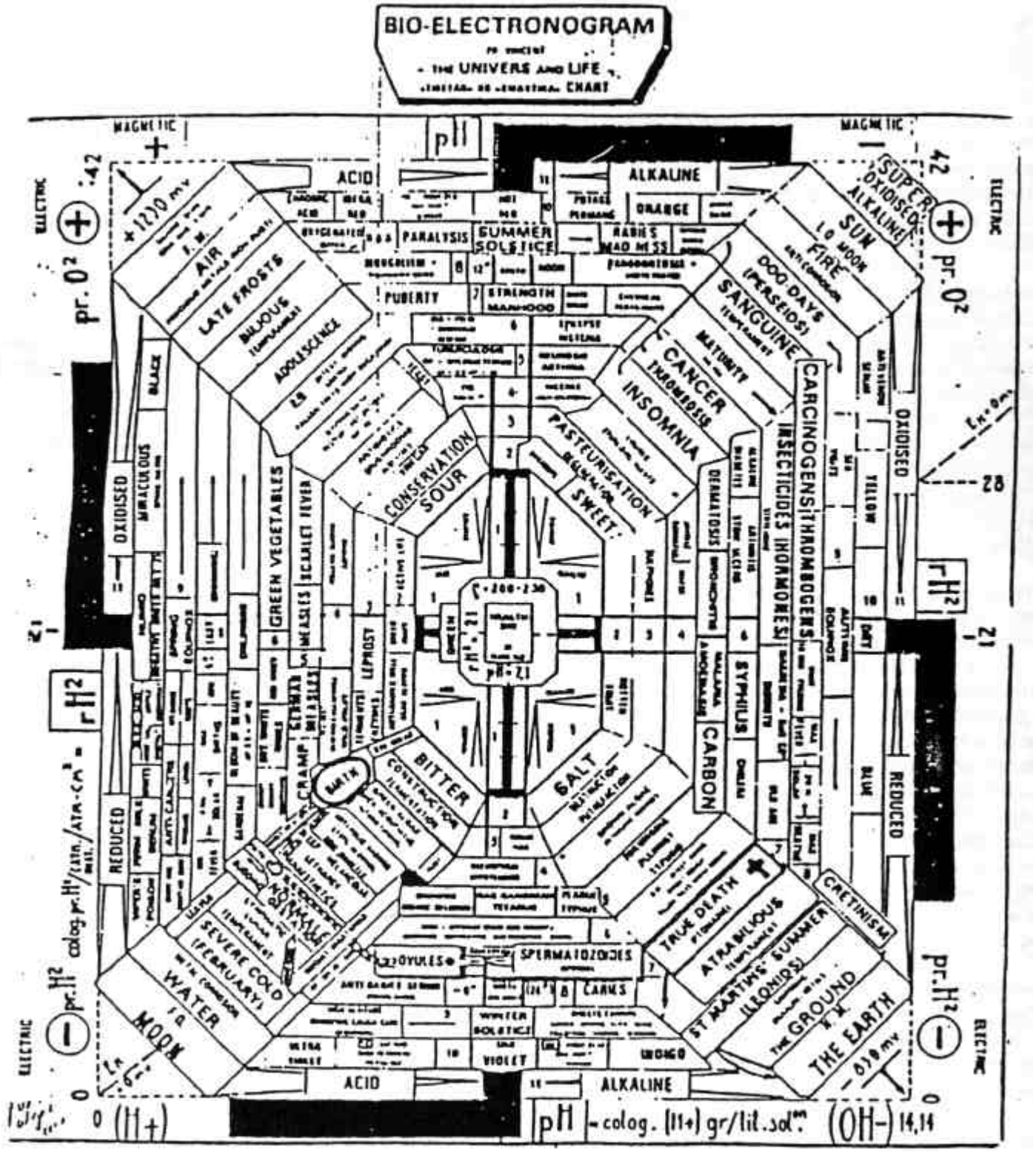
Statistical entropy and thermal dynamics were thought to be paramount, and to not have indeterministic or chaotic effects. But chaos theory in fractals is proven to have effects on supposedly chaotic events. This paper by Dr. Feigenbaum was one of the first to catalog the bifurcation points and set the criteria for limit cycles in tori.

Dr. Fiegenbaum's paper shows that if we have a function of x which has infinite bifurcation or trauma points, there can be a limit cycle oscillating around the attractor which sets the limits of the torus. The population dynamics, through the universality, will allow the bifurcation points as they approach the limit cycle by a ratio of " = 2.5029078750957, as a consistent point of departure bringing a dispersion point into the torus which will disrupt the torus cycle.

Feigenbaum found on his pocket calculator that this period building number, 2.5029078750957, was crucial in normal entropic situations in which the bifurcation would exceed that number, and would induce shifts in the cycle which would allow for fractal development. This same number, when applied to a limit cycle, such as that within the torus, could also be used to set the crisis or bifurcation point, in which biology would produce severe diseases. Thus if one of the modalities within the torus of life which produces the stability in a patient's health would exceed this 2.5 deviation from the norm, it would be disruptive, and could present a problem to the organism.

In analyzing the pluses and minuses from the norm of our biological matrices we will see, when a patient exceeds the 2.5 deviation from the norm, that it is life-threatening. We refer now to the article from Dr. Feigenbaum, which is supplied in *New Biology*.end elab 4

The type of torus we are discussing also comes akin to Rupert Sheldrake's morphic resonance, in which we can look at various attractions from the field of forms. Plato, in his analysis of the field of forms, outlined another world where the proper form of things existed. We have explored this as a subspace consciousness effect. This form thus created an attractor towards other items in the world as we know it. In the world of forms this type of shape created a kind of perfection that the world as we know it could never quite accomplish; yet, the world we know, in its tendency toward this form, was very much like this system of attractors. If we review Plato's world of forms, we can see that Rupert Sheldrake's idea of morphic resonance, and also our idea of the great attractor of the system of biology which we have outlined in *Quantum Biology* and in this book, make a great deal of sense in biology.



The subspace connection of biology is through the polymorphic enhancement or subtle guidance of the form of the subatomic particles of the cell. The connection of the dimensions is through the subspace connectivity of the orthonormal systems. A nonempty subset *M* of a set *M(n)* is called a linear manifold if , for every pair of vectors *u* and *v* is also in *M*. With every linear combination of *u* and *v* also in *M*. It is easily verified that a linear manifold in *M(n)* is a subspace in the sense of possessing common properties. Visualize this as a connecting plane through the origin of the first space. A set of independent vectors is called a finite basis for *M* if it spans *M* so that every vector *u* in *M* is a linear combination of all the vectors *u* , where it is easy to show that the numbers *k* are uniquely determined.

$$u = k(1)U(1)+....+k(r)u(r)$$

The manifold spanned by vectors all *u* is often noted by the symbols *M{u}*. It can be proved that every linear manifold *M* in *M(n)* has a finite basis and that every basis of *M* contains the same number of vectors. This number is called the dimension of *M*. The vector of *M(n)* are *n*- dimensional. The universe is intertwined with congruent space and subspace.

Every basis *v* of a linear manifold can be orthonormalized. Meaning it can be replaced by another basis u of the same manifold in such a way that all the u's are an orthonormal set. Divide the first vector set by its norm and set a new vector set. Consecutive norming of the various dimensions is called the Schmidt orthonormalization process. If a set of vectors spans the whole space it is said to be closed. If the zero vector is orthogonal to every vector in the set it is called complete. A complete set of vectors that is orthonormal is a c.o.n.s.(complete orthonormal set).

A linear manifold which is not closed cannot itself be a Hilbert space, since such a space would not be complete. Every infinite dimensional theoretical closed infinite dimensional space satisfies Hilbert space. Every set of subspaces have at least two well defined parameters , their intersection and tier closed sum such that:
a)The interaction is the greatest subspace common to all the spaces ,
b)There must be at least one base space dimension, which contains an intersection of all other spaces.

By using Fourier series analysis of Bessel's inequality (a form of Parsavals Equality) and Pythagorean theorem we can relate the spaces.

This is an abbreviated form of mathematical analysis of invariant subspace. The flexibility of our variant space will follow similar rules. Hermann Weyl's book on "The Theory of Groups and Quantum Mechanics" by Dover outlines the theoretical aspects.
For our brief purposes we need to 1. recognize the mathematical nature of our theory
2. Recognize the mathematical data of our theory.

The matrix we have supposed can be extrapolated through 10 dimensions to cover the extra dimensions of our existance. The base dimensions we live in and percieve most are but a reflection of the other dimensions that fill the universe. As issacs surmised " The human being could be the solution for the universe.". If this is true then in the human genes there would be the matematical solution for the universe, in the mind would be the potential for solving this solution, and in the hearts and guts there would be the ability to feel the grandeur and appreciate the what God hath done. If the universe is connected by God and we are made in his image then the solution for the universe would be in us.

Aside from our brief mathematical fits of documentation, we should see the basis for a broader description of the phenomena of our universe. But these thoughts have occurred before. Where else has a form of subspace been posited to exist?

Plato, saw this world of forms as an existing phenomenon that had some place in the heavens. We might see that this world of forms actually could be locked into the small which reflects the large, or the DNA structure. The DNA structure might offer a type of energetic form which could be expounded as the organism grows from one cell into many cells. Thus as the egg and sperm unite and produce another organism, this type of form might be locked into an energetic blueprint. This energetic blueprint, thus, would create the pull and push of the various cells, which then would grow into organs, organ systems, and other bodily structures. This is not a random process, but has a quantic relation, which is the basic treatise of *Quantum Biology*.
elab 5 In the movie "Awakenings" we see Robin Williams playing the part of a doctor who has found one type of modality that affects a catatonic patient. He uses dopamine in a large quantity exceeding natural reactions in a patient population that has deficiencies and the inability to handle this dopamine. The large quantity of dopamine that he gives them comes into the cycle and, by interrupting the limits, brings the patient back to normality. Continued use of the large quantity of dopamine without sensitivity to this type of cycle produces dramatic results, which ends up taking the patient back to the old torus of catatonia. If the doctor could have developed a more sensitive means of adjusting the dosage *before* the symptoms returned, as well as the sensitivity of the *whole* organism to the dopamine overload, he could have possibly caused a long-term effect on these patients and brought them back to normality. Thus holism could have been a directed answer to the doctor's dilemma in the movie.end elab 5

In a system of medicine we must now be able to look for systems of intervention that will help to guide the patient back to the balance of the health torus. Allopathy, in its use of compounds working *against* the body and often in large quantities, will produce much difficulty, whereas homeopathy might offer plans for a cure. Allopathy often also is ill-equipped to deal with some of the true ideologies and causative factors in disease. These are also mechanisms that need to be alleviated before we can get back to balance.

Thus concepts such as the minimal dose, like treating like, hormonal isodes, nosodes, sarcodes, and other types of homeopathic intervention will offer medicine true curative factors for the future.
elab 6 In conclusion, we can see that the complexity of biology as presented in this treatise offers us a theory of reverence that must be adopted in our system of medicine. We must respect the natural sensitivity of this process and realize our inability to duplicate it. The system of homeopathy with its proposition of bringing the patient back to balance, and the system of naturopathy, observing nature and using natural modalities, will become the forefront of medicine. We realize that there will be much resistance, as this will threaten many intellectual egos. We can only pray that these egos find the reverence in their hearts to make the change.end elab 6

The biochemicals disscussed have distinct electrical patterns. Each Chemical system has a trivector signature of voltage amperage and resistance profile. This sets up a band of capacitance and inductance bands for each system. These systems act as electron and subspace transport systems for communicating energy and information. The individual enzymes are distinct control areas for the flow. Within the band of electrical dynamics of a chemical system the individual enzymes act with more distinct electrical signatures. Thus if the chemical pathway or system of serotonin development has a reactance band of 2400 to 2750 siemens, the simple coenzyme pyridoxine might have a reactance band of 2450 to 2525. The resonant frequency of the simple chemical (enzyme) will also thus be more specific for each point versus the more general pattern of the chemical pathway.

To measure these patterns we need to first measure the overall electrical pattern of the patient's reactance to the chemicals. We then must chart the trivector, resonant frequency,and regae field reaction of the chemicals. This includes the resistance , impedance, voltage, amperage, capacitance, inductance, resonant and harmonic frequencies, ph, eh, reactance, polarity ,evoked potential, etc. Evoked potential is the reactance pattern of a subject to an applied stimulus. Then we measure the individual reactions of these patients in the context of the individual patterns. Then the specific chemicals can be measured in the same fashion. Attempts to measure just one parameter such as resistance or resonant frequency will be grossly inaccurate. Instead a fractal dynamics of non linear data analysis must be used for the best results. Then thousands of subjects need to be analyzed for pattern similarity. After 12 years of analysis a computer program capable of performing the vast numbers of individual analysis has been developed. (see Int. Jou. of Med Sci of Hom)

The end resulting computer program can now analyze and treat pathways and specificenzymes. Only by systemic analysis of the electrical trivector signature can the patterns be best analyzed. The computer can set up an interactive handshake analysis. A cybernetic link can be established where the computer can treat check and retreat in a consistent loop till the energetic imperfection is abolished, corrected, or till the system refuses to respond. Any more therapy would be unwise. The old style systems where just one way therapies without cybernetic feedback. Simply put this computer can interact during therapy with the patient to adjust the therapy for individual needs.

This computer was coined the' Butterfly system' in an article in 1990 in an English medical Journal. This was because of its' fractal analysis capacitity. The theory of chaos fractals is often assosciated with the butterfly flapping its' wings in singapore and causing a rain in central park. This fractal system is the key of our computer.

To accomplish this task in just twelve years took tremendous dedication and extreme sacrifice. When others were out enjoying the weekend , I worked on electrical parameter testing. The nonlinear systems of fuzzy mathematical analysis and fourier dynamics had to be learned and some new systems developed. A trinary system of subspace interaction had to be developed with very little help. A quantic matrix of energetic relations and frequencies had to be posited, tested, refined retested, etc. Clinical experimentation and laboratory analysis have paid off in results with patients.

The fuzzy analysis for the torus was developed to analyze the patient data in such a wayso to notice the first sign of disease. Rather than let patients get crisis breakdown of systems, a early warning system needs to be developed. We should try to detect the risk and the earliest sign of a problem rather than wait for heroic synthetic medication and surgery medicine. The nonlinear system of analysis is designed in the Biophysics section.

SUMMARY

1. Reductionism has been fully discredited as a procedure for operating in medicine and directing all medical decisions. Thus the entire procedure of medical decision-making has come under the gun as being potentially inappropriate in light of its over-reductionistic nature.

2. The torus of life is extremely complex; not only resistent to reductionism but also producing a reverence in the observer which should build confidence in naturopathy, acupuncture and homeopathy as medical endeavors.

3. The torus also implies the existence of a life force, or great attractor, which is not understood fully within the system of physics and science today. The understanding of this can only come through an appreciation and reverence of God's natural work. A system of medicine must be built around a reverence for nature, and thus synthetic pharmacology will always have problems.

4. The intervention of this quantum system through chaos theory also proves forever that an extremely small amount of an item can affect a large change, and thus stabilize health. This is the principle of homeopathy, which now has been proven beyond the shadow of a doubt to be a medical field of endeavor.

5. A computer system can be developed with handshake interlink to analyze the torus of the patient. This is the Quantum Med C.I..

Chapter 12

THE PATTERN OF LIFE
(A Matrix Periodic Table For Biology)

In Chapter 2 we prove that the functions of a cell fall under quantum dynamics. We next show that such quantum activities can be understood through matrix systems. In Chapters 1, 5 and 8 we briefly outline a history of medicine philosophy and propose a new philosophical and psychological leap for medical and biological thought evolution. We have also explored some simple rules and propositions of quantic theory to provide an understanding of our next endeavor. The quantic stage is set.

Now let us explore a possible set of mathematical matrices to outline our new biology. In quantum theory, interaction of systems occurs through eigenvalue matrices known as *hermitian matrices*. These matrices are usually theoretical. They reflect probabilities of interaction.

Our discussion of uncertainty and the development of the need for the hermitian matrix has now left us with discussions of probabilities as we look at fluctuations and expectations, in terms of probable quantic interaction events. If we look at collisions of the cross sections and transition rates of boundary layers, where various elements might interact, we will be presented with the undenying development of an interaction matrix. This will allow us to calculate and understand such probable interactions. It must be brought up again that this is a generation of probabilities, as uncertainty will not allow us to totally understand the or calculate the situation. If a blindfolded person were to throw a stone in a certain direction and try to hit a target; if there were many, many targets in that direction, the person throwing the stone would have a better chance of hitting at least one of the targets. This is the type of field generation we are dealing with in synthetic biology. In the Newtonian physics of reductionism, increasing mass, like increasing the number of targets, lessens indeterminacy. In quantum biology systems there appears to be some guidance of the stone that goes beyond probability (the *Nelson effect*). Yet, there is some type of pattern to this, as we have developed in our analysis of the science of the universe.

Thus if we repeat a quantum biological experiment, we might get a slightly different result from the first time we do the experiment. In the analysis of molecular biology at the quantic level we will find that the events we observe are very hard to duplicate in their exactitude. As in all quantic systems, observer effects (the Nelson effect) cannot be ignored.

This is another point of difficulty in basing a medicine solely on a clinical trial basis. These statistical clinical experiments will have difficulty getting consistency in minimal-dose measures. Since biology involves the indeterminacy principle, subtle measures of biology are often variant. Synthetic chemists solve this problem by giving large amounts of the chemical to demand consistent reaction (they often give thousands more times the naturally-occurring body doses). In homeopathy, where we are using subtle doses, often experimental consistency does not fit standard statistical criteria. See Chapter 15 for further clarification.

The limit of the probability with which an observation of n events occurs, where m is the mean of the infinite number of observations, is that of the poisson distribution.

$$P(n,m) = \frac{m^n e^{-n}}{n!}$$

$$2H^+ + 2E^- = 2H$$

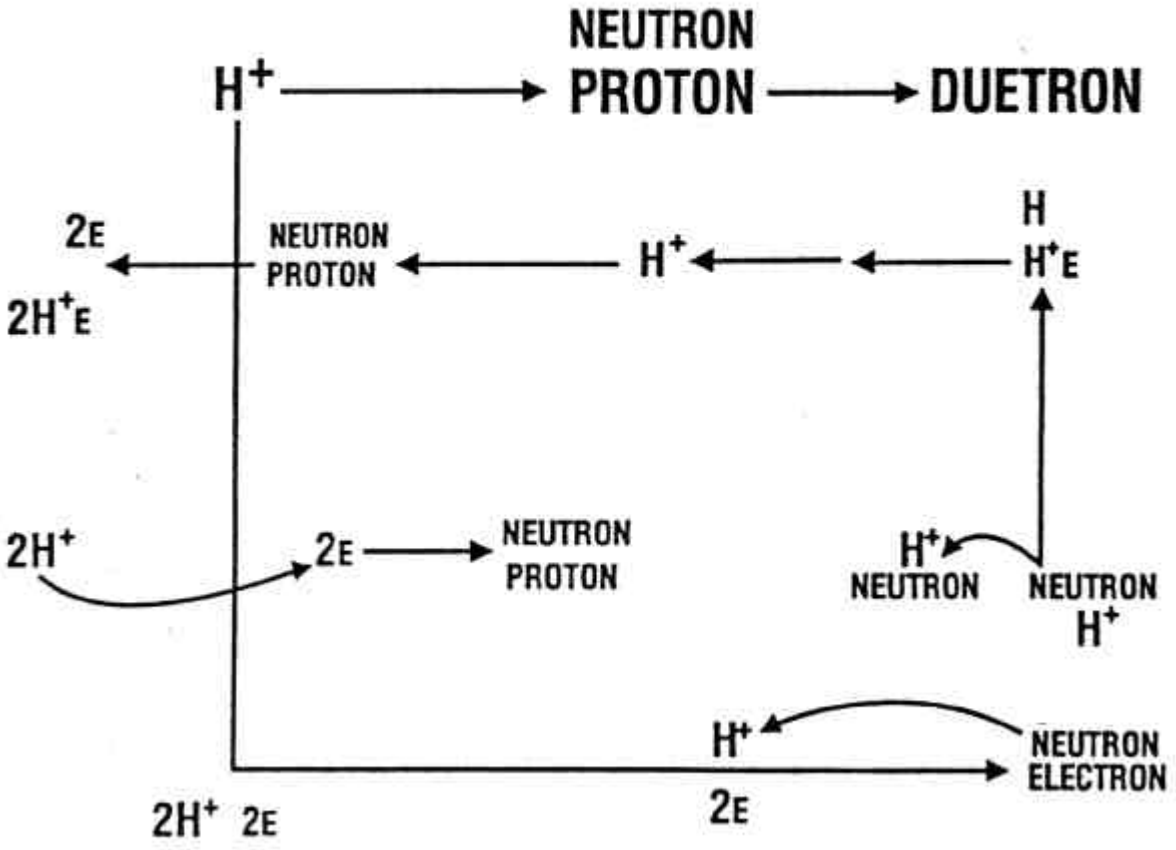
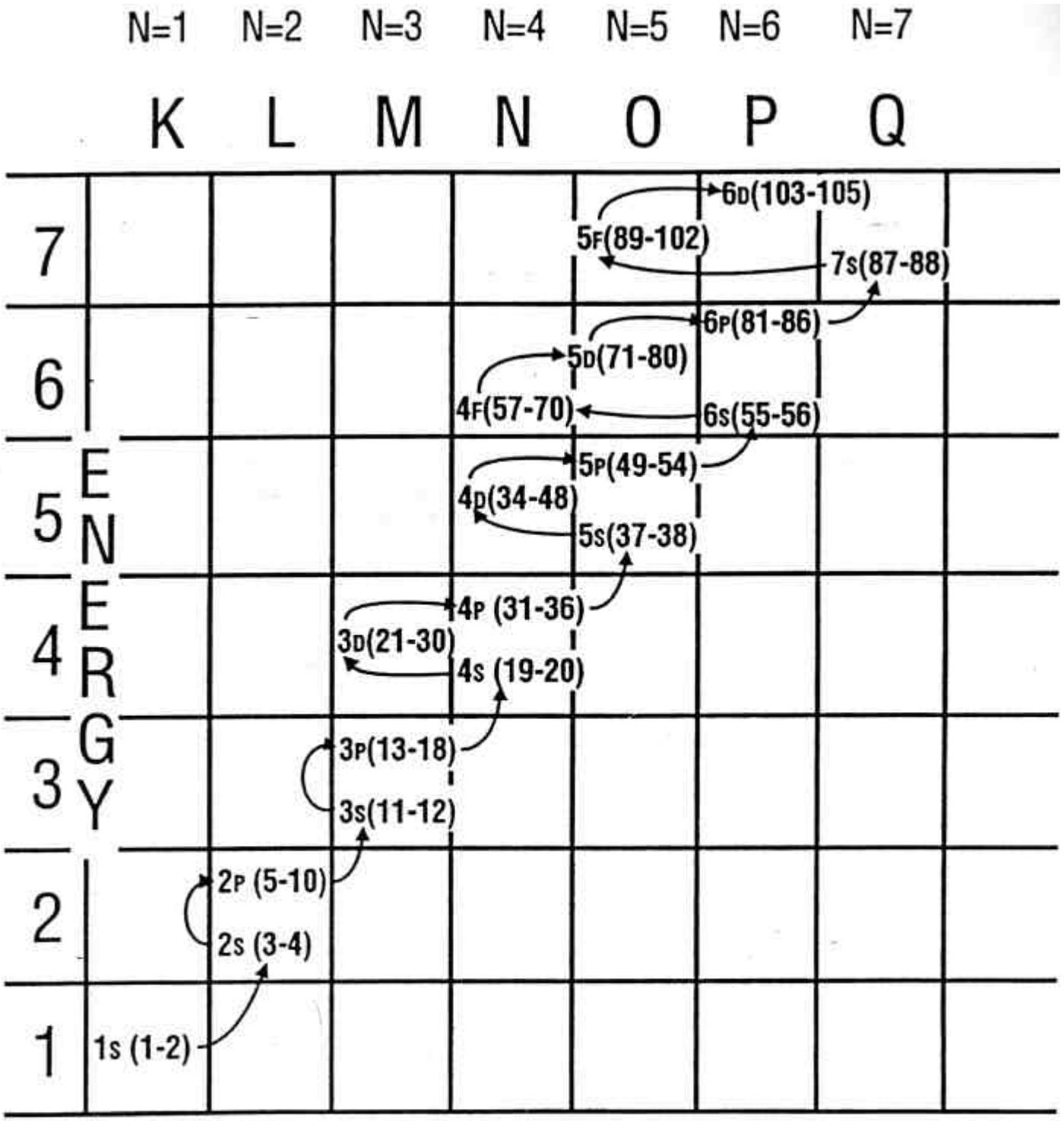


Fig. 1


N=1
N=2
N=3
N=4
N=5
N=6
N=7
K
L
M
N
O
P
Q
ENERGY
7
6
5
4
3
2
1
6D(103-105)
5F(89-102)
7S(87-88)
6P(81-86)
5D(71-80)
4F(57-70)
6S(55-56)
5P(49-54)
4P(34-48)
5S(37-38)
4P (31-36)
3D(21-30)
4S (19-20)
3P(13-18)
3S(11-12)
2P (5-10)
2S (3-4)
1S (1-2)

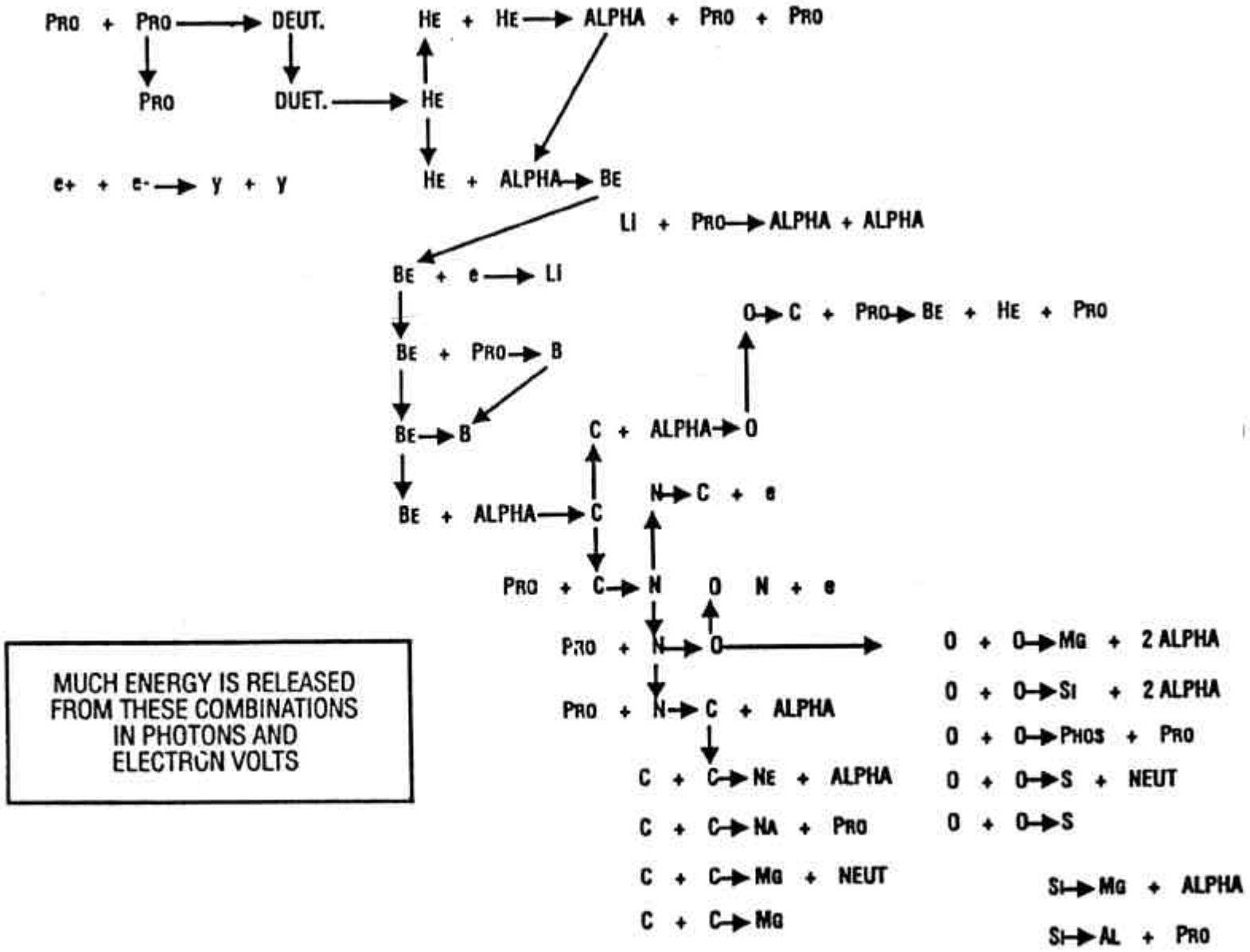


Fig. 3

ELEMENT MANUFACTURING IN STELLER NUCLEO SYNTHESIS

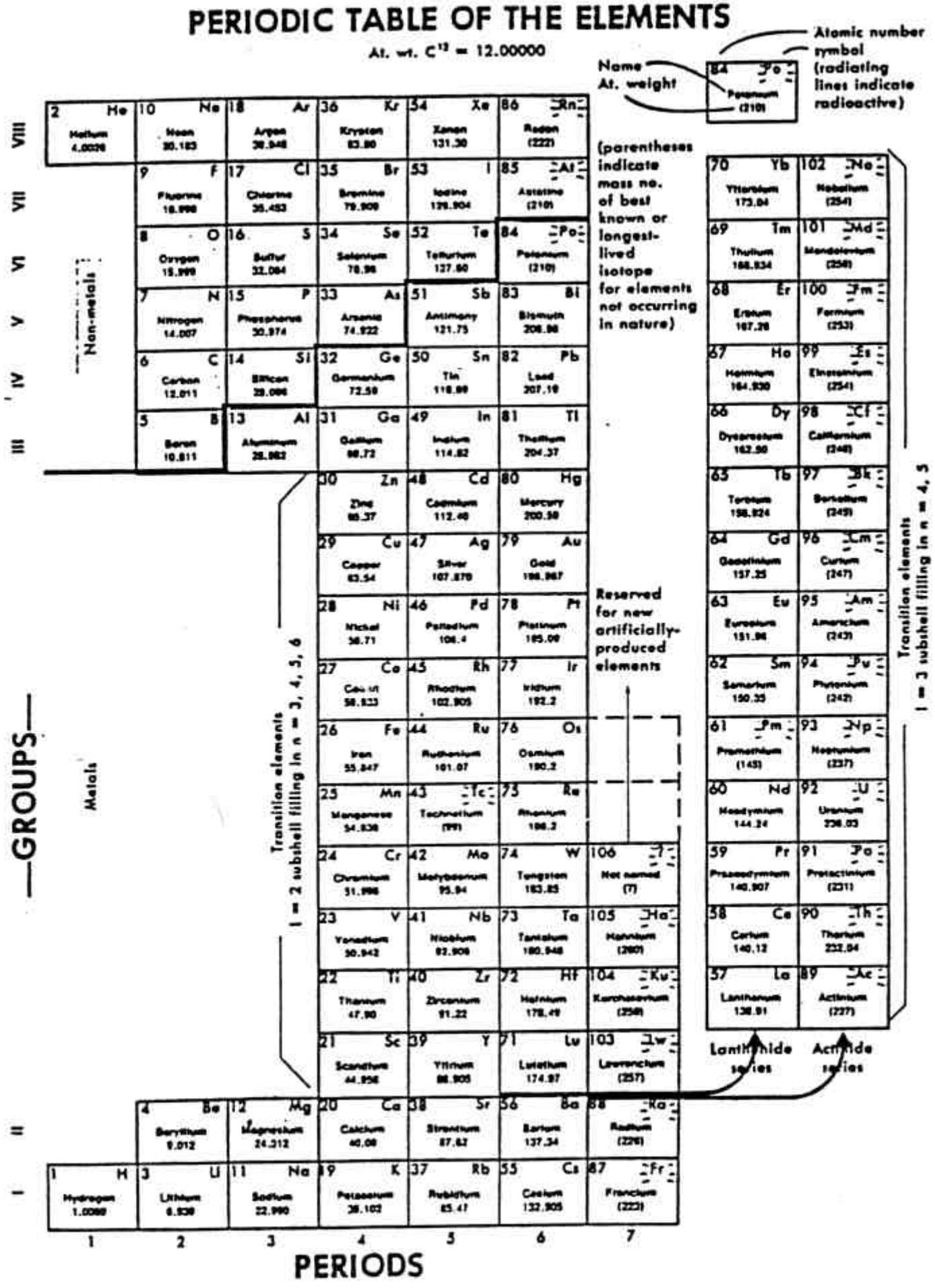

PERIODIC TABLE OF THE ELEMENTS
At. wt. C¹² = 12.00000
Atomic number
symbol
(radiating lines indicate radioactive)
Name
At. weight
(parentheses indicate mass no. of best known or longest-lived isotope for elements not occurring in nature)
Reserved for new artificially-produced elements
Non-metals
Metals
Transition elements l = 2 subshell filling in n = 3, 4, 5, 6
Transition elements l = 3 subshell filling in n = 4, 5
Lanthanide series
Actinide series
—GROUPS—
PERIODS
VIII
VII
VI
V
IV
III
II
I
1
2
3
4
5
6
7

Fig. 4

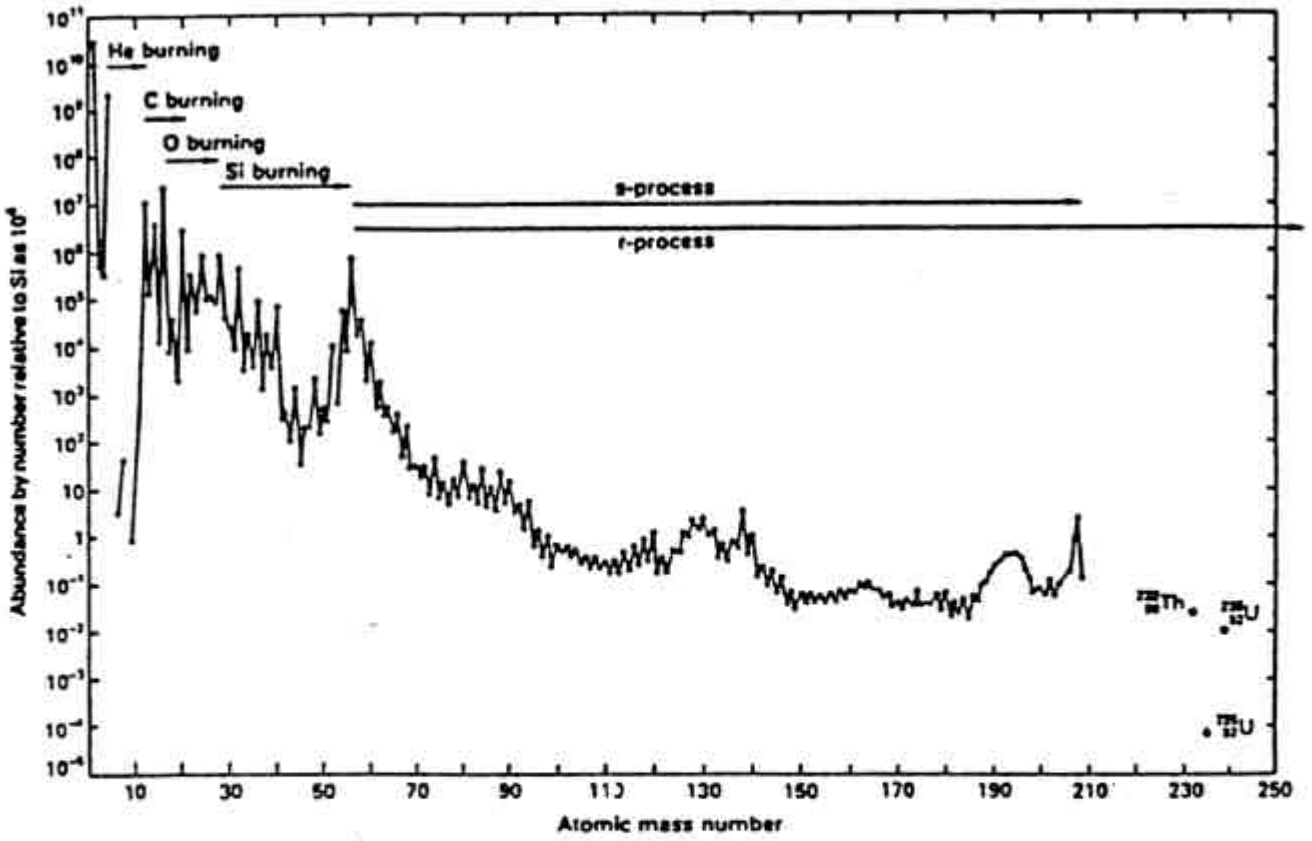
When there is a small number of events, *m*, we will find that the poisson distribution is quantic. When there is a large number of events, the equation approaches gaussian distribution, and becomes statistical. The standard deviation of the square root of *m* will tell us about the probability of the number of events occurring.

It is our treatise that biology in cellular form obeys quantic interaction past the subatomic quantic realm. It is also our treatise that as multicellular organisms grow, they also need quantic systems of information exchange and systems management. Thus we must understand the system of cybernetic regulation of the organism and put it into quantic terms. This quantic system is noncontinuous, and thus fits into a matrix. Our basic matrix will allow us to model the basic vion. The vion is the most basic and simple form of life (see *Quantum Biology section*).

We charted out *n* from 0 through 10 as an implication of a correlation to our ten-by-ten matrix (expanded elsewhere to a twelve-by-twelve matrix).

From Chapter 1 we can see that a pathway was established for definite interaction of all particles and wave forms at the beginning of the universe, so that they would interact in precise ways. Fig. 1 shows an adaptation of a likewise possibility of the development of different material at the beginning. This sets down the basis of our matrix.

In our analysis of the beginning of the universe, and from Fig. 3, we can see that the development of these lighter elements happens in a matrix-type system. The entire pathway follows quantic law and does not make half-steps, but does exacting procedures.



The abundance by number of atoms relative to $^{28}Si + ^{29}Si + ^{30}Si$ as 10^6 in the solar system, as a function of the atomic mass number A. The relative H, He abundances are close to those existing after Big Bang nucleosynthesis. The obvious absences are those of $A = 5, 8$, and $A > 209$ apart from $^{232}_{90}Th$, $^{235}_{92}U$ (not shown), $^{235}_{92}U$ and $^{238}_{92}U$. Large abundances occur for the even–even nuclei at $A = 12, 16, 20, 24, 28, 32$, and 40. The broad peak near $A = 56$ is the iron-like elements, noted as those with the greatest binding energy per nucleon in the periodic table. The abundance enhancing effect of magic numbers are also seen!

(1) at $A = 86$ to 90 due to $N = 50$,
(2) at $A = 114$ to 120 due to $Z = 50$,
(3) at $A = 138$ due to $N = 82$,
(4) at $A = 208$ due to $Z = 82$, $N = 126$.

In addition, the even-to-odd A abundance due to the pairing term effect on the binding energy is clearly visible.

Fig. 5

Past the development of these metals there is an *r* process and an *s* process that allow for the development of other elements needed for biology, as well as those that are toxic in biology. A review of this pathway system is found in "Nuclear and Particle Physics", by W.S.C. Williams. As these elements are developed, they have radii that are a factor in the quantum energy shells of the outermost electrons.

As we outlined before, these atoms can help play the role of conductor and nonconductor, and also can dope elements to provide for electron transport and photon regulation. These are the matters that are most important for biology, and which allow for the regulation of environmental interaction, as well as for the control needed for reproduction processes.

The formula for the radius of an atom is given by:

$$\text{mass}^2 \times \text{Planck's constant}^2 \div 8 \times \text{mass length}^2.$$

So in developing an idea of this matrix, we must incorporate the radii that will determine some of the cross sections in the interaction capacities of various items in the matrix of biology. In dealing with all radii we must incorporate the numbers of pi and other mathematical constructs that will determine some of the possibilities.

In developing our treatise on the radius of different items we see that there was a hint of a unified field theory displayed in *Quantum Vibrational Medicine*, where we projected that the basis of matter could go down to 10-62 meters. This would be compatible with the composite model of the unified field theory, wherein if such a unified structure existed, it would be below 10^{-24} meters. The electronic experiments that have been done for separating various entities have not been able to produce such small entities. Thus our limited technology has not been able to keep up with the possible theories of the unified field.

The combining of Maxwell's equation with Einstein's relativity also point in the direction of a *unified field theory*. The subject of the unified field theory will be discussed at length in the book, *Quantum Vibrational Medicine*.

Let us now return to the theoretical bio-quantum matrices.

At the cell membrane, the thermodynamic environment melts the quantic organized cell. This constitutes a boundary layer, represented mathematically as 6. There must be mathematical laws governing this boundary interaction. We introduced this type of mathematics in *Quantum Biology*, where we describe three vectors of mathematics: 1) metabolism, 2) reproduction, 3) epigenesis. A review of the chapter on "Vions" is suggested.

This mathematical relationship is quantic, and will fit a hermitian matrix. The atomic and quantic structure of the environmental molecules and energy will possess a mathematical form that must be dealt with by the cells. The cells need to metabolize, detoxify, regulate, disperse, and thus control the interaction layer in order to fight against entropy and death. Here is the true fight for life, and it must be mathematical in nature.

The mathematical matrices of interaction, as outlined by Dr. James Isaacs, incorporates a large hermitian matrix, shown in Table 1, which outlines vast interaction capacities of various items. In this matrix we will see columns numbered 1 to 12, and at various sites we will see numbers that appear. These numbers represent their quantic capacities. Factor 1 is a reflection of a linear series of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12. This refers to the principle quantum number. This linear series of numbers is the simplest series known to mathematics, and reflects the quantum energy levels of the great quantum number. Factor 2, which we see in the third column, is a reflection of another very integral series of numbers which is expressed in every biological unit. This is a Fibernaci series, which is generated by combining one number with the next number to get the third. This Fibernaci number is a reflection of quantic interchanges that occur in the spin numbers of the quantic number.

[RTF annotation: elab 4 1/30/92] The Fibernaci number, which is connected to the golden mean and the secret architecture numbers passed down by the masons, has been related as a dynamic number in biology. Many things have been found about it, including its ability to make architectural projects more beautiful and attractive to the eye.

QUANTUM NUMBERS	RELATION IN BIOLOGICAL MATRIX
1. N - Principle quantum number reflects general shall	Column #1 base mathematical reflection of linear series 15-25-2P, etc.
2. L - Orbital quantum number elliptical in nature reflects magnitude	Column #2 Fibernaci series reflects elliptical or spiral nature
3. Angular momentum number	Column #3 reflects harmonic-like series for vibrational control
4. M_L - Magnetic momentum reflects angular momentum to magnetic	Column #4 Quadratic series reflects magnetic capacities
5. M_S - Magnetic spin momentum	Column #5 x^y series reflects log increment
6. S - Spin quantum number	Column #6 - Column #4 - Column #5 reflect the bell curve
7. J - Subtleties of orbital not completely known	Column #7 - Column #4 - Column #3 profile limited series
8. R - "	Column #8 - Column #3 - Column #5 inversely proportional series stabilizes control
9. G - "	Column #9 - Column #2 - Column #7 reflect magic number in biology
10. H - magic number of quantum theory	Column #10 magic numbers of quantum theory

Table 1

Column	#1	#7	#2	#6	#3	#8	#4	#5	#9	#10
	1	1	2	1	1	1	-1	0	0	0
	2	1	3	4	1	2	1	3	2	2
	3	2	5	9	2	3	4	7	6	6
	4	3	7	16	4	3	9	12	12	12
	5	5	10	25	8	2	15	17	20	20
	6	8	14	36	16	-2	22	20	30	30
	7	13	20	49	32	-12	28	17	42	42
	8	21	29	64	64	-35	3	0	56	56
	9	34	43	81	128	-85	38	-47	72	72
	10	55	65	100	256	-191	35	-156	90	90

ISSACS MATRIX

1	1	2	1	1	1	-1	0	0	0	0	0
1	0	1	3	0	1	2	3	2	2	2	2
2	1	3	4	1	2	1	3	2	2	2	2
1	1	2	5	1	1	3	4	4	4	4	4
3	2	5	9	2	3	4	7	6	6	6	6
1	1	2	7	2	0	5	5	6	6	6	6
4	3	7	16	4	3	9	12	12	12	12	12
1	2	3	9	4	-1	6	5	8	8	8	8
5	5	10	25	8	2	15	17	20	20	20	20
1	3	4	11	8	-4	7	3	100	10	10	10
6	8	14	36	16	-2	22	20	30	30	30	30
1	5	6	18	16	-10	7	-3	12	12	12	12
7	13	20	49	32	-12	28	17	42	42	42	42
1	8	9	15	32	-23	6	-17	14	14	14	14
8	21	29	64	64	-35	3	0	56	56	56	56
1	13	14	17	64	-50	3	-47	16	16	16	16
9	34	43	81	128	-85	38	-47	72	72	72	72
1	21	22	19	128	-106	-3	-109	18	18	18	18
10	55	65	100	256	-191	35	-156	90	90	90	90
1	34	35	1	256	-221	-14	-235	20	20	20	20
11	89	100	121	512	-412	21	-391	110	110	110	110
1	55	56	23	512	-456	-33	-489	22	22	22	22
12	144	156	144	1024	-868	-12	-880	132	132	132	132
11	143	154	143	1023	-871	39	20	132	132	132	132

Fig. 6

The Fibernaci series reflects the elliptical or spiral nature of biology, as the spiral found in many organisms is directed by the Fibernaci number. The noman found by Darcy Thompson, which was reflective of the various lengths of the joints of the appendage in the human (finding that each joint was longer than the one previous), also reflects a Fibernaci relationship. Thus the Fibernaci series must be deep in the biological control factors of our matrices.

Factors 3, which are in the fifth column, is a reflection of the addition of column 1 to column 2. This will generate a harmonic-like series, which is reflected in some of the harmonic qualities of biology. It is interesting to note that this is not a *true* harmonic series, but a harmonic-*like* series; just as biology does not have *true*, exact harmonics, but harmonic-like functions. Some music can be developed with dissonant (harmonic-like) forms, as well as consonant (true harmonic) forms.

This harmonic-like series that results from adding the linear series to the Fibernaci series is very similar to the angular momentum quantum number reflected in quantum theory. If we take the Fibernaci series and square it, add 1, multiply by Planck's constant, divide by 2B, and take the square root of the entire series, we will approximate this number. Thus the angular momentum number must have a linear hold number reflection in the matrices to allow it to be quantum-like. We have chosen to use factor 4 for that purpose.

Factors 4, which are in the seventh column, are a reflection of the quadratic series in which we take 2 to the row power. This quadratic series is highly important in biology, and is a reflection of other quantum numbers.

In Factors 4 we use a quadratic series to reflect magnetic capacities. As discussed in Chapter 5, the magnetic momentum fans out at an angle into the magnetic field, and creates this vector. This is reflected in a quadratic series, which we will use to display this quantum number for biology.

Factors 5, which are in the eighth column, have 2 to the nth capacity, which gives us another type of variation on a quadratic series. These numbers are indicators of a different type of quantic pattern.

Here we use an *xy* series to reflect the magnetic spin number and its involvement in stability for our matrices.

Our chart will show how the quantum numbers relate to the biological reflection of the matrices. Here we have taken many of the quantum numbers upon which quantum theorists have speculated, and put them into biological matrices to utilize in a hermitian matrix, which can stabilize biology for its interaction of environment, thus metabolism; and for its interaction for growth; reproduction.

The other columns are generated by adding and subtracting the columns in the basic five we have outlined. Column 1 plus 2 yields column 3. Column 4 minus 5 equals column 6. Column 6 plus 5 equals 4. Column 8 plus 5 equals 3. Column 7 plus 3 equals 4. Columns 1, 2 and 7 yield column 4. Column 8 plus column 8 plus column 7 equals column 6. Column 2 plus 7 equals column 9. These are some of the basic interchanges that allow us to see some of the dynamics of these proposed hermitian matrices. On our graph we also show the differences between each state, as this will be significant in its ability to check various compounds.

If we carry the mathematics of these relationships to another factor, we can see that the matrices might be expanded to a twelve-matrix at certain times. Isaacs relates this as a factor needed in certain parts of the reproductive cycle, and possibly parts of the metabolism.

In the table expressing a description of Column 10 we see that the magic numbers of quantum theory can also have reflections in different capacities of biology.

Column Number 10

Column	Biological Component
2	A Sexual Conjugation
8	Hyperplasia
20	Plody (Metaplasia)
50	Proton
52	Transmutation
82	Fusion
126	Carbon stimulation of fusionary system

In the next series of developments in the matrices, we notice the mathematical relationship and the laws set in development, as various entities were made. At the beginning of the universe all that existed was energy. Next we had the "big suck", which led to the transfer of this energy into certain mass. We have outlined this initial energy in a procedure. Next, this energy congeals in the stars, and forms the larger minerals in the heat of the nuclear furnaces. Dr. Powell outlines a procedure of this, and Isaacs has given us the mineral matrix.

So in developing the following matrices of biology, we have utilized the quantum theory of radii developed by quantum theorists in calculating some of the various matrices in which capacities of biology might fall. We have developed matrices for minerals, vitamins, fatty acids, heavy metals and other factors.

Now as we present these matrices, we dedicate a new book to the pursuit of clinically developing these matrices for utilization in medicine. This book is called *Quantum Biophysics*. It was the purpose of *this* book to account for the believability of the phenomena at the quantic level, and to document the mathematical background to allow for this treatise. It was not intended that this treatise produce clinical or medical evidence; that will be accomplished in *Quantum Biophysics*. This book outlines some of the theoretical factors of our continuing discussion.

This basic mathematical matrix can be utilized to explain most of biology, although it fits the vion expansion.

Adaptation can account for the wide variety of living cellular and multicellular functions.

We also have the toxic element (heavy metal) matrix, which can be superimposed next to the mineral matrix. On the mineral matrix we have all the minerals necessary for life. The heavy metals are the metals that interfere with the living process. This heavy metal matrix, even though it contains items such as barium, which is not heavy but very light, is a categorizing of all the metals that can interfere with biology.

So here we have developed in the heat of these nuclear furnaces both pro- and anti-biological atoms. As these atoms combine, they develop into amino acids. This is a classification of all the amino acids, and how they have been utilized and put together to describe biology. The laws that determine how the amino acids are developed are also the laws that determine how the amino acids might be used in biology. The amino acids start to create electro-polarity, which then leads to basic life. In the development of life we now get into various cell structures.

After cell structures are developed, vitamins are also developed that will be used by the cell structures to assist in enzymatic processes.

Also being developed at this time are the hormones, which regulate the transfer of the electrons, protons, and metabolism, as well as reproduction processes of biology. All of biology's functions adhere to this mathematical accounting model in one way or another.

EIGENVALUE MATRIX OF QUANTIC INTERACTION

E1(0), E2(0), E3(0), E4(0), E5(0), E6(0), E7(0), E8(0), E9(0), E10(0), E11(0), E12(0)

E1(1), E2(1), E3(1), E4(1), E5(1), E6(1), E7(1), E8(1), E9(1), E10(1), E11(1), E12(1)

E1(2), E2(2), E3(2), E4(2), E5(2), E6(2), E7(2), E8(2), E9(2), E10(2), E11(2), E12(2)

E1(3), E2(3), E3(3), E4(3), E5(3), E6(3), E7(3), E8(3), E9(3), E10(3), E11(3), E12(3)

E1(4), E2(4), E3(4), E4(4), E5(4), E6(4), E7(4), E8(4), E9(4), E10(4), E11(4), E12(4)

E1(5), E2(5), E3(5), E4(5), E5(5), E6(5), E7(5), E8(5), E9(5), E10(5), E11(5), E12(5)

E1(6), E2(6), E3(6), E4(6), E5(6), E6(6), E7(6), E8(6), E9(6), E10(6), E11(6), E12(6)

E1(7), E2(7), E3(7), E4(7), E5(7), E6(7), E7(7), E8(7), E9(7), E10(7), E11(7), E12(7)

E1(8), E2(8), E3(8), E4(8), E5(8), E6(8), E7(8), E8(8), E9(8), E10(8), E11(8), E12(8)

E1(9), E2(9), E3(9), E4(9), E5(9), E6(9), E7(9), E8(9), E9(9), E10(9), E11(9), E12(9)

E1(10), E2(10), E3(10), E4(10), E5(10), E6(10), E7(10), E8(10), E9(10), E10(10), E11(10), E12(10)

E1(11), E2(11), E3(11), E4(11), E5(11), E6(11), E7(11), E8(11), E9(11), E10(11), E11(11), E12(11)

E1(12), E2(12), E3(12), E4(12), E5(12), E6(12), E7(12), E8(12), E9(12), E10(12), E11(12), E12(12)

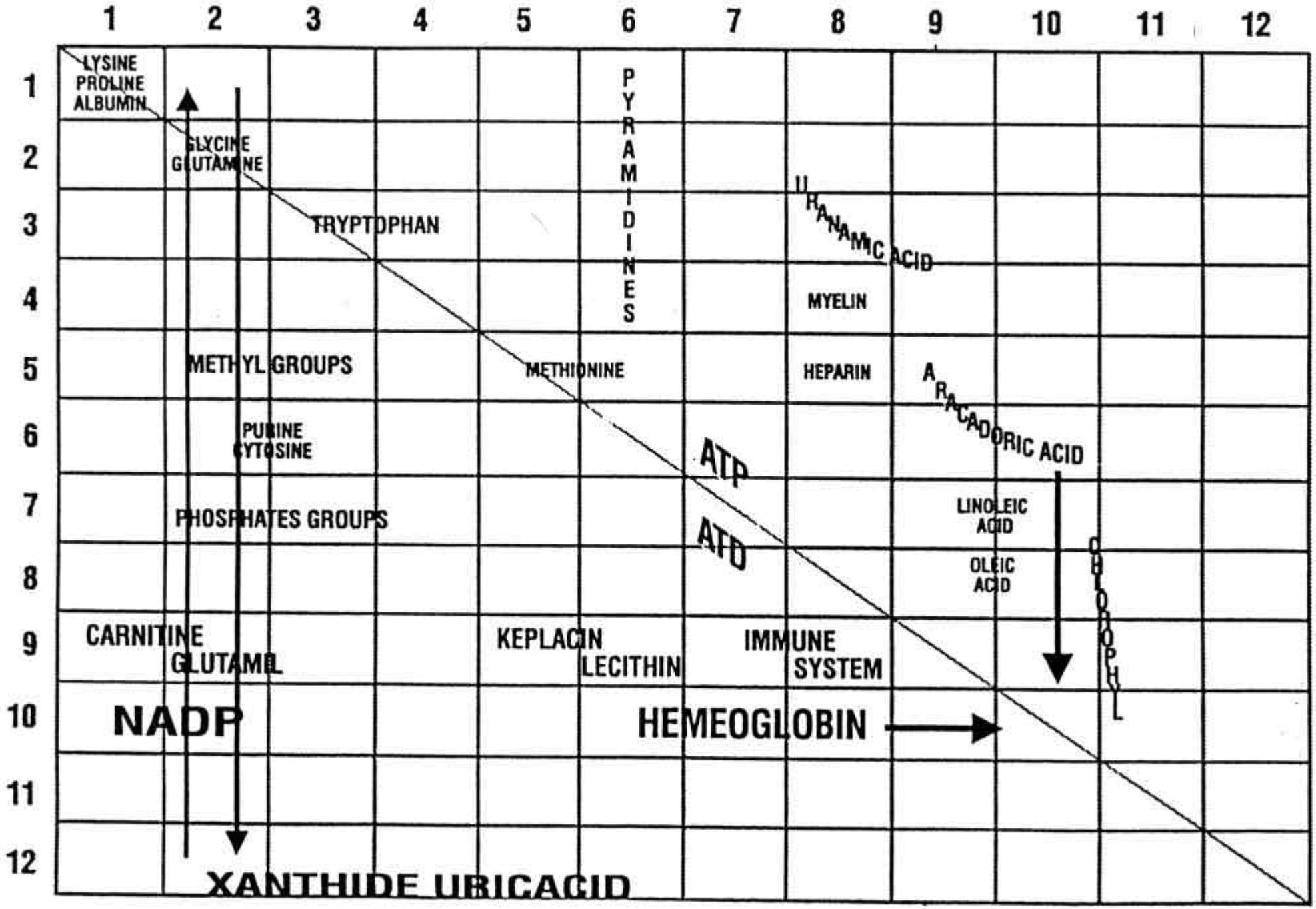
The values of the Isaac matrix can be superimposed on these eigenvalues.

The reproduction matrix is a description of the replication, translocation, and other processes used in transmitting genetic activity. This also will follow our matrices. Included on the side of this matrix is a description of the immuno-globulin development, and some of the possibilities for their regulation with the DNA process.

Vibrations and their reaction on biology are included as another possible matrix. Here we have the vibrations of different emotions and their various reactions, and how they would possibly fit into this matrix. Emotions may be just a harmony that is struck through the biological system.

Substates can be transferred through the system via a Davydov soliton and Fröehlich waves. This sets up a quantum procedure in which long-range forces can have transitional conductivity. Please review "A Quantum Field Theoretical Approach to the Collective Behavior of Biological Systems" in *The Experimental Evidence for Homeopathy II*. This explains how vions can communicate through a multicellular organism. Energy, mass, charge and momentum can be thus regulated, and controlled by the matrix. This allows for metabolism, reproduction and epigenesis in short life.

The electrical flow process of electroacupuncture also generates patterns of health and disease, which our Quantum Med C.I. system can detect in medicine. These electrical patterns are also matrix-bound. By developing a medical device capable of testing thousands of items in a short time, the Xrroid process allows for us to catagorize this reaction matrix and compare it to the matrixes disscussed in this chapter.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PYRAMIDINES
URANAMIC ACID
MYELIN
METHYL GROUPS
METHIONINE
HEPARIN
ARACADORIC ACID
PURINE
CYTOSINE
ATP
ATD
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OLEIC
ACID
CHLOROPHYL
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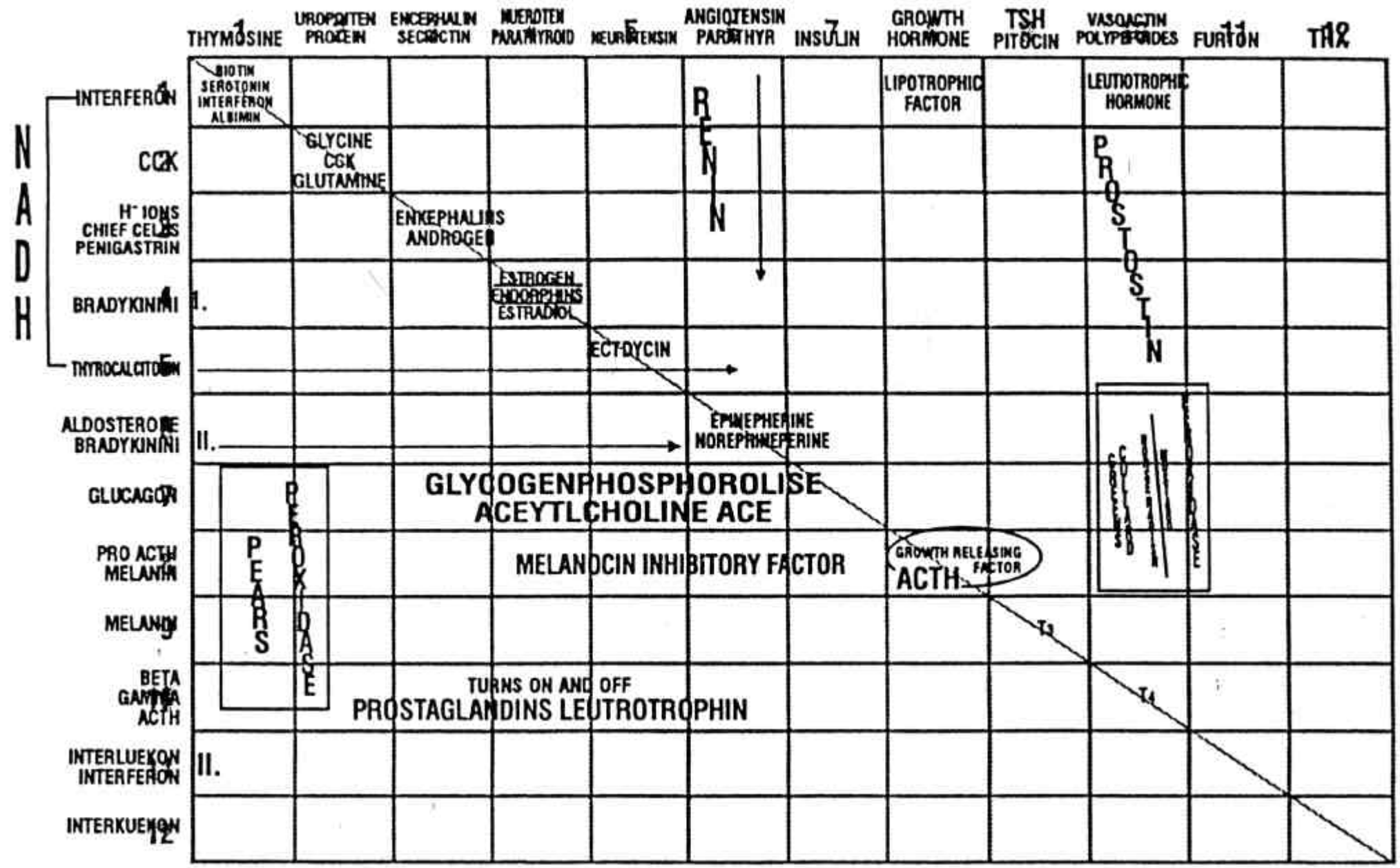
IMMUNE
SYSTEM
NADP
HEMEOGLOBIN
XANTHIDE URICACID


THYMOSINE
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NUEROTEN PARATHYROID
NEUROTENSIN
ANGIOTENSIN PARATHYR
INSULIN
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TSH PITOCIN
VASOACTIN POLYPEPTIDES
FURTON
TNF
NADH
INTERFERON
CCK
H⁺ IONS CHIEF CELLS PENIGASTRIN
BRADYKININ I
THYROCALCITONIN
ALDOSTERONE BRADYKININ I
GLUCAGON
PRO ACTH MELANIN
MELANIN
BETA GAMMA ACTH
INTERLUEKON INTERFERON
INTERKUEKON
BIOTIN SEROTONIN INTERFERON ALBIMIN
GLYCINE CCK GLUTAMINE
ENKEPHALINS ANDROGEN
ESTROGEN ENDORPHINS ESTRADIOL
ECTOCYCIN
EPINEPHERINE NOREPRINEPERINE
RENIN
LIPOTROPHIC FACTOR
LEUTIOTROPHIC HORMONE
PROSTOSTIN
GLYCOGENPHOSPHOROLISE
ACEYTLCHOLINE ACE
MELANOCIN INHIBITORY FACTOR
GROWTH RELEASING FACTOR
ACTH
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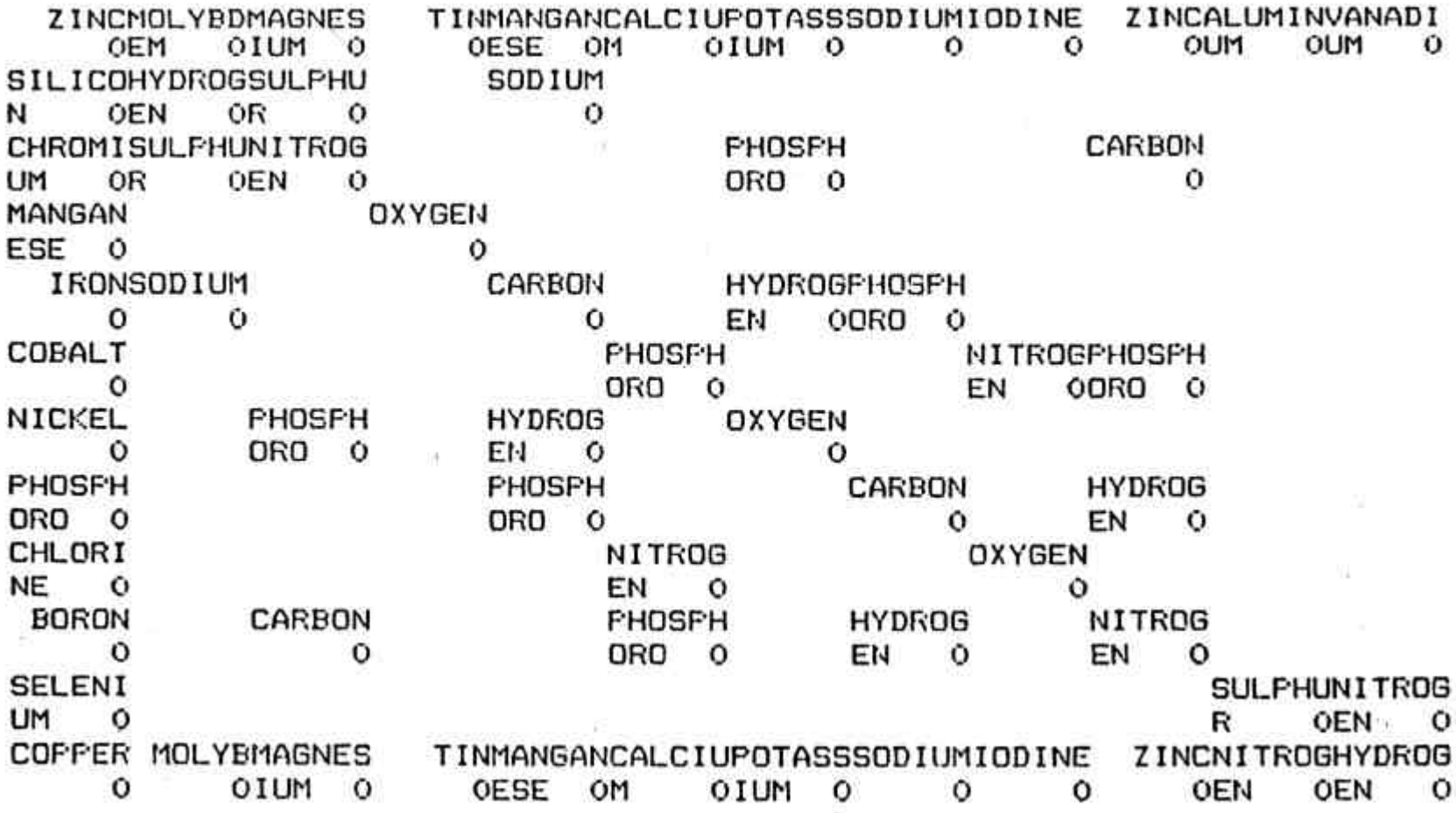
PROSTAGLANDINS LEUTROTROPHIN
I.
II.
T3
T4

MINERALS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SODIUMO
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PHOSPHORO
CARBONO
MANGANESEO
OXYGENO
IRONSODIUMOO
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NITROGENPHOSPHOORO
NICKELO
PHOSPHORO
HYDROGENO
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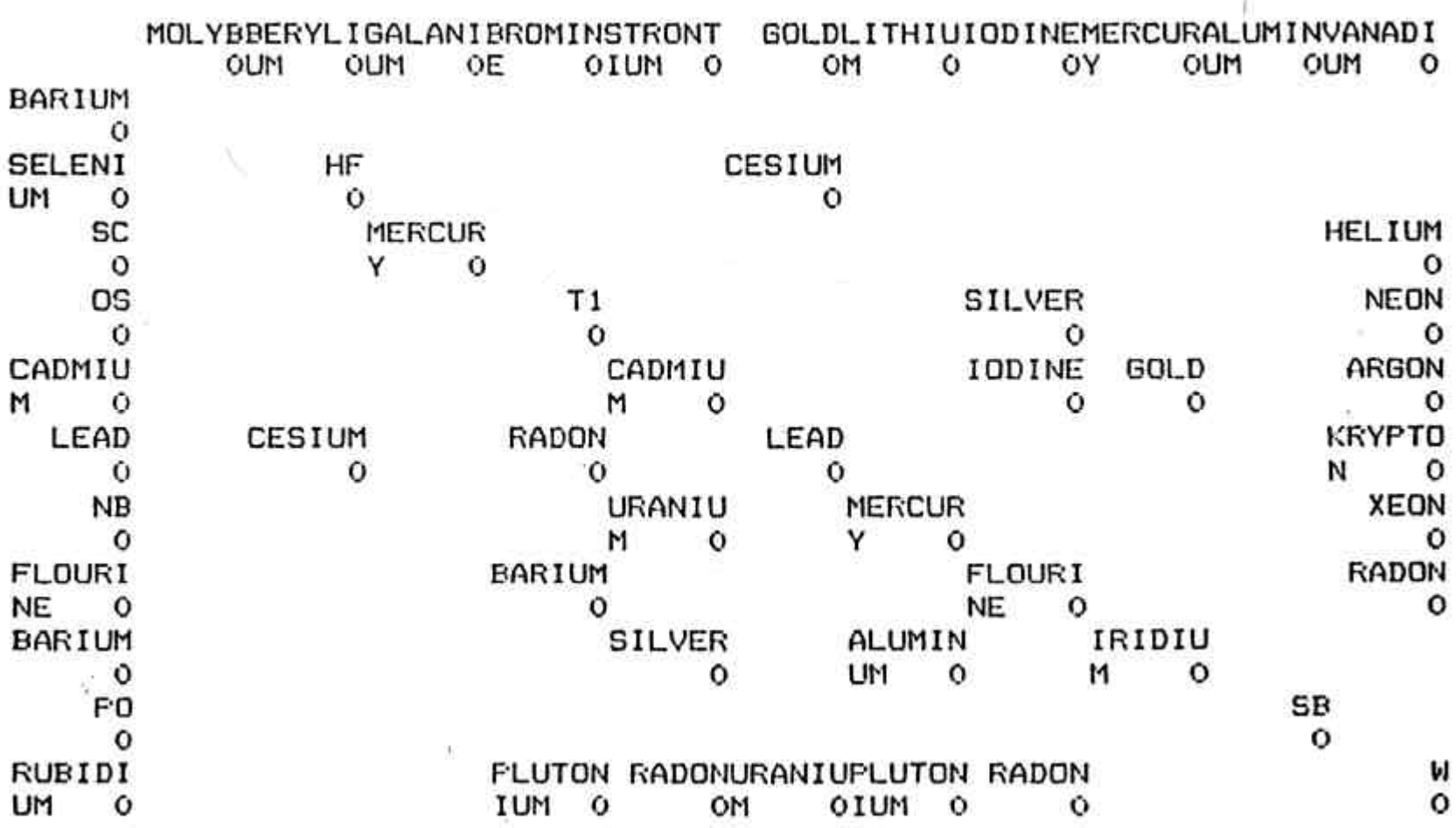
ZINCNITROGHYDROGOENOENO

HEAVY METALS



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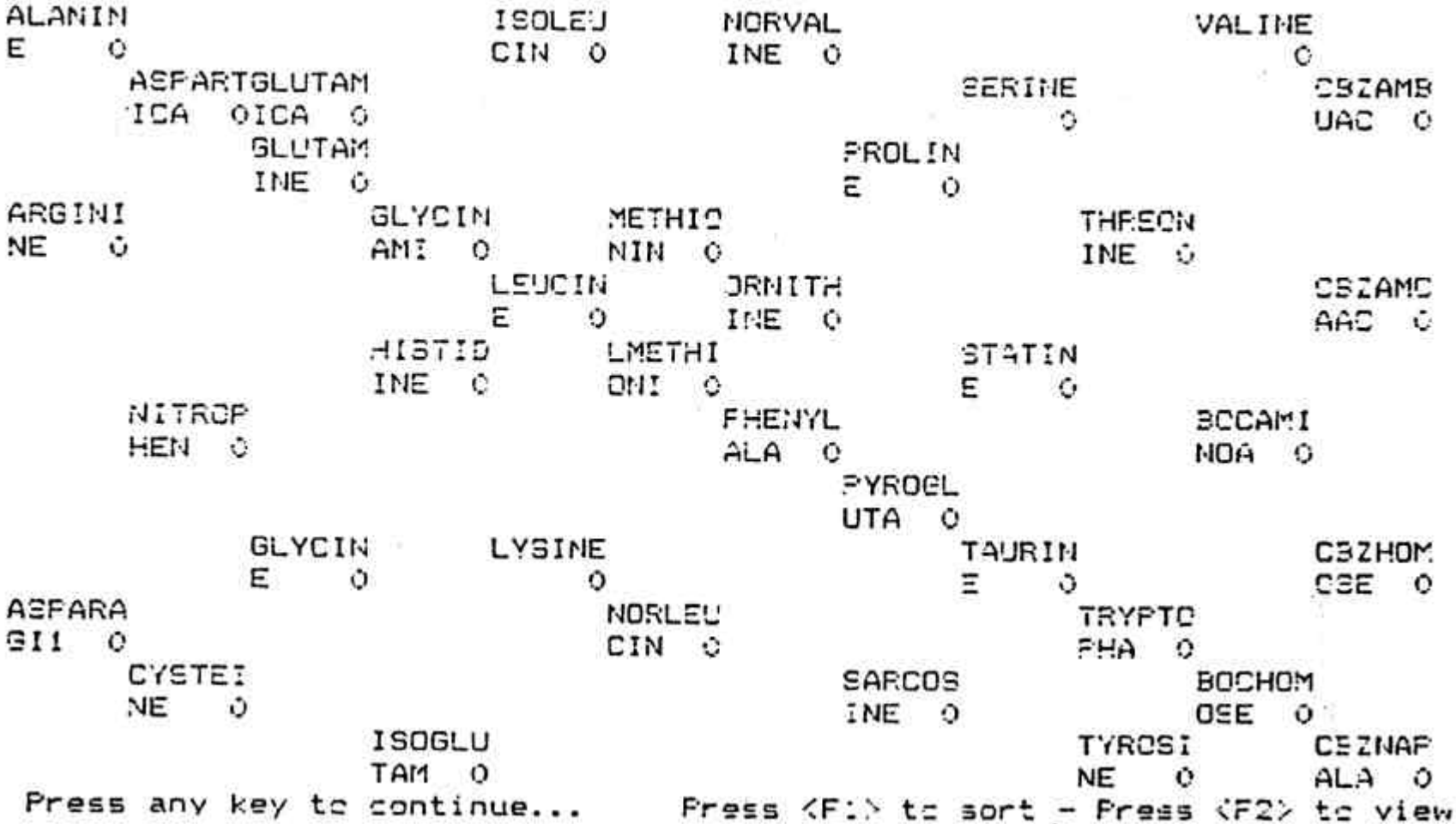
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LMETHIONI 0
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GLYCINE 0
LYSINE 0
TAURINE 0
ASPARAGI1 0
NORLEUCIN 0
TRYPTOPHA 0
CYSTEINE 0
SARCOSINE 0
BOCHOMOSE 0
ISOGLUTAM 0
TYROSINE 0
CBZAMB UAC 0
SERINE 0
CBZAMC AAC 0
STATINE 0
BCCAMINOA 0
CBZHOMOSE 0
CBZNAPALA 0
VALINE 0
ISOLEUCIN 0
NORVALINE 0
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THREONINE 0
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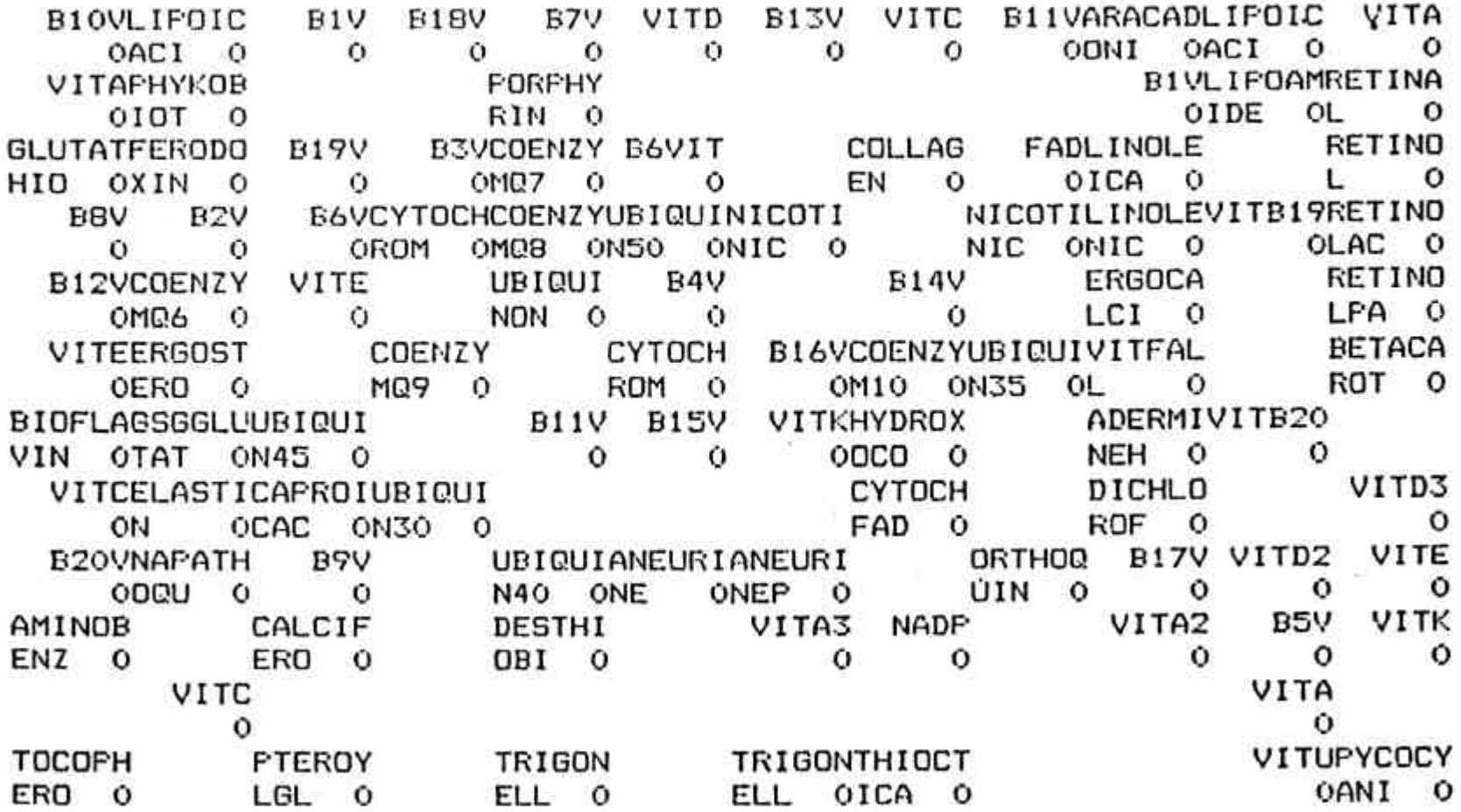
VITAMINS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OMQ6 O
VITEERGOST
OERO O
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VIN OTAT ON45 O
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ON OCAC ON30 O
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OOQU O
AMINOB
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VITC
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TOCOPH
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B1V
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B19V
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B6VCYTOCHCOENZY
OROM
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PTEROY
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VITKHYDROX
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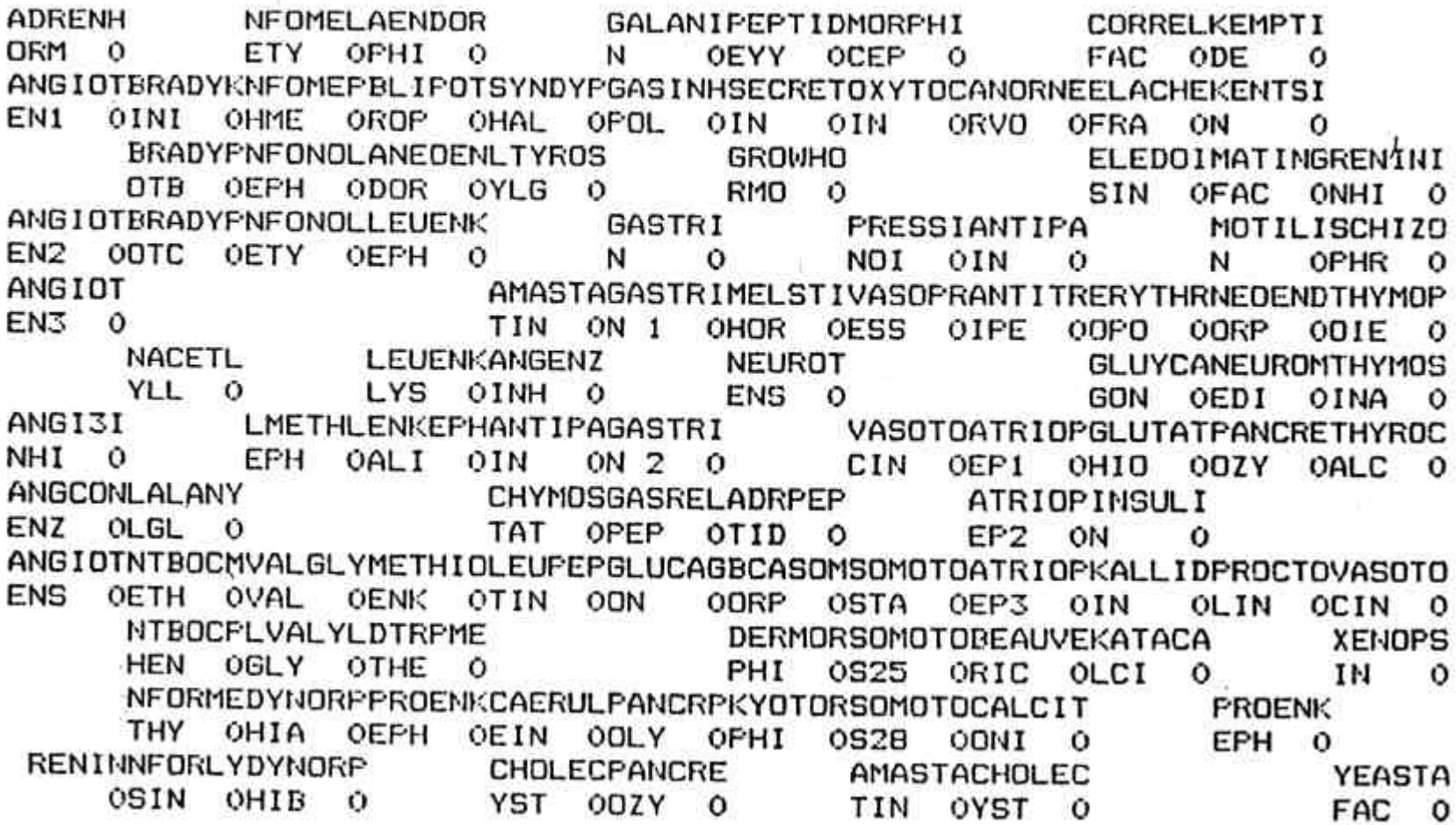
HORMONES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EN1 OINI OHME OROP OHAL OPOL OIN OIN ORVO OFRA ON O
BRADYPNFONOLANEOENLTYROS GROWHO ELEDOIMATINGRENINI
OTB OEPH ODOR OYLG O RMO O SIN OFAC ONHI O
ANGIOTBRADYPNFONOLLEUENK GASTRI PRESSIANTIPA MOTILISCHIZO
EN2 OOTC OETY OEPH O N O NOI OIN O N OPHR O
ANGIOT AMASTAGASTRIMELSTIVASOPRANTITRERYTHRNEOENDTHYMOP
EN3 O TIN ON 1 OHOR OESS OIPE OOPO OORP OOIE O
NACETL LEUENKANGENZ NEUROT GLUYCANEUROMTHYMOS
YLL O LYS OINH O ENS O GON OEDI OINA O
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ANGCONLALANY CHYMOSGASRELADRPEP ATRIOPINSULI
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THY OHIA OEPH OEIN OOLY OPHI OS28 OONI O EPH O
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OSIN OHIB O YST OOZY O TIN OYST O FAC O

ENZYMES

ACETYLBAMYLACANUTICHOLIN GLUCOSINVERTLACTOPLYTICEPANCREPHOSPA
EST OSE OLIS OACE O EDE OASE OERO ONZY OOZY OCID O
ACIDPH CARANHCHOLINDEOXYOGLUTAMISOAMY LDHMALATHPAPAINPHOSPHRIBONU
OSP O YDR OBUT OATP ODEC OLAS O OION O OOLA OCLE O
ADENOSANGCONCATALAACHYMODEOXYAGLUTAMISOCITLECITHMALTASPARAHYPHYTASSACCHA
INE OENZ OSE OTRY OLIG ODEH OLYA OINA OE ODRO OE ORAS O
ALKPHOARGINACELLULCOENZYDEOXYAGLUTATISOMALLECITHMONOAMPECTINPROSTDSTEROI
SPH OSE OASE OMEA OPOL OPER OTAS OINC OOXI OASE OEHY ODDE O
ALKPROASCOROCHLOROCORTISDNALIGGLUATHISOCITLECITHMYOSINPECTOLPROTEASUCRAS
TEA OXID OPER OONE OASE ORED OLYA OIND O OYAS OSE OE O
ASPARA CREATIDNAPOLGLYCPHISOMALLEUCINNADASEPENICI TRYPSI
GI2 O NAS OYME OOSP OTAS OEDE O OLLA O N O
ATPASECHOLESCREATIDOPAMIGLYCSYLACTASLIPASENEURAMPEPCARPSEUDOTRYPSI
OEST ONEP ONEB ONTH OE O OINI OBOX OCHO ONOG O
ALMOND CHOLOXCREATIELASTA LACDEHLIPOXINUCLEAPEPSINPYRUVDTRYPTO
MEA O IDA ONIN OSE O YDR ODAS OSE O OEHY OPHA O
AADECABILACICHOACECYTOCHENTERO LAC2MO LYSINORNDECPEPSINPYRUVKTYROSI
ROX ODEH OTYL ORMB OKIN O NOO O OARB OOGE OINA ONAS O
AAOXIDBROMELCHOKINCYTOCHFORMDEHISTAMLACOXI PEPTIDPYRUVOVANACI
ASE OAIN OASE ORMC OHYD OINA ODAS O ASE OXID ODEH O
AMIACICALCULCHOOXIDEOXYRFUCOSEHISTIDLACTIC OXALATPEROXI RENIN
TRA OASE ODAS OIB1 ODEH OASE ODEH O EOX ODAS O O
AAMYLACANPSE DEOXYRGABASEHYDROXLACTICLYSOZYPANCRE RENNINXANTHI
SE OUDO O IB2 O ORED ODEH OME OATI O OOXI O

VIBRATIONAL MATRIX

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COSMOS                                                DEPRES                    RECKLE
V    0                                                S    0                    SS   0
0-500H  EELF1STDIMRIGHTSANGERVSTATIC                      ANGER2          JOY
Z    0      OEN   OPIN  0      OPOS  0                        0            0
              ELF2NDDIM50CYCL GREEDMAGNES                    AGRESS
                OEN   OES   0      0     0                   ION  0
       500100    RE POWER3RDDIM60CYCLDELUSIMAGPOS                  AUSTIC
       OHZ  0      0      OEN   OES   OON   0     0                      0
       REDVIS100015   MIV RADIO75CYCLSADNESJEALOUSTATICCONFUS       CARELE
       IB   000H  0      0      OES   OS    OSY   ONES  OION  0       SS   0
CROWNC200025ORANGE4THDIM150020MICROW    FAHESITA  FEAR
HAK  000H  OV     OEN   000H  OAVE  0     OTIO  0     0
       BROWCH250030YELLOW5THDIMRATIONINFRAR    EO7THDIMANXIET          LUST
       AKR  000H  0      OEN   OALI  OED   0     OEN   OYV   0             0
       THROAT100CYC300035 GREEN6THDIMPROCECVIEISL    LABTHDIM WORRY
       CHA  OLES  000H  0      OEN   OTIO  OE    0     OEN   0      0
              HEARTC150CYCO50040 BLUEV400045GRAVITULTRAV       9THDIM
              HAK  OLES  000H  0      000H  OATI  OIOV  0       EN   0
              PASSIVSTOMAC      LEFTSPINDIGO450050    TI XRAYS    DO
              ITY  OHAK  0      IN    0     000H  0     0      0    0
       AWARNE                                  VIOLET500055       GAMMAR500010
       SS   0                                       000H  0       AYS  000C  0
                                 BASECH                      550060 10THDIHYPGAM
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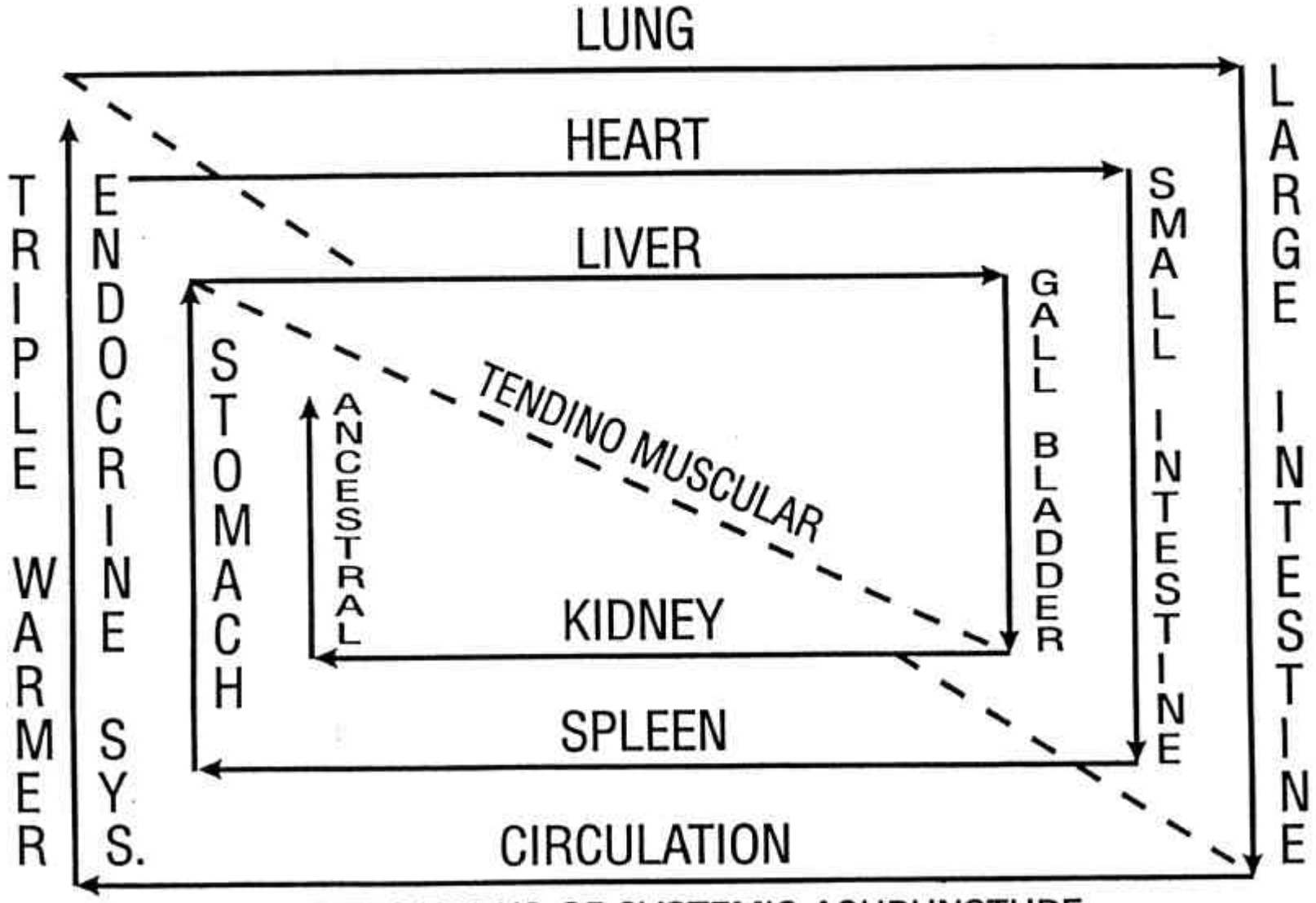
ACUPUNCTURE IN OUR MATRIX SYSTEM



ENERGETIC TORUS OF SYSTEMIC ACUPUNCTURE

Progressive Vicariation of Tonsillitis suppressed by Chemical Drugs: first in Agranulocytosis (Impregnation Phase) and then in Leukemia (Degeneration Phase)

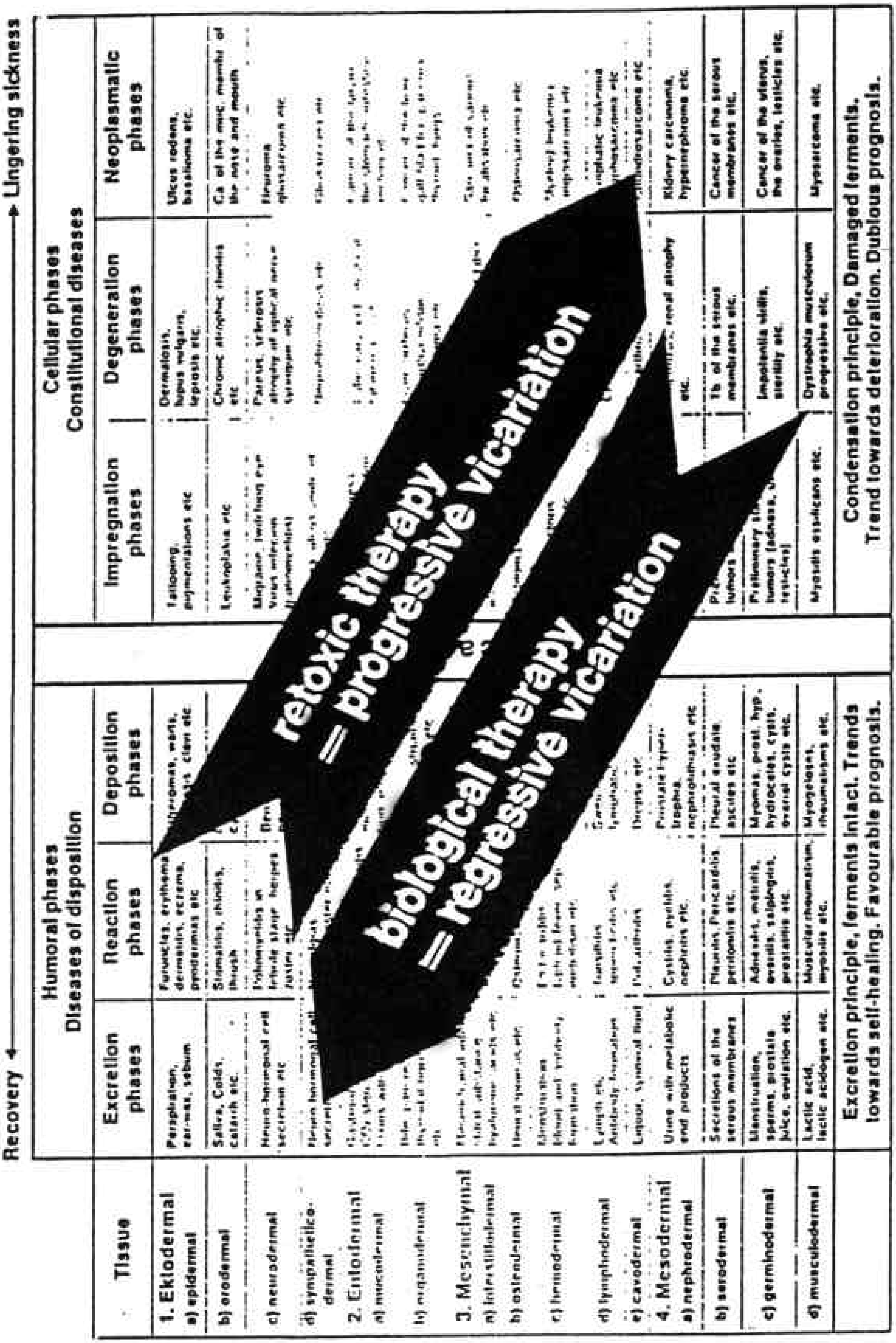


Diagram of Progress[illegible] and Regressive Vicariation (Vicariations Phenomenon)

Through nonbiological (retoxic [illegible] inflammations and excretions are suppressed, biologically [illegible] vicariation is initiated. This is characterized by transfer to the [illegible] in the Table of Homotoxicosis. Biological therapy stim[illegible] characterized as regressive vicariation in a transfer to the [illegible] Table of Homotoxicosis.

	1	8	2	7	3	6	4	5
Replication								
Translocation						6		
Transcription		2					4	
Transportation					PRF3		4	
Reverse Replication			-2 GRF		3			
Translation						6	4	5LHRF
Reverse Transcription	1		-2 GRF	7		4		
Transformation		8			3			-5 +LRF

Next we have the genealogy matrix, which is a matrix of the development of life on the planet, from single-cell activity all the way up to humans, dolphins and whales. This continuous chain of development also can be put into our quantic process. The point we have made in *Quantum Biology* is that evolution is more of a quantic process than a continuous growth. Thus various entities evolve from the quantic leap of the genetic structure.

Genealogy Matrix

Genetic		Metabolic					
1	8	2	7	3	6	4	5
Protesta	Protozoa	Myco Mycea	Myxo	Non-nucleic Bacteria	Nucleic Bacteria	Blue-green Algae	GA
Mesozoa	+	Sponges	+		=	Brophyta Plant & Animal	
Echinotera	Ento-prolta	Acanthia	Mollesca	Brachiopota	Ecto-proda	Plant	Photonida
Sipo-celodia	Hemi-cordata		Chatig-nofa	Annelida Seg Worms	Echino-demata	Lycopedia	Athro-poda
			Aues		Reptiles	Spenopotsida	Amphibia
	Moles		Flying Squirrel				Rodentia
			Flying Fox	Aardvark	Probisca Elephant		Sirenia Sea Cow
Monkeys	Homo Sapiens	Lemuk	Flying Lemuk		Apes	Angio-Sperma	Cetecea Dolphin
	50.000 years						

So in developing our quantum biology, we will find that all the processes, organs, sarcodes, nosodes, etc. will follow these quantic laws, and thus can be put into hermitian matrices of their own. To this end, this document is written as an initial proposition as to a possibility on how the entities of biology might fall into a periodic table governed by quantic law.

In the matrices we have been outlining, we use Davydov solitons and Fröehlich waves among many other modalities of information and transfer of mass, charge, heat and momentum in a highly-sophisticated cybernetic control to accomplish metabolism and reproduction. Our total understanding of this is minimal at this time, but we do have enough understanding to realize that synthetic allopathy is highly irregular as a form of medicine.[RTF annotation: end elab 11]

I have also enclosed a copy of Dr. Reckeweg's philosophy chart as an example of a matrix application in biology. Further applications will be made in our section, *Quantum Biophysics*.

This book also relates a theoretical proposition, and does not really outline a practical application of these theories in the field of medicine. For this we would like to mention other books such as *Natural Repertory*, the *RWC Book*, and *New Biology*. These are more practical applications of the theoretical applications of some of the theoretical prospects of this book.

As we said before, we can recount the clinical evidence for these theories in our next book, *Quantum Biophysics*. With this in mind we will further reinforce our theory of the natural superiority of medicine over synthetic dynamics.

Naturopathy and homeopathy will also come to light, as we can see that these matrices are indeed a highly sophisticated cybernetic internal feedback control. They adjust themselves to their environment through their dynamic exchanges of heat, mass, momentum and charge. The extreme sophistication of this cybernetic internal feedback control will completely baffle medicine, and make the fields of naturopathy and homeopathy real entities. Homeopathy will be able to intervene on this system with subtle manipulation that can encourage the entire system to go back to its own field of stability and achieve a balanced, healthful homeostasis.

Our proposal of a cyclic quantic mathematical regulator of life fits all our hypothetical conditions. The future is indeed brighter in biology.

SUMMARY

1. In this chapter we offered a hermitian-style matrix that can connect quantum theory to biological theory. By offering a quantum mathematical model for eigenvalue interaction, we start a whole new system of biology that builds to a new system of medicine.

2. The interaction of environmental molecules and energy with living cells has a quantum mathematical style. The subatomic particles have rotation, orbital patterns, valent tendencies, angular momentum and other quantic patterns. This matrix offers a guess on how the interaction is mathematically dealt with.

3. This matrix is then transposed and expanded to account for the development of elements, minerals, amino acids, vitamins, hormones, enzymes and other biological entities.

4. A propositional guess for the matrix is offered to account for the cybernetic internal feedback control of life.

5. Utilization of the predictive numbers in our matrix is done by the LTBM computer program for analysis of patient needs and medical interventions.

6. The indeterminacy of our quantic matrix is subject to some control (the Nelson effect). God does not play dice with the universe.

7. Only nature knows. Synthetic pharmaceuticals can't cut it.

Chapter 13

SUMMARY

To summarize what we have found in our excursion through quantum biology in this book, we now can see that there is dramatic evidence that biology follows quantic principles. With these quantic principles will come some of the following items. Quantum theory carries with it some important considerations for medicine and biology.

I. Experimenter intervention happens when we do experiments. This will tell us that in order to truly understand biology, we must realize that the philosophies and psychologies of the experimenter can come through clinical data. Consciousness effects subspace transfer of polymorphic restriction of the degrees of freedom in biology. The mind can effect quantic systems at a distance. Thus we will have to be very careful in not trying to bias our data in any way whatsoever. We will need to have a reverence for the natural process equal to the respect we have for the synthetic process, so that our psychology and philosophy do not dominate or come through in either way. Our reverence for statistical trials must change for medicine to improve.

II. We now can see that there is definitely an indeterminacy principle in biology, and that total knowledge of the situation of health and biology is unattainable. But the subspace transfer effect (Nelson effect) can be utilized by a computer program of proper sophistication such as the Quantum Med C.I.

III. We can also see that there is a tremendous complexity in even a single cell, and that there are dramatic intricacies and an extremely large number of functions that even this single cell must handle. This will tell us also that we should build a reverence for nature and the idea that nature knows, and that modern man, using allopathy or synthetic chemistry, does not.

IV. We can also see from the quantum principle that there is a matrix which can be utilized to help chart out procedures and which is involved in Hamiltonian factors through hermitian matrices. This is integral in our idea of setting up a biology, and then a medicine, for us to understand that sometimes a simple push of a very small item can be productive to help to establish cybernetic control.

Thus the complexity of the matrix will tell us that allopathic intervention of a synthetic, unnatural compound is directly contraindicated in almost every way, shape or form. Allopathy should be reserved for only dramatic cases in which all else fails. Homeopathy and naturopathy should be our first choices in medical intervention. This is shown in the quantum theories contained in this book.

V. Also from the quantum theories of this book we can see that an energetic form of medicine must take the foreground, and that we will need to have a system of medicine that is attuned to the voltage, amperage, resistance, temperature, oscillations, inductance, capacitance, and other electrical factors in the body. The International Journal of the Medical Science has several issues dedicated to the Quantum Med C.I.

VI. Concepts of the photodynamics of biology must be considered. Light, as it proceeds from biology, is extremely important. This electromagnetic radiation is not always invisible light, but is sometimes in the infrared, and possibly in the ultraviolet spectrum. But we have been able to prove conclusively the procedure of analyzing the electromagnetic component of biology in our book as a factor in medicine for the future.[RTF annotation: end elab 1]

We will also need to deal with psychological states, intent, psychosomatic intervention, somapsychic intervention, affirmations, positive thinking, suggestibility, and other factors must come into our medicine as we have proven within the concepts of these books.

Through our reverence we also must recognize a spirituality and a compassion factor in our medicine.

The ever-yielding development of these other philosophies has brought us to a new and challenging philosophy and psychology of biology and medicine. No longer will we be able to base all our decision-making processes on pure reductionistic clinical trials. We must contain a reverence for the deeper factors of biology and an appreciation for the individual through the development of a holistic medicine. This and other information will make it hard for medicine to maintain a cookbook approach, which it has in the past. Medicine must develop on various wavelengths towards more individual, holistic procedures. It is a challenge to the medical doctor and the system that educates him to be able to take him away from just plain cookbook-like, cold statistics to compassion and the appreciation of the intricacies in the new world of medicine.

What we have been able to prove in our treatises is that biology is not statistical and thermodynamic. Means of dealing with biology and medicine that are analogous to thermodynamics, such as cars, carburetors, etc. are inappropriate. Medicine must go into more neuvo quantic phenomena to find itself.

The treatises in these books will mean that much of medicine developed over the years has been contradictory and inappropriate. There will be a tremendous challenge for medicine over the next couple of years as it struggles with this treatise. At first it will attempt to discredit this treatise, find minute flaws, and overblow them in an attempt to discredit the entire document. But eventually this will meet with disfavor, as over the years an increasing number of intellectuals will tend to find that the ideas contained within the pages of this document are valid. Research will develop over the years to indicate that the body of medicine needs to improve its philosophical base.[RTF annotation: end elab 2]

This new world of medicine has come.

Chapter 14

THE ELECTROMOTIVE CONNECTION TO BIOLOGY

All biology is electrical in nature. Medicine implications of electrical or energetic measurements can be introduced by this chapter.

Criteria	**Medical Implication**
Amperage	Life force measurements - cellular capacity Indolamine connection (see Voltametry)
Voltage	Willpower, catecholamine connection (see Voltametry)
Resistance	Inflammation versus degeneration - reactivity Medication testing (see Electroacupuncture)
Capacitance	Charge transfer and storage, voltage and amperage regulation
Reactance	Variance in capacitance, resistance that determines the ability of the body to react to medication testing
Induction	Magnetic control, voltage and amperage regulation
Worberg's Law	Interaction of capacitance and frequency that allows for medication testing
Resonant Frequency	Cancer versus nervous tendencies (see Mitogenic Radiation)
Redox	Oxygenation potential (see The Biological Pool)
Hydration	Water Stability (see Polymorphic Studies)
PH, EH	Proton-electron transfer (see The Biological Pool)
Phase Angle	Fricke's law sets boundaries of electroacupuncture testing

As we pointed out in the *Quantum Biology section*, electricity as an electrical entity travels in the direction of, for example, your right thumb. Then for conduction of the electron, there is a magnetic field produced at 90E, and a static field will be produced at another 90E. This electromagnetic and electrostatic combination and its effect on conductance and *from* conductance is the basis for understanding electrical phenomena.

This chapter is dedicated to the electron and its action, not the photon that we described in *Quantum Biology section*. (It must be pointed out that from QED theory, electrons and photons are interdependent. But let us now investigate electron activity.)

French physicist Coulomb laid out a law, which states: "The force of attraction or repulsion between two charged bodies is directly proportional to the product of the charges and inversely proportional to the square of the distance between them."

Thus the force can be allowed in the following equation

$$F = \frac{Q_1 \times Q_2}{D^2}$$

The inverse square law is a dictum of four-dimensional physics. Our ten-dimensional model questions its pervasiveness.

Here Q represents the force of the charges, D is the distance, and F is the force in dynes. A coulomb of charge, C, is nearly 3 times 109 esu. The strength of an electrical field will have the equation

$$E = \frac{9 \times 10^9 \times q}{R^2}$$

This is called the *electrical potential*. The potential at a point is equal to the work needed to bring one coulomb charge to the point from an infinite distance away. Biology will need to monitor this effect very closely.

An electric potential is thus work per unit of charge. Kinetic energy, which is equivalent to work, is measured in a relationship of force to distance. A gram that is moved at one centimeter per second of velocity is an *erg*. A kilo-

gram that is moved at one meter per second is known as a *joule*. When we have a joule per coulomb, this is known as a *volt*. One volt equals one joule divided by one coulomb. The volt is often a measure of potential energy. It is the difference between two points, between positive and negative charge; thus a six-volt battery with a potential difference of 6 joules or coulombs that can flow from one terminal to the other. Potential difference, thus, is an integral measurement of profound importance in biology and medicine.

If the surface of an item has a charge that is stored as potential energy, the ratio of charge to potential is called the *capacitance* of the body. The basic unit of capacitance is known as the *farad*, which is one coulomb per volt. If one coulomb of charge added to a body gives it potential of one volt, it has the capacitance of one farad. In a capacitor current is proportional to the rate of change of voltage.

Thus capacitance can be measured as a fluctuation in voltage (DV) over a qualitative time.

$$1\ Farad = \frac{1\ Coulomb}{1\ Volt} \qquad Capacitance \quad \frac{dV}{dt} \cdot Amps$$

The farad is a very large unit, measuring a lot of potential. Often in electronics we use *micro*-farads, or even *pico*-farads; a micro-farad being 10^{-6} farads and a pico-farad being 10^{-12} farads. By having two sheets of a high conductor, such as metal, with an insulating material between them, we can produce a condenser or capacitor. In biology cellular forces will invoke pico-farads. Organismic forces must relate to and control micro-farads.

The capacitance of the capacitor is the amount of the electrical charge on its plate divided by the potential difference between its plates. This depends on several factors, such as the area of the plates. If the plates are made larger, greater charge can be put on them. The thickness of the insulating layer is important. The closer the plates are to one another, the greater the amount of charge that is held. It is the strength of the electric fields of the electric plates as they are brought closer together. In biology organs, cells, organ systems, and organisms must store charge to deal with metabolism and growth.

The material between the plates will have an influence on the capacitor. These insulators, or non-conductors between the plates, are also known as *dielectrics*. Biology is filled with membranes that act as storage entities. We have only to review neuronal axon transfer to see biocapacitance at work.

The dielectric constant of an insulating material is a relationship between the effect of the material and that of a vacuum between the plates. The dielectric constant of water is 80; the dielectric constant of air is 1.001, as compared to a vacuum. The dielectric constant of rubber is 2.5.

Water has such an enormous dielectric constant because the water molecule is already polarized, even if it is not in an electric field. One end of the water molecule is positive and the other negative, because of the dipole magnetic effect. Biology uses this concept of water to store and use energy. The molecules can now rotate easily in the liquid state, and in response to the electric forces on them can readily produce strong layers of induced charge on its surfaces. Capacitance action is of extreme importance to biology.

When we move one coulomb of charge per second, this is known as an *ampere*. An amp is movement or quantity of charge. Movement of charge, amps, is the most important criteria of biology. This correlates to life force and indolamine production.

$$1\ Amp = 1\ Coulomb\ per\ second$$

$$Volts = Inductance \cdot \frac{d\ Amps}{d\ Time}$$

$$Amps = Capacitance \cdot \frac{d\ Volts}{d\ Time}$$

Dr. Ohm, a German physicist, found that electric current in a conductor is directly proportional to the potential difference between its ends. Thus he generated Ohm's law, finding that the resistance of one ohm is generated in a conductor if the potential difference of one volt between its ends will cause a current of one ampere to flow through it. Thus we have generated and found Ohm's law, which is

Amperes = Volts / Ohms

or Volts = Amps x Resistance

Ohm's law is not strictly adhered to in electrolytes, discharge of gasses, and semiconductors; nor is it followed perfectly applicable to biology, for there are many different factors that can affect it. Changing potentials over time causes an instability in Ohm's law for biology. But in knowing an electrical system we must know the amperage, the voltage, and the resistance in order to be able to calculate variables more accurately. Ohm's law, when involved in quantic systems, is not precise, but still shows the tendencies of electromotive force. For biology Ohm's law offers an invaluable systemic measuring system for easy bio force analysis.

Now let us look at some of the basic components and relationships of magnetic fields.

When strongly polarized molecules align, they induce stronger and stronger magnetic poles. An electric current flowing through a wire will also generate a magnetic field of 90E (right-hand rule). The strength of the magnetic field created by a current is directly proportional to the strength of the current and inversely proportional to the distance from the wire. The formula for this will show that

$$\text{Magnetic Fields} \left(\frac{\text{Amp}}{2\pi d}\right)$$

Thus a magnetic field strength can be measured in units of amperes per meter. Inductance is the factor measured for biological significance. Magnetic and paramagnetic forces can have strong implications in the long- and short-range forces of biology (see *Quantum Biology*).

A magnet near a stationary electric charge will not have an effect on it. If there is movement, then they have a natural influence on each other. Biology will need to be dynamic, and move constantly to use magnetic properties. The force of this influence is at right angles to both the velocity of the charge and the direction of the field. Stagnation is a magnet's enemy.

The magnitude of this force is

> Force = Charge in Coulombs x Velocity in meters per second
> and Magnetic Force of Amperes per meter x the Permeability
> Factor through which the Magnetic Field permeates.

This permeability factor times the magnetic factor, which is amperes per meter, is known as the *magnetic flux density*, or the *magnetic induction*, and is expressed in *Webers* per square meter. In an inductor the voltage is proportional to the rate of change in the current.

$$\text{Inductance} \times \frac{d\ \text{Amps}}{d\ \text{Time}} \cdot \text{Volts}$$

$$1\ \text{Henry} \cdot 1\ \text{Volt} / (1\ \text{Amp}/1\ \text{Sec}) \cdot 1\ \text{Volt Second}/\text{Amp}$$

These permeability factors are rated between that of the material and that of permeability of a vacuum. Materials that are high-ratio (that increase the flux density) are called *ferro-magnetic*; such as iron, cobalt, and nickel. Substances that are close to the ratio of 1, or other substances (which are very near to the relationship of the vacuum) are *paramagnetic*, and will contribute weakly, such as aluminum. There are substances like bismuth that are actually detrimental to the magnetic field. These are called *diamagnetic*, and their ratio is actually less than 1. Items which are non-magnetic will have no influence, and thus have a ratio of 1. Bismuth will have a place in biology, and is used in several homeopathics for energetic stability. Magnetic induction can be measured by changes in amperage over a qualitative analysis, such as the LTBM* machine test. This might be used to infer magnetic interaction, and thus, involvement of geopathic stress.

Thus we have outlined the concept of magnetic, static, and conductive forces, which are used to our understanding of the electrical nature of our homeopathic pharmaceuticals. By measuring the inductance, the dielectric constant and the conductance relationship, we can find an electrical profile for these various substances. This makes up an electrical fingerprint that allows us to calculate and plot its electrical nature. The trivector analysis is born. The long-range implications on energetic medicine are profound.

By charting the resistance, inductance, and dielectric constant of various homeopathic items we can get a trivector analysis of their electromagnetic fields. This trivector analysis gives us three vectors, which we will be able to apply to a three-dimensional space. Thus a variety of homeopathics have been analyzed for their trivector analysis. The dimension of time gives us a four-dimensional relation that with some superb mathematics we can extrapolate the six virtual dimensions using a trinary logic system.**

Here we can see some of the effects that sarcodes, nosodes, allersodes and classic herbals have in their relationship to each other. This trivector analysis gives us a quality control factor for the electric field of a homeopathic item. In analyzing patients we can analyze serum in blood or personal field in a similar fashion. We can measure body pH from urine, blood, breath, etc., as well as redox capacity and body fluid resistance. Skin resistance readings can be taken at several points and easily averaged. Body voltage can be easily measured by dissimilar metals creating potential across the electrolyte capacity of the body, just as in a battery. Most proficient instruments choose to use silver and zinc (zinc because of its equi-potential for giving or receiving electrons, silver because of its great medicine

history). Amperage is a correlate of voltage and resistance by placing similar metals in contact with the body (two silver probes contacting the frontal eminences). We can get an amperage reading. Capacitance is measured by changes in voltage during a scheduled interview. Inductance can be calculated through changes in amperage over the same interview. Resonant frequencies of the body can be calculated from the equation

$$\text{Resonance Freq.} = \frac{10^6}{\sqrt{1 - ((CAP)^2 \cdot (IND)^2)}}$$

From these readings we can now calculate a true metabolism chart to define a patient's overall health and energetic well-being. We can now compare a patient's readout to the homeopathic product's trivector analysis.

The preliminary work has shown that where patients have valleys, or dips, in their fields, homeopathic peaks will be helpful. Work on this is just starting; more work, funding and time will be needed before we can find out if this is a viable technique for quality control and/or for homeopathic utilization. Now, with the help of the computer, matching remedies is high-tech and easy.

Another factor that we can use with this trivector analysis is that once we know the first three vectors, and the vector of time, we might be able to extrapolate the other six virtual dimensions. If we know the four factors of conductance, capacitance, inductance and time, we might be able to extrapolate other dimensional effects from this four-dimensional type of field.

Biology needs to not only look into quantum physics but also needs to embrace an energetic philosophy as well. This seems complicated at first, but is easy with today's tools. This author has written some energetic articles on medical application of these theories in *A Legal Outline of the Medical Practice of Electroacupuncture*. Applying our right-hand rule and Ohm's Law to energetic medicine represents a dramatic quantum leap in energetic medicine which is significant to the field. Many doctors who just do resistance will have their egos assaulted, and will thus have a hard time accepting such a technological jump. Let me assure you that the jump does not take as much mental activity as you might fear.

The technology of electroacupuncture (with just resistance) was important in the early 1960s and 1970s. When we get there we will see that electronic duplication has its limitations; and proper homeopathy, nutrition and behavioral medicine have their place.

Welcome to the new age of energetic medicine. If I can make the transition easier, *please call*.

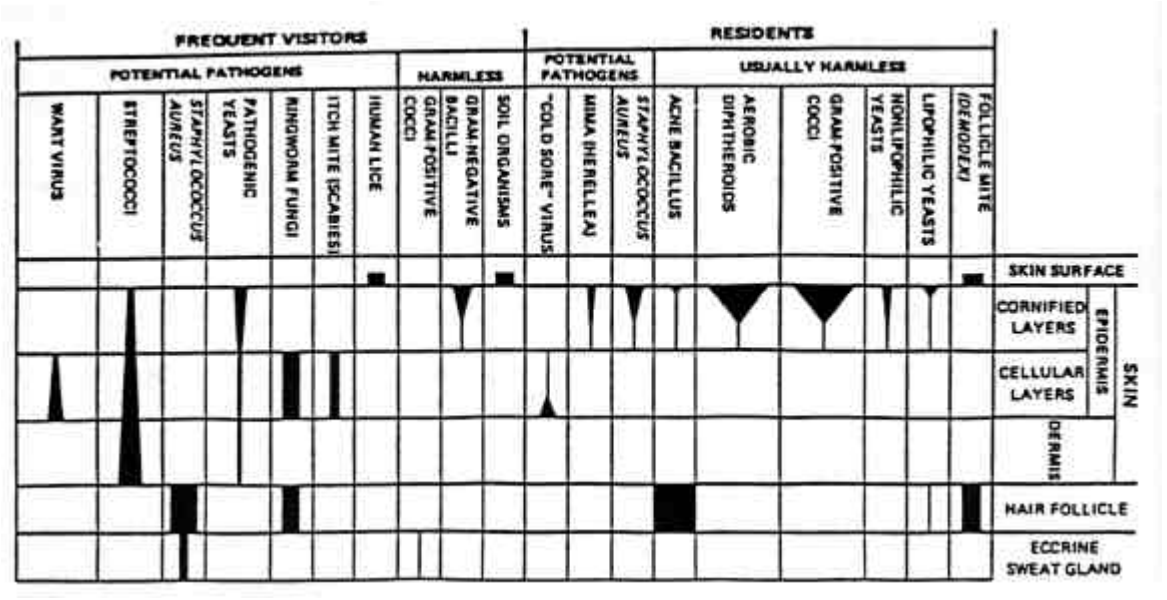
As pointed out in the *Quantum Biology* impedance is a correlate of resistance that is also affected by capacitance and inductance. Now let us understand the application of applying an electrode to the surface of the skin with an interface of the electrolytes not only at the surface area, caused by sweat, but also an understanding of the electrolytes and their effect on the impedance circuitry of the intradermal layers of electrolyte within the body.

The composition of human sweat is very dilute compared to other bodily fluids. Sweat is about ninety-nine percent water, and the remaining one percent is a rich variety of other substances. A table of these substances is shown below.

Composition of Human Sweat

Substance		Amount (g%)
Water		99.742-99.221
Solids		0.258- 0.779
Organic solids		0.030- 0.290
Ash		0.144- 0.566
Chlorine (usually over 0.15 percent)		0.059- 0.346
Lactic acid		0.070
Sulfate	about	0.004
Sodium	"	0.150
Potassium	"	0.017
Urea	"	0.030
Sugar	"	0.004

There are many inhabitants at the skin level that also can affect the conditions of our electrode and electrolyte interface. A list of these is shown below.



How electrodes react with the electrolyte and *through* the electrolyte was first reviewed by Helmholtz in 1879. An electrical double layer was referred to as the “Helmholtz layer”. The Helmholtz layer showed how ions could interchange between electrode and electrolyte. When we place electrodes on an electrolyte like skin, this is called “electrode polarization”, which is the capacitance action of the electrode/electrolyte potential that will make a stored charge and affect the readings.

Bethune made a table of the various electrode potentials of the materials used for skin-type electrodes. This table is shown following.

Electrode Potentials for Commonly used Materials in Electrodes (E^0 Values

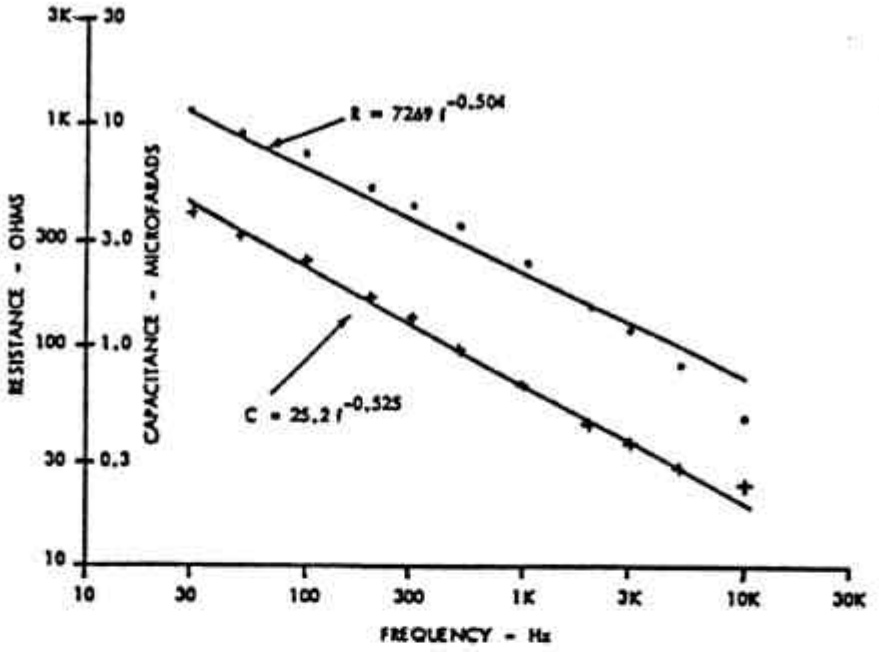
Metal and Reaction	Potential (E0 25E C)	(V)Temperature Coefficient(mV*E C)
A1 = A13+ + 3e-	-1.662	+1.375
Zn = Zn2+ + 2e-	-0.7628	+0.962
Zn (Hg) = Zn2+ + Hg + 2e-	-0.7627	—--
Cr = Cr3+ + 3e-	-0.774	+1.339
Fe = Fe2+ + 2e-	-0.4402	+0.923
Cd = Cd2+ + 2e-	-0.4029	+0.778
Ni = Ni2+ + 2e-	-0.250	+0.93
Pb = Pb2+ + 2e-	-0.126	+0.420
Pt(H2)H+	0	—--
Ag + Cl- = AgCl + e-	+0.2225	+0.213
Cu = Cu2+ + 2e-	+0.337	+0.879
Cu = Cu+ + e	+0.521	+0.813
2 Hg = Hg22+ + 2e-	+0.788	—--
Ag = Ag+ + e-	+0.7991	-0.129
Pt = Pt2+ + 2e-	+1.2 approx.	—--
Au = Au^{3+} + 3e-	+1.498	—--
Au = Au^{+} + e-	+1.691	—--

This demonstrates the effects that various metals have, as well as the varying temperature coefficient effects.

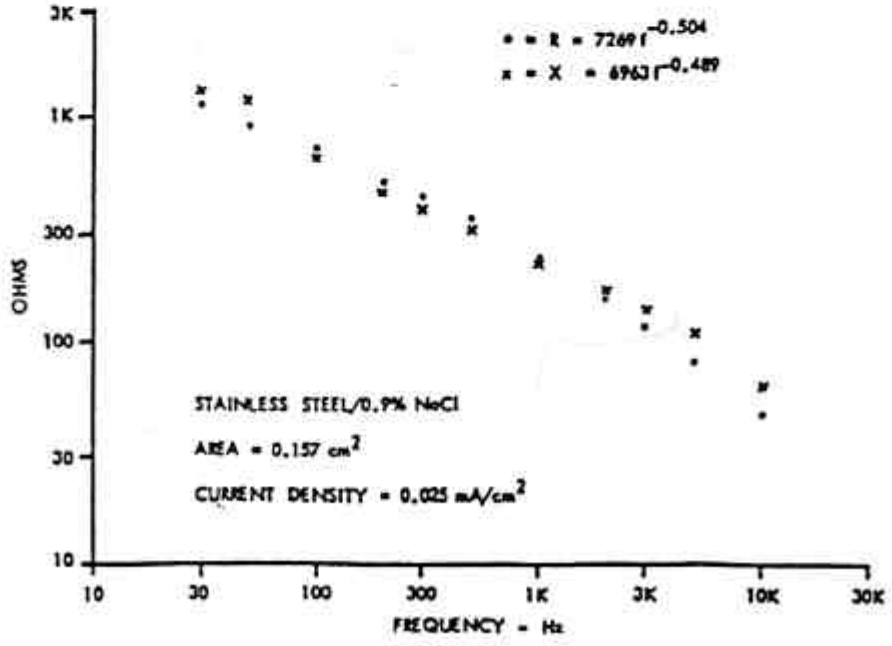
The following table will tell us about fluctuations of potential between electrodes in electrolytes. This fluctuation is part of the indicator drop effect in electroacupuncture.

Fluctuations in Potential Between Electrodes and Electrolytes

Electrode Metal	Electrolyte Type	Potential Difference Between Electrodes	Investigator and Year
PbHg	PbC12 in channels on human skin	0-600 μV (basal) 1.3-6.8 μV (fluctuations)	Ferris (1934) (av. of 10 electrodes)
Calomel	Saline	1-20 μV	Greenwald (1936)
Zn-$ZnSO_4$	Saline	180 μV	Greenwald (1936)
Zn	Saline	450 μV	Greenwald (1936
Stainless Steel	Saline	10 mV	Lykken (1959)
Zn	Saline	100 mV	Lykken (1959)
ZnHg	Saline	82 mV	Lykken (1959)
Ag-AgCl	Saline	94 mV	Lykken (1959)
Pb	Saline	1 mV	Lykken (1959)
PbHg	Saline	1 mV	Lykken (1959)
Pt	Saline	320 mV	Lykken (1959)
Ag, AgCl sponge	ECG paste	0.2 mV 0.07 mV drift in 1 hour	O'Connell et al. (1960)
Ag, AgCl (11-mm disk)	ECG paste	0.47 mV 1.88 mV drift in 1 hour	O'Connell et al. (1960)
Pb (11-mm disk)	ECG paste	4.9 mV 3.70 mV drift in 1 hour	O'Connell et al. (1960)
Zn, $ZnCl_2$ (11-mm disk)	ECG paste	15.3 mV 11.25 mV drift in 1 hour	O'Connell et al. (1960
Zn, Ag	Water	250 mV on acupuncture pt. 100 mV on normal skin	Nelson (1988)
Brass, brass	Water	50 mV on acupuncture pt. 40 mV on normal skin	Nelson (1987)
Aluminum fabric	Dry	100 mV norm skin	Nelson (1992)



Series-equivalent resistance R and capacitance C of a stainless steel electrode (0.157 cm^2) in 0.9% saline measured with a current density of 0.025 mA/cm^2 (From Geddes et al., Med. Biol. Engng. 1971. In press. By permission).



Series-equivalent resistance R and reactance X of a stainless steel electrode in 0.9% saline. (From Geddes et al., Med. Biol. Engng. 1971. In press. By permission.)

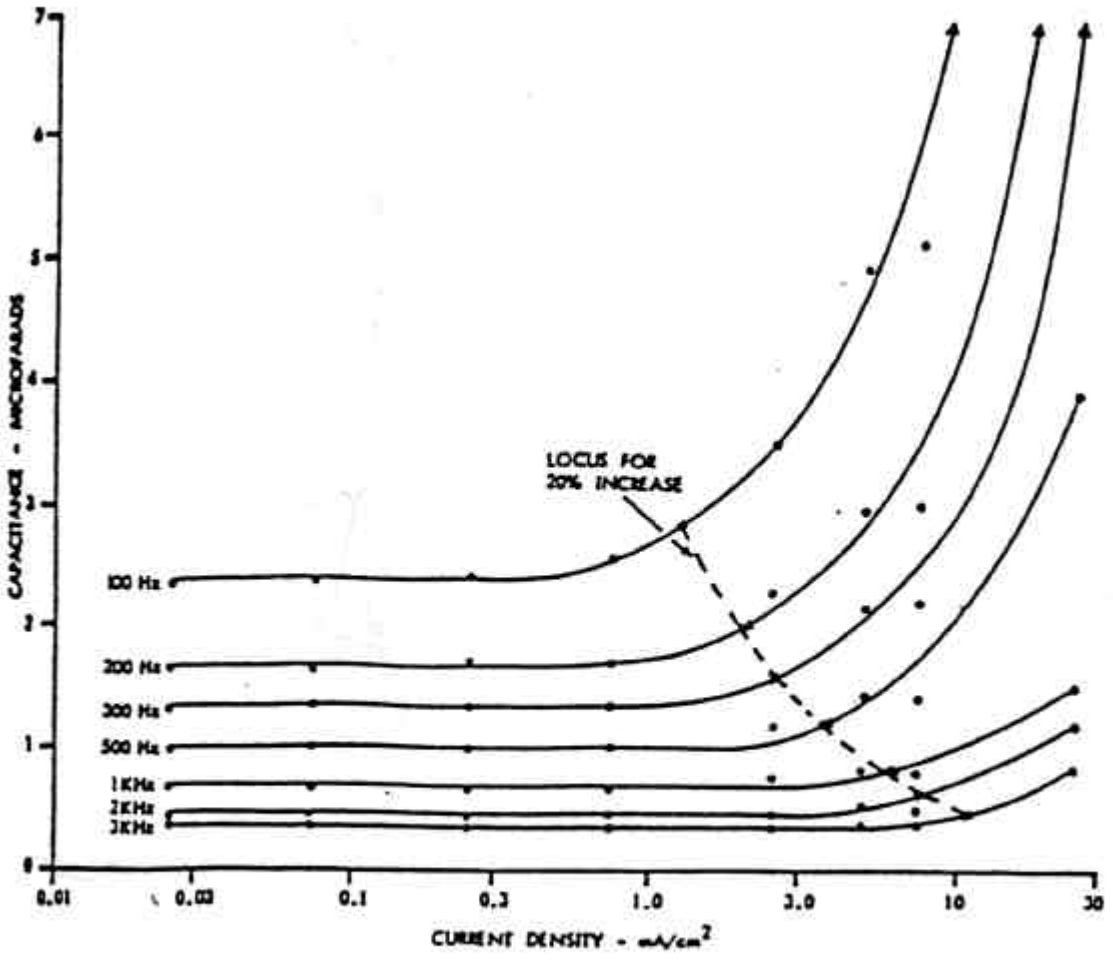
impedance". Subtle energetic frequencies are vastly important in our electroacupuncture impedance readings. Some can see how a few electrical parameters and some mathematics can allow LTBM technology to chart types of reactivity.

Thus Worberg's law for the electrode-electrolyte interface shows that frequency, resistance and capacitance are all variables of developing our skin impedance reading. Some simple reverse extrapolations can generate our machine values.

Worberg's law, simply stated, is: *an electrode / electrolyte interface can be equated to a series resistance and capacitance circuit, and the value of each varies inversely approximately to the square root of the frequency. If resistance is compared with reactance, it is seen that they are approximately equal, and both vary almost inversely with the square root of the frequency.*

As we have demonstrated, infectious nosodes have rather high resonant frequencies (see *Quantum Quality Control* book). This would affect the body inversely by lowering impedance, and would have a direct or positive effect on conductance by raising it. Thus a high reading above 50 on the electroacupuncture devices correlates to possible infection. Cancer tissues have lower resonant frequencies (see Chapter 8 of *Quantum Biology*), and thus, they increase impedance and produce lower readings on our electroacupuncture device which correlate to degenerative tissue.

Thus our changes in reactance can be equated to product frequencies to determine patients' biological needs. In our *Quantum Quality Control* book we show how the resonant frequencies of homeopathic products can be determined. This can effect the patient's biophysical state and be measured via the machine through the LTBM process. This is an example of Worberg's law being used practically in bio medicine.



Dependence of the series-equivalent capacitance on current density and frequency: stainless steel electrode (0.157 cm^2) in contact with 0.9% saline. (From Geddes et al., Med. & Biol. Engng. 1971. In press. By permission.)

From this table we can see the powerful effects of zinc and silver, and how the cross correlation of those make a very excellent choice of electrodes for skin use. Neither is toxic. The zinc can accept and donate electrons equally, allowing for the freedom of the silver electrode to be involved with pH indications.

At contact there is a potential started between the electrode and electrolyte, where two solutions can have different concentrations in ionic mobility. This can be expressed as a variation of the Nernst equation.

$$E = \left(\frac{u^+ - v^-}{u^+ + v^-} \right) \frac{RT}{nF} \ln \frac{C_1}{C_2}$$

In this expression *u* and *v* are mobilities of the cat-ions and an-ions, respectively. *R* is the gas constant, *T* is the absolute temperature, *F* is the faradays, or capacitance involved, and *n* is the number of charges that are carried by the ions. Once again we can see that temperature, capacitance, and inductance have an interesting effect on biological systems.

Worberg, at the turn of the century, was the first to demonstrate that electrode/electrolyte interface valued two different readings of resistance and capacitance. The value of each is frequency-dependent, so that as frequencies change, resistance and capacitance will vary with it. He found that at various frequencies the reactance of the capacitance is approximately equal to the resistance, and that both vary inversely as the square root of the frequency of the current used for measurement. The impedance of this series-equivalent circuit is thus known as the "Worberg

Series-equivalent resistance *R* and capacitance *C* of a stainless steel electrode (0.157 cm2) in 0.9% saline measured with a current density of 0.025 mA/cm2 (From Geddes et al., *Med. Biol. Engng.* 1971. In press. By permission).

Series-equivalent resistance *R* and reactance *X* of a stainless steel electrode in 0.9% saline. (From Geddes et al., *Med. Biol. Engng.* 1971. In press. By permission.)

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Dependence of the series-equivalent capacitance on current density and frequency: stainless steel electrode (0.157 cm2) in contact with 0.9% saline. (From Geddes et al., *Med. & Biol. Engng.* 1971. In press. By permission.)

Since we are dealing with a frequency, it could become important to know the phase angle, and this might help us to calculate the resistance and impedance. Fricke's law states that *the phase angle, which is theta, is dependent on alpha, the exponent describing the manner by which capacitance varies with frequency.* Fricke's law states that:

$$\text{Phase angle} = \phi = \frac{\pi}{2}(1 - \alpha)$$

$$\alpha = \frac{d\ cap}{d\ freq}$$

If we involve current densities with our Worberg experiment, we find that there is an effect of too much current that can be disruptive on the reading because of the increase in capacitance effect.

This results from voltages over 3.5 volts with amperages over 100 microamps. Thus manufacturers of some machines flirt with this disturbing current density as part of their challenge philosophy. This unnatural challenge can produce "measurement aberration", which can result in inaccurate data. The Interro (which at the time of this writing has been deemed illegal in many of the American states) utilizes currents well past the safe zones. Thus the reliability of the data of such devices is questionable. This data reading is thus mostly divination or operator effect. See Facilitated Diagnosis Int Jou Med Sci Hom.

The above diagram shows us that if we increase the current with too much amperage, we can get to the point of field disruption by increasing the capacitance and causing a variance in the ability to get a reading. This is why most of the good units that we have used will want to use micro-amperage currents to below the 5 micro-amp range and below 1.5 volts. This will give us very good readings and stability. This is why some of the best companies have chosen to do voltage readings below 1.2 volts and amperage readings below .5 milliamps. Our measures of reactance peak in these ranges, which dictates the parameters of the LTBM machinery.

Dependence of the series-equivalent resistance on current density and frequency: stainless steel electrode (0.157 cm2) in contact with 0.9% salt(From Geddes et al., *Med. & Biol. Engng.* 1971. In press. By permission.)

We can see from both of these diagrams that as we approach a full milliamp the accuracy of our readings is dramatically affected as variance on the resistance.

Skin Impedance Variables on Amplifier Input

When we measure a bioelectric event with surface, subintegumental, or intracellular electrodes, the first variable measured is usually potential. So if the measuring device is calibrated in volts, it must not draw current from the bio-potential source. We must consider the conditions that must be fulfilled to accurately measure biology. Since both intracellular and extracellular measurement techniques are utilized, the conditions that apply to each situation must be discussed separately. Let us now discuss the conditions for accurate measurement of bioelectric events with extracellular electrodes. The conditions pertaining to the intracellular electrode technique are not covered at this time. This intrudes on quantic space and greatly interferes with our system measurement.

As a pair of electrodes is positioned to encompass a group of irritable cells, the potential difference can be measured between them as the cells become active and recover. As we showed previously, the potential between the electrode terminals will be representative of the potential presented to the electrodes only if the potential-measuring device draws no current; implying that its input impedance must be infinite. A small, practical amount of current is drawn from the source of the bio-potential. To draw the least amount of current, the input impedance of the voltage-measuring instrument must be many times higher than that appearing between the electrode terminals. Conditions under the electrodes and the nature of the tissues and fluids comprising the bioelectric generator determine the impedance measured between the electrode terminals. So it is vital to examine the equivalent circuit in order to discover how to specify input characteristics for the potential-measuring device.

Let us now consider a pair of electrodes placed on tissue containing an aggregate of irritable cells. As cells become active and recover, they send current through the volume conductor that makes up their environment. The electrodes are always placed to measure as much of the voltage drop produced by the environmacross the terminals AB; this voltage is $Er*(R + r)$. We can calculate the impedance of the equivalent generator using the voltage sources (in this case, E), which are short-circuited, and the impedance between the terminal AB is measured; this impedance is $rR*(r + R)$. The voltage to be measured EAB is separated from the measuring point AB by a resistance R'. If the impedance of the electrodes ZA, ZB are considered to be low with respect to the resistance Rin of the voltage measuring instrument, the voltage indicated by it $E"AB$ is easily calculated; $E"_{AB} = E' - I\text{m}IR'$. Current Im flowing is the voltage E' divided by the resistance of the circuit $R' + R\text{in}$; thus $I\text{m} = E'*(R' + R\text{in})$. Substituting for Im in the equation for voltage $E"_{AB}$, this calculation is obtained

Specifically this is the ratio of E''_{AB} to E' (i.e., the ratio of what is measured to what is available). Dividing the previous expression by E' produces

$$E''_{AB} \cdot E' \; 1 - \left(\frac{R'}{R' \cdot R_{in}} \right)$$

The ratio $E''AB * E'$ should be as close to 1.0 as possible. The actual value is dependent on the relation between Rin and R', the ratio of the resistance of the measuring device Rin to the resistance of the generator R'. If this ratio is given the symbol 0 (i.e., $0 = R\text{in} * R'$) and substituted in the preceding expression, the following equation is obtained:

$$\frac{E''_{AB}}{E'} \cdot 1 - \left(\frac{R'}{R' \cdot R_{in}} \right)$$

We plot the ratio of the measured voltage to available voltage (i.e., $E''AB * E'$) versus 0, the ratio of the resistance of the measuring instrument to that of the generator. Our figure presents these data and shows that when the ratio is $100 * 1$, the measured voltage is 0.99 (that is, ninety-nine percent of the available voltage). When the ratio is $1000 * 1$, the measured voltage is 99.9 percent of that available.

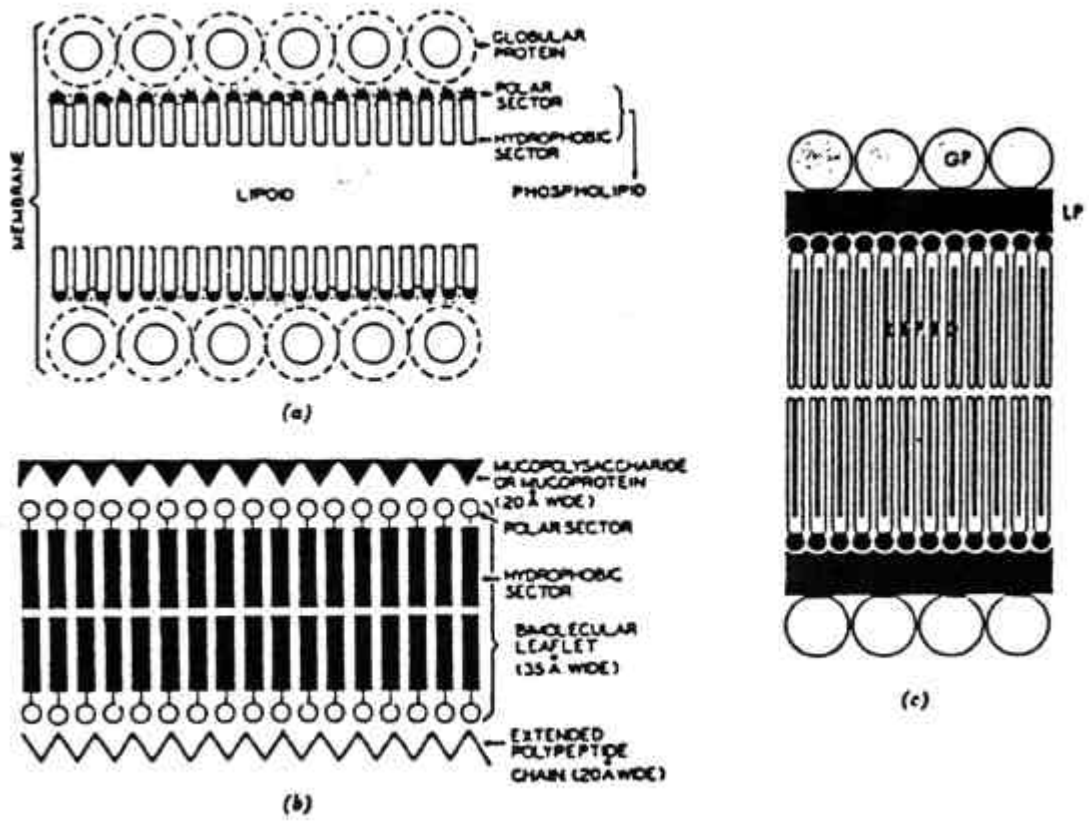
$$\frac{E''_{AB}}{E'} \cdot \frac{\eta}{\eta \cdot 1}$$

This oversimplified analysis shows two important conclusions. First, in order to measure the maximum amount of the potential available, the resistance of the voltage-measuring device should be as high as possible with respect to the resistances of the source of the voltage; (this statement can be further generalized by substituting the word impedance for resistance). Second, if the resistance of the measuring device is lowered, the voltage indicated will decrease. As we connect incrementally lower values of resistance across a generation, this is called “loading the generator”, and a plot of voltage versus load resistance constitutes a load curve. We note that when a load is placed across the generator terminals so that the open-circuit (i.e., unloaded or $R\text{in} = 4$) voltage drops to one-half, the resistance of the load is equal to the resistance of the generator. This technique of loading a generator to reveal its loss of output voltage is frequently performed to determine its output resistance and impedance; the technique also permits calculation of the open-circuit voltage if it cannot be measured.

In finding the important facts just presented, it is necessary to recall that the following simplifying assumptions were made: 1) the bioelectric generator was surrounded by a homogeneous resistive volume conductor, 2) the impedance of the electrodes was small with respect to the resistance of the generator and the voltage-measuring instrument. These assumptions are reasonably valid for the argument presented. When it is necessary to establish the relation between electrode impedance and the input impedance of the voltage-measuring instrument, it should be obvious that causing appreciable current to flow through the electrode impedances (by the use of a voltage-measuring instrument that does not have a high input impedance) will result in appreciable voltage drops across the electrode impedances. These voltage drops will not only affect the various sinusoidal frequency components of the bioelectric event differently, they will also introduce time displacements between them (that is, phase distortion).

It should therefore be apparent that, in the measurement of a bioelectric event, it is essential to avoid creating potential drops across the electrode impedances. This condition is achieved by making the input impedance as high as possible with respect to the sum of the impedance of the bioelectric generator plus those of the two electrodes AA, ZB. Because electrode impedance is primarily related to electrode area in an inverse manner, the range of magnitudes encountered are presented when the various electrode types are discussed. In many instances loading tests have been performed to indicate the order of magnitude of electrode-bioelectric generator impedance and thereby enable specification of amplifier input impedance.

Complete electrode-subject impedance controls the magnitude of the amplifier input impedance required to detect bioelectric events, and the previous discussion is focused on this rule. We know that it is relatively easy to obtain amplifiers having high input impedances, but it is better to have electrode-subject impedance as low as possible. In nearly all recording situations with ground-referred (i.e., power-line-operated) recording instruments, there are possible large amounts of environmental power-line interference present that can enter the amplifying system along with the wanted signals.



Protein-lipid-protein models for the structure of the cell (plasma) membrane deduced from surface tension, x-ray diffraction and electron-microscope studies of a variety of cells: *(a)* the Davson-Danielli model, derived from studies of marine eggs; *(b)* Robertson's polar model in which the exterior (mucopolysaccharide or protein) is different from the interior (polypeptide) surface; *(c)* Hokins's butter sandwich model consisting of two lipid layers (butter) between two layers of protein (globular layer GP) and layered protein (LP). [*(a)* and *(b)* from R. M. Dowben, *Biological Membranes.* Boston: Little Brown and Co., 1969. (By permission), *(c)* from L. E. Hokin and M. H. Hokin, *Sci Amer.* 1965, 213:78-96. (By permission © 1965 by Scientific American, Inc. All rights reserved.]

The outside interference appearing at the output of the amplifying system depends on the amount of interference present and the type of amplifier (e.g., single-sided or differential), but the use of a low electrode-subject impedance (consistent with the constraints imposed by the particular measurement situation) will favor rejection of interference when bioelectric signals are measured.

Let us move into analysis of the biological membranes and their parameters.

The dielectric constant of the membranes determines its ability to store and transfer charges. Capacitance and inductance are extremely important for the life of the cell. As we look at an axon membrane, which has a thickness of about 70 angstroms, we will see that there is a 50-angstrom layer and two 10-angstrom layers surrounding it.

We can calculate the capacitance with three basic formulas.

$$C_{\mu F} = 0.0885 \times 10^{-6} \frac{A}{d} K$$

$$K = \frac{Cd}{0.0885 \times 10^{-6} A}$$

$$K = \frac{1.0 \times 70 \times 10^{-8}}{0.0885 \times 10^{-6} \times 1}$$

Capacitance is measured in micro-farads. The area is *A*, and the distance is *d*, which will be labeled in centimeter units. We want to measure the dielectric constant, *K*. While we maneuver *K* to other sides, we can now determine the value for the average dielectric constant, by knowing the area, the capacitance, and the distance. The distance across this capacitor, as we have said, is 70 angstroms, which is 70 x 10-8 centimeters. The area is in centimeters squared. We find that our average dielectric constant will become 7.9. The dielectric will fluctuate as the cell needs to control static charges and activate potential to set off neurological and biological processes.

Electrical Properties of Cells

Cell Types	Membrane Capacitance (μF/cm²)	Membrane Resistance (Ω for 1 cm²)	Phase Angle (deg.)	Dielectric Constant	Cytoplasm Resistivity (Ω-cm)	Investigator and Year
Node of Ranvier (from	3-7	10-15	–	–	–	Tasaki (1955)
axon)	–	$p = 10^9$	–	5-10	100	Hodgkin (1951),
Internode						Stämpfil (1952)
	0.5	3000	–	–	–	Tyler et al. (1956)
Asterias (marine egg)	5-9	–	–	–	–	Tasaki and Hagiwara
Toad sartorius muscle	2.6	3000	–	–	–	(1957)
Frog sartorius muscle	3.9	680	–	–	–	Falk and Fatt (1964)
Crayfish muscle	0.5-2.0	1000	–	–	–	Falk and Fatt (1964)
Many different cells	0.87	–	90	–	–	Cole (1968)
Sea urchin egg	1.0	–	90	–	–	Cole (1968)
Asterias (marine egg)	0.74	–	90	–	–	Cole and Cole (1936)
Arbacia (eggs)	0.6	–	–	–	–	Cole and Cole (1936)
Yeast	1.0	–	–	–	–	Fricke and Curtis (1934)
Leucocytes	0.7	–	–	–	–	Fricke and Curtis (1935)
E. Coli	0.5-1.1	–	–	–	–	Fricke et al. (1956)
Mitochondrium	1.0	–	–	–	–	Pauly et al. (1960)
Nitella-Valonia	0.94	–	80	–	–	Blinks (1936)
Nitella	1.3	–	80	–	–	Curtis and Cole (1937)
Squid	2.0	–	86	–	570	Curtis and Cole (1938)
Frog eggs	0.7	–	75-80	–	–	Cole and Guttman (1942)
Squid axon	1.1	8000	–	–	90	Taylor and Chandler (1962)
Crab (Carcinus leg nerve)	1.3	23,000	–	–	60	Hodgin (1947)
Lobster (Homarus leg	0.55	?	40?	–	560	Hodgin and Rushton (1946)
nerve)	1.1	1500	75	–	30	Cole and Curtis (1936)
Frog– sciatic nerve	0.65	?	40?	–	720	Cole and Marmont (1950)
Squid– stellar nerve	1.5	~40	70	–	250	Cole and Curtis (1936)
Cat– sciatic nerve						Bozler and Cole;
Frog– sartorius muscle	0.8	?∞	90	–	–	Cole and Curtis (1936,
	1.0	–	80	–	140	1938)
Red cell– man	0.8	?∞	90	–	140	Fricke (1931)
Leucocyte– rabbit						Fricke and Curtis (1935)
Red cell– turtle						Fricke and Curtis (1934)

Having calculated the types of electrical capacitance factors of different cells that have been done by many experimenters through the years, we can now compare these to the dielectrics of certain other materials. This comparison will help us to understand electroacupuncture.

Properties of Physical Dielectrics

Type of Material	Dielectric Constant	Resistivity (-cm)	Dielectric Strength (V/cm)
Distilled water	78	0.5×10^6	–
Oil (transformer)	2.5	–	80,000
Paraffin	2.0-2.5	10^{15}–10^{19}	100,000
Rubber (neoprene)	4.5	8×10^{12}	120,000
Rubber	2.0-3.0	–	120,000-300,000
Rubber (hard)	2.8	2×10^{15}	188,000
Glass (Pyrex)	4.5	–	130,000
Glass (ordinary)	5.5=10	9×10^{13}	60,000-120,000
Quartz (fused)	3.8	$> 10^{18}$	160,000
Polystyrene	2.65	10^{16}	240,000
Barium Titanate	1200	10^{12}-10^{13}	30,000
Epoxy	3.62	$> 3.8 \times 10^7$	162,000
Cellulose acetate	3.2-6.2	10^{10}-10_{12}	100,000-160,000

We can now see some of the variances of the biological capacitance factors, keeping in mind that the biological capacitance factor will be an active, living one which can have variance and transfer of charge. Thus the living tissue will have a quantic effect not found within the nonliving, or thermodynamic, systems.

The study of membraneology will allow us to calculate resistance, where the units will be listed in ohms per square centimeter. At thicknesses of 100 angstroms, and membrane resistances of 1,000 ohms, or 1 K per cubic centimeter, the resistivity will become 10^9 ohms per centimeter, which is a value slightly below those for good insulators which have resistivity values in the range of 10^{10} or 10^{18} ohms per centimeter. The resistivity of distilled water is five times 10^5 ohms per centimeter at 18E C.

Once we are aware of the resistivity in the dielectric strength, the electric field can be calculated by dividing the membrane potential by the membrane thickness. The resting membrane potential of many cells with membranes 50 to 200 angstroms thick is thus about 80 millivolts. These parameters indicate an average electric charge of 40,000 to 160,000 volts per centimeter that exist on the membrane. Comparative to the dielectric strengths of plastic, rubber, paraffin, transformer oils, we can see that living tissue has similar types of dielectric strength compared to insulators, which is needed to control the flow of the various electrical entities needed for life.

As we look at the resistivity of the inside of the cell (the cytoplasmic area), we can see that the range of variation is not very large; it extends from 30 to 700 ohms per centimeter.

Cole and Curtis found that the typical value for cytoplasmic resistivity on most cells in the mammalian class is 300 ohms per centimeter. The semi-permeable and selectively permeable membranes also allow for further control.

The osmotic behavior of living cells was first described in 1748 by Abbee Nollet. Nollet filled animal bladders with alcohol and placed them in pure water. The bladders were seen to swell greatly; some burst. The quantitative study found that the phenomenon employed transfer of material across the membrane from osmotic distention. If the concentration of the environments on both sides of the membrane is similar, the solutions are said to be *isotonic*. *Hypotonic* solutions will cause cells to swell, and *hypertonic* solutions will cause cells to shrink.

Later Van't Hoff changed the ideal gas law, and produced a concept of osmotic membrane potential,

$$P = \frac{n}{V} RT = mRT$$

where *n* is the number of moles of the solute contained in the volume *V* (liters) of the solvent, *R* is the gas constant, *m* is the molal concentration, and *T* is the absolute temperature. We will find that at *RT*, where *T* is 25E C., it is 22.4 liter atmosphere per mole. Therefore, one mole of solute in one liter of solvent exerts a pressure of 22.4 atmospheres. This is equivalent to the constant atmosphere supporting a column of 760 feet of water.

In looking at the osmotic pressure found on electrolytes and non-electrolytes, the above formula can be used. In calculating the osmotic pressure of electrolytes, a higher osmotic pressure will be found versus a non-electrolyte,

$$P = G \frac{n}{V} RT$$

where *G* is an electrolyte coefficient, known as the *cryoscopic coefficient*. *G* is less than the total number of ions formed from a molecule of electrolyte, because it is the activity of the ion rather than its concentration which determines the osmotic pressure. Ionic interference reduces the number of ions free to participate. Cryoscopic coefficients, which include ionic activities, are determined by measuring the depression in the freezing point caused by additional substances. Thus the mineral content of solutions can be calculated.

Cyroscopic Coefficients at Various Molal Concentrations

Electrolyte	0.02	0.05	0.1	0.2	0.5
$MgCl_2$ Mag. Mur.	2.708	2.677	2.658	2.679	2.896
$MgSO_4$ Mag. Sulf.	1.393	1.302	1.212	1.125	–
$CaCl_2$ Calc. Mur.	2.673	2.630	2.601	2.573	2.680
LiCl Lith. Mur.	1.928	1.912	1.895	1.884	1.927
NaCl Nat. Mur.	1.921	–	1.872	1.843	–
KCl Kali Mur.	1.919	1.885	1.857	1.827	1.784
KNO_3 Kali Nitrate	1.904	1.847	1.784	1.698	1.551

Biological osmosis is very important to bring water and other products into and out of a cell. The cytoplasm consists of large molecules and thus cannot pass outward through the cell membrane. If we manipulate the external environment osmotically with the addition or removal of electrolytes or non-electrolytes, different things will happen. If sea urchin eggs are placed in sea water to which a little distilled water is added, water enters the egg, and it swells. The amount increases with increasing dilution of the sea water. If, on the other hand, salt or sucrose is added to the sea water, water leaves the cell, and it shrinks.

The red cell of the human body follows a similar phenomenon. The swelling can actually cause rupture of the cell membrane, cytolysis or hemolysis, and result in the death of the red cell. Or a shrinkage of the red cell can occur, called *crenation*, which will produce prune-like wrinkles on the cell. Heavy concentrations of mineral drinks such as K M can produce such effects in the human body.

Donnan equilibrium is a special type of ionic distribution. There are special properties in some membranes which are freely permeable to special ions, but impermeable to others. The situation results in an osmotic pressure gradient and a potential difference. Dannan equilibrium also allows for the ionic gradient that can manifest itself as potential difference across the membrane. Thus it allowed for the development of the Nernst equation (see Chapter 12 of *Quantum Biology*). Active transport was discovered later, where violations *against* this osmotic and Nernst equation relationship could be achieved by a cell when it actively had to transport and overcome a potential difference.

Thus the isothermic laws of the Boyle's gas laws were not active enough to describe biology. Biology, by obeying a quantic rule, could overcome the thermodynamics and produce a stability of metabolism and reproduction, known as life. To understand this active transport we must leave the rules of thermodynamics behind, and now go into quantic explanations (see *Quantum Biophysics*).

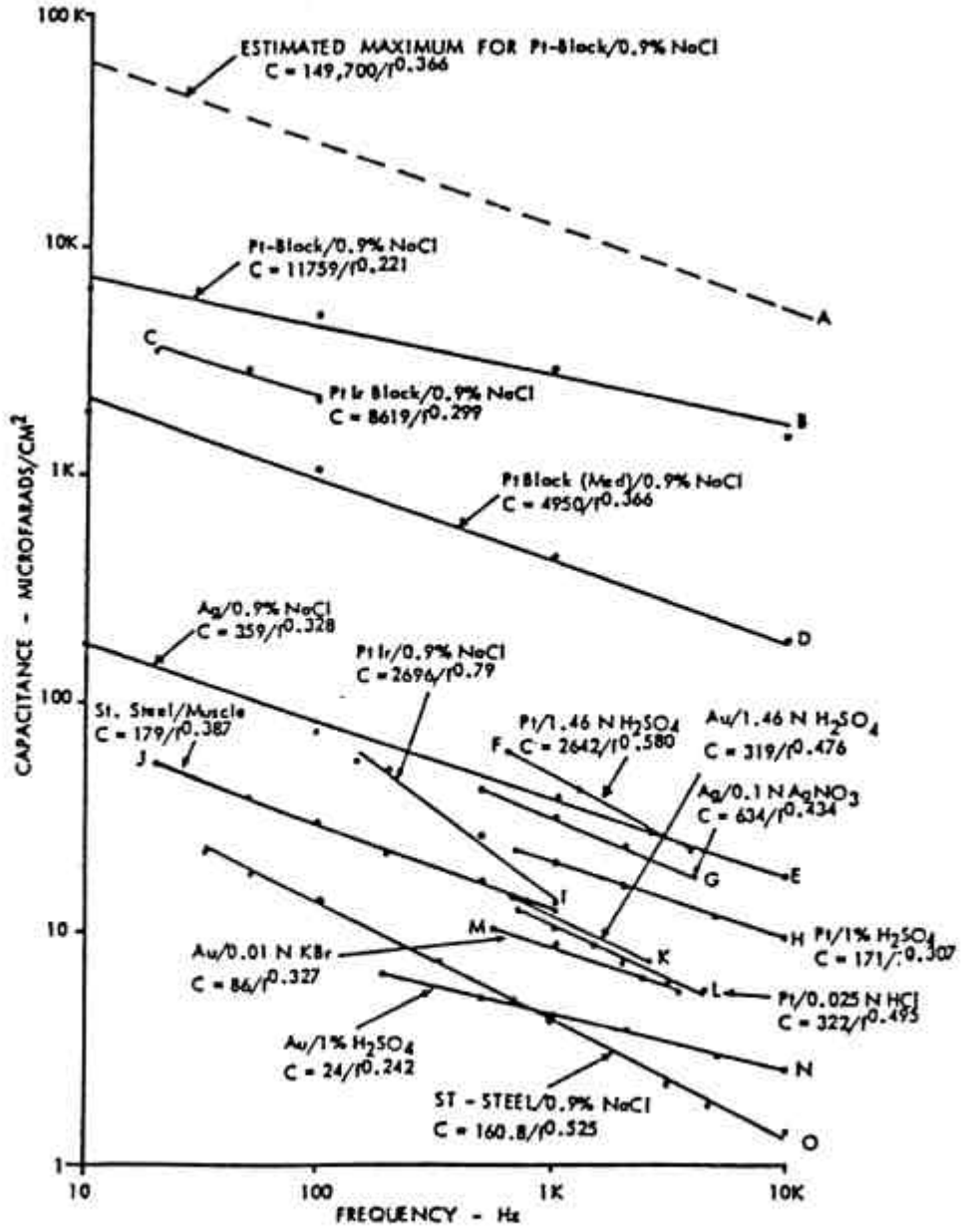
Approximte Concentrations of Ions and Other Substances in the Axoplasm of Freshly Isolated Giant Axons and in the External Field

Substance	Concentration in Axoplasm	Blood	Seawater	Units
H_2O	865	870	966	g/kg
K	400	20	10	mM/kg H_2O
Na	50	440	460	mM/kg H_2O
Cl	40	560	540	mM/kg H_2O
Ca	0.4	10	10	mM/kg H_2O
Mg	10	54	53	mM/kg H_2O
Isothionate	270	–	–	mM/kg H_2O
Aspartate	75	–	–	mM/kg H_2O
Glutamate	12	–	–	mM/kg H_2O
Succinate + fumarate	17	–	–	mM/kg H_2O
Orthophosphate	2.5-9	–	–	mM/kg H_2O
Adenosinetriphosphate	0.7-1.7	–	–	mM/kg H_2O
Phosphagen	1.8-5.7	–	–	mM/kg H_2O

The above table shows the ionic gradients and membrane potentials of the various factors of compounds as they lie in certain types of biological systems. Blood and seawater are much more similar than dissimilar in their makeup, leading one to think that possibly life did come from the sea after it incurred a quantic interaction that allowed it to then metabolize and reproduce.

The work done on separating charged particles in terms of potential can be measured in volts. The resting membrane potential, which is listed in millivolts, is a reflection of one ionic gradient consideration of work.

To develop techniques of measuring ionic gradients, it is impossible for current researchers to measure more than just one membrane potential ion at a time. The total complexity of all the various ions in the inner ion effects, the considerations of synergy and destruction, make reductionistic understanding of these membranes nearly impossible. Once again we see that only nature truly knows.



Equivalent series capacitance-frequency data for various electrode-electrolyte surfaces calculated from date published by the following authors: curves A and D, Schwan (1964): curve B. Gesteland et al. (1956): curves C and I, Ray (1965): curves E and J. Geddes (unpublished): curves F and K, Zimmerman (1930): curve G, Jones and Christian (1935): curves H and N. Wolff (1926): curve L, Jones and Bollinger (1935); curve M, Miller (1923); curve O, Geddes et al. (1971).

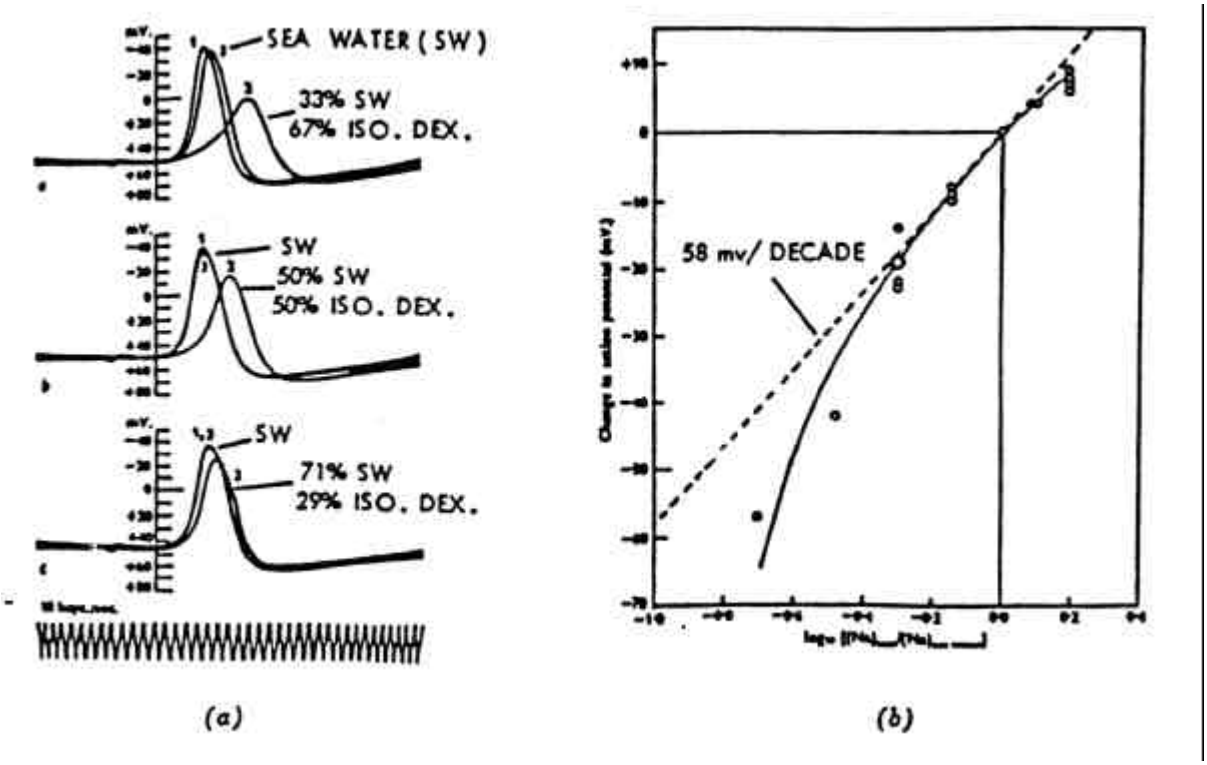
Equivalent series capacitance-frequency data for various electrode-electrolyte surfaces calculated from date published by the following authors: curves *A* and *D*, Schwan (1964): curve *B*. Gesteland et al. (1956): curves *C* and *I*, Ray (1965): curves *E* and *J*. Geddes (unpublished): curves *F* and *K*, Zimmerman (1930): curve *G*, Jones and Christian (1935): curves *H* and *N*. Wolff (1926): curve *L*, Jones and Bollinger (1935); curve *M*, Miller (1923); curve *O*, Geddes et al. (1971).

Resting Membrane Potentials

Type of Cell	Size (μ)	Temp (° C)	Type of Environment	Membrane Potential (mV)	Investigator and Year
Nerve			Seawater	45	Hodgkin and Huxley (1939)
Squid giant axon	500	20	Ringer's solution	71	Huxley and Stämpfil (1951)
Frog myelinated axon	12-15				
Chick embryo spinal ganglion	30-40	37	Tissue culture fluid	50-65	Crain (1956)
Cat spinal motoneuron	70	Body	In vivo	70	Coombs et al. (1955)
Cat pyramidal cell	70	Body	In vivo	55	Phillips (1955)
Rabbit sup. cervical ganglion	–	36-38	Physiological solution	65-75	Eccless (1955)
Frog neuro-myal junction	–	22-23	Ringer's solution	90	Nastuk (1953)
Toad symp. B neuron	35	Room	Ringer's solution	65	Nishi et al. (1965)
Muscle (skeletal)					
Frog sartorius	80	20-22	Ringer's solution	97.6	Ling and Gerard (1949)
Rat	–	Body	In vivo	99.8 ± 0.19	Bennett et al. (1953)
Barnacle	1500	Room	Barnacle saline	70.8	Hagiwara et al. (1964)
Muscle (Cardiac)					
Frog ventricle	30	12-15	Ringer's solution	62 (50-90)	Woodbury et al. (1950)
Tortois ventricle	30-80	Room	In vivo	56 (50-63)	Sano et al. (1956)
Chick embryo auricle	–	38.5	In vivo	29.2	Fingl et al. (1962)
Chick embryo ventricle	–	38.5	In vivo	39.3	Fingl et al. (1962)
Rat auricle	–	30	In vitro	62	Hollander and Webb (1955)
Rabbit auricle	–	37	In vitro	78	West (1955)
Rabbit auricle (pacemaker)	–	37	In vitro	56	West (1955)
Dog ventricle	16	Body	In vivo	80 (65-95)	Hoffmann and Suckling (1952)
Dog auricle	10	Body	In vivo	85 (66-94)	Hoffmann and Suckling (1952)
Dog papillary muscle	16	38	In vitro	85 (70-95)	Hoffmann and Suckling (1953)
Dog Purkinje	25-35	37	Kreb's solution	71 (60-82)	Coraboeuf and Weidmann (1949)
Muscle (smooth)					
Guinea pig intestine	–	36	Physiological solution	51.5	Holman (1958)
Guinea pig uterus (pregnant)	–	Body	In vivo	32.6	Woodbury and McIntire
Rotozoa Noctiluca scintillans	300	Room	Seawater	45	Hisada (1957)

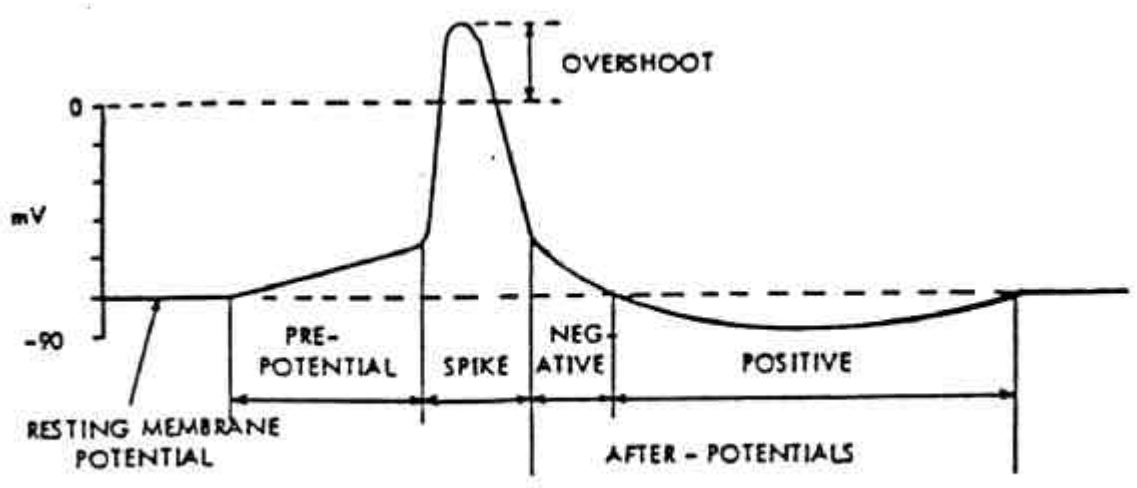
In finding the potential, there was a polarization and depolarization effect, where the cell could accumulate charge, and at a certain point, trigger the release of such charge. This was called *polarizing* and *depolarizing* the cell. A threshold level of energy had to be achieved to allow for the depolarization. This threshold level of energy was reflected by an accumulation of energy that could come from the conversion factors of mass, heat, charge, and momentum.

Thus once achieved, the cell would have the desired energy stored to cross the threshold, depolarize, and transfer a large charge at one time. This is best reflected in the EKG or heart rate, where the collective muscle fibers will become depolarized after being triggered from the neural action of the sinus, which causes the collective contraction of the heart muscles along a very professional, guided pattern.



The relation between the amplitude of the action potential and the environmental concentration of sodium: *(a)* action potentials with different environmental concentrations of sodium— SW = seawater, ISO. DEX. = isotronic dextrose; *(b)* change in amplitude of action potential produced by changing external sodium concentration. (From A. L. Hodgkin and B. Katz. *J. Physiol.* 1949, 108:37-77. By permission.)

The controlled fluctuations of sodium and potassium ions allowed for an expression of current, which is very important in neurological firing. Thus permeability and precise transfer of ions allows for control, and this allows for nerve conduction.



Hypothetical action potential and commonly used nomenclature.

Hypothetical action potential and commonly used nomenclature.

Polarization Versus Repolarization

A simple measurement with extracellular electrodes is shown in Fig. A, which shows two electrodes (*A,B*) on the surface of a long strip of isolated irritable tissue. Assume that the electrodes are small and widely separated in relation to the amount of tissue occupied by excitation. Also, it will be assumed that the fundamental bioelectric event consists of depolarization, reverse polarization, and repolarization; giving a simple monophasic action potential without pre- or post-potentials. Charges appear only on the upper surface of the tissue where the electrodes are located. Theoretically the same charge distribution exists over the whole surface of the irritable tissue. If the tissue is inactive, then both electrodes will be in regions of equal positivity.

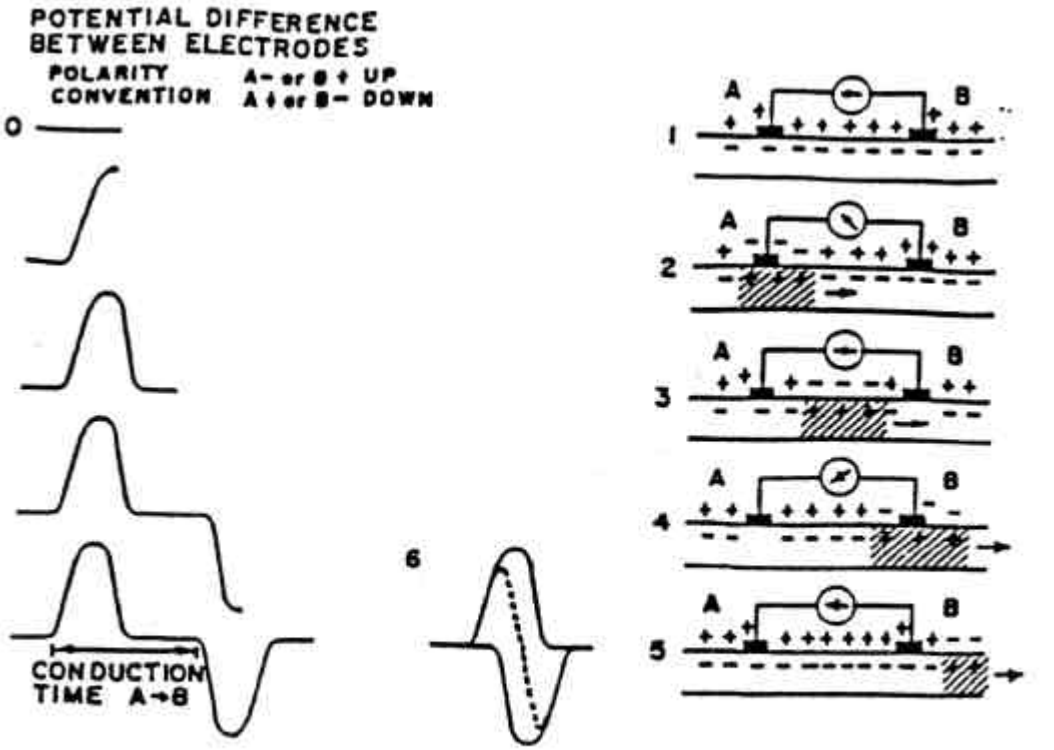


Fig. A The measurement of action potentials with electrodes placed on the surface of isolated irritable tissue.

Fig. A The measurement of action potentials with electrodes placed on the surface of isolated irritable tissue.

The potential difference seen by the potential indicator is zero. When the tissue has been excited electrically to the left of electrode *A*; when the wave of excitation reaches the region under electrode *A*, it becomes negative with respect to electrode *B* and the indicator rises. As the wave of excitation passes onward toward electrode *B* and occupies the region between the two electrodes, the region under *A* is recovered and that under *B* has not yet become excited. There is no voltage potential under these conditions. The first (upward) phase of the monophasic action potential is thus complete. While the wave of excitation occupies the region under electrode *B*, the excitation wave becomes negative with respect to *A*, and hence the potential indicator will fall. Recovery occurs as the wave of excitation passes *B*, the membrane potential is re-established. The potential indicator reads zero. The downward phase of the action potential is thus complete. The time between onset of the action potentials is set by the velocity of propagation in the tissue and the spacing interval of the electrodes. As we reduce the inter-electrode distance, the two monophasic action potentials will be closer to each other. The time factors are such that excitation occurs under electrode *B* before recovery is complete under *A*, so a smaller action potential results.

This applies also to an isolated single strip or bundle of irritable tissues having the same propagation velocity. If the tissue consists of a bundle of fibers having different velocities of propagation, then the waves of excitation will arrive under each electrode at varying times. So the wave form displayed by the recording instrument will be very complex. It must also be recognized that the activity of the tissues closest to the recording electrodes will contribute the most to the recorded potential. If we filter out interference, it becomes easy to diagnose traumatized or injured tissue.

Experimentally it is possible to provide verification for the preceding explanation for the wave form of potential variance, which is recorded by two electrodes on the surface of an isolated strip of injured tissue. The frog sartorius muscle consists of a bundle of very similar muscle fibers running parallel for the whole length of the muscle. The application of a stimulus to one end of the muscle (curarized) will cause a wave of excitation to travel along each fiber at the same rate. The waves will reach the end of the muscle at the same time. By recording the response with two widely separated electrodes, the diphasic action potential can be obtained; a typical result appears. If the electrode spacing is reduced so that the monophasic action potentials overlap (i.e., excitation of the distal electrode occurs before recovery at the proximal electrode), the action potential is that predicted by the preceding analysis and shown by the dashed curve in Fig. B.

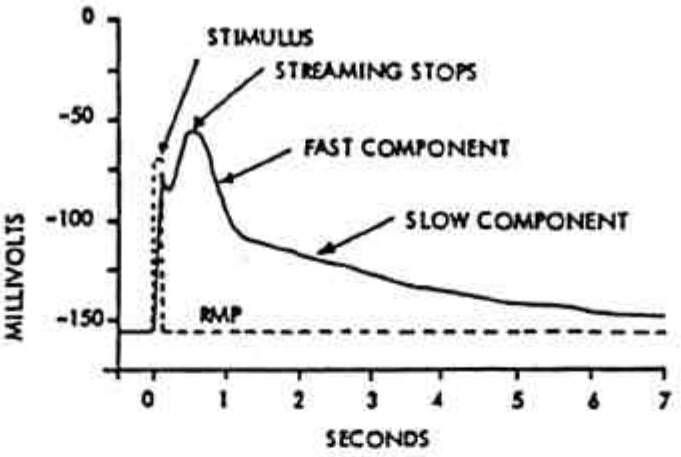
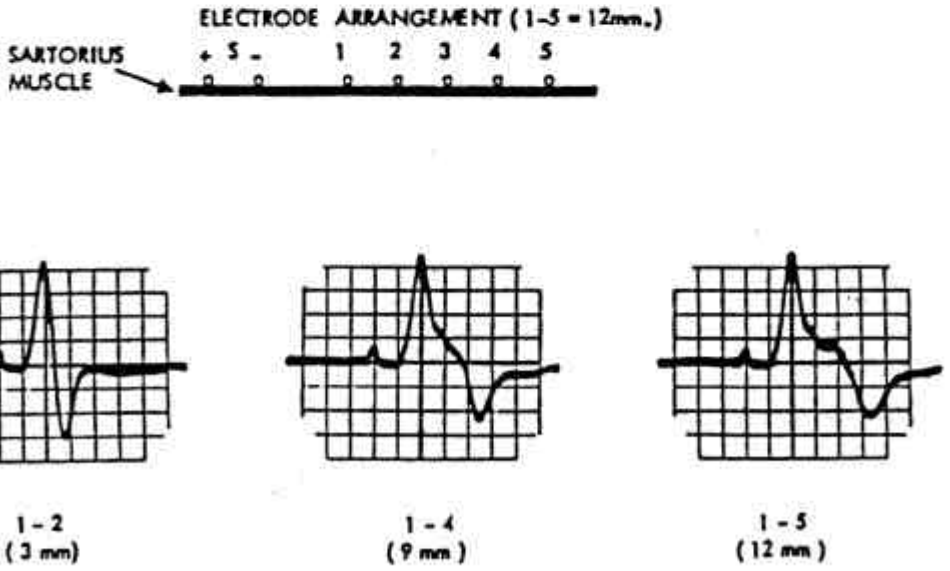
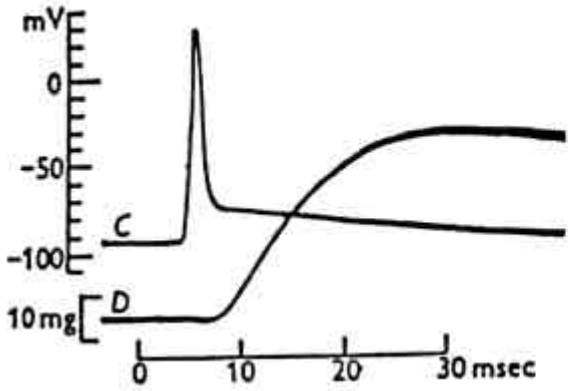


Fig. B The resting membrane potential (RMP) and action potential of Nitella. Redrawn from G. P. Findley, Aust. J. Biol. Sci. 1959, 12:412-426.)



The effect of electrode spacing on the action potential of isolated frog sartorious muscle at room temperature: S = stimulus 0.5 msec; propagation velocity (calculated from record 1-5) = $12 \times 10^{-3} / 6 \times 10^{-3}$ = 2 m/sec; time scale-2 msec. (Courtesy of Dr. L. E. Geddes)

The effect of electrode spacing on the action potential of isolated frog sartorious muscle at room temperature: S = stimulus 0.5 msec; propagation velocity (calculated from record 1-5) = 12 x 10-3/6 x 10-3 = 2 m/sec; time scale-2 msec. (Courtesy of Dr. L. E. Geddes)



Action potential (*C*) of a single skeletal muscle fiber in the frog, and *D* the tension developed. (From A. L. Hodgkin and P Horowics, *J. Physiol.* 1957, 136:17P-18P. By permission.)

Our recorded diphasic action potential permits determination of the direction of the spread of excitation. When the electrodes are closely spaced, the direction of the initial deflection of the potential indicator still provides this information if its deflection is known in terms of the polarity applied to its terminals. The polarity convention chosen was such that when electrode *A* was negative to electrode *B*, the indicator of the potential-measuring instrument rose. So when excitation traveled from *A* to *B*, the first phase of the action potential would be upward. If the tissue were excited at its opposite end (i.e., beyond *B*), electrode *B* would become negative first and the initial deflection of the potential indicator would be downward. We see this in Fig. C. Electrically we can find foci of brain disturbance or heart dysfunction from multi-probed EEG or ECG channels.

We see that the meaning of the polarity of the potential difference between the electrodes has been devoted to the case of the spread of excitation being in the same direction as a line joining the electrodes. The orientation of the electrodes with respect to the direction of excitation and recovery is important. It can be shown by placing the electrodes opposite each other on the tissue and causing a wave of excitation to be propagated. If everything is symmetrical, dipolarization and repolarization will occur simultaneously under each electrode. The potential indicator will not be deflected as excitation and recovery pass. Acupuncture meridian cascade can also be demonstrated by multi-channel measurement of acupuncture points on a meridian.

Some tissue (especially cardiac muscle) will have excitation in all the tissue before recovery occurs under either electrode. Sometimes recovery does not travel in the same direction as excitation. Therefore, the action potentials recorded from a pair of electrodes on the surface of such tissue are expected to be different from those previously discussed (see “Cardiology”, by Dr. Nelson).

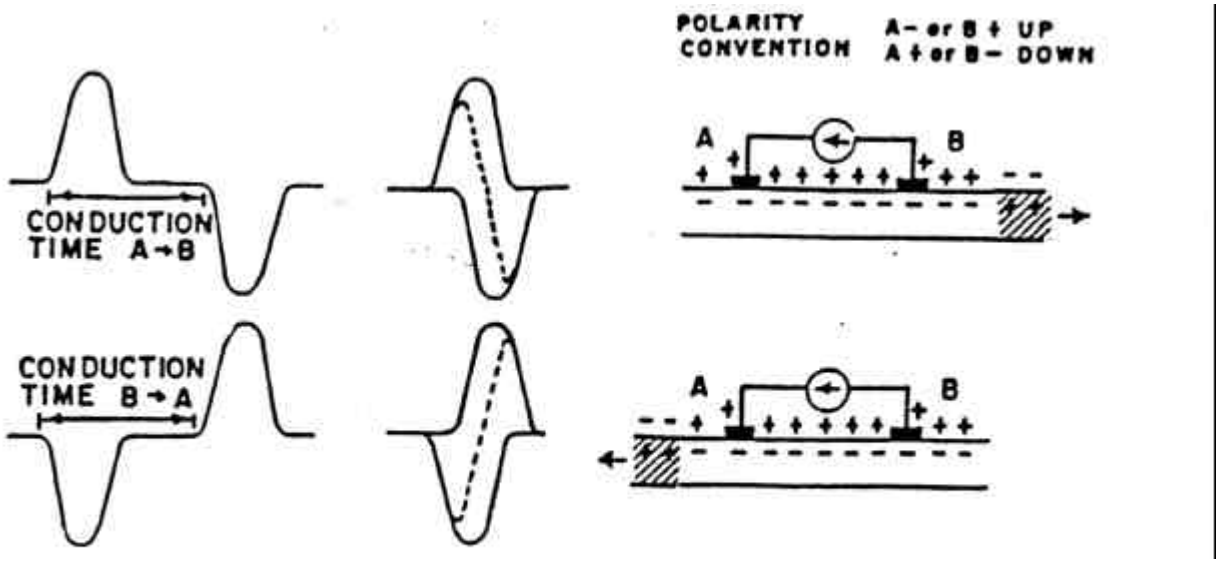


Fig. C The relation between direction of propagation of excitation and the recorded action potential with electrodes on an isolated strip of irritable tissue.

Fig. D diagrams a strip of isolated irritable tissue in which excitation occupies all the tissue before recovery occurs under either electrode. Assume that the tissue has been stimulated to the left of electrode *A* and that excitation advances and occupies the region under electrode *A*, making this electrode negative with respect to electrode *B*; with the polarity convention adopted, the potential voltage indicator rises. Excitation advances will occupy the region under electrode *B*. Recovery will not have occurred under electrode *A* and because both electrodes are now over active tissue, the indicator shows no potential difference, and the first upward phase of the action potential will result (see Fig. E). If the strip of irritable tissue is uniform, recovery will follow in the same direction as excitation, occurring first under electrode *A*.

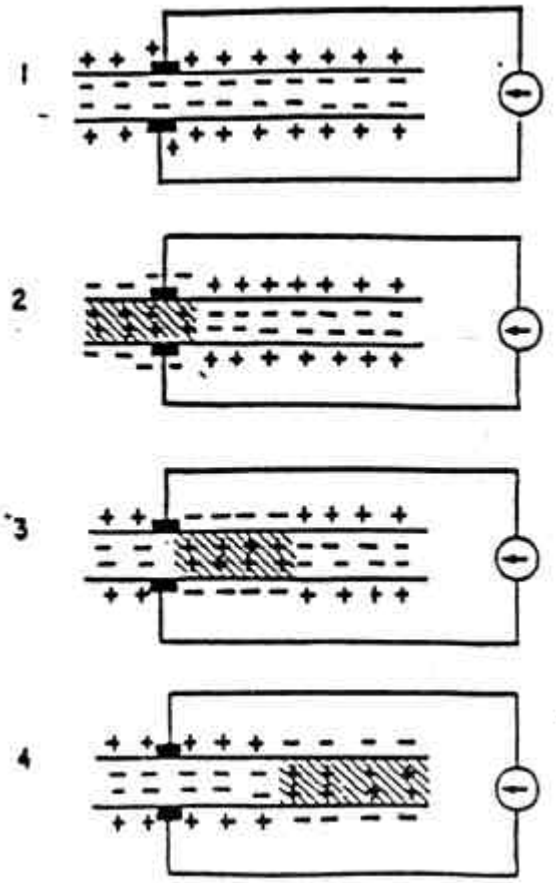


Fig. D Excitation and recovery propagated at right angles to the axis of a pair of electrodes on an isolated strip of irritable tissue.

Under this condition, electrode *B* is negative with respect to *A* and the potential indicator falls. As recovery occurs under electrode *B*, the potential indicator reads zero and the second (downward) phase of the action potential is completed as shown in Fig. E.

As we see, the two monophasic action potentials have special meanings. The peak of the first upward monophasic action potential indicates excitation under electrode *A*; the end of this action potential indicates that the whole tissue is active. A downward wave indicates recovery starting under electrode *A* and recovery under this electrode becomes complete when the peak of the downward action potential is reached. Completion of the downward action potential shows full recovery of the tissue.

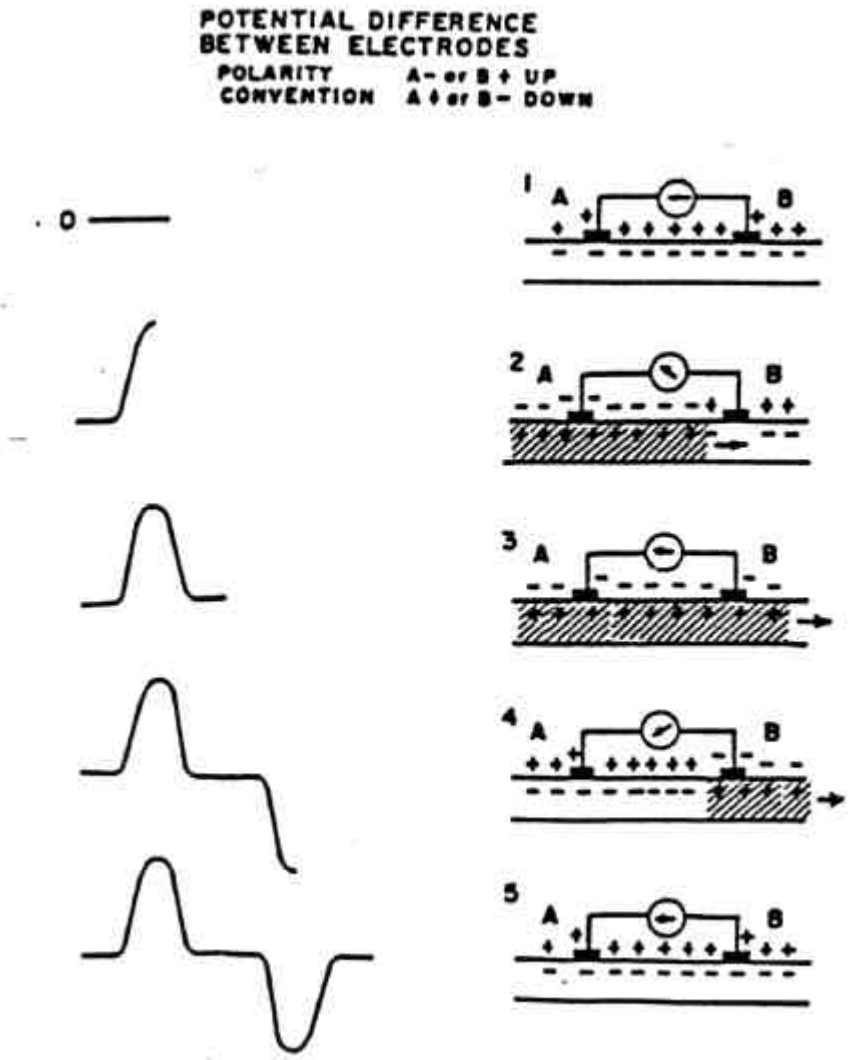


Fig. E Action potentials recorded from the surface of isolated tissue which becomes depolarized under both electrodes and with recovery following in the same direction as excitation.

If there exists a metabolic gradient in irritable tissue, the sequence of events will be different. If, when all of the tissue is active, recovery proceeds in the direction opposite that of excitation, the second phase of the action potential will be different. Recovery appears first under electrode *B*, resulting in electrode *A* being negative with respect to *B* (Fig. F). Thus the potential indicator will rise and the second phase of the action potential will be upward (i.e., in the same direction as the first). As the tissue covers under electrode *A*, the second (upward) phase of the action potential results.

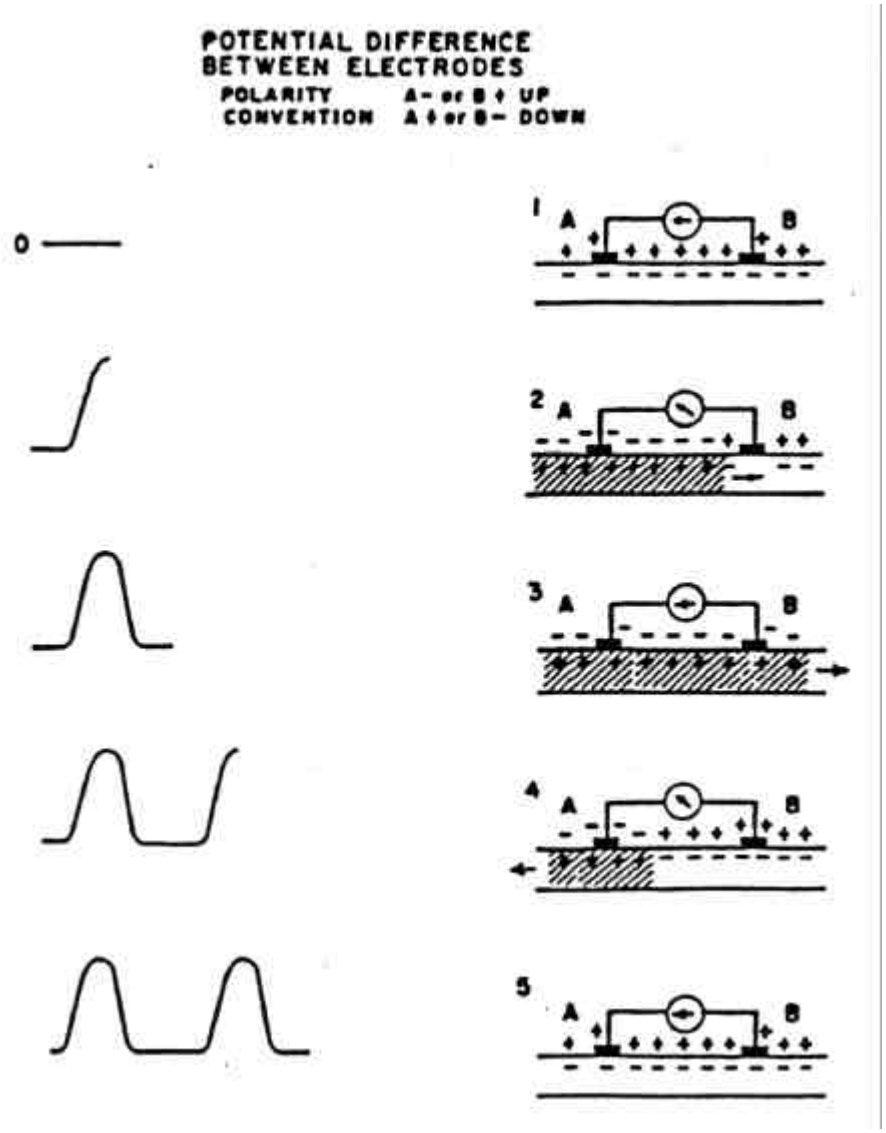


Fig. F Action poetnails recorded from the surface of isolated irritable tissue that becomes depolarized under both electrodes and recovery occurs in the direction opposite to excitation.

As presented, the peak of the first upward phase described excitation under electrode *A*. At the end of the first monophasic action potential, when the indicator read zero, the whole tissue was active. The beginning of the second upward phase indicated the start of recovery under electrode *B*; total recovery occurred when the second upward monophasic action potential was completed. To summarize, in tissue that is totally occupied by excitation before recovery occurs anywhere, if the two phases of the action potential are in the opposite direction, excitation and recovery travel in the same direction. This implies general skin voltage readings, not acupuncture points. If the two phases are in the same direction, excitation and recovery travel in opposite directions. This can often be found in the heart of a cold-blooded animal and in homogenous tissue; the latter is characteristic of the mammalian ventricles. Acupuncture meridians show the characteristic voltage changes, but follow uncharacteristic impedance variance from other skin tissue. This phenomenon accounts for electroacupuncture.

Injured Tissue Effects On Action Potential

A surprising observation associated with the measurement of action potentials with extracellular electrodes, applied directly to injured tissue, is the appearance of wave forms that resemble, to a remarkable degree, those obtained with transmembrane electrodes. Many papers presenting such records usually state that one electrode was placed on uninjured tissue and the other was over injured tissue. This allows for the electrical location of trauma cases and a quantifiable means of rating the injury. Such a sophisticated instrument is manufactured by LTBM. This instrument can be passed down the spine to measure voltage, amperage, resistance, and temperature of the skin next to the vertebrae. From this we can measure spinal injuries quite accurately.

As we have demonstrated, if two electrodes are placed on the surface of a uniform strip of irritable tissue, a diphasic action potential is recorded when the tissue responds to a stimulus. Excitation and recovery under the first electrode are found in the first phase; the second indicates the same event under the second electrode. If the two electrodes are close together, the phases will be temporally closer. If one of the surface electrodes is advanced

through the membrane into the cell, the membrane potential appears. If the cell is excited, the monophasic action potential will be recorded rising from, and returning to, the resting membrane potential. This shows two boundary conditions (i.e., both electrodes are extracellular), which give rise to the idealized diphasic action potential; when one electrode is extracellular and the other is intracellular, the idealized monophasic action potential results. Imagine a strip of irritable tissue, injured at one end (i.e., depolarized) by crushing at *B* as in Fig. G. The membrane potential is not fully maintained all the way to the site of injury.

Graham and Gerard (1946) used frog sartorius muscle and explored the potential along the membrane with transmembrane electrodes up to and within the site of injury. It was found that the potential between the exploring electrode was within 5 mm of the site of injury. As electrode *B* was moved toward the cut end, the potential decreased; at 2 mm from the site of injury, the potential was twenty-five percent of the membrane potential. Graham and Gerard placed one electrode on the intact surface of a muscle cell and another in the region of injury, comparing the potential difference so measured with the resting membrane potential. The injury potential was thirty to thirty-nine percent of the membrane potential. This accounts for electrical measurement of tissue.

At the site of injury the spatial distribution of membrane potential, whatever it may be, causes current to flow through the fluid environment. Thus in the fluid there will be established more electrical current, or amps.

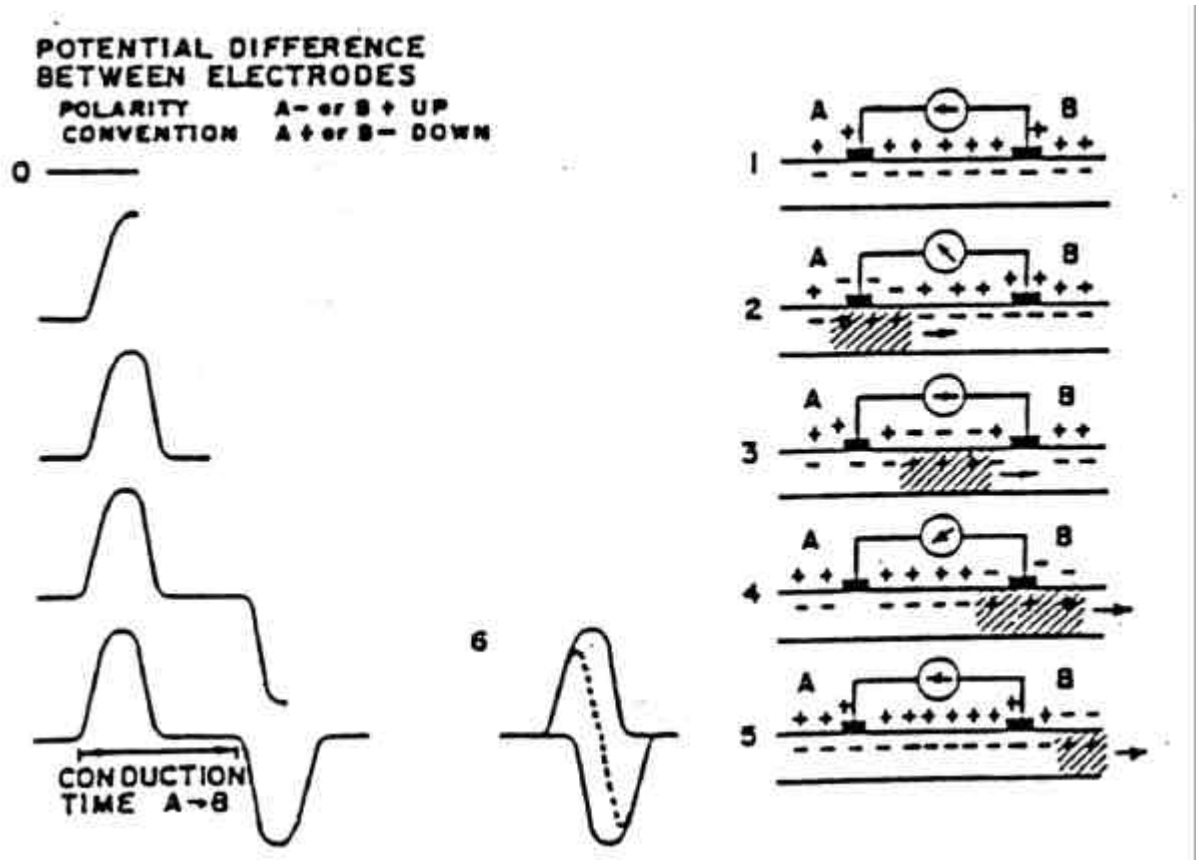
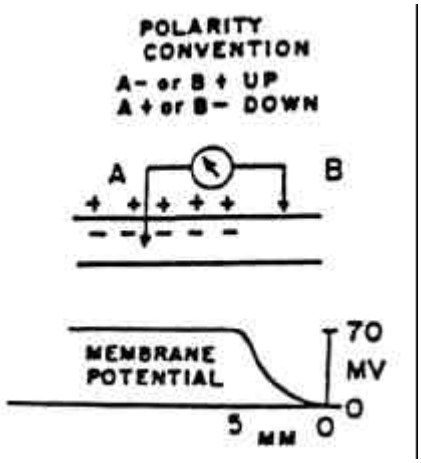


Fig. G The measurement of action potentials with electrodes placed on the surface of isolated irritable tissue.

This is necessary to provide greater electrical flow for rebuilding and reconstruction.

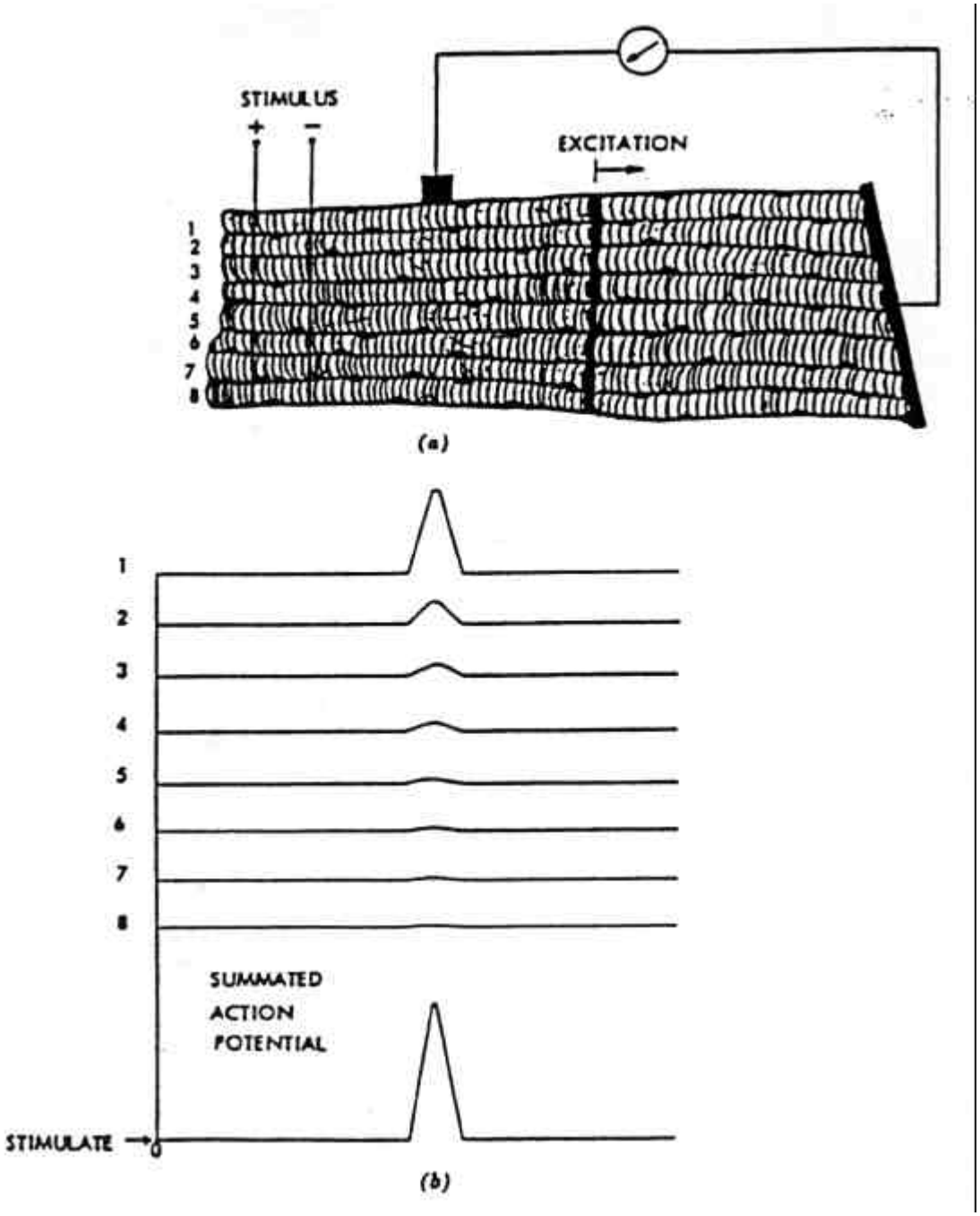
Consequently, the potential measured between an electrode inside the cell and one at the site of injury will depend on the local conditions at the site of injury and the position of the electrode in the fluid environment. If this potential (the injury potential) is measured under optimum conditions, it may amount to slightly more than one-third of the membrane potential. The same type of information developed by Woodbury and others (1951) demonstrated that if the diameter of an intracellular electrode is large with respect to the size of a cell, the potential measured is considerably less than the membrane potential and approximated thirty percent of the true membrane potential. It is apparent that a typical injury potential may be about one-third of the membrane potential. This will allow us to measure the probability of injury in the body.



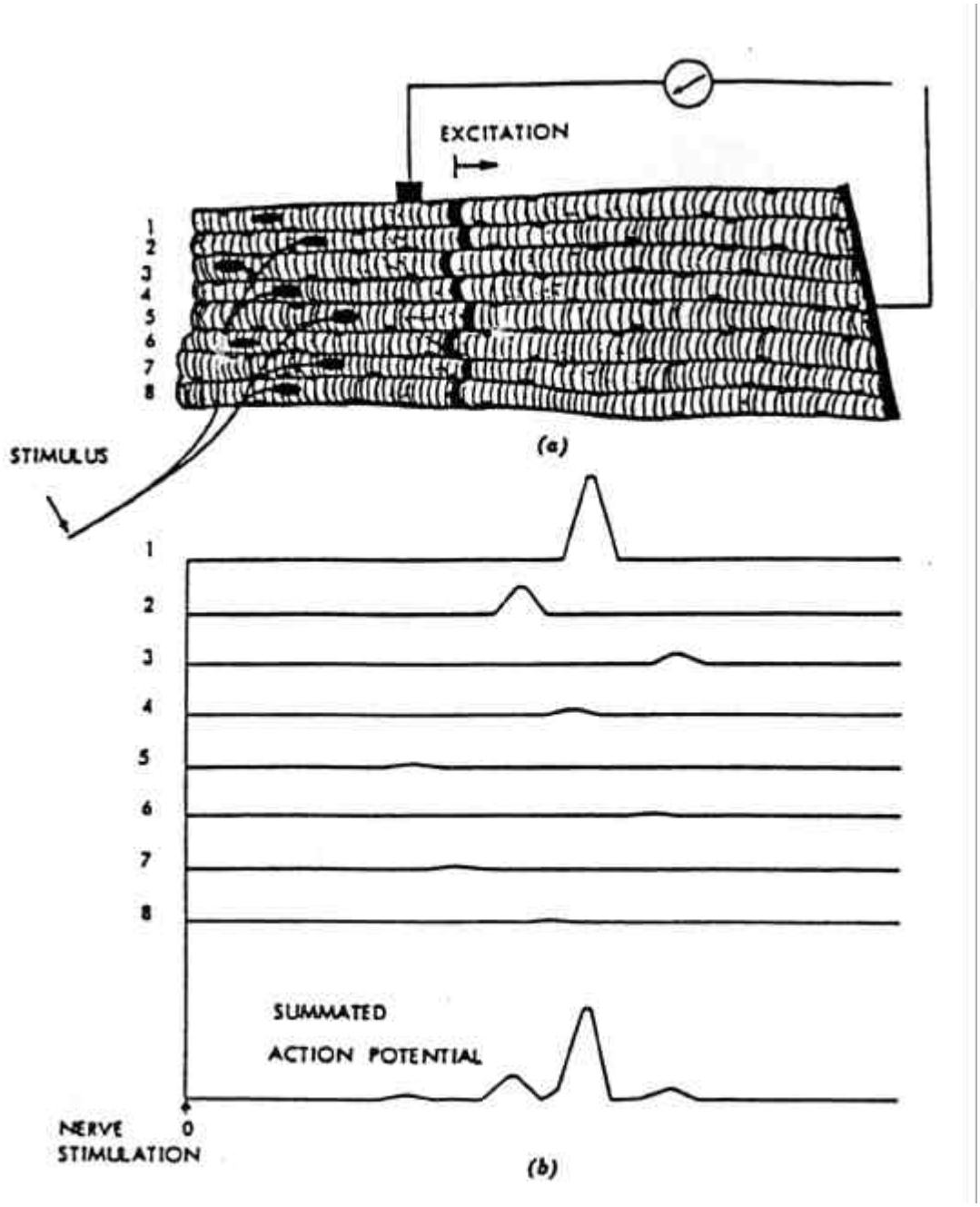
Membrane potential in the vicinity of injury. (Redrawn from data presented by Graham and Gerard, 1946.)

This situation has an important implication when an action potential is measured with one electrode on the surface of an irritable tissue and the other in an area of injury. Suppose that before excitation, the resting membrane potential is -70 mV, that electrode *A* is on the intact surface of the irritable tissue, and that electrode *B* is in the site of injury. Under this condition the potential difference between the electrodes may be thirty-five percent of the membrane potential and amount to about -25 mV. Now if the tissue is stimulated to the left of electrode *A*, when excitation reaches this electrode the potential difference measured between the electrodes will be the algebraic sum of the potentials at the two electrodes. For example, assume that the membrane depolarizes and reverse polarizes to +20 mV; the potential difference was -25 mV just before depolarization and +65 mV at the peak of reverse polarization. It will then return to -25 mV when the wave of excitation passes the surface electrode. This sequence illustrates that a fair representation of the wave form of the transmembrane action potential can be obtained by injuring the tissue under one electrode. Important to note that, although the magnitude of the reverse polarization of the membrane amounted to only 20 mV, in the record it showed up as a much larger potential of +65 mV. This situation probably serves to explain the considerable reverse potential observed by Bernstein (1871) when he measured the nerve action potential with the rheotome (see Hoff and Geddes, 1957).

There is another point to consider when the action potential is measured with one electrode on an intact membrane and the other in a region of injury. Before excitation there will be a standing potential difference (the injury potential), whose magnitude will depend primarily on the location of the electrode at the site of injury. If electrode *B* is over the injured area, an appreciable percentage of the membrane potential may be detected; if it is moved a short distance from the site of injury and is over-excitable tissue, the steady (injury) potential difference between the electrodes will be less. Now if the tissue is excited and excitation and recovery passes under the surface electrode, the usual monophasic action potential will occur, superimposed on a baseline of the injury potential. If the strip of irritable tissue is long with respect to the time of propagation of the impulse and the amount of tissue occupied by excitation is small with respect to the inter-electrode distance, excitation and recovery will take place under the first electrode before it enters the region of electrode *B*, which is near the area of injury. Electrode *B* may also be close to uninjured tissue, and therefore detect not only the injury potential but also an attenuated action potential as it advances toward the area of injury. Thus the resulting action potential measured between the two electrodes will be diphasic, consisting of a large monophasic action potential superimposed on the injury potential, followed by a smaller monophasic action potential in the opposite direction reflecting what electrode *B* detects from the depolarization and repolarization of normal tissue near the site of injury. This is a factor used by LTBM machinery to find improper reactivity or to correlate proper reactivity.



Summated action potential from stimulated muscle fibers detected with local electrodes.



Summated action potential in muscle due to nerve stimulation detected with local electrodes.

If we move the electrodes together, or if the area of the tissue occupied by excitation is great compared to the inter-electrode distance, the smaller downward phase of the action potential will be moved towards the upward phase. A type of this wave form is often recorded when a needle electrode inserted into active tissue is compared to another electrode on uninjured tissue (see *Quantum Biology*).

Multiple Measurement of Irritable Tissues. Previously we analyzed the situation involving the potential expected from electrodes on the surface of a strip of isolated injured tissue. We can predict the anticipated potential from electrodes on a bundle of isolated irritable tissues. In particular, this line of reasoning has value in explaining the action potentials recorded from the surface of a nerve trunk and the effect of injury determining the action potentials recorded from myocardial tissue. Sometimes the analysis is better performed by use of the dipole concept.

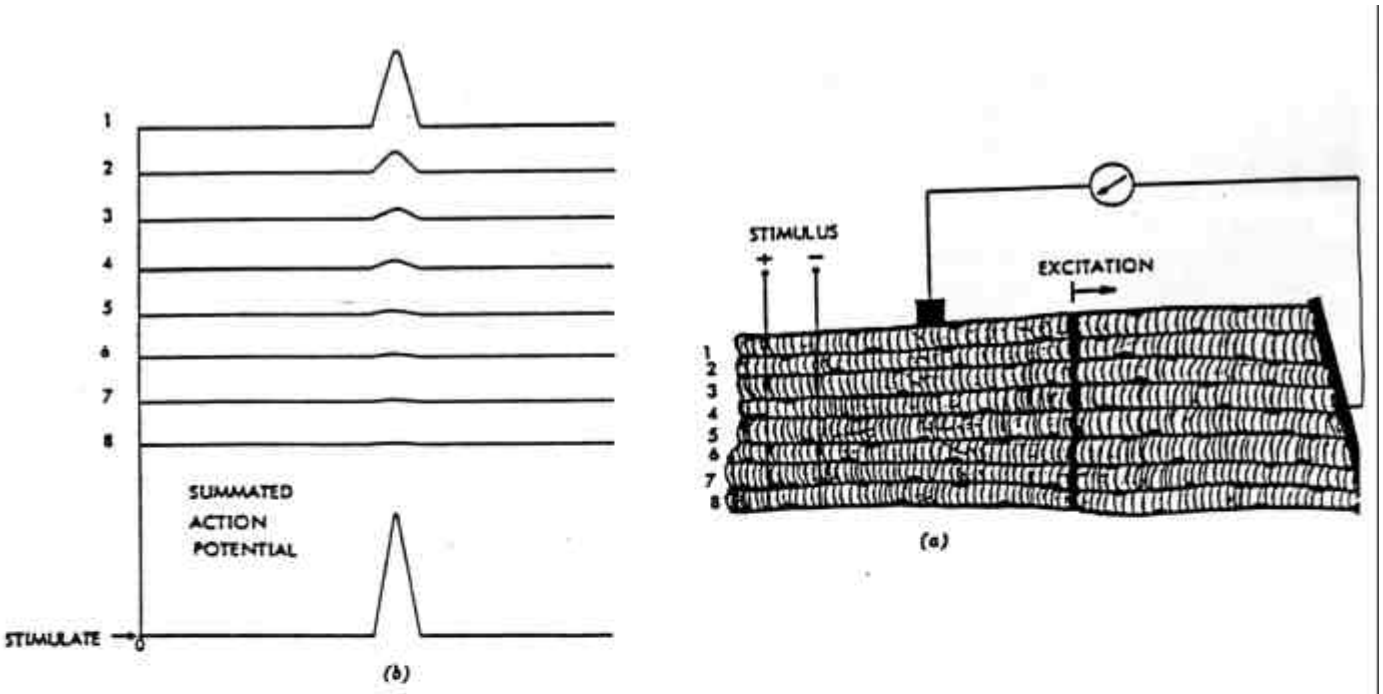
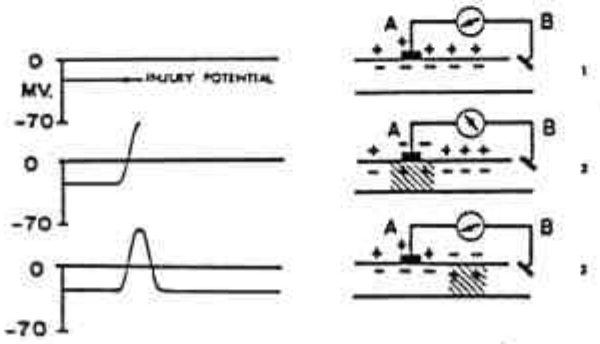


Fig. H Summated action potential from stimulated muscle fibers detected with local electrodes.



The injury and monophasic action potential.

Imagine a bundle of irritable fibers with similar propagation velocity. Place on the surface of the bundle one electrode, and place the other electrode at the cut (injured) end. Without excitation there will be a standing potential difference (the injury potential) between the electrodes. If we stimulate the fibers at the end opposite the cut, all the propagated excitations will pass by the surface electrode at the same time. The surface electrode will preferentially detect the action potentials in fiber 1, which is immediately under it. The action potentials in the more distant underlying fibers will also be detected, but the more distant fibers will contribute less to the voltage detected by the surface electrode. In accordance with Fig. H, the resulting action potential will be a combination of all the action potentials of the local and distant fibers. Because all fibers were chosen to be identical, the action potential will be a smooth monophasic wave; no action potentials will be detected at the site of injury.

If we do not stimulate the individual fibers simultaneously, as for example in skeletal muscle by nerve stimulation, the action potentials of the individual fibers will not pass under the surface electrode synchronously. The potential between the electrodes reflects this situation and the action potential recorded. The potential will still be unidirectional and polyphasic. The form of the potential will reflect the temporal pattern of excitation and the spatial distribution and velocities of propagation of the various fibers.

This is by no means uncommon in the routine measurement of bioelectric events with local extracellular electrodes. In nerve trunks, a spatial distribution of fibers has various diameters. Velocities of propagation are related to fiber diameters. Larger fibers propagate excitation much more rapidly than the smaller ones. When we stimulate all the fibers simultaneously, we induce a larger time separation between the action potentials of the rapidly and slowly propagating fibers. Sequential action potentials can then be detected by a surface electrode. This is how the variances in nerve conduction velocity were found by Erlanger and Gasser (1937). Their Nobel Prize-winning study and experiments with some sample oscillograms are found in Fig. I. The investigators employed injured tissue to

obtain unit activity. They proved that the propagation velocity in nerve is related to fiber diameter. Erlanger and Gasser demonstrated that the wave form of the action potential recorded by a surface electrode placed on a mixed nerve trunk, in which all of the axons are stimulated simultaneously, will depend on the propagation velocities and the distance from the point of stimulation to the active (surface) electrode. The electrode can detect the action potentials of the fibers below it. Electrodes in the more distant fibers will contribute less to the recorded action potential.

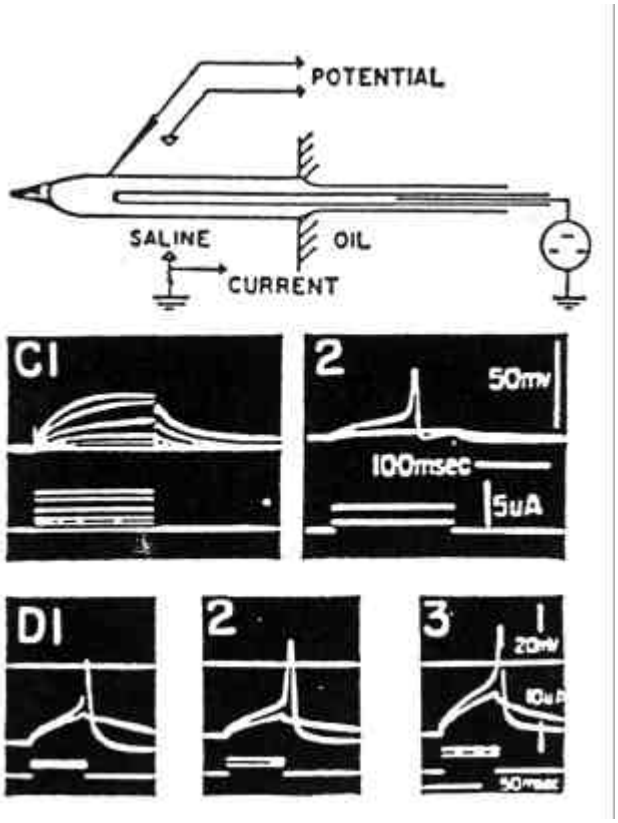


Fig. I Transmembrane potential and current changes in the giant barnacle muscle in response to square-wave stimuli. The graded response to an increase in stimulus intensity is shown in C1; local spike formations produced by first decreasing the intracellular concentration of calcium and then varying the extracellular calcium concentration (20, 84, 338 mM) appear in D1, 2, 3. (From S. Hagiwara et al. *Science* 1964, 143:1446-1448. By permission. Copyright 1964 by the American Association for the Advancement of Science.

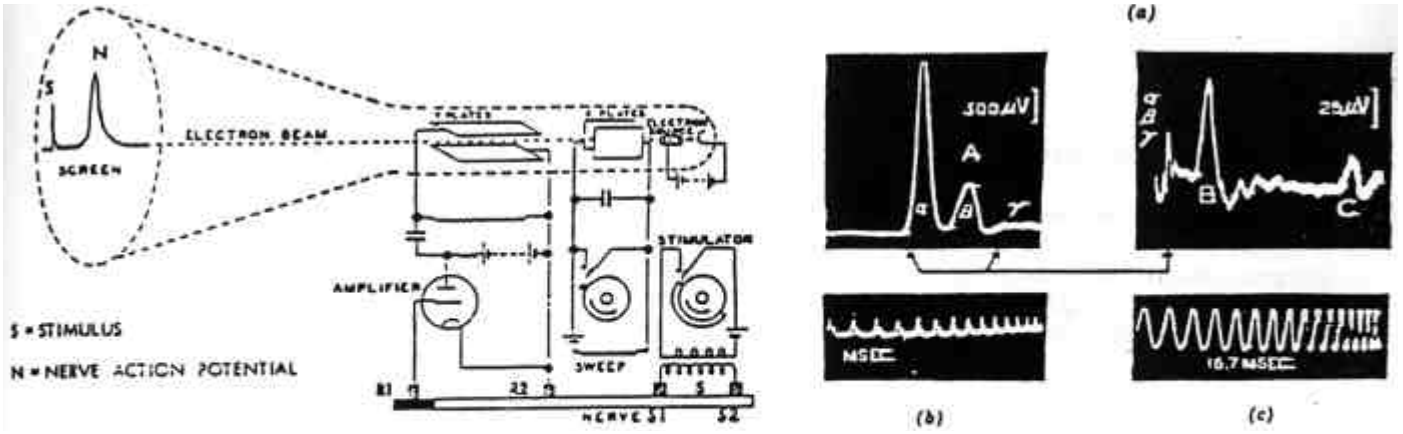
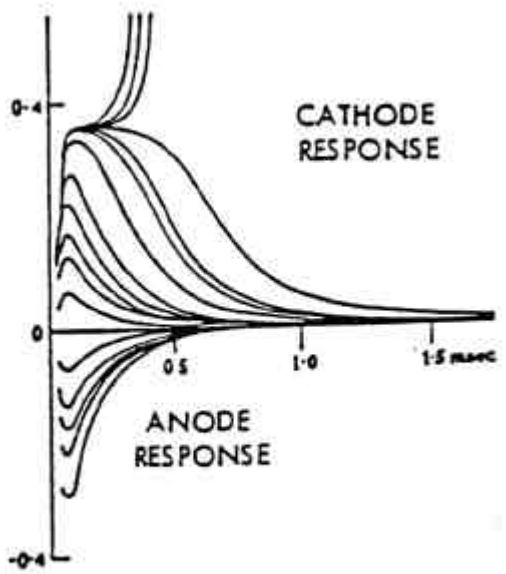


Fig. J The action potentials of a nerve trunk containing a population of fibers having different diameters and therefore different propagation velocities: (*a*) recording method; (*b*) action potentials from the fastest propagating fibers (A",ß,(), (*c*) action potentials *B* and *C* from the fibers with slower propagation velocity.

Action potentials of a mixed nerve recorded with a pair of surface electrodes during physiological activation of its neurones (or receptors) will reflect the asynchrony of activation of the axons. Also reflected are differences in their propagation velocities, and the electrode separation. Action potentials have a similar asynchrony as the activity of skeletal muscle is recorded. This situation is diagrammed in Fig. J. Here we demonstrate skeletal muscle where there is a spatial distribution of motor end plates. If all the axons were excited simultaneously by a single stimulus, all the muscle fibers would not be excited simultaneously. An electrode close to the end of the muscle will detect the action potentials of the individual fibers as they arrive at various times because of the distances from the end plates. Action potential recorded will be polyphasic. If motor neurones are activated physiologically, simultaneous excitation does not occur. There will be an added asynchrony to the arrival of the action potentials under the muscle electrode, and the electrical activity will consist of a train of action potentials.



Local potential changes under the cathode and anode with increasing stimulus intensity. Note that under the cathode, when the stimulus intensity reduced the local potential to about 0.38 of the amplitude of an action potential, excitation occurred; excitation did not occur under the anode with increasing stimulus intensity. (Redrawn from A. L. Hodgkin, *J. Physiol.* 1939, 126:87-121.)

Electrophysical Interference

Previously we have dealt with the case of electrodes placed on the surface of isolated active tissue and in regions of injury. When both electrodes are placed on the surface of a bundle of fibers or group of cells, the electrical potential measured will show the time change factors of arrival of excitation to each electrode. The distances of the individual fibers from each electrode are also revealed. Algebraic summation over time is often called the interference theory, originating with Burdon Sanderson (1879). They explained the genesis of the *QRS* and *T* waves of the ECG from the monophasic action potentials recorded by each electrode. If a pair of electrodes is placed on a bundle of similar uninjured fibers that are excited asynchronously, or on a bundle of dissimilar fibers excited synchronously, then interference theory says that the action potential appearing between the electrodes will be polyphasic and complex.

The interference theory has value in explaining some electrocardiographic wave forms. This theory is particularly handy in explaining the contribution of injury to the ECG. The true form of ECG action potential was first recorded with transmembrane electrodes much later by Coraboeuf and Weidmann (1949). Sanderson showed that the addition of two temporally displaced monophasic action potentials recorded from the ventricle of a frog gave rise to the *R* and *T* waves. The interference theory in ECG is also posited by Lewis (1925) and Hoff et al. (1941). The dipole concept is a better way of viewing the genesis of some of the electrocardiographic wave forms, particularly when recorded with a “monopolar” electrode, but the interference theory is still helpful and may be applied to the situation in which a pair of electrodes are placed on the surface of cardiac muscle. Modification of this with modern fractal theory (LTBM) can peak electrical reactivity for medical use.

Assume that a pair of electrodes is placed on the surface of intact cardiac muscle and that excitation and recovery of each of the cardiac muscle fibers will contribute a potential to each electrode. The effect diminishes with distance. Fig. K.A shows the amount of potential contributed by fibers at different depths to electrodes *A* and *B*. We know that active tissue is electronegative to inactive tissue plus active tissue under electrode *A* moves the potential indicator in one direction and active tissue under electrode *B* will cause the potential indicator to move in the opposite direction. Thus the contributions of potential to the active fibers under electrode *B* are drawn inverted. Injury to tissue will generate irregularities in the heart beat. Thus the entire field of electro-cardiology is indeed an established energetic medicine.

The interference theory states *that the potential difference recorded between terminals A and B is the algebraic sum of the temporal development of voltages provided by the active fibers under each electrode.* A typical summation of these potentials appears in Fig. K.B, which diagrams genesis of the *R* and *T* waves of the electrogram of simple ventricular myocardium. If recovery occurs earlier under electrode *B* than *A*, the duration of the monophasic action potential under *B* will be less and the *T* wave will be upward.

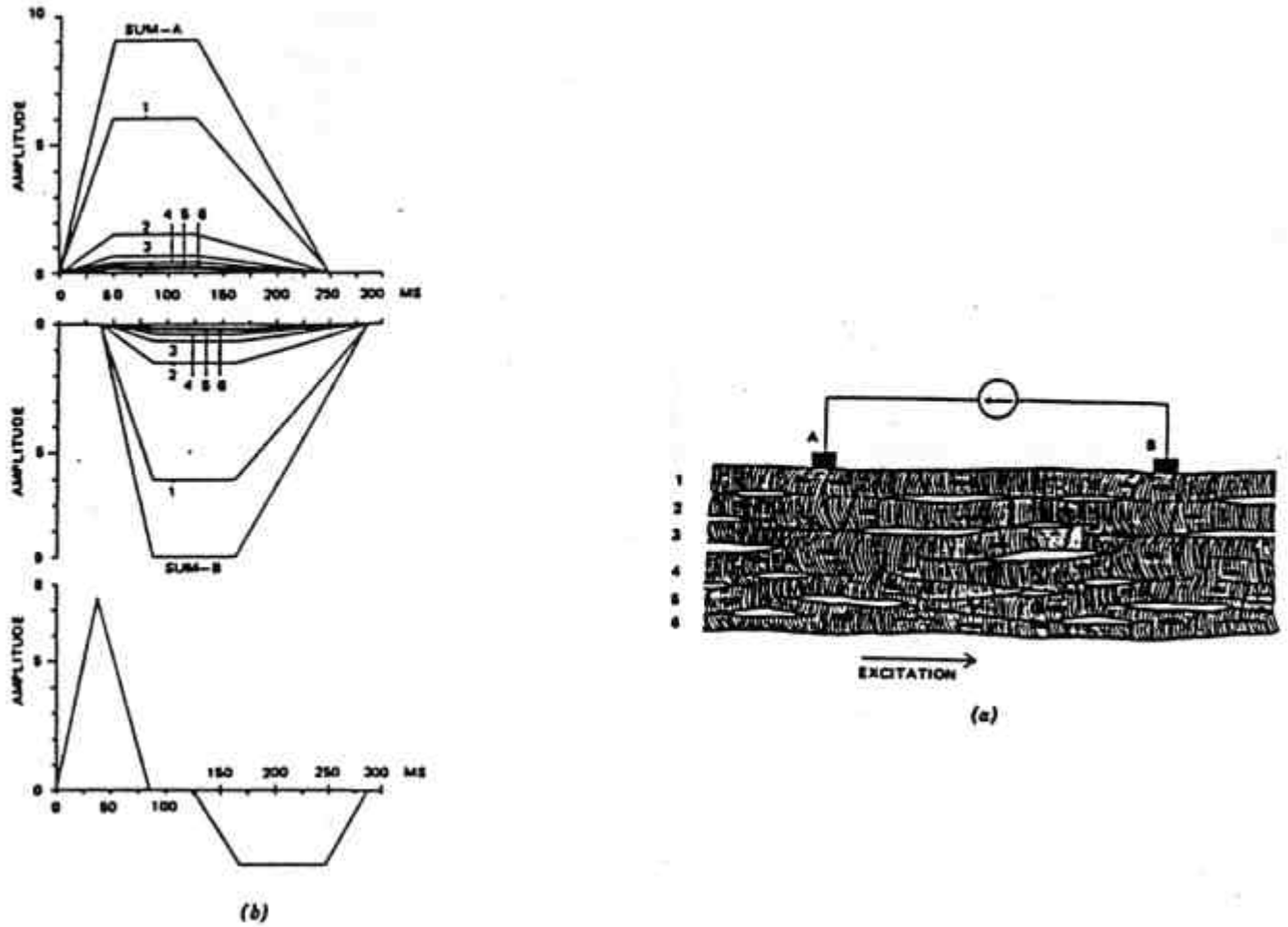


Fig. K.A The potentials from electrodes placed on the surface of cardiac muscle.

If some of the myocardial fibers under electrode *B* are now injured, such as by ischemia, the electrical activity detected by electrode *B* will be altered. Figs. K.A and K.B show tissue injury under electrode *B* at the level of the fibers corresponding to depth 2. There will be no excursion in membrane potential in the region, and there will be a standing injury potential. The growing excitation over the myocardial fibers under electrode *A* will thus produce normal monophasic action potentials. Excitation passing under electrode *B* will produce monophasic action potentials in the uninjured fibers and nothing but a standing injury potential from the area of injury. The temporal summation of action potentials under electrode *B* will be less (Sum *B*), and the potential indicator will reflect the sum of the action potentials detected by electrode *A* (Sum *A*), the sum detected by electrode *B* (Sum *B*), and the standing injury potential.

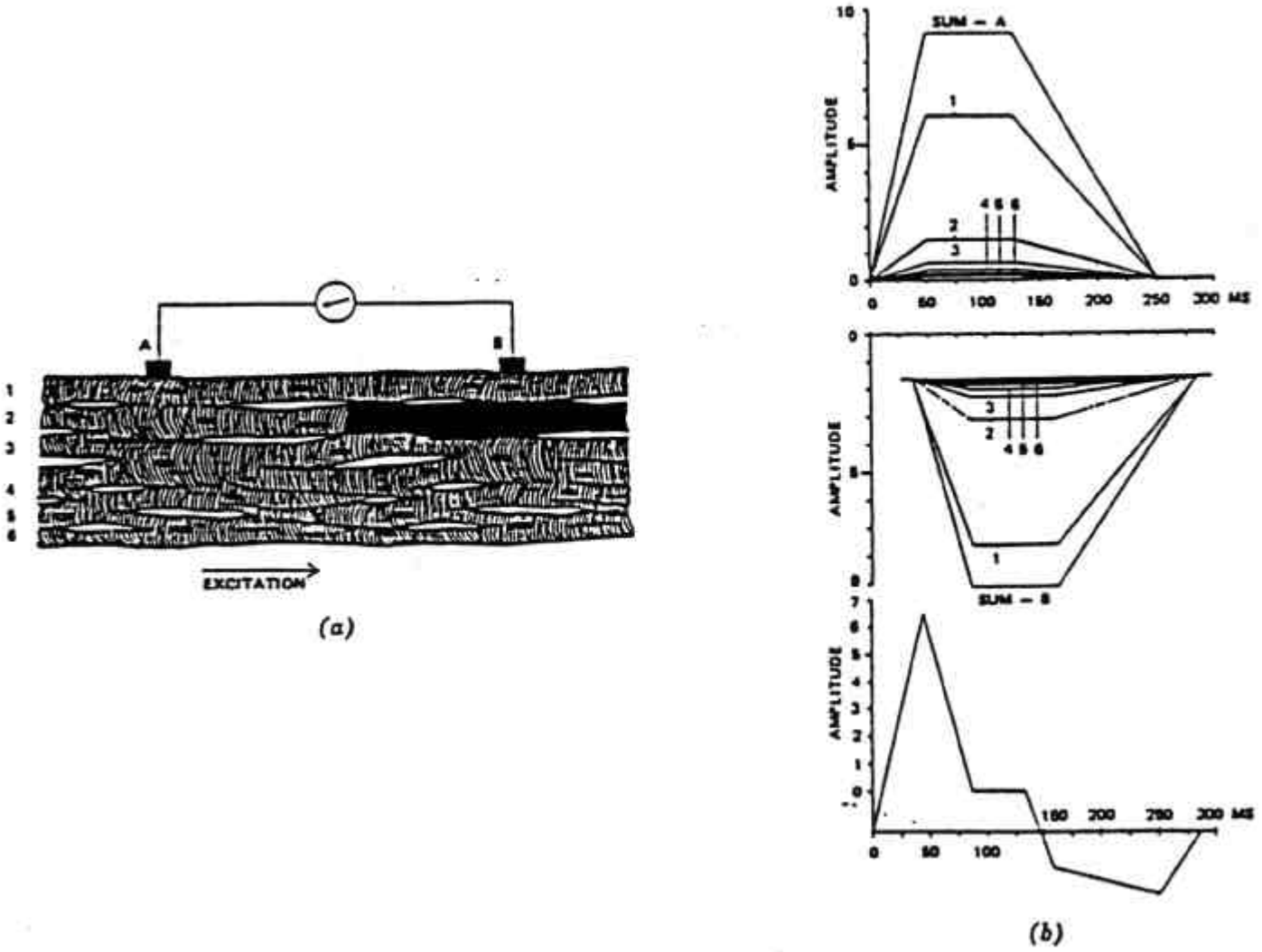


Fig. K.B Action potentials of injured cardiac muscle idealized by use of the interference theory.

The fractal calculus sum of these three components over time reveals that the *R* wave starts at the level of the injury potential and rises and falls, reaching a plateau of zero potential when all the tissue is depolarized; this is the *S-T* segment. When the injured tissue recovers, the *T* wave will end at the level of the injury potential. The elevation in the *S-T* segment (actually a depression of the diastolic baseline) is the principle sign of injury to the ventricular myocardium. Whether it appears as an *S-T* segment elevation or depression depends, of course, on the proximity of the injury to one electrode or the other. (See "Cardiology" by Dr. Nelson).

We have demonstrated that when electrodes are placed on irritable tissue, the potential measured reflects the excitatory and recovery process in the individual tissues as the active tissues are excited and the electrodes are strategically located with respect to the electrodes. We will know the presence or absence of an injury potential in the tissues. Whether the action potential will have upward and downward components will depend on whether one electrode is located in an area of injury or not and the sequence of recovery. Multi-channel equipment, such as the LTBM technologies, is needed to analyze such disturbances. How could anyone do energetic medicine with just one channel?

Dipole Effect. In the practical measurement of a bioelectric event it is often impossible to place both extracellular electrodes directly on the irritable tissue; one may be nearby and the other at a considerable distance, constituting a reference or "indifferent" electrode. The principal difference between this method of measurement and that featuring electrodes directly in contact with the irritable tissue is that the potentials measured reflect the flow of current in the conducting environment surrounding the active region of the irritable tissue. Bernstein's pupil Hermann (1879) first presented this; it was later extended by Craib (1927), Wilson et al. (1933), and Macleod (1938) to include cardiac muscle. Verification of its applicability to human electrocardiography has been presented by Hecht and Woodbury (1950).

Whenever a source of potential (a volume conductor) current flows, a potential field is generated. Fig. L illustrates the manner in which the potential field is distributed. The iso-potential lines (of which there is an infinite number) describe the potential measured by a "monopolar" electrode located anywhere in the environment of the dipole when referred to another electrode in a region of zero potential (i.e., at an infinite distance or on the zero iso-

potential line passing midway between the poles of the dipole). Imagine now that a monopolar electrode starts from a remote point and is moved along a line (*d* = 1) parallel to the dipole axis (the line joining its positive and negative poles); the iso-potential lines are encountered in an orderly sequence and the potential will first increase, then fall to zero (when the electrode is over the midpoint of the dipole), then reverse polarity and increase magnitude, and then decrease as the electrode is moved further away. It should be noted that the same sequence will be measured if the electrode is fixed and the dipole moves. If the procedure were repeated by moving the monopolar electrode along another line parallel to the dipole axis but more distant (*d* = 2), the same sequence of events would occur, but the magnitude of the excursion in voltage would be less (d = 2). Quantic derivatives are not much different. They involve indeterminacy, probability and hermitian matrices. See *Quantum Biology* for more details.

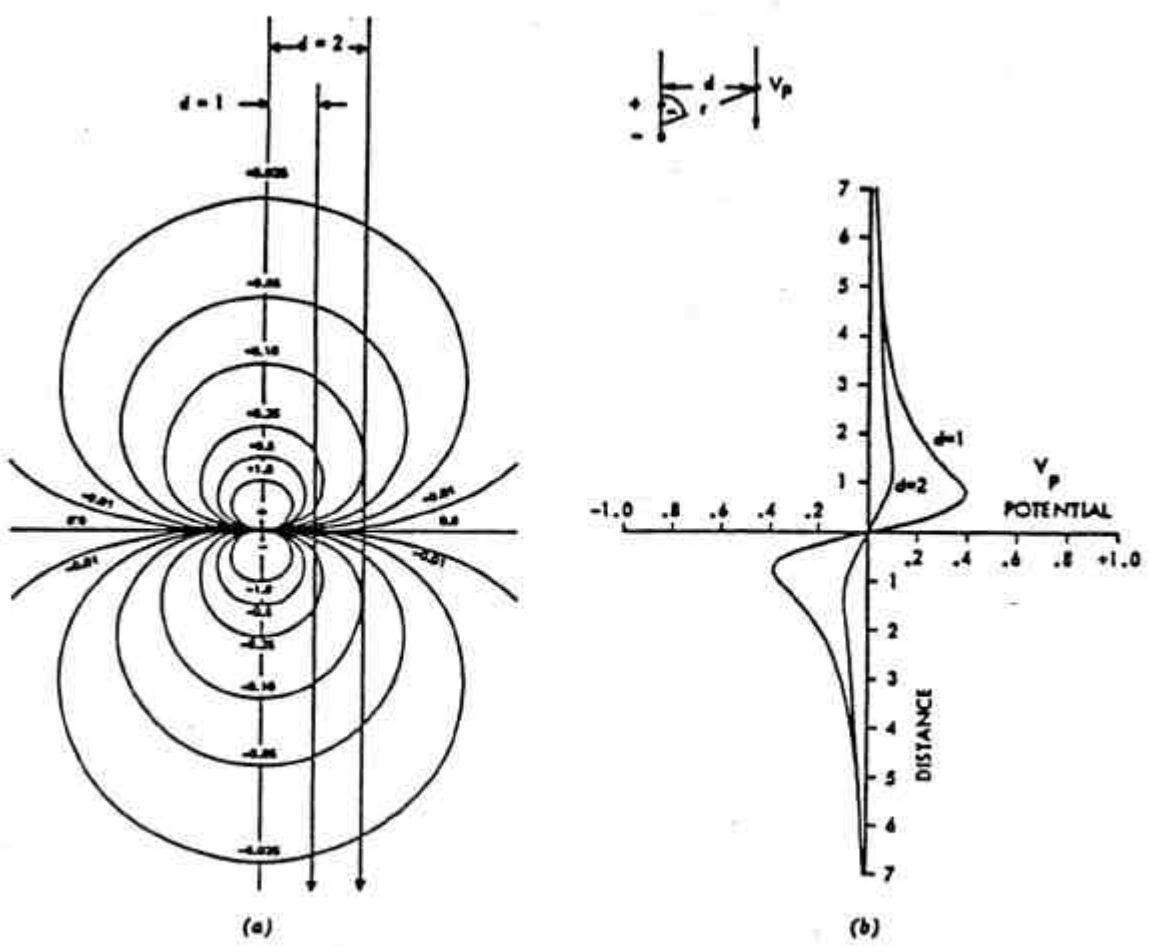


Fig. L The dipole and its field of potential: (a) potential distribution; (b) potential encountered by exploring electrode moving along lines (d = 1, d = 2) parallel to the dipole axis.

Fig. L The dipole and its field of potential: (*a*) potential distribution; (*b*) potential encountered by exploring electrode moving along lines (d = 1, d = 2) parallel to the dipole axis.

The dipole concept is illustrated in Fig. L, in which *a* shows a long strip of irritable tissue at rest. "Monopolar" is the term for the potential *V*p at a nearby point *P*, which is measured with respect to a truly indifferent electrode. An indifferent electrode is one at an infinite distance in the conducting environment, the potential will be essentially zero. When tissue is electrically stimulated, the active region (which is negative to the resting region) will cause current to flow in the conducting environment and to establish a potential field. Because the boundary between the active and inactive regions is characterized by charges of opposite sign, the wave front of excitation are equal to a dipole with its positive pole facing the direction of propagation of excitation. Whenever the active region is in a large segment of the irritable tissue, we find that the potential changes appearing at the point *P* are those displaying the dipole accompanied by its potential field as it moves by. The potential difference appearing between a nearby electrode and a distant reference electrode is clearly diphasic (positive followed by negative) as the wave of excitation passes the nearby electrode. Even if the polarity chosen for the indicator goes up or down, which is controlled by the convention adopted.

Similar reasoning can be used to even the recovery diagrammed in Fig. M. Since the active area is negative to inactive tissue, recovery can be similar to a dipole with its negative pole facing the direction of progressing recovery. Therefore, passage of recovery by the nearby measuring electrode will produce a negative-positive variation in potential. Of greater concern is the phenomenon of electrical reactance. Reactance is defined as a change in capacitance to an inductance field. This produces changes in resistance over time. Thus we can easily interrupt the phenomenon of medication testing. Since there is a proven virtual biophoton field around all items, this field can produce a change in the bioelectrical pattern of the body. This reactance peaks on the acupuncture meridians; mostly near the wrist, ankles, fingers and toes. These acupuncture points are near the peripheral points of the body. Voltage drops with volume of material. So the points near the periphery have peak voltage. The interaction of medication reactivity and electro physiology offers the world of medicine dramatic potentials.

From the foregoing it can be seen that when excitation goes by a nearby monopolar electrode a diphasic (positive-negative) potential change is recorded. If recovery passes in the same direction as excitation, a negative-positive diphasic potential change is measured. If the active region is small, the time between excitation and recovery will be brief. The two diphasic waves will be proximal and may indeed overlap, resulting in a complex positive-negative-positive wave form to signal passage of excitation and recovery. Fig. N clarifies this point by showing the effect of decreasing the width *S* of the active region.

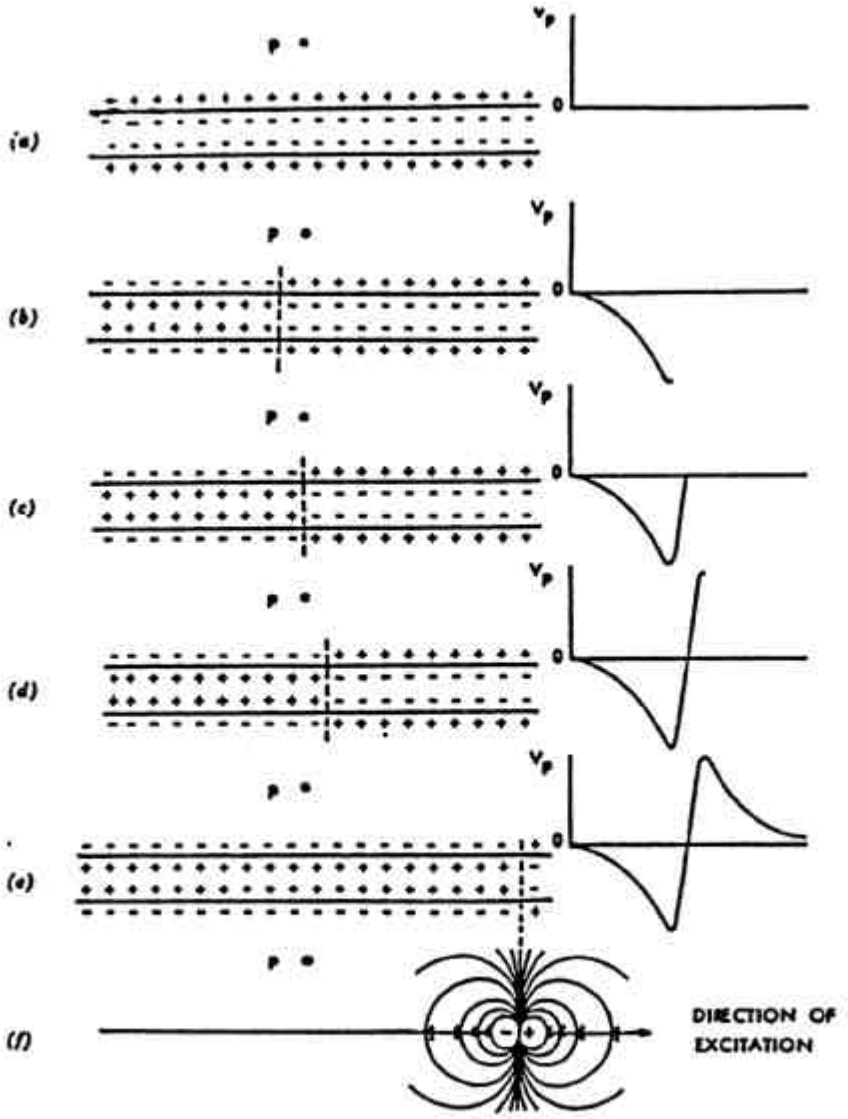
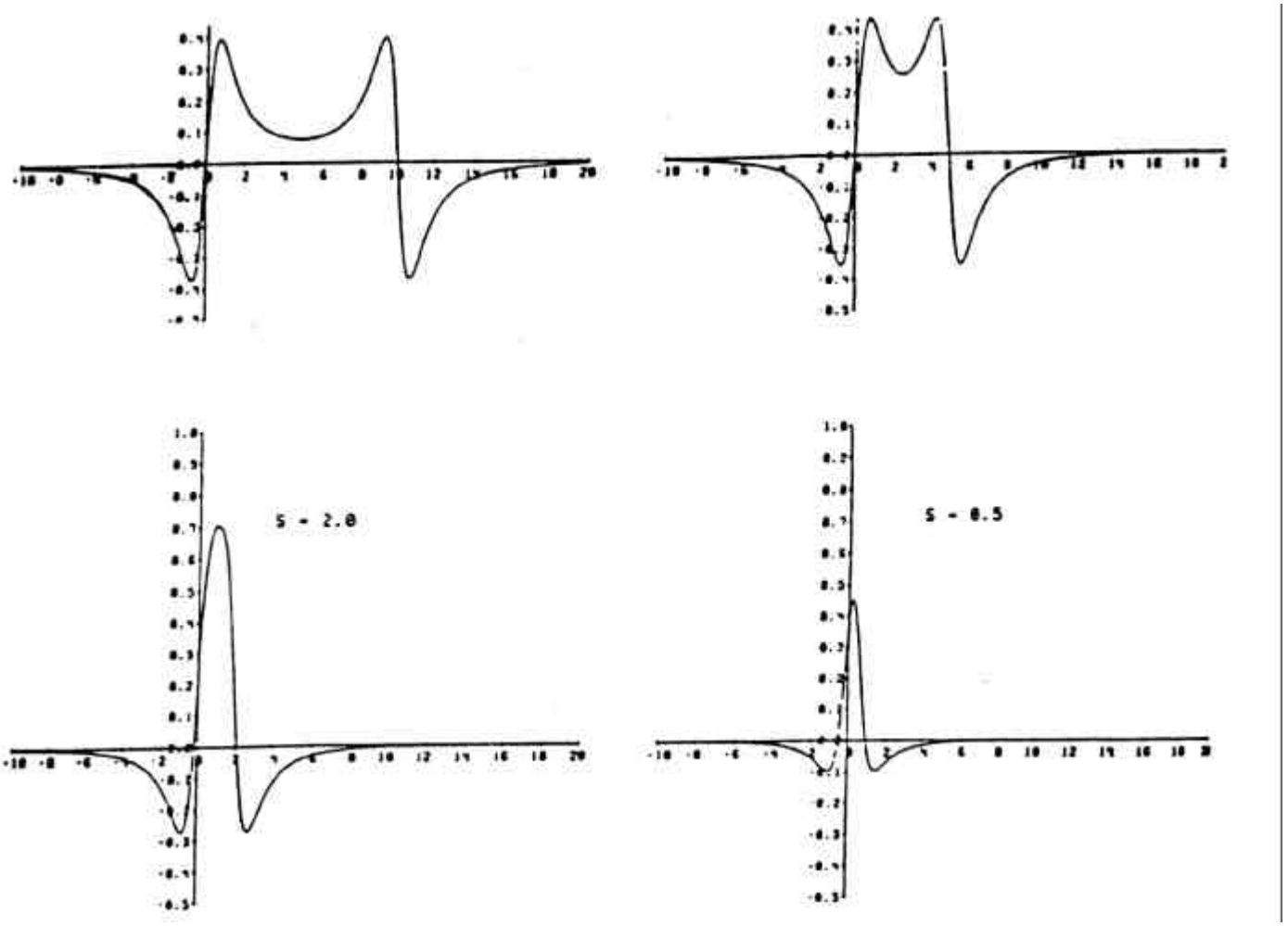


Fig. M Extracellular potential variations at point *P* reflecting excitation represented by a dipole travelling with its positive pole facing the direction of propagation of excitation.

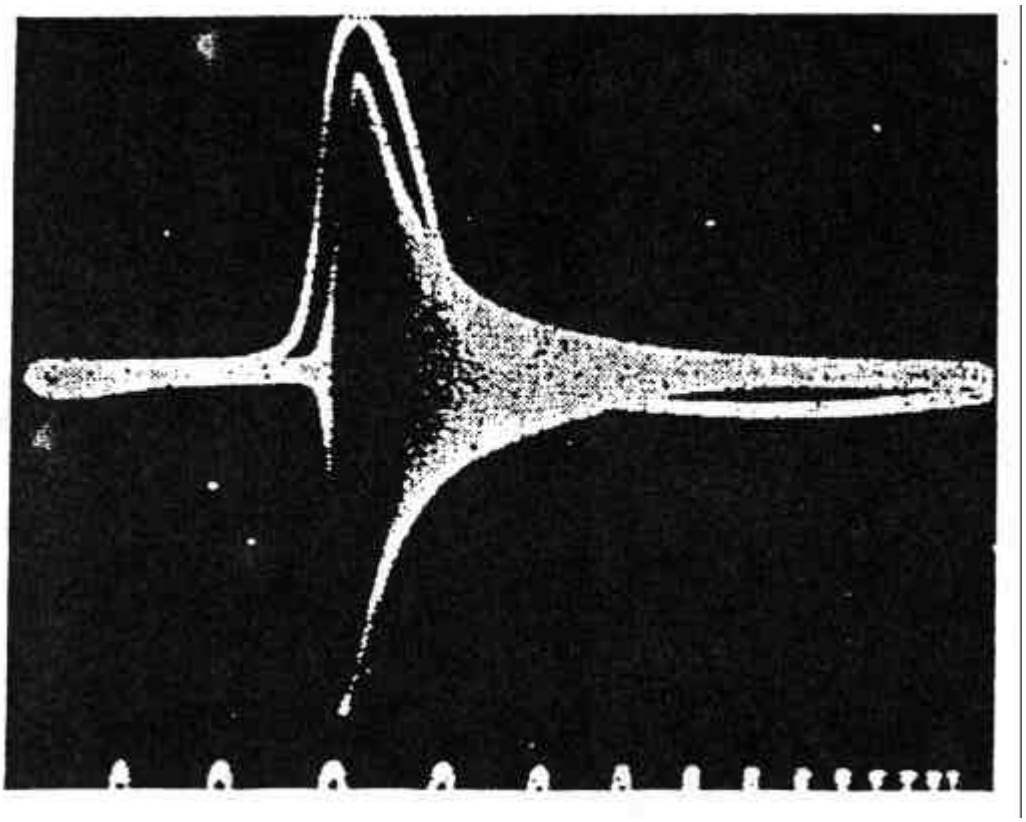
Extracellular potential variations at point *P* reflecting recovery represented by a dipole travelling with its negative pole facing the direction of propgation of recovery.

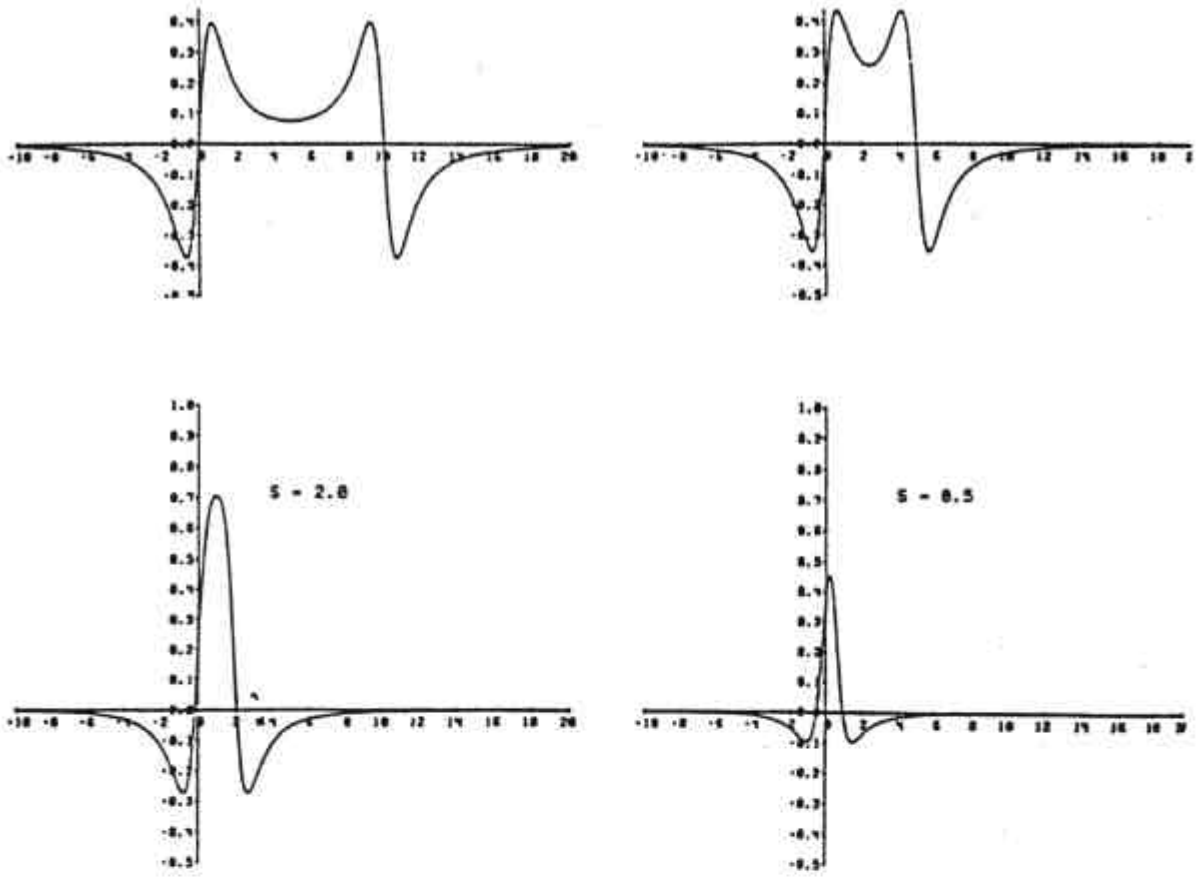
Various configurations of charge and potential distribution at an electrode-electrolyte interface; (*a*) Helmholtz (1879); (*b*) Gouy (1910); (*c*) Stern (1924); (*d*) pure Gouy.



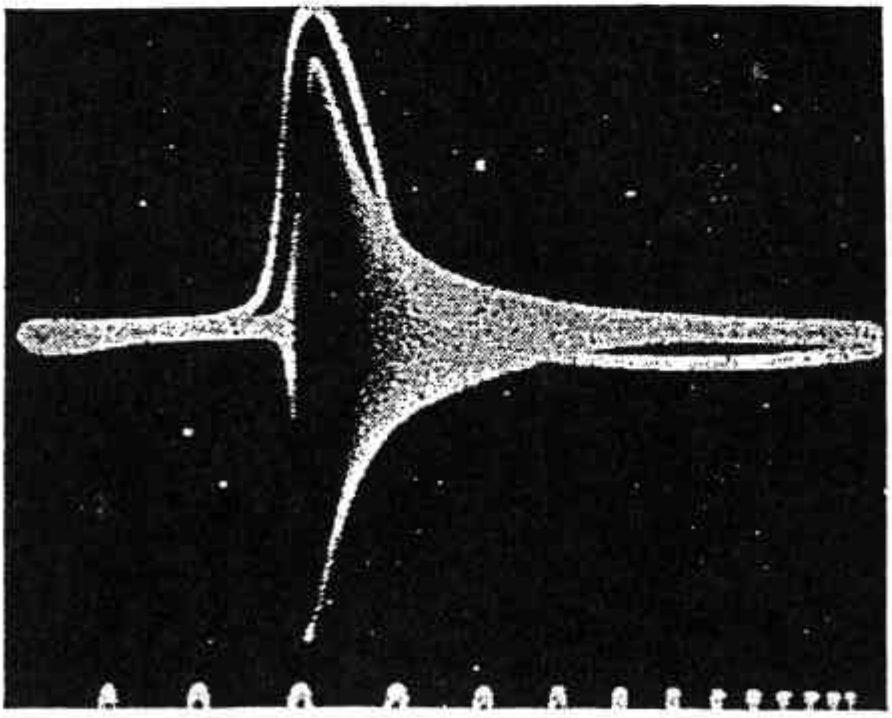
Action potentials recorded by a monopolar electrode in the environment of a strip of irritable tissue in a volume conductor when the length *S* of the active region is decreased (*S* is in arbitrary units).

The relation between the action potential and decrease in membrane impedance shown by the imbalance voltage of a 20-KHz impedance bridge; time marks 1 msec. (From K. S. Cole, and H. J. Curtis. *J. Gen. Physiol.* 1938-1939, 22:649-670. By permission.)





Action potentials recorded by a monopolar electrode in the environment of a strip of irritable tissue in a volume conductor when the length S of the active region is decreased (S is in arbitrary units).



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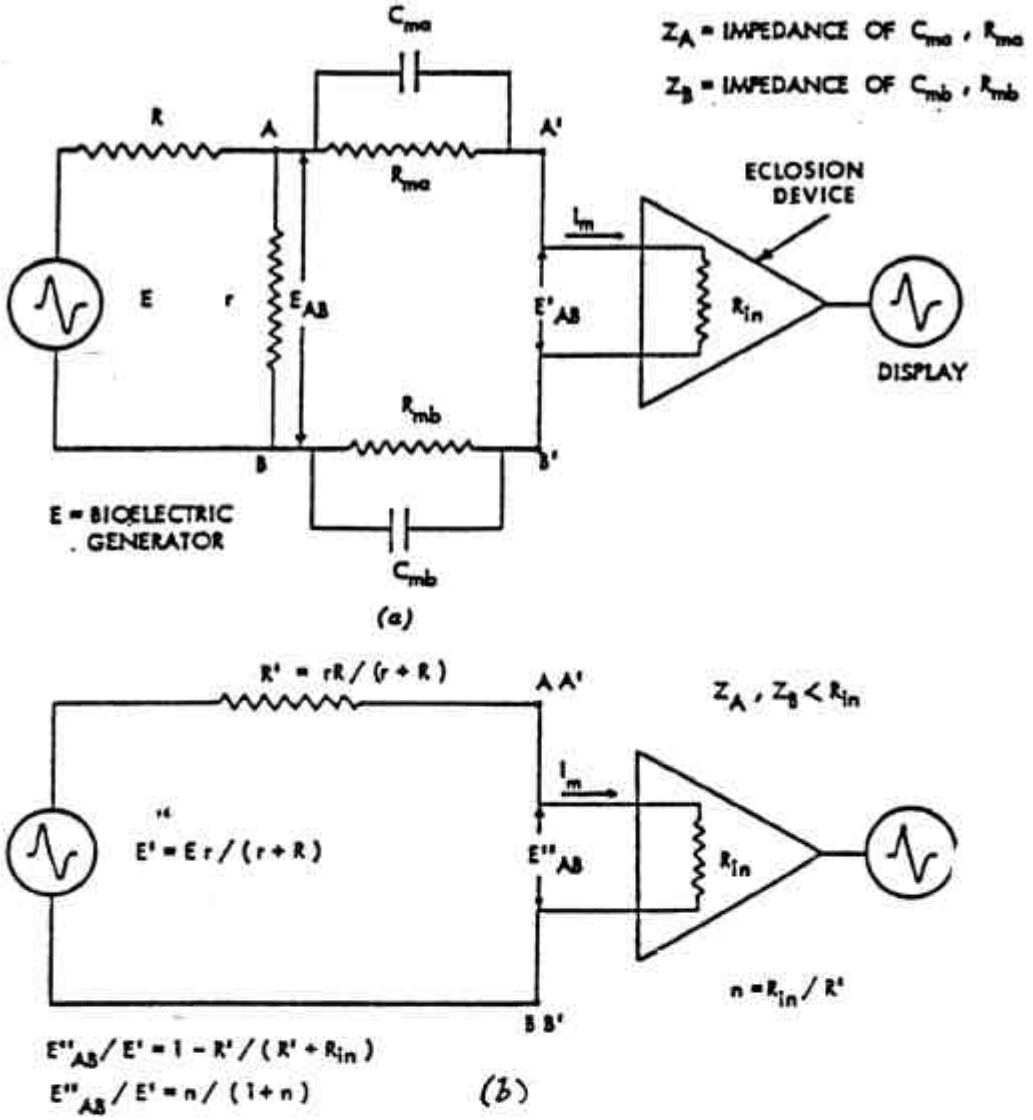
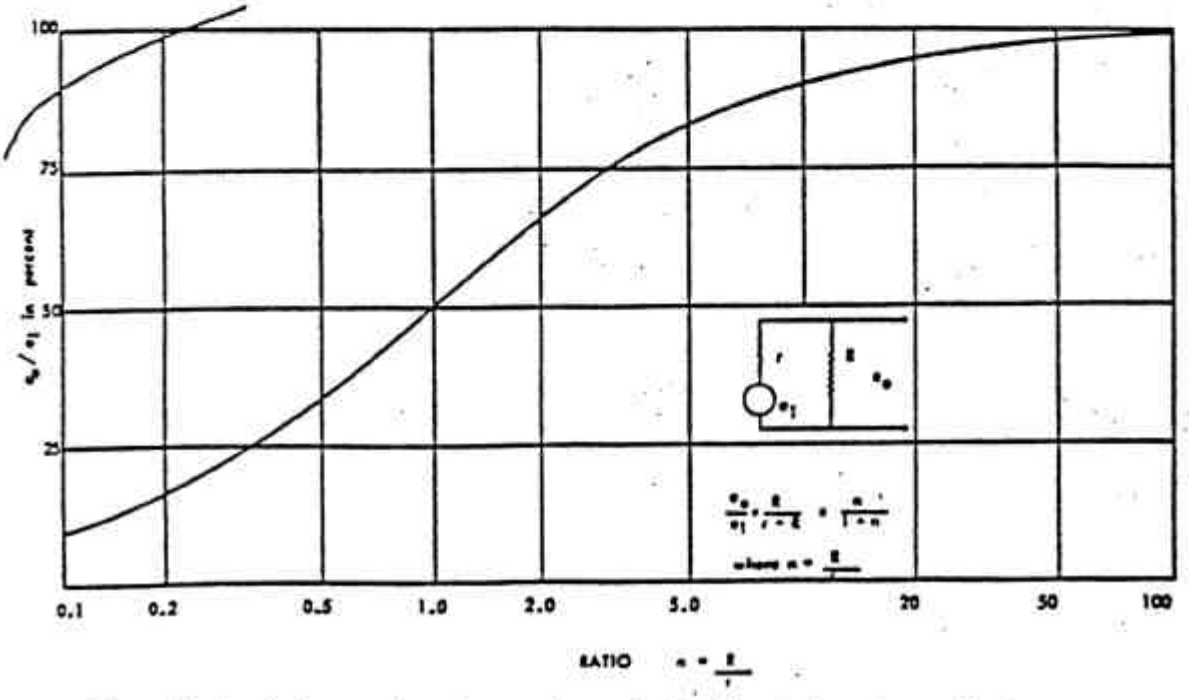
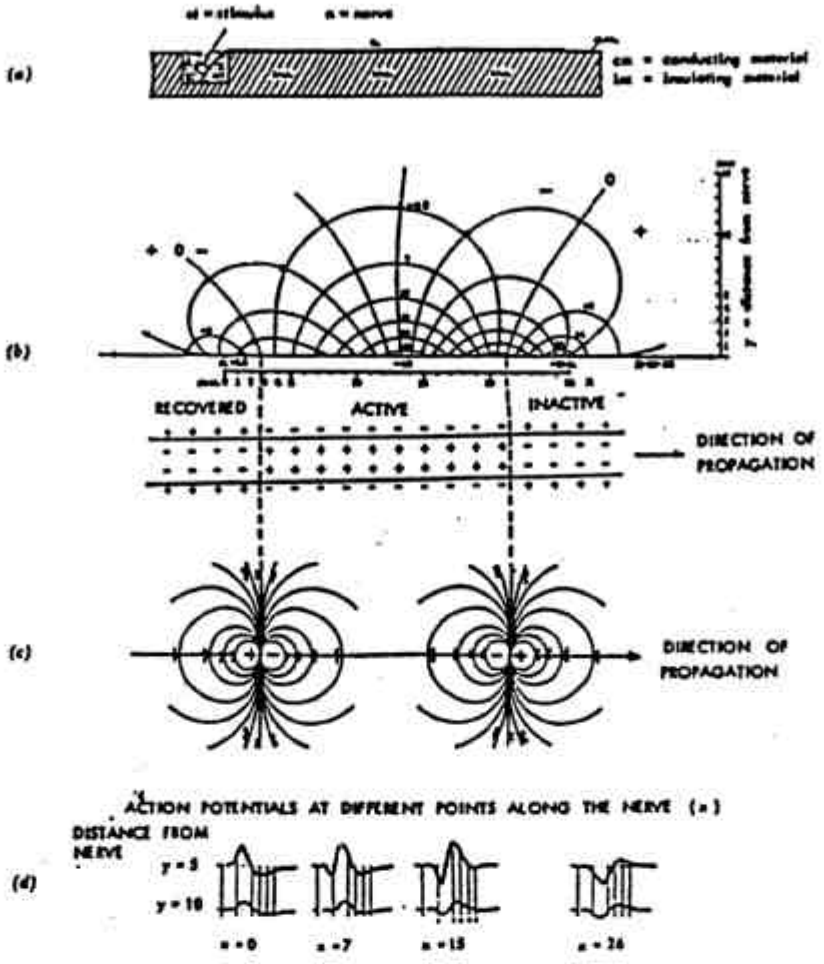


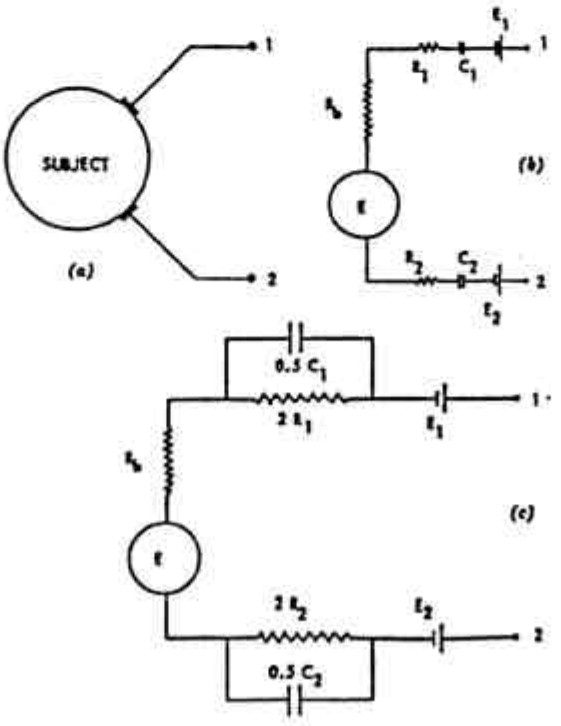
Approximate equivalent circuits: (a) electrodes on a subject; (b)simplified equivalent circuit.



The effect of increasing the ratio n of the input impedance of the measuring instrument to that of the generator on the measured voltage.



The field pattern surrounding an active region on nerve on a conducting plane and its relation to the dipole concept and the action potentials recorded from different points on the conducting plane. (Redrawn after R. Lorente de Nò, A Study of Nerve Physiology. New York: Rockefeller Institute, 1947, Part 2, Chapter 16.



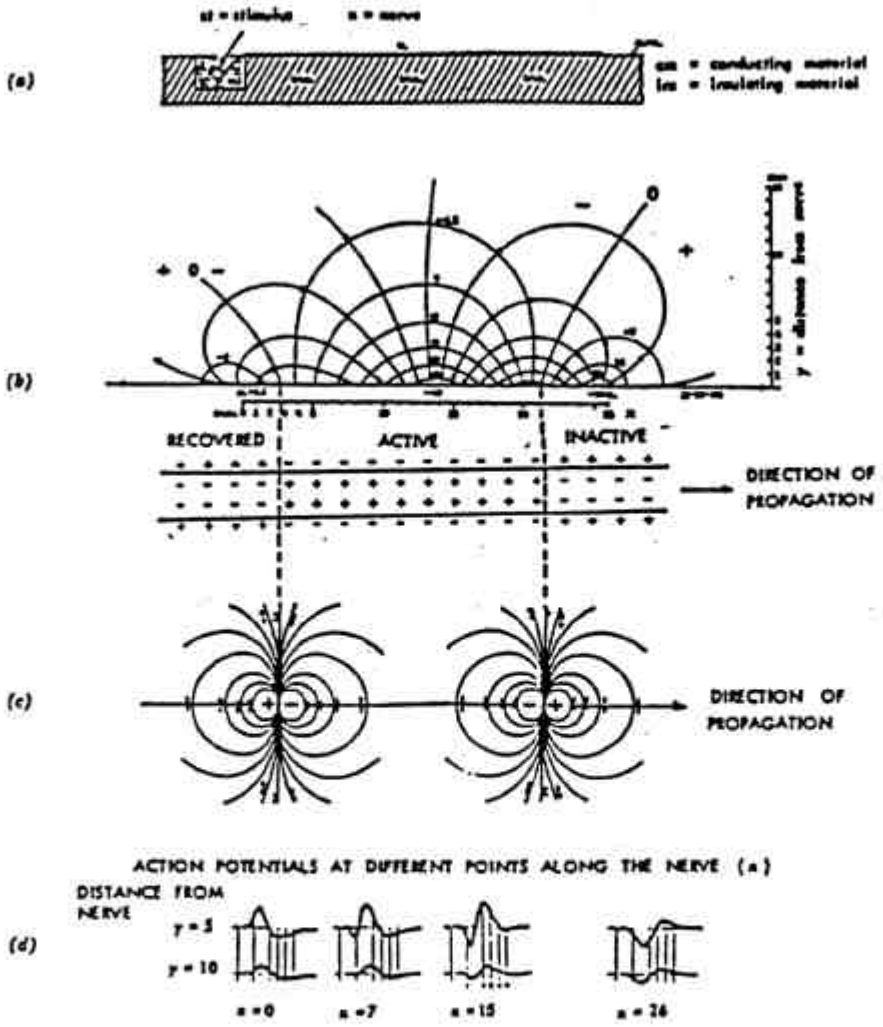


Fig. N The field pattern surrounding an active region of nerve on a conducting plane and its relation to the dipole concept and the action potentials recorded from different points on the conducting plane. (Redrawn after Lorente de Nò, A Study of Nerve Physiology. New York: Rockefeller Institute, 1947, Part 2. Chapter 16.

Lorente de Nò found that the dipole concept could be measured *in vivo* by femoral exposure of a branch of the sciatic nerve of a frog measured by antidromical stimulation, and then recording action potentials with a metal microelectrode placed at sites on the adjacent muscle. Fig. O, which shows the recording he obtained, demonstrates the two theorem results of this theory: 1) that passage of the wave of excitation and recovery gives a triphasic action potential, and 2) that the recorded amplitude diminishes with increasing distance from the irritable tissue (nerve).

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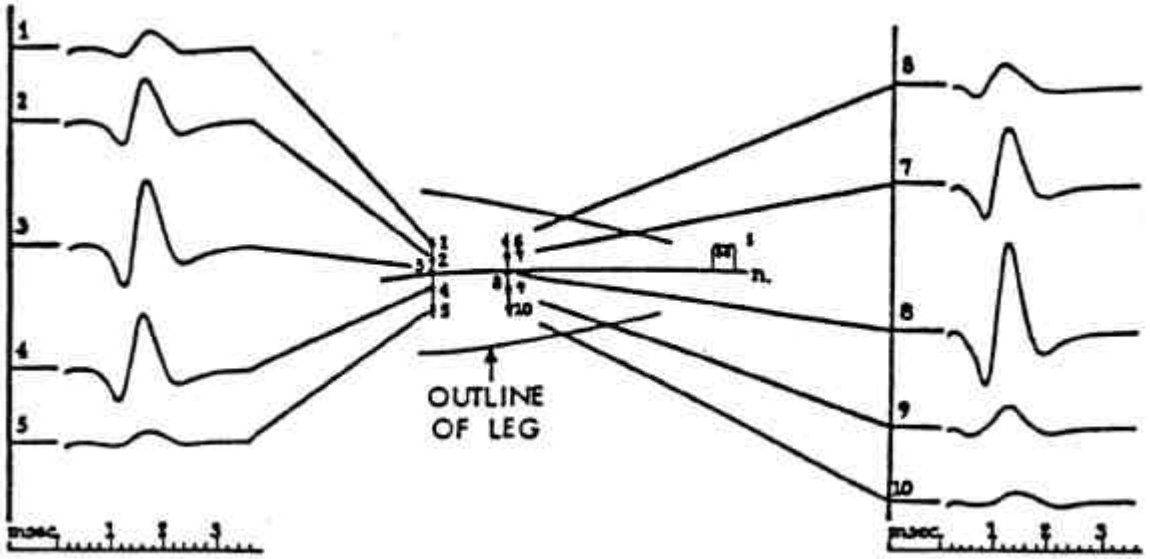


Fig. O Extracellular action potentials recorded in situ from the stimulated (s) bullfrog sciatic nerve (n) on the right side of the animal. The numbers on the recordings in the vicinity of the nerve identify the locations of the monopolar metal microelectrode (tip
radius 20 μ); the "indifferent (ground) electrode was placed on the left leg. (Redrawn from
R. Lorente de Nò. *A Study of Nerve Physiology*. New York: Rockefeller Institute, Part 2,
Chapter 16, Fig. 9.

Dipole theory outlines that excitation and recovery are viewed as traveling dipoles. Recordings are made with a considerable spatial distribution of dipoles. Depolarization is rapid and the transition between active and inactive tissue occupies only a short distance. The wave form representing excitation usually adjusts to that predicted by a traveling dipole. Recovery time is much less, however, and it is unevenly distributed over a greater amount of tissue. The wave form representing recovery is usually less in amplitude and greater in duration. Macleod (1938) demonstrated this difference in studies using the dipole theory explaining the recovery (*T*) wave of an ECG that was recorded with an electrode pair. The pair consists of one active and one "indifferent" (reference) electrode. Macleod described an application of the dipole concept to cardiac muscle. This also explains why irritable tissue is to be considered in the practical application of the dipole concept. Macleod wrote (1938):

Muscle does not become active instantaneously. The active process spreads with a given velocity so that one length of muscle will be coming active, another will be fully active, and a third will be regressing from the active state. The lengths that are in transition are the distances over which the potential difference which exists between resting and active muscle must be distributed. It is possible to represent the potential difference either by a chain of doublets [dipoles] distributed along the transitional region or by a single positive and a single negative pole located at its beginning and end, respectively. Conversely the length of the doublet chain or the distance apart of the positive and negative poles measures the length of the transitional region.

The distances between the poles of the dipoles of excitation and recovery are expected to be different.

The dipole concept predicting the potential recorded with a monopolar electrode is obviously very greatly simplified. We must use caution in extrapolating it to all *in vivo* situations. It is extremely complex. Consider what might happen if both electrodes are in the environment of the active tissue (i.e., one electrode not in a region of zero potential). Realize that the *in vivo* environmental conducting medium does not extend to infinity in all directions and is constituted by inhomogeneous tissue. Thus a relatively complex wave form, reflecting excitation and recovery, can be detected by extracellular electrodes. Accurate prediction of the wave form is impossible in many practical circumstances. But our theories generate an approximate “map” to guide us in our intervention.

Extracellular Potentials Across the Membrane. There is no easy way to relate the action potential detected by an external monopolar electrode (i.e., one paired with an indifferent electrode) to the transmembrane potential. No simple and constant relationship can be attained since there are environmental inhomogeneities of various kinds.

If an irritable tissue in a volume conductor becomes active, there is a current flow in the environment and a potential field results. A monopolar electrode detects the potential due to the flow of current through the resistance of the environmental material. The current surge starts the active region of the membrane, which experiences an excursion in potential. In the field theory (Lorente de Nò, 1947; Clark and Plonsey, 1968; Plonsey, 1969) and with the cable analog (Huxley and Stämpfil, 1949; Tasaki, 1959; Clark and Plonsey, 1966) we show that the membrane current does not have the same wave form as the excursion in transmembrane potential. The mathematical analysis puts forward the case of a cylindrical irritable tissue located in a uniform volume conductor, showed that the membrane current is proportional to the second derivative of the transmembrane potential.

$$\text{Membrane Current} = \frac{d^2}{dT} \text{ (Transmembrane Volt.)}$$

The cable analog for a long, cylindrical, irritable cell can be used to show that the external action potential detected by a nearby monopolar electrode in the environmental volume conductor is proportional to the second derivative of the transmembrane action potential. Allow the environment as a resistance having a value *r*S/unit length; similarly, the resistance per unit length of the cytoplasm is designated r_2.

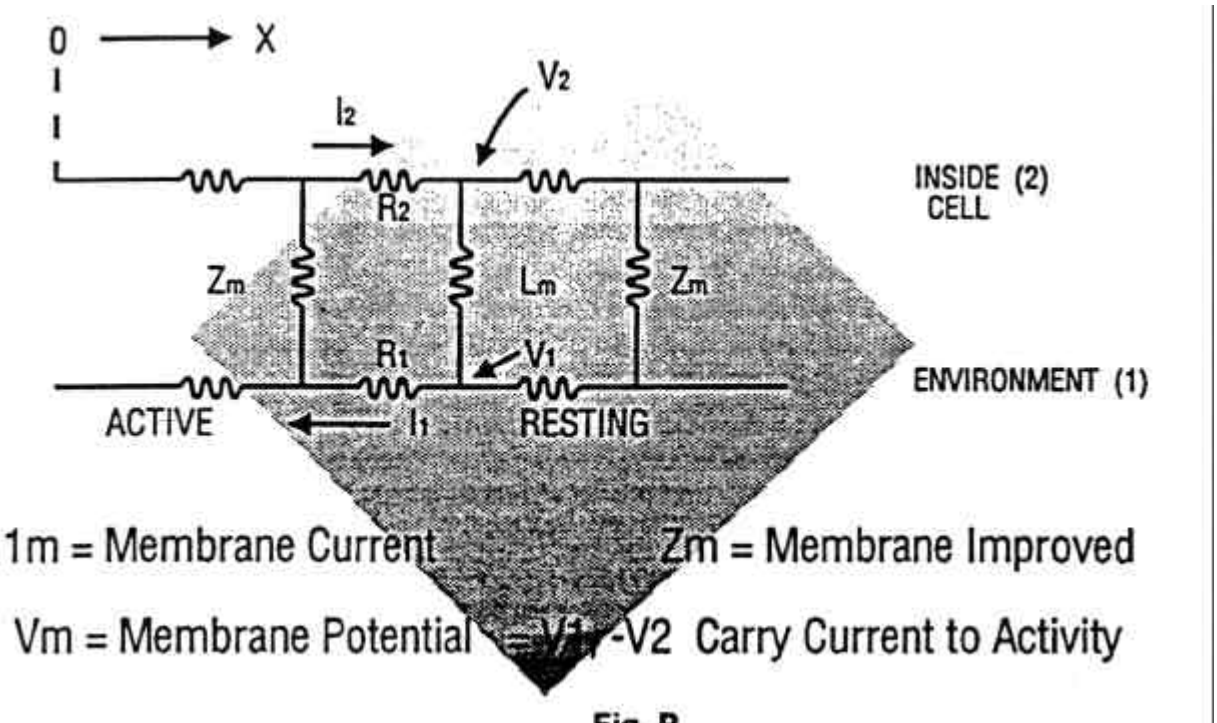


Fig. P

During activity there is a current flow in the environment i_1, in the cytoplasm i_2, and through the membrane im. In Fig. P the currents are identified, along with the coordinate system in which x increase to the right. There is a decrement in current within and without the cell, and this decrement reflects the current im flowing through the membrane. Because of the current flow, at any point there are potentials developed; at a point outside the cell, a potential V_1 will exist and within the cell a potential V_2 will exist.

Since the membrane current im is the decrement in the cytoplasmic and environmental current,

$$i_m = \frac{\partial i_2}{\partial x} \quad \text{and} \quad i_m = \frac{-\partial i_1}{\partial x}$$

Cytoplasmic and environmental potential gradients exist because there is current flow, therefore

$$\frac{\partial V_2}{\partial_x} = i_2 r_2 \quad \text{and} \quad \frac{\partial V_1}{\partial x} = i_1 r_1$$

from which

$$\frac{\partial^2 V_2}{\partial x^2} = \frac{r_2 \partial i_2}{\partial x} \quad \text{and} \quad \frac{\partial^2 V_1}{\partial x^2} = \frac{r_1 \partial i_1}{\partial x}$$

Now

$$r_2 i_m = \frac{r_2 \partial i_2}{\partial_x} \quad \text{and} \quad r_1 i_m = \frac{-r_1 \partial i_1}{\partial x}$$

Therefore

$$r_2 i_m = \frac{\partial^2 V_2}{\partial x^2} \quad \text{and} \quad r_1 i_m = \frac{-\partial^2 V_1}{\partial x^2}$$

In *Quantum Biophysics* we can quantify these readings and show that at the cellular level these functions are quantic.

Because the transmembrane potential *V*m is the difference between the potential outside V_2 and inside V_1 the cell,

$$V_m = V_2 - V_1$$

Therefore

$$\frac{\partial^2 V_m}{\partial x^2} = \frac{\partial^2 V_2}{\partial x^2} - \frac{\partial^2 V_1}{\partial x^2} = r_2 i_m + r_1 i_m = i_m (r_1 + r_2)$$

Now because the excursion in membrane potential is a wave that is propagated with a constant velocity *u* and without decrement, it can be represented by

$$V_m = f\left(t - \frac{x}{u}\right)$$

This expression satisfies the wave equation

$$\frac{\partial^2 V_m}{\partial x^2} = \frac{1}{u^2} \frac{\partial^2 V_m}{\partial t^2}$$

The membrane potential can be transformed from the distance (*x*) coordinate to the time domain *t*; which yields

$$i_m = \frac{1}{u^2 (r_1 + r_2)} \frac{\partial^2 V_m}{\partial t^2}$$

We thus have shown that the membrane current is proportional to the second derivative of the transmembrane potential with respect to time. Tasaki (1959) recorded simultaneously the membrane current and the transmembrane action potential of the squid giant axon. “The membrane current *i*m was detected by forcing it to flow through a low value of resistance *r*, connected to a small central pool of seawater 2 mm wide; on either side of this pool, and insulated from it, were two other pools containing electrodes joined together and connected to the other side of the resistor. The potential difference appearing across *r* was found to be proportional to the membrane current flowing during activity on the application of a stimulus (square wave) to one end of the nerve. The transmembrane potential of the central segment of the nerve was measured by inserting a micropipet into the axon.” The voltage appearing across *r* and that detected by the micropipet were applied to two amplifiers *A*i and *A*v, whose outputs are shown in Fig. Q. The transmembrane potential is a monophasic wave, but the membrane current has an entirely different wave form, and is, in fact, decidedly triphasic.

Our cable theory predicts that the membrane current varies as the second derivative of the transmembrane potential; the study carried out by Tasaki allows analysis. Our quantum matrix will allow us to properly chart out the electrical patterns of health and disease, and furnish a true energetic medicine.

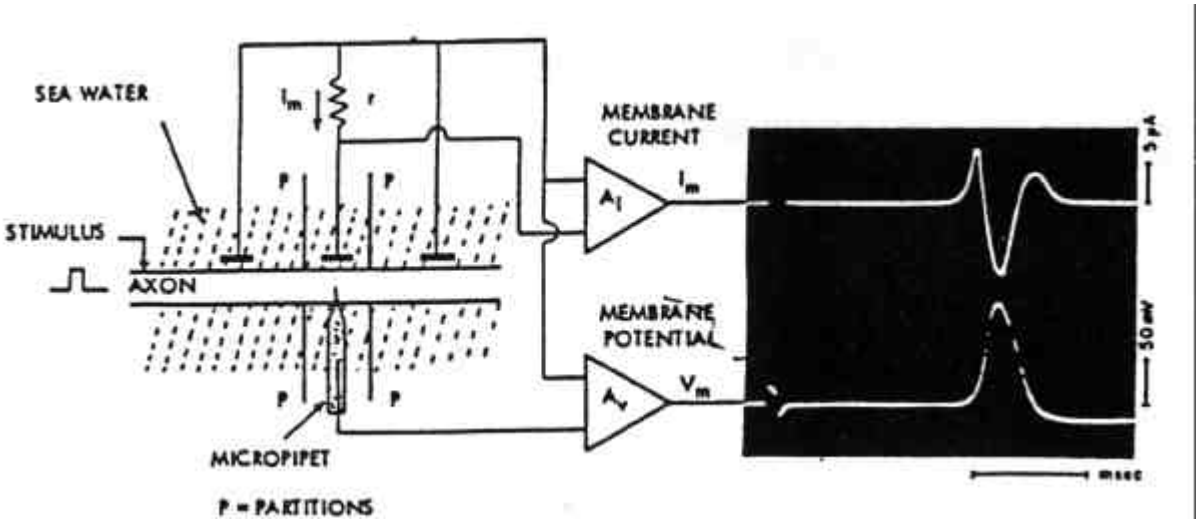
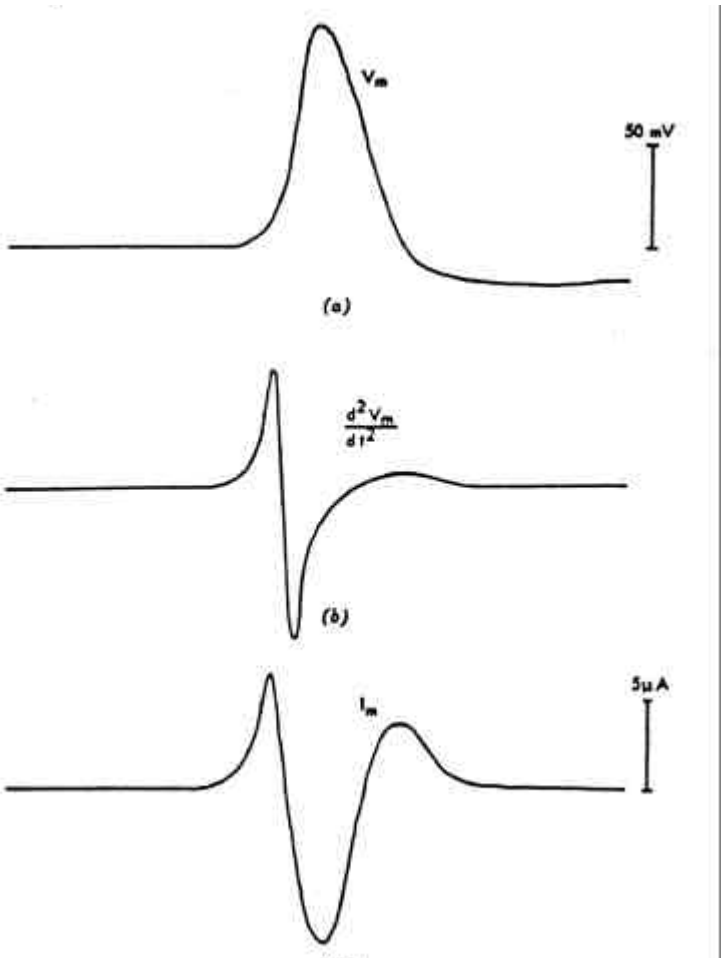
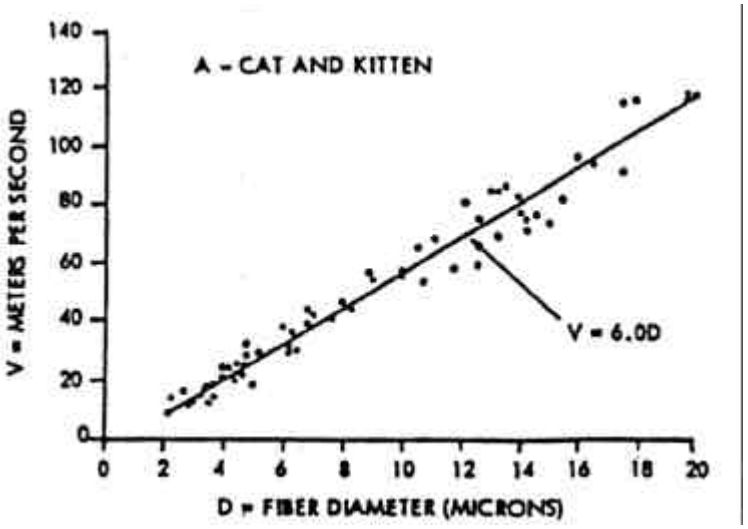


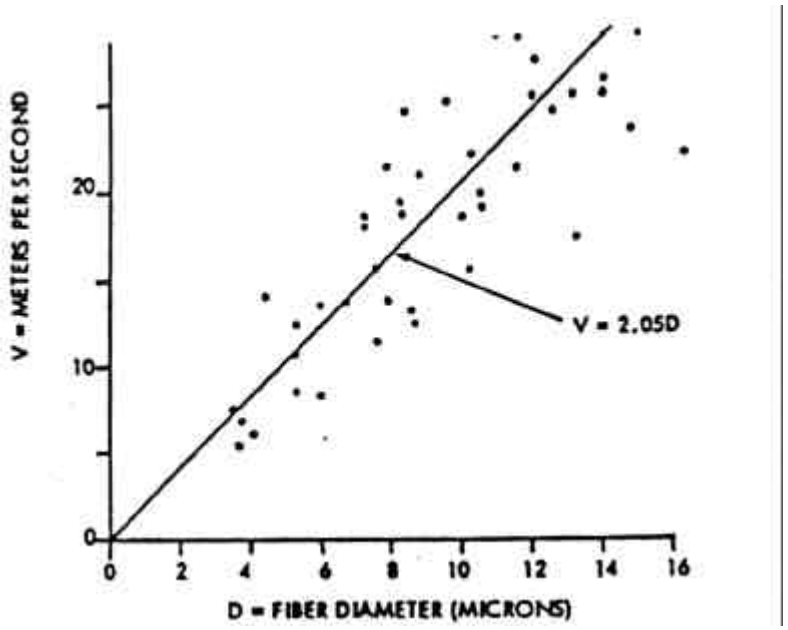
Fig. Q Simultaneously recorded membrane current im and transmembrane potential Vm. (From I Tasaki. *Handbook of Physiology and Neurophysiology*. Vol. 1. J. Field, H. W. Magoun, and V. E. Hall, Eds., Washington, D.C.: American Physiological Society. 1959. By permission.)

Our comparison of the second derivative of the transmembrane potential *b* with the membrane current *c* reveals that they have the same general contour. The difference is probably due to experimental limitations. In the theoretical derivation electrode size and cell dimensions were not considered; potentials and currents were said to exist at various points. Experimentally, neither the axon nor the electrode pair was infinitely small; nor did the volume conductor environment extend to infinity in all directions. Still, with these limitations, there is a reasonable similarity between the wave form of the membrane current and the second derivative of transmembrane potential.

Since the wave form of the membrane current is proportional to the second derivative of the transmembrane potential, the potential detected by a local monopolar electrode should also be proportional to the second derivative of the transmembrane potential. An experiment was designed so that a specimen (2 x 1 mm) of dog Purkinje fiber was placed in a 3-ml beaker of oxygenated Krebs-Ringer solution and connected to a tiny bipolar simulating electrode that was connected to a stimulator having an isolated output circuit. An electrode was placed in the solution about 15 mm distant, and the potential developed in the solution (when the specimen was stimulated) was measured with a 1-μ micropipet filled with 3M potassium chloride.







The relation between propagation velocity *V* and fiber diameter *D*; curve *A* redrawn from J. B. Hursh. *J. Physiol.* 1939, 127:131-139 (by permission); curve *B* redrawn from I. Tasaki. *Nervous Transmission*, Springfield, III., 1953: Courtesy of publisher Charles C. Thomas, (by permission).

Reactivity, or reactance, is the key to medication testing. To maximize this phenomenon we must maximize the force of life in our patients. We must also analyze the variability and the indeterminacy of this process. There are statistical limitations to this phenomenon. To maximize medication testing, we must also:

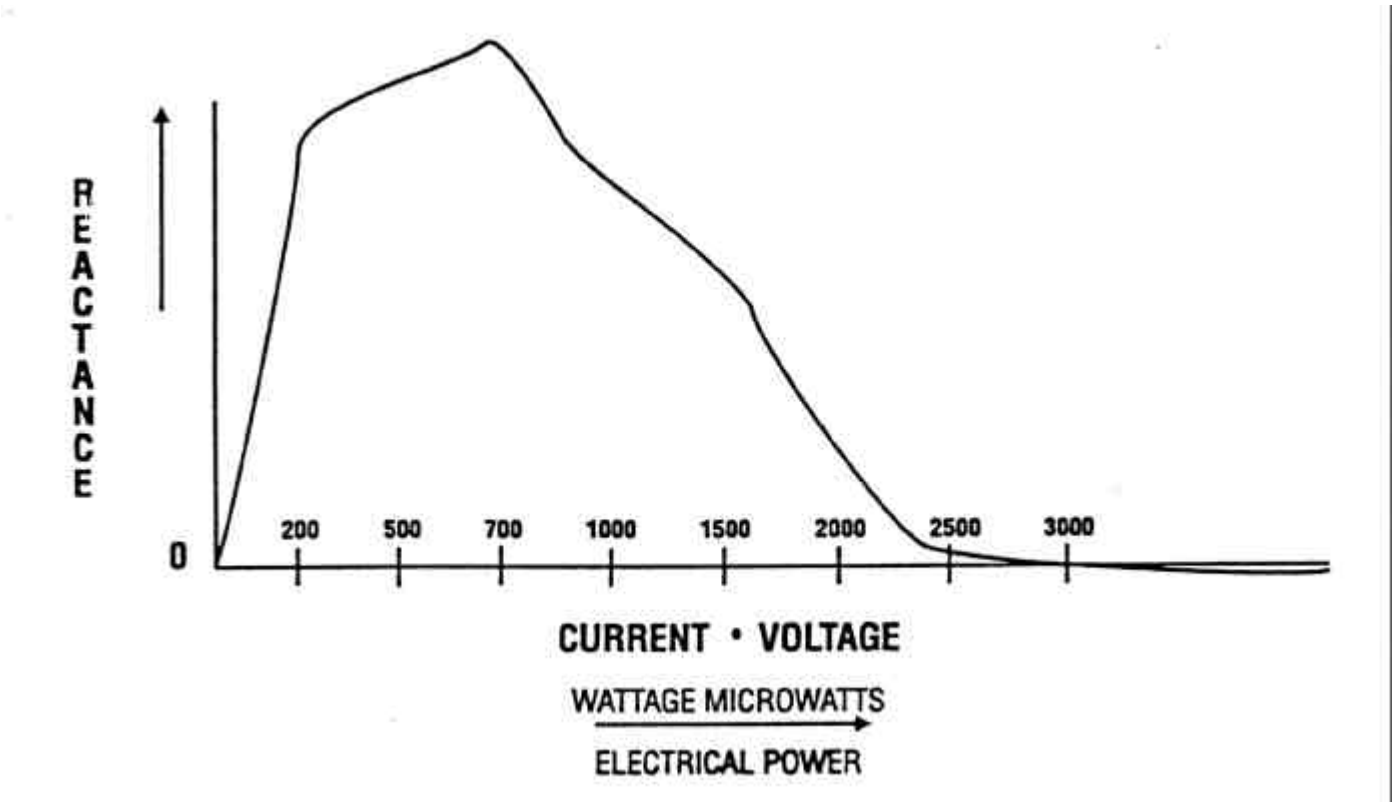
1. Test substances singularly without energetic complications. Use LTBM technology.
2. Measure multiple channels.
3. Measure multiple electrical parameters beyond only resistance; i.e., voltage, amper age, capacitance, inductance.
4. Involve proper medical history and scientific reasoning.
5. Understand the flow matrix of quantic theory to chart out the electrical functions of the body.

As we have shown in other parts of our book, some of the factors of electromotive reactivity in the body have hormonal correlates. Catecholamines have a correlate with voltage, in that the different adrenaline-like compounds act as voltage stimulators, and thus, amperage regulators. The indolamines will act as amperage stimulators and voltage regulators. Thus the entire precept of the body in analyzing its hormonal and electrical components can be done through our quantic philosophy, as we understand how the cells unite to make multicellular organisms such as the human body.

When there are conditions of hypoadrenia, or deficiencies in the catecholamines, this will result in a parasympathetic dominance, a release of histamines, and a susceptibility to various swellings of the tissue that the histamines predominate. These histamines will cause alkaline shifts in the tissue, which is another electrical component; and thus accumulate water. So irritations of sinusitis, asthma, irritable bowel, hives, and other allergic symptoms can result. This involves voltage deficiency. Thus by adding volts to the body we do not correct the basic deficiency of the catecholamine weakness.

Depression is often a case of a deficiency of the indolamine compounds, which means that there could be a deficiency in the amperage quality of the body, and also voltage regulation. Thus by supplying amperage to the body we do not correct some of the deficiencies of the indolamine compounds. The inverse can happen in psychotic reactions, where there are too many brain hormones.

So here we can see some of the very basic diseases which can be detected by the overall measures of the human body, which also can detect and help to chart therapy courses for correction. The purpose of this book is to outline some of the basic science behind these technologies. Our further publications go into the correction factors of how these things must be dealt with in a medical setting. Let us recount that this book is to direct a new thought pattern away from the pure chemical forces and into a chemical-electromagnetic, physiological, psychological, true, holistic medicine which can be analyzed from quantum physics.



The relation between extracellular potentials *A*-*E*, transmembrane potential *F*, and the second derivative of the transmembrane pontential *G*. (Data courtesy of Drs. D. Riopel and R. Vick, 1970.)

The human beings have distinct electrical patterns. Each person has a trivector signature of voltage amperage and resistance profile. This sets up a band of capacitance and inductance bands for each person. The body has electron and subspace transport systems for communicating energy and information. The nerves are distinct control areas for the flow. Within the band of electrical dynamics of the nervous system the individual nerves act with more distinct electrical signatures. Thus if the parasympathetic system has a reactance band of 150 to 175 siemens, the vagus nerve might have a reactance band of 150 to 157. The resonant frequency of the nerve will also thus be more specific for each nerve versus the more general pattern of the nerval system it belongs to.

To measure these patterns we need to first measure the overall electrical pattern of the patient. This includes the resistance , impedance, voltage, amperage, capacitance, inductance, resonant and harmonic frequencies, ph, eh, reactance, polarity ,evoked potential, etc. Evoked potential is the reactance pattern of a subject to an applied stimulus. Then we measure the individual nerval reactions of these patients in the context of the individual patterns. Then the specific nerval reactions can be measured in the same fashion. Attempts to measure just one parameter such as resistance or resonant frequency will be grossly inaccurate. Instead a fractal dynamics of non linear data analysis must be used for the best results. Then thousands of subjects need to be analyzed for pattern similarity. After 12 years of analysis a computer program capable of performing the vast numbers of individual analysis has been developed.

The end resulting computer program can now analyze and treat nerves and nerval systems. Only by systemic analysis of the electrical trivector signature can the patterns be best analyzed. The computer can set up an interactive handshake analysis. A cybernetic link can be established where the computer can treat check and retreat in a consistent loop till the energetic imperfection is abolished, corrected, or till the system refuses to respond. Any more therapy would be unwise. The old style systems where just one way therapies without cybernetic feedback. Simply put this computer can interact during therapy with the patient to adjust the therapy for individual needs. By using the mathematics in this chapter and the rest of this book anyone of superior intelligence and with 5 years of work could develop a device like the Quantum Med C.I.

SUMMARY

1. In this chapter we reviewed some of the uses and measurement factors of electro-medicine. We can see how some of the practical measures of electro-medicine have been used to develop electro-medicine systems. These and other analytical systems are now available in the Quantum Med C.I.

2. We further proved the need for an electro-medicine in biology to study the electrical factors of the human organism.

3. The allocation and need for development has been outlined for more research into the field of electro-medicine.

4. Outline of volts, amps, resistance, impedance, capacitance, inductance, and oscillation proves necessary for electro-medicine.

5. The varying electrophysiology of injured versus healthy tissue was reviewed. This was used in developing LTBM- related technology used in the Quantum Med C.I..
6. Reactance, or medication, has boundaries of measurement. There are ways to maximize the medication testing phenomenon.

** The remainder of this chapter contains excerpts from the book, “Electrodes and the Measurement of Bioelectric Events”, by L. A. Geddes, Publ. Texas, Wiley-Interscience, 1972.

* Licensed Trinary Biofeedback Manufacturers

Chapter 15

A NEW PERSPECTIVE ON RESEARCH

In late 1991 US News, a well-known magazine in the United States, wrote a series of articles about alternatives to medical techniques, and how these alternative medical techniques were getting more and more attention by doctors throughout America. More doctors were turning to alternative techniques in light of an inability to get lasting results via synthetic allopathy and surgical intervention. As the populace starts to look for more natural techniques with fewer side effects, alternative medicine has been developing natural types of therapies for years, and the ability to work with these natural modalities. This underground medical group has developed some wonderful techniques to deal with a wide variety of medical problems.

It is important to note that every field of endeavor in society will have evolution in its thought and philosophies. There can be no eternal stagnation in the philosophy or psychology of any group.

Through the years medical philosophy has built many different philosophical foundations that have yielded to the challenge of time. Medicine started with very natural philosophies and became very statistical and analytical after the development of statistics by Poincaré. Synthetic chemistry came along and offered its processes, and the dramatic amount of profitability that could be incurred from patenting such items further helped to develop the synthetic cause, thus leading to an allopathic philosophy primarily based on synthetic chemistry and surgical intervention. This is the basic mind set which has developed in medicine over the last fifty years and which is now starting to yield to other fields of endeavor. Some of these new fields of endeavor are electronics, physics, energetic, naturopathy, homeopathy and the like.

Thus we can see that a new psychology for medicine will develop over the next five to ten years which will have a stronger base in a softer philosophy, allowing for some of the mistakes made in the past due to synthetic allopathy.

So as we observe this process of the psychological evolution in medical philosophy, it is important to note that it parallels the psychological evolution of the minds of men. This chapter is dedicated to a new concept of medical psychology and philosophy. The opponents of this development will try to cling to oldstyle ideations, and they will also secure themselves in arrogant, obstinate judgmentalism. This
judgmentalism might stop them from actually reading and getting the benefits of what this treatise has to offer. We hope that they can soften their hearts and minds to allow anew psychology and philosophy to develop freely.

In this US News article many concepts were addressed; among those were acupuncture, biofeedback, homeopathy, nutrition, naturopathy and others.

As we can see from the above articles, the critique that was made on homeopathy was one for which there were not enough apparent clinical trials. It is the purpose of this article to question the very foundations of clinical trials as the end-all deciding factor in whether procedure or medical belief is acceptable or worthwhile in medicine. The factor of clinical trials means that once an item or drug is chosen it can be put to a clinical test in the patient population to see if it really does that for which it was originally designed.

To do a clinical trial, a randomly selected group of patients, possessing whatever traits we would be looking for (such as diabetes, high blood pressure, or any other type of medical illness) would be selected. Then a controlled population or group is selected. We now give the substance, the therapy, to a certain number, known as the “effect group”, and the control group would get a placebo or some other type of comparative therapy regime. We now do a statistical manipulation at the end of this study, whatever time line it might be, to see if the purported remedy would work better than placebo in the study. Comparative statistics would be used to evaluate whether the substance performed well versus the placebo or control group. This is an over-simplfication of a statistical clinical trial.

The purpose and the basis of our study is to challenge the Null hypothesis. The Null hypothesis is that the two groups that are being statistically challenged will be equivalent, and will not show any difference. If the Null hypothesis is disproved, and the two groups are different, then we can assume that there is statistical evidence that one group outperforms the other by some criteria.

The problem with modern medical statistical analysis is that if the two groups are proved equal, and the Null hypothesis is not disproved, then the assumption is that the two therapies are equivalent. This is not what the Null hypothesis states as it was originally set up for analysis. The true conclusion is that the groups differed, but the difference in the two groups could not be detected by the limitations of our

measurements. Thus in determining that synthetic vitamins are equivalent to natural vitamins in the statistical studies, we must clarify that the Null hypothesis does not state that the two groups are equivalent; just that the sophistication of our measurement skills is not sufficient to measure the difference. This is the true conclusion that can be achieved from the Null hypothesis. But often in science the Null hypothesis is abused to assume that two groups are equivalent, when actually there might be a problem with the accuracy skills.

Reductionism is often the problem in science, not the solution. In doing these types of studies we see the errors of reductionism at their highest.

PROBLEMS OF CLINICAL TRIALS

1. Reductionism. Reducing the complex patient to simple measurements. This makes attained information sus pect and weak. Medicine becomes cold, impersonal, and statistical. Compassion cannot be reflected by sta tistics.
2. Never long enough. Effects of a synthetic medication can result in genetic damage generations later. Overconfidence and misinterpretation of the Null hypothesis. If a study of natural versus synthetic vitamins shows no difference in results, it does not occur to researchers that they, or their ability to measure, could be in error.
3. Almost always benefits the one who can afford to fund the study. (Experimenter effect)
4. Trials will always reward and reinforce the philosophy of those performing them. Allopathy is preferred; homeopathy and naturopathy are ignored.
5. Quantity does not dispel quality. Publish or perish rule pushes paper out of educational institutions, which just perpetuates the allopathic delusion.
6. Inability to accept the truth that allopathy is hurting patients in vast numbers. latrogenic malpractice suits resulting from synthetic drugs top fifteen billion dollars a year. We must realize that our clinical trial process is a .failure, and replace it.

These errors of reductionism result in errors of decision-making for the medical establishment. As we take these individuals with rampant, variant problems, conditions of liver, function, kidney function, skin conditions, ethnic backgrounds and the like, we then take these populations and reduce them to one type of criteria. We reduce the complexity of their human diversity to a simple variable of blood pressure, hormone level in the blood, range of motion, or whatever type of statistical measurement technique we use.

There are possibly millions, if not millions of millions, of variables in the human body that can be measured. The body is vastly complex. No known study has ever measured all the possible variables to achieve a total analysis. Every known study has been reductionistic in some way.

So it is to this end that we must realize the inadequacy of our statistical abilities, and in continuing with them to not revere them or put them onto the pedestal created by modem science.

SOLUTIONS TO CLINICAL TRIAL PROTOCOL

1. Realization of the inadequacy of any clinical trial to give perfect conclusions. Incorporate compassion, educa tion, and love back into medicine.
2. Nature has designed chemicals and complex compounds (such as herbs and glandulars) for millions and millions of years. Naturopathy comes with its own long-term background study.
3. Realize that the Null hypothesis only says that this study showed (not proved) no effect.
4. Reduce restrictions on orphan drug funding and encourage more natural drug testing by reducing philosophical criticisms.
5. Broaden our philosophy of medicine to revere the natural process and acknowledge the unknown in biology.
6. Give equal funding to studies on homeopathy and naturopathy at educational institutions.
7. Broaden our medical philosophy to include quantum theory, energetics, homeopathy, and naturopathy. Teach doctors that there is a safer and more compassionate way to do medicine. “First don’t hurt” must be brought back into medicine. Clinical trials should only be a small part of medical consideration, and not defied.

As we have pointed out several times in our book, the concept of reductionism is the fallacy, the error, of science. Not that reductionism is totally bad; it must be a part of our decision-making process. But to make it the only part, the pinnacle, the demigod of medicine, is where the error comes about. Using reductionistic studies to shape medical protocol has resulted in a medical establishment which is about to collapse under the weight of iatrogenic diseases and malpractice payments.

In science we often talk about the Null hypothesis, meaning that we try to prove an experiment versus the Null hypothesis. As an example our hypothesis might be that digitalis can help heart patients. The Null hypothesis is that digitalis does nothing, and actually is no different from a placebo. To test our

Null hypothesis we work up a random-sample group in which two populations will receive differing treatments. One will get the digitalis and one will get the placebo. If both groups experience equal results, then the Null hypothesis is proven; there is no difference between the groups or the interventions. This basic assumption is incorrect in the true management of science. In the true management of experimental science and statistical management we will find that all that we know from this study is that the study could not prove any difference between these two materials. It is wrong to assume that the two materials are the same just because this study did not prove them to be different.

Years ago in the journal of the American Medical Association a medical study was released in which hyperactive children were random-sampled into two basic groups. One group was given a lemonade made with a processed white sugar, and the other was given lemonade made with saccharin. It was found that there was no basic difference between the two groups, and that the Null hypothesis was achieved. Many of the medical doctors who reported on this study and who were quoted on Lifetime Medical Network said that from this study they could conclude that there were no problems regarding hyperactivity generated by sugar. That was an irregular conclusion. The actual conclusion is that there is no difference between saccharin and processed sugar, but the study did not involve any natural sugars or fruit sweeteners.

So just because our study tells us that there are no differences does not mean that differences do not exist. One such example of bad science has happened over the last fifty years; during this time scientists have found from their studies that there is no difference between natural and synthetic compounds.s.

Thus a natural vitamin was found to have the same effect as a synthetic in that the two did not prove different in studies performed. These studies were reductionistic and flawed. Just because their studies could not find any difference does not mean that there were no differences.

The basic misuse of the Null hypothesis thus has generated a tremendous income for synthetic pharmaceutical companies, who develop synthetic compounds by the train car load. Studies that do show differences between the natural and synthetic compounds are quickly discounted by the chemical companies. This brings us to a political ideation of who can make a true judgement on the correctness of a study, and often times the philosophy of the judge will affect his decision.

Here in America we are also complicated by another issue of the freedom of choice, and if a person truly wishes to have natural entities, and only natural entities, put into his body, this is his choice. These natural compounds are dispensed under the same guidance of the Food and Drug Administration to guarantee safety and efficacy. Yet synthetic chemical companies wish to tyrannize the choice of mankind and force on it synthetic compounds, even the ones who want to choose a truly natural path.

Many drugs would get by the clinical trials which later are found in the patient population to cause sickness. Every year ten to twenty medications on the average are taken off the shelves of pharmacists because the clinical trials were not thorough enough in finding out some of the various problems. Prozac was released on the medical system, and now much evidence is pointing to the possibility that people taking Prozac might develop unstable thinking abilities. Prozac might possibly even contribute to provoking a user to kill other people in fits of anger. At the time of this writing over fifty-five people have been killed by crazed Prozac users.

Thalidomide was taken off the market after its clinical trials proved its success in handling morning sickness. But Thalidomide produced babies born with flippers, and other gross genetic defects. One of my professors remarked at that time that it was a blessing that Thalidomide caused flippers and great aberrant dysfunctions of genetic material. I inquired of him what he meant by “blessing”, and he said that the

blessing was that it was a violent enough reaction for us to find out quickly, and get it off the market. What if the effect of Thalidomide was just that it lowered the I.Q. five or ten points? We might not have discovered that until several generations later. Thalidomide was taken off the market, altered, and released back on the market as Bendictine. Bendictine had “just an effect”; it lowered IQ ten points, and was later taken off the market in the late eighties because of its ability to alter genetic functioning and cause a wide variety of learning disabilities and other disturbances.

The Thalidomide problems were horrible, but yet were not pervasive to the population. The Bendictine problems were much less horrible, but were much more pervasive, as it affected literally millions of children in America.

The following is a list of drugs that were taken off the market after it was found that their original clinical trials were not thorough enough to indicate some of the problems with them. Perhaps this list will convince the reader that clinical trials are not sufficient to protect the public.

ACETAZOLAMIDE
ACETYLDIGITOXIN
ALKAVERVIR
ALLOPURINOL
ALSEROXYLON
AMINOPHYLLINE
AMINOSALICYLATE SODIUM
AMITRIPTYLINE HYDROCHLORIDE AMODIAQUINE HYDROCHLORIDE
AMPICILLIN/AMPICILLIN TRIHYDRATE
ANILERIDINE HYDROCHLORIDE
ANISOTROPINE METHYLBROMIDE
ATROPINE SULFATE;

DIFENOXIN HYDROCHLORIDE
AZATHIOPRINE
BACAMPICILLIN HYDROCHLORIDE
BENDROFLUMETHIAZIDE
BENZTHIAZIDE
BENZTROPINE MESYLATE
BETAZOLE HYDROCHLORIDE
BETHANECHOL CHLORIDE

BRETYLIUM TOSYLATE
BROMODIPHENHYDRAMINE HYDROCHLORIDE
BROMPHENIRAMINE MALEATE
BUTABARBITAL SODIUM
CALCIUM; MEGLUMINE; METRIZOIC ACID
CALCIUM METRIZOATE
CAPTOPRIL
CARPHENAZINE MALEATE
CARPROFEN
CEFADROXIL
CEPHALEXIN

CEPHRADINE
CERULETIDE DIETHYLAMINE
CHLOPHEDIANOL HYDROCHLORIDE
CHLORAMPHENICOL
CHLORAMPHENICOL; POLYMYXIN B SULFATE

CHLORAMPHENICOL; PREDNISOLONE

CHLORDIAZEPOXIDE HYDROCHLORIDE
CHLORHEXIDINE GLUCONATE
CHLORMERODRIN, HG-197
CHLOROQUINE PHOSPHATE
CHLOROQUINE PHOSPHATE; PRIMAQUINE PHOSPHATE
CHLOROTHIAZIDE
CHLORPHENIRAMINE MALEATE
CHLORPHENTERMINE HYDROCHLORIDE
CHLORPROMAZINE HYDROCHLORIDE
CHLORPROPAMIDE
CHLORTHALIDONE
CHLORZOXAZONE

CHYMOPAPAIN
CISPLATIN

CLORAZEPATE DIPOTASSIUM
CODEINE PHOSPHATE; *MULTIPLE*
COLCHICINE; PROBENECID
CORTISONE ACETATE
CRYPTENAMINE ACETATES
CRYPTENAMINE TANNATES
CYCLOBENZAPRINE HYDROCHLORIDE
CYCLOTHIAZIDE
CYCRIMINE HYDROCHLORIDE
CYPROHEPTADINE HYDROCHLORIDE
CYSTEINE HYDROCHLORIDE
DECAMETHONIUM BROMIDE
DEMECLOCYCLINE HYDROCHLORIDE

DESERPIDINE
DESOXIMETASONE
DESOXYCORTICOSTERONE ACETATE
DEXAMETHASONE
DEXAMETHASONE SODIUM PHOSPHATE
DEXBROMPHENIRAMINE MALEATE
DEXBROMPHENIRAMINE MALEATE;

PSEUDOEPHEDRINE SULFATE
DEXTROAMPHETAMINE SULFATE
DIATRIZOATE MEGLUMINE
DIAZEPAM
DIAZOXIDE
DIBUCAINE HYDROCHLORIDE
DICLOXACILLIN SODIUM
DICUMAROL
DIETHYLPROPION HYDROCHLORIDE
DIETHYLSTILBESTROL
DIFENOXIN HYDROCHLORIDE;

‘MULTIPLE’
DIFLORASONE DIACETATE
DIGITOXIN
DIGOXIN
DIHYDROERGOTAMINE MESYLATE;

HEPARIN SODIUM; LIDOCAINE

HYDROCHLORIDE
DIMENHYDRINATE
DINOPROST TROMETHAMINE
DIPHEMANIL METHYLSULFATE
DIPHENHYDRAMINE HYDROCHLORIDE
DISULFIRAM
DOPAMINE HYDROCHLORIDE
DOXEPIN HYDROCHLORIDE
DOXYCLYCINE HYCLATE
DROMOSTANOLONE PROPIONATE
DYDROGESTERONE
DYPHYLLINE
EPINEPHRINE; ETIDOCAINE

HYDROCHLORIDE
EPINEPHRINE; LIDOCAINE

HYDROCHLORIDE

CLINDAMYCIN HYDROCHLORIDE
ERGOLOID MESYLATES
ERYTHROMYCIN
ESTRADIOL VALERATE; TESTOSTERONE
ENANTHATE

ESTROGENS, CONJUGATED

ESTROGENS, ESTERIFIED
ESTRONE

ETHCHLORVYNOL

ETHINYL ESTRADIOL
ETHINYL ESTRADIOL; NORETHINDRONE
ETHOXZOLAMIDE
ETHYLESTRENOL
ETHYNODIOL DIACETATE; MESTRANOL
ETIDOCAINE HYDROCHLORIDE
FERROUS CITRATE, FE-59
FLUOCINOLONE ACETONIDE
FLUOROMETHOLONE
FLUPHENAZINE HYDROCHLORIDE
FLUPREDNISOLONE

FOLIC ACID 1 MG.
GALLIUM CITRATE, GA-67

GEMFIBROZIL
GLUTETHIMIDE
GLYCOPYRROLATE
GONADORELIN HYDROCHLORIDE
GONADOTROPIN, CHORIONIC
GUANABENZ ACETATE
HALCINONIDE
HALOPERIDOL
HEPARIN SODIUM
HETACILLIN
HETACILUN POTASSIUM
HEXACHLOROPHENE
HEXOCYCLIUM METHYLSULFATE
HEXYLCAINE HYDROCHLORIDE
HOMATROPINE METHYLBROMIDE
HYDRALAZINE HYDROCHLORIDE
HYDROCHLOROTHIAZIDE
HYDROCHLOROTHIAZIDE; LABETALOL HYDROCHLORIDE
HYDROCHLOROTHIAZIDE; METHYLDOPA
HYDROCHLOROTHIAZIDE; PINDOLOL
HYDROCHLOROTHIAZIDE; RESERPINE
HYDROCHLOROTHIAZIDE; SPIRONOLACTONE
HYDROCHLOROTHIAZIDE; TRIAMTERENE
HYDROCODONE BITARTRATE; ‘MULTIPLE’
HYDROFLUMETHIAZIDE
HYDROXOCOBALAMIN
HYDROXYSTILBAMIDINE ISETHIONATE
HYDROXYZINE HYDROCHLORIDE
HYDROXYZINE PAMOATE

ERGOCALCIFEROL
INDOMETHACIN
INSULIN SUSP ISOPHANE

PURIFIED PORK
INSULIN SUSP PROTAMINE ZINC

PURIFIED PORK
INSULIN ZINC SUSP EXTENDED

BIOSYNTHETIC HUMAN
IODIPAMIDE SODIUM
IODOXAMATE MEGLUMINE
ISOETHARINE HYDROCHLORIDE
ISONIAZID
ISOPROTERENOL HYDROCHLORIDE
ISOPROTERENOL SULFATE
ISOSORBIDE DINITRATE
LACTULOSE
LEVALLORPHAN TARTRATE
LEVODOPA
LEVOPROPOXYPHENE NAPSYLATE,

ANHYDROUS
LIDOCAINE HYDROCHLORIDE;

OXYTETRACYCLINE
LIOTHYRONINE SODIUM
LIOTRIX (T4; T3)
LITHIUM CARBONATE
LOPERAMIDE HYDROCHLORIDE
LOXAPINE SUCCINATE
MANNITOL
MAZINDOL
MEBUTAMATE
MECLIZINE HYDROCHLORIDE
MECLOFENAMATE SODIUM
MEFENAMIC ACID
MEFLOQUINE HYDROCHLORIDE
MENADIOL SODIUM DIPHOSPHATE
MENADIONE
MEPENZOLATE BROMIDE
MEPERIDINE HYDROCHLORIDE
MEPREDNISONE
MEPROBAMATE
MESTRANOL;NORETHINDRONE
MESTRANOL;NORETHYNODREL
METHARBITAL
METHICILLIN SODIUM
METHIXENE HYDROCHLORIDE
METHOCARBAMOL
METHOTREXATE SODIUM
METHOXSALEN
METHYCLOTHIAZIDE
METHYLPREDNISOLONE
METHYLPREDNISOLONE;

NEOMYCIN SULFATE

IFOSFAMIDE
IMIPRAMINE HYDROCHLORIDE
INDOCYANINE GREEN
METRIZAMIDE
MINOCYCLINE HYDROCHLORIDE
MINOXIDIL

MOLINDONE HYDROCHLORIDE
NALOXONE HYDROCHLORIDE
NETILMICIN SULFATE
NIACIN 500 MG.
NITROFURANTOIN
NITROFURANTOIN SODIUM
NYSTATIN 500,000 IU.
ORPHENADRINE CITRATE
OXANDROLONE

OXAZEPAM
OXYBUTYNIN CHLORIDE
OXYPHENBUTAZONE
OXYPHENONIUM BROMIDE
OXYTETRACYCLINE HYDROCHLORIDE
OXYTOCIN
PARAMETHADIONE

PARGYLINE HYDROCHLORIDE
PARAMOMYCIN SULFATE
PENBUTOLOLL SULFATE
PENICILLIN G BENZATHINE
PENICILLIN G POTASSIUM
PENICILLIN G PROCAINE
PENICILLIN G SODIUM
PENICILLIN V POTASSIUM
PENTAZOCINE HYDROCHLORIDE
PENTOBARBITAL SODIUM
PENTOLINIUM TARTRATE
PERPHENAZINE
PHENDIMETRAZINE TARTRATE
PHENINDOINE
PHENMETRAZINE HYDROCHLORIDE
PHENPROCOUMON
PHENTERMINE HYDROCHLORIDE
PHENTERMINE RESIN COMPLEX
PHENYL AMINOSALICYLATE

PHENYLPROPANOLAMINE HYDROCHLORIDE;
MULTIPLE .
PHENYTOIN SODIUM
PHYTONADIONE
PIPERACETAZINE
PIPERAZINE CITRATE
PIPOBROMAN

METHYLTESTOSTERONE
METHYPRYLON
METOCLOPRAMIDE HYDROCHLORIDE
PROCAINE HYDROCHLORIDE
PROCAINE MERETHOXYLLINE;

THEOPHYLLINE
PROCHLORPERAZINE EDISYLATE
PROCHLORPERAZINE MALEATE
PROGESTERONE
PROMAZINE HYDROCHLORIDE
PROMETHAZINE HYDROCHLORIDE
PROPANTHELINE BROMIDE
PROPOXYPHENE HYDROCHLORIDE
PROPOXYPHENE HYDROCHLORIDE;

MULTIPLE
PROPRANOLOL HYDROCHLORIDE
PROPYLIODONE
PROPYLTHIOURACIL
PROTAMINE SULFATE
PSEUDOEPHEDRINE HYDROCHLORIDE
PSEUDOEPHEDRINE HYDROCHLORIDE;

TRIPROLIDINE HYDROCHLORIDE
PYRIDOXINE HYDROCHLORIDE
PYRVNVIUM PAMOATE
QUINESTROL
QUINIDINE GLUCONATE
QUINIDINE SULFATE
RESCINNAMINE
RESERPINE
SARALSIN ACETATE
SECOBARBITAL SODIUM
SELENOMETHIONINE, SE-75
SODIUM IODIDE, i-123
SODIUM IODIDE, I-131
SODIUM MONOFLUOROPHOSPHATE
SODIUM SUCCINATE
SOMATROPIN, BIOSYNTHETIC
STREPTOMYCIN SULFATE
SUCCINYLCHOLINE CHLORIDE
SULFABENZAMIDE; SULFACETAMIDE;

SULFATHIAZOLE
SULFADIAZINE
SULFAMETER
SULFAMETHIZOLE
SULFAMETHOXAZOLE
SULFAPHENAZOLE
SULFASALAZINE
SULFINPYRAZONE

POTASSIUM AMINOSALICYLATE
POTASSIUM CHLORIDE
PRALIDOXIME CHLORIDE
PREDNISOLONE
PREDNISOLONE ACETATE

PREDNISOLONE SODIUM PHOSPHATE
PREDNISONE

PRILOCAINE HYDROCHLORIDE
PROCAINAMIDE HYDROCHLORIDE
TESTOSTERONE PROPIONATE
TETRACYCLINE HYDROCHLORIDE
THALIDOMIDE
THEOPHYLLINE
THIORIDAZINE HYDROCHLORIDE
THYROGLOBULIN
TIMOLOL MALEATE
TIOCONAZOLE
TOLAZAMIDE
TOLBUTAMIDE
TRAZODONE HYDROCHLORIDE
TRIAMCINOLONE ACETONIDE
TRIAZOLAM
TRICHLORMETHIAZIDE
TRICLOFOS SODIUM
TRIDIHEXETHYL CHLORIDE
TRIFLUPROMAZINE HYDROCHLORIDE
TRIHEXYPHENIDYL HYDROCHLORIDE
TRIMEPRAZINE TARTRATE
TRIMETHOPRUM
TRIMIPRAMINE MALEATE
TRIPELENNAMINE HYDROCHLORIDE
TRIPROLIDINE HYDROCHLORIDE
TRISULFAPYRIMIDINES
TROLEANDOMYCIN
URSODIOL
VERAPAMIL HYDROCHLORIDE
VERATRUM VIRIDE
VINBLASTINE SULFATE
VINCRISTINE SULFATE
VIOMYCIN SULFATE
WARFARIN POTASSIUM
WARFARIN SODIUM
XENON, XE-133

SULFISOXAZOLE DIOLAMINE
SULFOXONE SODIUM
SUPROFEN
TECHNETIUM TC-99M ALBUMIN

AGGREGATED
TECHNETIUM TC-99M SODIUM

PERTECHNETATE
TEMAZEPAM
TESTOLACTONE

Some forms of these compounds have been restricted after clinical trials showed them safe. If you are taking some form of one of these drugs, please ask your pharmacist or doctor if this form is safe for you.

As we can see, there has been tremendous iatrogenic (doctor-caused) damage wreaked on the people of the United States. Clinical drug trials are not at fault here, but the medical establishment's worshipping of these clinical drug trials are. Every item on this list went through the same clinical trial basis that the medical establishment uses as its criteria. We now must realize that this decision-making process of taking clinical trials and making them the demigod of the industry is at fault here, and that people are being hurt because of a faulty logic process in medicine. These trials are expensive and can be purchased by rich patent-seeking synthetic chemical companies. This author realizes that this challenge of the very establishments's heart will not be taken lightly, and will not be without violent attacks.

If we look at the legal damages incurred by these iatrogenic compounds, we can see that there are literally billions of dollars every year paid out by drug companies in medical malpractice and iatrogenic damage suits. The vast amount of damage caused by this industry is incredible; an industry that takes in approximately one hundred billion dollars of income pays out literally ten to twenty billion dollars a year in malpractice settlements. This still leaves an eighty billion-dollar profit margin in an industry that costs very little in actual product manufacturing. The largest amount of expenditure by any drug company is that of research, development, and clinical trials of laboratory studies.

It is this very research and development of the whole cognitive plan of allopathic medication that we are challenging. The allopathic medication philosophy is that of working against the body, or developing a compound to sedate a symptom. If the person has a histamine response, we give him an anti-histamine; if he has a depression, we might give him an MAO inhibitor. In every case of allopathic utilization we assume that the body's function is irregular and foolish, and we develop some type of synthetic irregularity that can upset the cybernetic balancing system of the body.

The legal issues of medical practice are also stacked against alternative practitioners. In 1990, of the 570,000 doctors in the United States 1,437 were put on probation, or had their licenses suspended or revoked. That represents 0.3 percent of the population. In 1989 there were 1,500, and nine practitioners who were likewise reprimanded. Very few of these practitioners were actually prosecuted for
unprofessional conduct by aligning themselves with alternative practices. The majority of these medical doctors were dealt with because of alcohol abuse, drug abuse, and sexual abuse of patients; some of them for allopathic malpractice. Very few of them were actually dealt with because of alternative therapies. In most states a medical doctor is bound to perform therapies and diagnostic techniques which are medically accepted.

Last June the Alaska state medical board amended its state medical practice act to include the following: that the Alaska state medical board may not base a finding of profession incompetence solely on the basis that a licensee's practice is unconventional or experimental in the absence of demonstrable physical harm to the patient; thus the idea that if the doctor is not hunting anybody with an experimental or unconventional technique, he could not have his license revoked. He would have to find strong evidence that patients had been harmed in order to challenge the doctor. Many of these so-called unconventional therapies are accepted by a vast majority of doctors, and there is no one form of medicine that is accepted above all others. We will find that medicine abounds with many techniques which are not fully, scientifically evaluated or properly challenged. Often doctors who use these unconventional techniques are challenged by traditional medical doctors on the basis of sometimes only one or two cases. Many doctors have had their practices disrupted because of one or two cases in which unconventional therapy did not quite comply.

It should be pointed out that doctors see patients dying every day. Hospitals abound with patients whose therapies and diagnostic accuracy have led to their demise.

Years ago, in the state of North Carolina, Mendelssohn wrote in his book on The Medical Philosophy that when the doctors in a group of hospitals in a certain local community went on strike, there was a major change in the death rate; it dropped dramatically. In simple words, much fewer people died when the doctors in the hospitals stopped practicing some of their accepted medical techniques.

In a recent case in Denver, Colorado the state brought charges against a parent for not using traditional medicine when the chill of this parent died from a disease that was assumed treatable at a local hospital. The parent was a Christian Scientist who believed more in prayer than drugs. Yet if we look at the ratio of children who survive with Christian Scientist parents versus the ratio of children who survive overall in local hospitals, we will see that there is a tremendous amount of variance, and that children die by a much greater rate in hospitals than they do from just having Christian Scientist parents. In fact, in the world today, the United States is fifteenth overall in birth mortality, meaning that there are fourteen countries where new-borns have a better chance of survival than in the United States. If we analyze these countries, we wilt see that these are countries which depend more on natural medicine, homeopathy, and prevention techniques. Perhaps these types of analyses can open up the closed minds of the so-called traditional statisticians to realize that perhaps there is a practical alternative.

Thus we can see how legal judgements can be based on incomplete scientific ideas. We must accept that the science of medicine is still a pseudo-science; it is not an exact philosophy. With this in mind we should be slow to write laws that prohibit or discourage philosophies of medicine.

As we can see from Quantum Biology, this book, the Natural Repertory, and the like, these philosophies

have substance. Practitioners and patients have the right to make such choices. We do need medical boards and peer groups to challenge practitioners who try to take philosophies, practices, and the like, and push them into areas in which they do not have strong scientific validity. Thus the laws of each state for the practice of medicine are vital, and medical board inquiries are essential in developing better and better qualities of medicine. Yet in the proof that a doctor is doing something wrong with unconventional techniques, as in the case of Warren Levin, who was chafenged because of two separate Instances, it should become quickly apparent that we should not jump on one or two cases for impropriety. No doctor in the land could stand such a shifted bias; whereas one or two cases out of the thousands seen over a ten-year period should put a person's practice on line. Here we must look for statistics as well, and look for a certain percentage wherein a doctor might be brought out in front of a peer group, and the peer group also should be able to express its opinions.

Many people with medical minds are firmly entrenched in reductionism, synthetic chemistry and surgery, which make tremendous amounts of money for the industries that they promote. Yet people die every day of iatrogenic diseases resulting from surgery and synthetic drugs. Society has found a way to let these doctors off the hook, and yet put doctors who do unconventional therapies on the hook. It is possible that this challenge might be directed to help destroy a natural medicine industry that would challenge the incomes of the synthetic drug companies.

The investigations of this book and many others, including Murder By lnjection, Off The Pedestal, Mendelson's series and many others are bringing to light the vast medical cover-up that has been promulgated by allopathic minds seeking to tyrannize and influence the minds of men. We need to deepen our philosophy of medicine, get into quantum physics, and try to understand some of the factors of biology at many different levels. These levels will include the ideas of statistical analysis, peer group philosophies, and scientific development of energetic phenomena.

In this book we make a heavy-duty physics statement, utilizing the highest levels of mathematics, physics and science known to our society. We come up with the idea that allopathy is an irregular choice, and that the factors of clinically trials in reductionistic science are incomplete in their ability to protect the people using our pharmaceutical products. We can see from this advanced physics and this upper level science that homeopathy and naturopathy are much more logical choices to use in developing medical techniques.

Also, what we can see in the Natural Repertory is that as we go through the various clinical trials that have been done in this book, we also review the literature of other research that has been done in naturopathy and homeopathy. We can see that in almost every attempt to utilize naturopathic and homeopathic techniques success is achieved. It is very rare in the literature to find a homeopathic or naturopathic study that failed to show a large degree of efficacy and safety.

In the February 1990 issue of the British Medical Journal three Dutch researchers wrote that they assayed over 105 clinical trials of homeopathy done around the world. Their conclusions were that 81 of these trials showed positive scientific undeniable results. 24 of these trials could be challenged. Their conclusions were that there was a legitimate case for further evaluation of homeopathy. A copy of this article is included in our Natural Repertory, as this is a breakthrough report. This can be found in the chapter on "The Literature Search of Homeopathy".

According to our Null hypothesis we see that in the case of homeopathy there is dramatic evidence of efficacy. Homeopathy works according to the scientific literature. With this type of data contained in these books and in this type of report it would seem that the use of homeopathy not only should be warranted, but that using an allopathic drug, which could produce a side effect or risk, might become a case of medical impropriety; in that if a doctor could use a safer compound than the allopathic medications which contain risk, this would be malpractice. I don't believe that medicine can wait for homeopathy to be challenged over a twenty-year time, and I can tell you for sure that there are many synthetic drugs which don't wait that long, either.

Homeopathy and naturopathy as industries throughout the world outsell allopathic medications almost three to one. This is because of the large number of sales that are done in India, Pakistan, Bangladesh, China, etc. Out of this entire world market, which amounts to perhaps ten billion dollars in sales (it costs much less to manufacture and sell homeopathic products than allopathic products), malpractice and other settlements measure in the thousands of dollars throughout the entire world. There are hardly any suits taken against naturopathic and homeopathic doctors, although when this happens, the settlements are usually very small. We can see that out of a ten billion-dollar industry less than one percent of one percent of one percent of one percent of its total capital generation is paid out in malpractice, compared to our allopathic counterparts, which pay in the neighborhood of fifteen to twenty percent a year in settlements.

Thus we can see that the justification for homeopathy need not come completely from clinical trials. Without using clinical trials we can look at the world market, and see that homeopathy works. We can see that it makes sense. We can look at the returns on malpractice insurance, which tells us about how many people were hurt, and see that homeopathy works, whereas synthetic chemistry hurts. The statistics bear this out. We can look at these statistics and see that allopathy needs to be challenged, and that the process of using clinical trials and revering to the publication/print process as the end-all answer must be challenged for us to proceed any further with medicine. Reductionistic clinical trials are the problem, not the solution.

We must realize that the mind of the observer interferes with the experiment. This is a basic premise of quantum theory, which we are now putting into biology. The basic treatise of this book has proved the consideration of quantum theory as a meaningful step into biology.

As we have said, in quantum theory the mind state of the observer will influence the outcome. In our preparation of clinical trials we must realize the power of the mental philosophy and mind state of the person behind them.

The development of modem chemistry, which pinnacled in synthetic processes, gave these people a severe mind set; a mind set based on chemical analysis, not energy, physics, or some of the other sciences. This predominantly chemical-based philosophy, thus, will interfere with their observational ability. Hence we can see the action of this philosophical backdrop in their pursuit of medical truth. This has led them to chemical solutions, surgical solutions, and allopathic ideation.

Another philosophical and psychological problem behind this medical juggernaut is the idea of allopathic superiority to nature. As we pointed out in Quantum Biology, it is basically akin to the philosophy of allopathy and synthetic chemicals that the observer knows more than the situation he observes, in that the medical doctor knows more about biology than the patient's body. The patient's body, thus, becomes flawed and stupid in the experimenter's eyes. If there is a histamine, we give the "stupid" body an antihistamine; i# there is a depression, we give the "stupid" body an MAO inhibitor; if there is fever, we give the "stupid" body an anti-pyretic. In other words, the concept of allopathy is that something is wrong in the body, and that outside intervention from a superior intellectual source will help correct the problem. This also is a seriously flawed philosophy and psychological backdrop to which all of the medical experiments are then interred.

With an idea on homeopathy and naturopathy as a basis in medicine we can develop a different psychological and philosophical foundation. Our foundation will revere the natural process, and realize our inability to know intimately such a process. So we want to intervene on the process very little, and try to stimulate the process back to its own natural balance ability using natural mechanisms and gentle nudges to help stimulate the organism to achieve its own balance. The organism has the superior knowledge of biology.

If we take such a philosophy, and now reevaluate the last hundred years of medical research, we can see that some of the conclusions drawn from this research were severely flawed: An overview of the medical research will now show us that many of the experiments performed were reductionistic and philosophically inadequate.

This book has been written partly with the idea that there is an evolution in human thought, and that human thought has evolved from many different states. It is wrong for us to think that human thought and social conditions have stayed the same throughout the years. The early tribes and societies had very weak ideas of philosophy, and the ideation of a king becoming part god showed some of the limitations of their thinking. Early societies did not have the ideation of spatial organization to allow them to do proper art perspectives. This was a developmental process. There was a-developmental process in the ideas of psychology and philosophy, in the idea of science, and in the concepts of religion and theology.

Every form of human thought will evolve and change through the ages, just as medicine will evolve and change through the impact of not just this book, but thousands more like it which will challenge the ideation behind medical thought and philosophy and bring about a new ideation; one in which there is a softness in the approach, a gentleness and a humility towards what we do not know. As we develop and achieve this new type of mental thought, we will be able to embrace an old philosophy of medicine. We will be able to find this old philosophy, ignored by the modem medical establishment, which will be developed and blended into this modem medical technology, and achieve a new collection. Thus the thesis and the antithesis will blend into a new form of truth. The thesis is that of naturopathy and homeopathy; the antithesis is allopathy and surgery. These two will blend to achieve a new form of thought in which the doctor, being educated and knowledgeable in all of these different philosophies, will have more directed choices, and will be able to affect more safety and efficacy with his patients.

Thus it is this author's purpose to challenge the conclusions of the article in US News. Perhaps more long-term studies need to be adapted to allopathic thought (long-term meaning over a period of ten generations). To say that more clinical trials need to be done in homeopathy is to state a truth, but to say that before homeopathy should be used by the masses this needs to be done is to state something that is incorrect. Grossly incorrect is this proposition to make homeopathy spend massive amounts of money on ridiculous reduetionistic trials. Homeopathy is a legal entity in America and should not be forced into major expenditures in clinical trials, where this expenditure would do nothing to increase the safety of efficacy. It is the opinion of these synthetic drug companies that if they could force homeopathy into such trials, they could perhaps destroy homeopathy, because homeopathy does not make the large amount of income that allopathy does. Thus homeopathy would not have the money to afford such trials. Homeopathy by definition is not a money-making proposition. It is, however, curative.

These trials are irregular with modem mathematics and modem medicine, and they will not give us the complete results we had thought they would. Statistics lie, and statisticians deceive.

The FDA was formed by Dr. Clayton to protect homeopathy. Dr. Clayton lobbied for years and years for a federal organization that could protect the American people in their choices of foods and drugs. He sought also to help in protecting the philosophy of homeopathy. Within two weeks after formulating the FDA, Dr. Clayton died. The FDA has acknowledged the Homeopathic Pharmacopeia of the United States, and it is a legal entity accepted in America. The HPUS, though, has never commanded enough money to generate popularity.

Allopathic philosophy, in it use of clinical trials, has sought to tyrannize people's minds and change their perspectives. It has hoped that doctors would make allopathic choices of drugs, rather than homeopathic choices. This type of tyranny over the minds of people is what the founders of our country sought to fight against.

When recently President George Bush came down with a hyperthyroid condition which produced heart palpations, this author wrote him a letter. In that letter, I said in paraphrase):

"Mr. President As President of the United States t recognize that you have a lot of pressure to choose an allopathic therapy for your condition. At this time of war [written just after the Gulf War] I can imagine the tremendous amount of stress and tension that you were going through, and I can also fathom how it has probably produced a hyperthyroid condition that has now gone out of control. In your choice of therapy, Mr. President you, as an American citizen, have the right to choose many different types of medicine.

You can choose chiropractic treatment for your condition, and perhaps adjustment of the nerves might provide a balance to the thyroid and alleviate stress. You can choose acupuncture treatment, and an acupuncturist might try to balance the meridian flow and help to sedate the irritation of the nerves of the heart, and sedate the body and balance its energies. You can choose nutrition, and seek a diet to help relax and balance your

metabolism. You can also choose homeopathic therapy, and take a homeopathic which we have shown to be not only safe, but also effective in many cases of treating hyperthyroid conditions. You could choose naturopathy in the District of Columbia, and seek natural therapies for your condition. You also can choose allopathic medicine, which works against the body. I realize, Mr. President the tremendous amount of pressure on you to choose allopathic medication. Because of your position as United States President if you were to choose a chiropractor, acupuncturist, homeopath, or other doctor, you might rock a very large economic boat, and threaten an entrenched philosophy of medicine.

The Queen of England, in a very similar position, has made the choice of homeopathy, Mr. President The Queen of England and her family are only treated by homeopathic physicians; they are not treated in allopathic ways at all. They here rocked that big boat for many, many years. Even in fight of extreme pressure, the logic and success of homeopathy outweighs the finances of allopathy.

Along with this letter I send two bottles of a Hyperthyroid homeopathic which we were able to blend. We did some pilot studies and found that it was safe and effective in these cases. Many similar cases of hyperthyroidism have been cured by this remedy.

So, Mr. President you as an American citizen have the freedom of choice, to choose any of these different endeavors. I, as an American citizen. also have the freedom of choice to write this letter, and to voice what type of therapy I might have chosen. Had f been in your position, Mr. President, I would have chosen homeopathy and alternative natural therapies. [President Bush could also have chosen naturopathic treatment, since naturopathy is legal within the confines of Washington, D.C.)

But also, Mr. President as an American citizen I will fight for you to have the right to choose. If you choose allopathy, even if I don't agree or approve, I will fight to protect that choice. t hope, Mr. President, that you will also fight to protect my choice. There are several forces in the allopathic community who so value clinical trials, and so value their process and their philosophy that they seek to tyrannize the minds of men. And Mr. President, you can walk down to the Jefferson Memorial, where written, around the top of the inside of the memorial, in big letters carved in stone, is a quote by Thomas Jefferson: '1 have sworn on the alter to oppose any tyranny over the minds of men.' Mr, President; freedom of choice has never been more threatened than it is now by allopathic mental tyranny.

The President wrote me back a nice little thank you letter, saying that he appreciated my concern. Thus we can see that homeopathy is legal, and indeed has a solid rationale behind it It is protected by the FDA and established in the American government Clinical trials are a poor way of choosing homeopathy's "proof for the pudding". The "proof of the pudding" of any type of therapy will probably come down to commercial success, and also the degree to which it doesn't hurt people. Now homeopathy, which has been given a new boost by such free thinkers as myself and other authors, will need to answer some of these questions. Clinical trials will definitely need to be done; they cannot be ignored. But they should not be deified. In developing a pharmaceutical program for a nation we should be able to look at the basic philosophy of that medicine: is it allopathic, homeopathic, etc., and how does it fit within the confines of structure, safety and effectiveness? As Hippocrates said, "First don't hurt" This basic tenet of medicine must be revered, working with the body and not against it Allopathy has had to forget the "first don't hurt" philosophy. Allopathy needs to biopsy, sedate, stimulate, x-ray, cut, stab, and alter to do medicine.

But homeopathy also enters into the nineties with some baggage as well. The people doing homeopathy in the United States are, most of the time, unable and unwilling to do highly sophisticated quality control techniques. Often the manufacturers do not comply with legal regulations set out by the FDA. Often even the 211 CFRs (Code of Federal Regulations) are not utilized by unregistered -homeopathic companies. Homeopathy must build quality control techniques such as those used by the licensed Nelsonian technologies: pilot studies, clinical trials, safety and effectiveness ratings; and pharmacological quality control techniques such as spectrophotometer, spectrographic analysis, culture techniques, and chromatography. Quality control techniques of the energetic process must be done as well, such as the REGAE (rare electron gas a-allopathic evaluation), capacitance rating, inductance rating, conductance rating, and polymorphic shaping studies to understand the crystalline effects.

These are some of the factors that must be done in a true quality control process, as well as total legal compliance. As yet the homeopathy industry as a whole does neither. To meet the challenge of our new thinking and to direct homeopathy back into the medical mainstay, homeopathy will have to meet these challenges head on, change, and make itself legal to bring itself into reputability.

As we have seen from our exploration in these various books, reductionism was probably more of a problem than a solution in science. We need to use our reductionistic trials; we also need to develop holistic, individualized concepts of medicine, for more safety and effectiveness without just using short-term clinical trials. Nature knows protection. We only hope that the freedom of choice be kept alive in America. Many people I have known have left America in search of freedom of medical choice. We can only hope that freedom of choice be reestablished as the basic tenet of the American justice system. Our capitalistic philosophy has produced a successful past for our patentable synthetic chemical brethren. But now the logic and reason of homeopathy and naturopathy must earn at least the freedom of choice. Perhaps this philosophy will earn more. As Victor Hugo once said, 'here is only one thing more powerful than all the armies of the world, and that is an idea whose time has come." Natural medicine's time has come. Watch out, allopathy.

Beprop Chopra's book on "Quantum Healing" offers supportive information for that contained within this thesis. We see that he comes up on an idea of quantum healing that must involve compassion, and a new form of understanding that goes beyond the physical area and into quantic dimensions. This is very important for us to realize. In his book he makes a point about how a certain patient was "picnic-deficient", and needed to have nice, enjoyable picnics to restore him to health. Chopra puts Into view as a mystical connection with another world, and puts it into different Asian terms. These terms he later relates to as quantum factors of some type of energy.

In our treatise we also find that there is something that affects this indeterminacy, or quantic principle. We have called it a "God-consciousness", a nature within this document of Quantum Biology.

We truly believe that Chopra's referral to a God-consciousness and a quantic understanding is the same as what we are replying. There must be some type of greater power that dictates the precision with which biology pursues.

As we have mentioned several times, compassion must be an integral part of the decision-making and therapy areas of our medical business. We heartily recommend to the reader "Quantum Healing" by Chopra, for a better perspective on some of the scientific treatises contained within this document

Chopra puts some of our scientific perspectives into more human harms, as he relates various cases, and how the cases go beyond classic medical understanding. Many other researchers of late have followed a similar path, and found challenging ways of critiquing modem medicine's statistical type of logic.

We must point out in this document that if there is a God-consciousness, an ability of will, happiness, joy, compassion, caring, sharing and touch to help people, it will not fit into any model that could be measured with statistical pre-test/post-test, clinical, drug trial data. Clinical trials must be part of our concept, but not deified. We need to use them to help determine safety and help to interpret our range of effectiveness, but they still should be within the guidelines of nature.

THE PROBLEMS BEHIND OUR MEDICAL DILEMMA

1. Arrogance of medicine, a belief in superiority over biology.
2. Persecution for belief in nature and homeopathy.
3. Judgmentalism- psychological over-reaction against other synthetic philosophies. Preferred doctors of high influence are almost always allopaths who are ignorant of homeopathy.
4. Greed- synthetic companies profit mostly from patented unnatural compounds.
5. Lack of personal responsibility in health care.
6. Belief that medical technology will save one after years of unhealthy lifestyle.
7. Crisis philosophy- seeking medical help only after all else fails.
8. Insurance costs.
9. Malpractice costs and medical fears.
10. Lack of a true biology and no philosophical base.
11. Quantity-based medicine, not quality-based.

SOLUTIONS TO OUR MEDICAL. DILEMMA

1. Humility, reverence for nature's process, understanding of quantic philosophy
2. Proper study will show homeopathic and naturopathic credibility
3. Proper peer group process: allowing a group of Pike-minded doctors to evaluate the amount of harm done, if any
4. Protecting natural formulas with more strict copyrights that allow natural-based pharmaceutical companies to benefit from their research
5. Building personal responsibility into medical education at every level
6. Educating for prevention and early treatment procedures
7. Building a low-cost system of wellness counselors who can intervene and help in early and simple health care problems, reserving doctors and hospitals for crisis care
8. Reducing insurance costs by using homeopathy and naturopathy, and also escalating insurance costs for:

    1. Overweight
    2. Smoking
    3. Alcohol abuse
    4. Drug addiction

    Letting the ones who incur the most medical costs pay them. This will discourage bad health habits.
9. Malpractice results mostly from synthetic allopathic drugs and surgery. Changing to homeopathy and naturopathy will show dramatic results.
10. Appreciation and reverence for the unknown builds a quantum philosophy for medicine.
11. Building everything for quality, not quantity. This will take more cash initially, but will be cheaper in the long run.

Now let us be more specific as to what might be needed to actually set the criteria of how to approve new combination homeopathics, or new combination drugs. First, we will need to depend on safety as our primary goal. We need to took for safety first, or as Hippocrates said, "First don't hurt" This needs to be our absolute guideline for everything we do. We have to imagine that everything we do could get to the youth of our society, as I think that everything could get to my five-year-old daughter. The thought of anything happening to this small chili is absolutely, totally intolerable. Frost don't hurt.

Safety first is an absolute guideline. It is unfortunate that in the late 1950s the president of the American Medical Association (AMA) said in a public address that the AMA no longer had to guarantee safety firms they had to biopsy, x-ray, sedate, stimulate, stab, cut, and otherwise defame the body in order to do medicine. This idea will be intolerable in our new medicine as it forms. Safety first must be engineered at every step of the way.

In a recent report, Dr. McDonald said that there is a possibility that the plankton at the South Pole might be in a condition of iron deficiency, and that if these plankton had an exposure to iron, they might be able to develop the ozone needed to compensate for the ozone deficiency of the South Pole. His treatise makes very sound, scientific sense, and all the science regarding the plankton around the South Pole has been done in a superior manifest way. But yet, the scientific community is hesitant to make such a
maneuver, fearing the consequences of what one tanker-load of iron might do at the South Pole.

This same type of fear of what this might do to the ecology of the entire world is not shared by the synthetic chemical companies, as they engage ever-increasing numbers of synthetic chemicals that do not exist in the world, and they are putting these into the exosphere of our planet. This has been happening for over fifty years without fear. Our new medicine will absolutely hoist on proof that safety within the smallest amount of parameters must be guaranteed before we can proceed. We should no longer dump synthetic, never-occurring natural compounds into the environment in the percentage they have been in the past.

We must set policies as to what we are going to do, and this policy has to be geared through an idea that only nature knows. Only through such humility can science actually address the issues of biology and medicine. The arrogant idea that if we do not know its function we should cut it out allowed for the destruction of adenoids, tonsils and appendix; spleen, thymus, etc. This type of arrogance must cease. Nature knows, and nature had a plan for the adenoids, tonsils and appendix, even though we did not know it. To assume that it must not be needed because we do not understand it is an absolute arrogance of science. We must have a humility and a reverence towards our science to be able to proceed in any way, shape or form. Clinical trials are not enough; we must have a guaranteed policy of understanding nature and nature's own in order to proceed into the new dimensions of medicine and biology.

But the alternative industry has done very little to offer any type of scientific inquiry regarding statistics as its guideline. We will need to develop pilot studies that guarantee effectiveness in, primarily, safety. These types of statistical endeavors will have to be replicated by many doctors in many ways; not with the same criteria as drug trial studies, but in something similar that will guarantee the world's safety and the world's effectiveness of such remedies. These pilot studies must use the statistics of the day, and must be at a razor-sharp edge to prove both safety and effectiveness.

As we continue to revere nature and understand that only nature truly knows, we will have to develop this into a hallmark of our biology. This will allow homeopathy and all its nosodes, allersodes, isodes, sarcodes, etc. to explode into the scene of medicine. We also must have the philosophy and the psychology to understand that behavioral medicine, psychological intervention, the psycho-immunological link, and other factors are also very much needed for us to have a true medicine. We need to take Chopra's advice, and develop a science and a medicine of compassion, caring, sharing, touch, and healing to carry us into the new era of medicine.

We will need to have a constant field input to allow doctors who are using such medications to critique their actions in an ever-changing environment, realizing that the action of any homeopathic or drug might change as the population evolves, in light of an ever-changing reactivity to the elavironment Statistics will play an ever larger part, but yet will not be deified in light of philosophy. The philosophy that nature knows must be revered, not the statistics of clinical trials.

We must realize what nature and God-consciousness can do in the field of biology and medicine. Only then can we truly shape a new medicine through these various guidelines, concentrating on safety at all costs. We need effectiveness, but never at the cost of safety; revering nature and education, so that the doctors, the populace, and the society at large can share in our appreciation and harmony of the natural flow of medicine. To this end this book is written.

SUMMARY

1. A REVIEW OF THE INSURANCE LITERATURE AND THE TRUE SUCCESS STORIES BEHIND NATUROPATHY AND HOMEOPATHY VERSUS SYNTHETIC ALLOPATHY HAVE CONCLUSIVELY PROVEN THAT THERE IS A SEVERE PROBLEM IN THE FIELD OF SYNTHETIC ALLOPATHY. SYNTHETIC ALLOPATHY PAYS BILLIONS OF DOLLARS IN DAMAGES EACH YEAR. MILLIONS MORE ARE HURT BY THE TECHNOLOGY WHO DO NOT SEEK REPERCUSSION. THOSE WHO ARE HELPED DO NOT OUTWEIGH THE DAMAGES. THE SOLUTION FOR THIS COULD BE A NEW RISE FOR HOMEOPATHY AND NATUROPATHY INTO THE GENERAL PROCEDURE OF MEDICINE.
2. WE HAVE ALSO ENCOUNTERED THAT THERE WERE PROFITEERING ISSUES BEHIND THE SURGE OF SYNTHETIC ALLOPATHY THAT WERE SPEARHEADED BY REDUCTIONISM AS A MECHANISM OF DIRECTING RESEARCH. NOW WITH THE SKILLS INVOLVED N TODAYS MATHEMATICS AND QUANTUM THEORY, WE CAN SEE THAT THE FIELD OF REDUCTIONISTIC RESEARCH LEAVES DRAMATIC PROBLEMS FOR MEDICINE.
3. A NEW SYSTEM OF RESEARCH MUST BE DEVELOPED FOR MEDICINE. SOME IDEAS FOR A NEW SYSTEM WERE PRESENTED WITHIN THIS CHAPTER.
4. MEDICINE MUST LEARN NOT TO DEIFY STATISTICAL REDUCTIONISTIC PAPERS, AND MUST LEARN TO DEVELOP A REVERENCE FOR THE NATURAL PROCESS RATHER THAN SYNTHETIC DYNAMICS.
5. FREEDOM OF CHOICE MUST RETURN TO THE WORLD SYSTEM OF MEDICINE.
6. SYSTEMS OF MEDICINE SUCH AS CHIROPRACTIC, NATUROPATHY, HOMEOPATHY, ACUPUNCTURE, BEHAVIORAL MEDICINE AND BIOFEEDBACK ARE LEGAL SYSTEMS.
7. SYNTHETIC ALLOPATHY SEEKS TO TYRANNIZE THE MINDS OF MEN (PEOPLE AGAINST THESE OTHER MEDICAL BELIEFS.)
8. WE MUST OPPOSE ANY SUCH TYRANNY OVER THE MINDS OF MEN.

QUANTUM BIOPHYSICS

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QUANTUM BIOPHYSICS

INTRODUCTION

In the previous books on *Quantum Biology*, *Towards a Bio-Quantum Matrix*, *Quantum Vibrational Medicine* and the *Quantum Energetic Medicine Dictionary*, we have outlined a new procedure of biology. In this book we wish to develop more practical analyses of the physical processes of biology in order to bridge the gap to a more medical model.

As we have pointed out in the books previously mentioned, the fact that biology is a quantum process brings with it many implications, such as needing hermitian matrices in an accounting of the process of metabolism and reproduction. Also we must involve indeterminacy in our relationship. We must explain and develop the Nelson effect and its impingement upon biology, as well as all the other intricacies of quantum theory in biology.

In this book we endeavor to take the fields of genetics, hematology, nephrology, rheumatology, immunology, neurology and cellular metabolism into a deeper understanding of the process by developing a quantum procedure for these analyses. The implications of these analyses, as they develop into a quantum model, will be vast and varied for medicine. A review of the previously mentioned books would be wise at this time as a backdrop of information before proceeding into the field of quantum biophysics.

Our endeavor of quantum biophysics will mandate that biology and medicine need to drop their reductionistic models and their simplistic viewpoints of two-variable interactions. We will see from the development of our fuzzy arithmetic and uncertainty that only through a nonlinear, nonreductionistic model can a true mathematical protocol be established for understanding biology. We will see how the quantum research of subatomic particles allows us to understand biological functions.

We will also endeavor to introduce the fields of homeopathy, energetic medicine, and electroacupuncture to the researcher and the researching public as meaningful modalities of diagnosis and therapy for quantum biophysics.

The reductionistic model has been false for biology. The reductionistic model might have worked for physics, electronics, and some other endeavors, but in the field of biology the reductionistic model has failed miserably. The reductionistic model has allowed for the development of synthetic chemistry, synthetic pharmacology, and many other processes built on a two-dimensional analysis of the body. This so-called two-body problem is an incomplete and inaccurate system in comparison with the multi-dimensional human being, in which there can be literally millions upon millions of variables that influence the individual case.

As Poincaré pointed out, once we leave the two-body system, we enter a world in which fractal dynamics and chaos theory become a better road map than the simple two-part interaction. A researcher who attempts to research a modality such as blood pressure in comparison with only one intervention (such as a synthetic pharmaceutical) is not developing a true system of analysis, and the results of his study will be open for bias and incomplete analysis.

As we develop a more exacting model, recognizing the complexity of the system, we must develop reverence for the system, and realize that in God's world, only the actual process of nature truly knows the secrets involved. Mankind will explore nature and attempt to better understand these phenomena.

The field of synthetic chemistry has generated a synthetic pharmacology, which at present accounts for over fifteen billion dollars a year in malpractice suits. Iatrogenic disease from pharmacological intervention is on the rise. We should have learned from the insecticide generation that adding these vast amounts of poisons and synthetic drugs into the ecology is an unwise and irrational endeavor. These synthetics, developed on a thermodynamic, statistical system of simplistic reductionism, are not able to cope with the total complexity of nature.

Thus in developing our quantum biophysics model, we must realize that nature knows the answer to these biological questions, and that nature develops remedies that are not only chemically correct, but are also energetically and quantically correct. Our system of biophysics will develop into a true analysis of the science of biology. This will lay the groundwork for the development of a true, natural, quantic and energetic medicine.

QUANTUM BIOPHYSICS

Chapter 1

CHANGING THERMODYNAMIC FORMULAS TO QUANTUM FORMULAS

This is the fourth book in our *Quantum Biology* series. Our other quantum books, *Quantum Biology*, *Bio-Quantum Matrix*, and *Quantum Vibrational Medicine* all relate a new paradigm for medicine and biology.

Quantum biophysics is the analysis of biological (living) phenomena in physicomathematical terms. We will involve all formal theories of the behavior of living organisms and their subsequent parts. We will analyze theories in an attempt to analyze biological phenomena, electro-physical and chemical concepts. This chapter tackles such endeavors as enzyme kinetics, a quantum molecular theory of cell forms and cell division, and the hermitian mathematical theory of aggregates of cells and organisms.

As we proceed, we will: 1) prove the quantic relationship to biology, 2) operationalize the variables quantically where possible, 3) determine the effect and consequences for medicine, and 4) outline a form of medicine for the future.

A living (biological) system is a spatially circumscribed quantic phase (or aggregate of such a phase) in contact with another phase or set of thermodynamic phases in the environment. Thus a boundary layer is set between the living quantic cells and the dead thermodynamic environment. It is in constant interaction with the environment; matter, energy, momentum and charge pass between the two. Living systems, while they display the criteria of life, are never in thermodynamic equilibrium. To describe their energy relations requires a generalization, and a departure from classical thermodynamics.

Quantum mechanics dictates some of these interactions. This book is designed to educate the reader in a new adaptation of biophysics concepts. We trust that the reader has reviewed the other books in our Quantum Biology series. As we develop a new biology, we develop a new medicine. In this case our discoveries contradict many modern medicine techniques, most prevalently synthetic allopathy and reductionism, and we are replacing them with homeopathy, naturopathy, and bioenergetics. As we outline more principles in biophysics in this, our fourth book on book on Quantum Biology, medicine is given some steep challenges to meet. The mathematical equations contained within these four texts are not easy reading, nor are the texts designed for the general public. But these texts are designed for the open-minded intellectual skilled in biophysics, quantum theory, fractals, and electronics. If there are any questions of developments that result from reading these texts, please call for discussion.

For lessons in how to use these new forms of medicine, we point the reader to the Natural Compendium of Disease and Its Treatment by Dr. Nelson, as well as the books on *New Biology I*, *A Legal Outline of the Medical Practice of Electroacupuncture*, and *Physical Diagnosis*.

Sample Conversion Lists

ma = mass density of substance a in gm cm^{-3}
m = total mass density ($= \sum_a$ ma)
Va = velocity of substance a
C_A = concentration of substance a in moles gm^{-1}
Ma = molecular weight of substance a
Ra = chemical reaction rate of substance a in gm cm^{-3} sec^{-1}
P = stress tensor
F = external force
H = total energy per unit volume
q = vector of heat flow
p = hydrostatic pressure (See *Quantum Energetic Medicine Dictionary* for complete lists.)

QUANTUM BIOPHYSICS

Now, to account for biology, we must start our conversion.

Two variables must be accounted for now, on the compounds that leave the cell to the environment and those that do not.

The scalar quantities are functions of coordinates x, y, z (x′, y′, z′) of articles in the cell environment relative to chosen coordinate system, and to time t.

The mean diffusion velocity of the system at a point relative to the viscosity reference coordinate system is

1) $$\text{Viscosity Momentum} = mV = \sum_a m_a V_a$$

The average diffusion velocity of substances in class 1 from classical dynamics is

2) $$\text{Mean velocity} = m_1 V_1 = \sum_a m_a V_a$$

(a ranges over substances of class 1)

for V_2, with $m_1 = \sum_a m_a V_a$ over class 1, etc.

The average diffusion velocity of substance a is then $U_a = V_a - V_1$. We define

$$R_1 = \sum_a R_\alpha, \quad (\alpha \text{ over class 1})$$

$$R_2 = \sum_i R_i, \quad (i \text{ over class 2})$$

$$J_a = mC_a U_a$$

$$J = mU = \sum_a M_a J_a$$

Here M_a and C_a are related by $m_a = mM_a C_a$, and $U = V - V_1$. The internal energy per gram, e, is defined by

3) $$me = H - \tfrac{1}{2}mV^2$$

The differential equation relating to large-volume interstitial fluid involves the first law of thermodynamics, which is then

4) $$m\frac{de}{dt} = (\mathcal{P} \cdot \nabla) \cdot V - \nabla \cdot q - \Sigma \nabla \cdot (\mu_a J_a) + e\nabla \cdot J$$

where $\mu_a = \partial e / \partial C_a$ and the operator d/dt is given by

$$\frac{d}{dt} = \frac{\partial}{\nabla t} + V_1 \cdot \nabla$$

The operator displays the rate of change at a given point in the cell, having a velocity $V_1 1$. Additional equations of diffusion and continuity show

$$5) \qquad \frac{dm}{dt} = -m\nabla \cdot V_1 - \nabla \cdot J, \quad m\frac{dC_a}{dt} = \frac{R_a}{M_a} - \nabla \cdot J_a + C_a \nabla \cdot J$$

and the hydrodynamic equations are shown.

$$6) \qquad m\frac{dV}{dt} = \nabla \cdot \mathcal{P} + F - (J \cdot \nabla)V, \quad m_1\frac{dV_1}{dt} = \nabla \cdot \mathcal{P}_1 + F_1 - R_1 V_1$$

The differential equation in large interstitial volume involving the second law is

$$7) \qquad \left.\begin{aligned} m\theta\frac{d\eta}{dt} = (\mathcal{P} \cdot \nabla) \cdot V_1 + (\mathcal{P} \cdot \nabla) \cdot U + p\nabla \cdot V_1 - \sum_a \mu_a \frac{R_a}{M_a} - \nabla \cdot q \\ - \sum_a J_a \cdot \nabla\mu_a + (e + pv - \sum_a \mu_a C_a)\nabla \cdot J \end{aligned}\right\}$$

where η is the entropy and θ the absolute temperature.

Defining the Gibbs free energy we find

$$\psi = e - \theta\eta$$

We have for this function the equation in biological nonquantic events of large magnitude.

$$8) \qquad \left.\begin{aligned} m\frac{d(\psi|\theta)}{dt} = -\frac{me}{\theta^2} \cdot \frac{d\theta}{dt} + \frac{1}{\theta} - p\nabla \cdot V_1 + \sum_a \mu_a \frac{R_a}{M_a} - \sum_a \mu_a \nabla \cdot J_a \\ + (\sum \mu_a C_a - pv)\nabla \cdot J \end{aligned}\right\}$$

What we have outlined in the previous eight formulas is a thermodynamic principle. Let us now convert this into a quantic process by converting the mass and by putting this into the equation of mass and position, known as the Heisenberg uncertainty principle, and generate eigenvalues necessary for quantum utilization. This is needed to understand quantic events in cellular transport of diffusionary or viscous fluids.

$$\sum_j \left(\frac{\partial\theta}{\partial Q_j}\frac{\partial M}{\partial P_j} - \frac{\partial\theta}{\partial P_j}\frac{\partial M}{\partial \dot{Q}_j} \right) = [\theta, M] = -[M, \theta]$$

Equations of the same form as above hold for the environment (in fact, one set holds for each phase if there are more than two phases). At interfaces, we have boundary conditions of two sorts: those prescribing the stress P at the boundary, and those prescribing the diffusion flux. The latter are of the form

$$J_i = J_{iS}, \qquad (i \text{ over class 2})$$

$$J_\alpha = 0 \qquad (\alpha \text{ over class 1})$$

The quantity J_{iS} is generally given by

$$J_{iS} = n(a_i C_{iS} - a'_i C'_{iS})$$

where S denotes surface values, the primes denote the "external" or adjoining phase, and n denotes the unit external normal to the surface of the phase.

The cell shape is related to the system as follows: if the equation of the cell surface is $S(x, y, z, t) = 0$, then

9)
$$\frac{dS}{dt} = \frac{\partial S}{\partial t} + V_1 \cdot \nabla S = 0$$

In the equation, if V_1 (the solution of the hydrodynamical equation) is obtained, we can solve the formula. V_1 is dependent on R_1. The cell shape relates to cell metabolism. Improper cellular shape can prophesy disease.

As we study growth, the equations for the total mass M and total volume V_0 of any region ($d\tau$ = element of volume) become

10)
$$\left.\begin{aligned} \frac{dM}{dt} &= \frac{d}{dt}\int m\,d\tau = -\int \nabla \cdot J\,d\tau \\ \frac{dV_0}{dt} &= \frac{d}{dt}\int d\tau = \int \nabla \cdot V_1\,d\tau \end{aligned}\right\}$$

For a region sufficiently small to be approximately homogeneous, those take the simpler form

11)
$$\left.\begin{aligned} \frac{dM}{dt} &= -V_0 \nabla \cdot J \\ \frac{dV_0}{dt} &= V_0 \nabla \cdot V_1 \end{aligned}\right\}$$

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Converting this formula into its quantic dynamics will result in

$$[M, V] = \sum_{j} \frac{\partial M}{\partial Q_i}\frac{\partial V}{\partial P_j} - \frac{\partial M}{\partial P_j}\frac{\partial V}{\partial Q_i} = - [V, M]$$

The dynamics of enzymes in catalyzed reactions

Simple Reactions

One basic theory of enzymes is that the substrate and the enzyme form a complex. This complex reacts to develop the product or products, and then set free the enzyme. The enzyme can now enter the next cycle. The simplest possible case has been described in equations first derived by Victor Henri.

Denote the total enzyme by E_0, enzyme substrate complex by C, free enzyme by E, product by P, and substance by S (all expressed as concentrations, e.g., in moles cm^{-3}).

(Concentrations in moles cm^{-3})

Total Enzyme	E_0
Enzyme Substrate Complex	C
Free Enzyme	E
Product	P
Substance	S
Log of Biophoton (Nelson effect)	B_P

The stoichiometric relations are

$$S + E \underset{k'_1}{\overset{k_1}{\rightleftharpoons}} C, \qquad C \xrightarrow{k_2} E + P$$

The quantic implications of this formula result in

$$S + (E\ C)B_P \quad ; \qquad C\ (e^{Bp}) + P$$

with implications of biophoton involvement that undermine synthetic pharmaceuticals but further validate our quantum biology hypothesis.

We have, moreover

$$E_0 = E + C$$

$$E \text{ Total} = (E + C)^{Bp}$$

Every one hundred biophotons have a profound effect on biology. Could this virtual bio-Nelsonian law account for the transfer of our original four products of biophysics? Our answer: Yes. (See *Quantum Biology*.)

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Continuing our pursuit of knowledge, and assuming that the first reaction is in equilibrium, and that the overall reaction rate is related by the transformation of C to E and P, this gives

1) $$V = k_2 C = k_2 \frac{S}{K + S} E_o$$

where $K = k'_1/k_1$.

Haldane modified the theory to predict a steady state for the complex, instead of equilibrium of the complex-forming reaction. Thus Haldane presumes bio-quantic reactivity, and produces

$$dC/dt = 0$$

C is minute, and defines chemical understanding. This yields for the reaction rate, and thus

2) Thermodynamics in vitro In vivo

$$V = k_2 \frac{S}{K + S} E_o \quad \text{or} \quad k_2 = \frac{S^{Bp}}{K + S} E_o$$

where $K' = K + k_2/k_1$. The quantic form is the same, but K' no longer implies the dissociation constant of the complex, so that $1/K$ does not measure exclusively the affinity of enzyme for substrate.

Our quantic conversion allows us to see that a hermitian relationship in a fuzzy number sequence is a better describer of the enzyme substrate interaction. It has long been known that these enzymes work in in vitro situations, where large amounts of enzyme are needed with large amounts of substrate. In an entropic, thermodynamic situation, these enzymes and substrates must bump into each other, and thus large amounts of them must ensue. Biophotons allow for intracellular enzyme maximization beyond thermodynamic control.

In biology our in vitro analogy is incomplete and inaccurate without biophotons. In biology very small amounts of these enzymes have profound reactions, and the substrates are brought to the enzymes in contact via quantic molecular forces that are not thermodynamic. This requires our biophoton explanation. These nonthermodynamic forces fall into a more quantic pattern. Thus enzymatology must change, and develop a quantic interaction to study the in vivo relationship, in the body. This must involve the biophoton and Nelson effect. Our quantic patterning explains more of the intercellular functioning. Enzymatology and biology are changed forever.

Enzyme Inhibitors

Substances that inhibit enzymatic reactions have effects due to their action on the free enzyme molecules, on enzyme-substrate complexes, or both. Such reactions can be viewed as stoichiometric combination when its formal equivalent is assumed.

The assumed equations are

1)
$$\left.\begin{array}{l} E + S \underset{}{\overset{1}{=}} C \rightarrow P + E \\ \\ E + I \overset{3}{=} E_I \\ \\ C + I \overset{u}{=} C_I \end{array}\right\}$$

where I is the free inhibitor, E_1 is the enzyme-inhibitor complex, C_1 is the enzyme-substrate-inhibitor complex, and the other symbols are as before.

We have the conservation equations

2)
$$\left.\begin{array}{l} E_0 = E + C + E_1 + C_1 \\ I_0 = I + E_1 + C_1 \end{array}\right\}$$

(assuming combination in 1 : 1 proportions as above, and using I_0 as the total inhibitor).

Take C in the steady state as previously outlined, and assume that reactions involving inhibitor are in equilibrium (which is true for many but not necessarily for all inhibitions). Thus we have

3)
$$ES = K_1 C, \quad EI = K_3 E_1, \quad CI = K_4 C_1$$

where $K_1 = k'_1/k_1 + k_2/k_1$, $K_3 = k'_3/k_3$, $K_4 = k'_4/k_4$.

Our solution of this system provides for the inhibited reaction rate

4)
$$V_i = k_2 C = \frac{1}{2} \cdot \frac{k_2}{k} \left[\left(\frac{k}{m} - \Delta \right) + \sqrt{\left(\frac{k}{m} - \Delta \right)^2 + 4 \frac{k}{m} E_0} \right]$$

where $k = k_1/S + 1$, $m = K_1/SK_3 + 1/K_4$, $\Delta = E_0 - I_0$.

We can easily plot results of inhibition experiments in terms of the fractional inhibition i or the fractional residual activity ρ, defined by

$$i = \frac{E_1 + C_1}{E_0}$$

$$\rho = V_i / V$$

where V is the uninhibited rate as previously determined. These quantities are related by $i + \rho = 1$. Our theoretical equations are

5)
$$I_0 = iE_0 + \frac{k}{m} \cdot \frac{i}{1 - i}$$

for the plot of I_0 against i, and

6) $$E_0 = \frac{I_0}{1-\rho} \cdot \frac{k}{m} \cdot \frac{1}{\rho}$$

for the plot of E_0 against ρ, or

7) $$I_0 = (1-\rho)E_0 + \frac{k}{m}\,\frac{1-\rho}{\rho}$$

for I_0 against ρ.

Our mathematics generally imply an infinite value of I_0 for complete inhibition, and an infinite value of E_0 for complete inhibition.

There are some special cases of interest that have been worked out in the past, and they can be easily derived from the previous results. When the inhibitor reacts only with free enzyme, we have what is frequently called competitive inhibition, since we propose that substrate and inhibitor compete for the same grouping on the enzyme. Substrate will outrun inhibition in bio systems. In this case $1/K_4 = 0$, $k/m = K_3(1 + S/K_1)$. If this is substituted in the i, I_0 relation

8) $$I_0 = iE_0 + K_3\left(1 + \frac{S}{K_1}\right)\frac{i}{1-i}$$

and the amount of inhibitor require to produce a given fractional inhibition increase with the concentration of substrate.

If inhibitor combines somewhat impartially with E and C and has the same affinity for both, $K_3 = K_4$. In this case, $k/m = K_3$, and the relation of I_0 to i is independent of S. This sort of inhibition is called uncompetitive, and happens in states of low biophoton radiation.

Biophoton radiation increases with

-- Optimism
-- Awareness
-- Enthusiasm
-- Health
-- Perseverance
-- Acceptance
-- Nonjudgmentalism

So-called "uncompetitive" inhibition results if inhibitor combines only with C. Then

9) $$1/K_3 = 0$$

and

10) $$\frac{k}{m} = K_4\left(\frac{K_1}{S} + 1\right)$$

The i, I_0 equation now reads

11) $$I_0 = iE_0 + K_4\left(\frac{K_1}{S} + 1\right)\frac{i}{1 - i}$$

By increasing the substrate concentration we decrease the amount of inhibitor required to develop a given degree of inhibition by quantic logarithmic decrease.

If the combination of inhibitor with E and C is found to be irreversible, then $K_3 = K_4 = 0$, and therefore $k/m = 0$. In this case, substitution in the i, I_0 equation gives $i = I_0/E_0$.

Likewise, our relationship of reaction rate to E_0 takes the special form of a broken line. For $0 \leq E_0 \leq I$, $V_i = 0$, while for $E_0 > I_0$

12) $$V_i = \frac{k_2}{k}(E_0 - I_0)$$

We call this form of inhibition "titration" of the enzyme by the bio inhibitor. The same result is obtained with competitive and noncompetitive inhibition if $K_3 = 0$, and for uncompetitive inhibition if $K_4 = 0$.

This titration of the enzyme by the inhibitor can only be viewed through our fuzzy arithmetic and our uncertainty relationship for biology. Often one enzyme is all that a cell has to work with, and that one enzyme consistently in a fixed period of time performs its function. This cannot happen in a thermodynamic process that would have a degree of randomness. The uncertainty must have some degree of control in the process that can be understood in a quantic system.

Thus our quantic analysis of biophysics allows us to understand the specific titration that happens within a biological system. This is different from the titration of the enzyme in the inhibitor that happens in vitro. In vivo is not the same as in vitro. Biology has thus changed synthetic pharmacology forever.

Cell Metabolism

Metabolism and intracellular concentration

Our simplest theoretical model of a living cell has foundations in the minimal set of metabolism and reproduction characteristics in the cell determined by the environment. There are chemical reactions that constitute metabolism going on inside the cell, and products of metabolism diffuse out of the cell into the environment.

In the Quantum Biology book we outline the entity of the vion and its basic capacity of cell metabolism and reproduction. In Bio-Quantum Matrix we outline a basic quantic hermitian matrix for biology that regulates metabolism and reproduction. The process of cellular metabolism is of taking in different products and expelling different byproducts. This process of metabolism has a byproduct of energy needed for photon, electron, ion, viscosity, heat, and control. The Quantum Biology book covers the subject of the vion in depth. Now we will convert some of the information of quantic relationships to our development of medicine.

These chemical characteristics can be expressed by a modified form of the classical partial differential equation of diffusion. If a substance is undergoing no chemical reactions, this equation will be

1) $$\frac{\partial \mathcal{H}}{\partial t} = -\nabla \cdot J$$

where $C[= C(x, y, z, t)]$ is the concentration of the substance in gm cm^{-3} (moles cm^{-3}) and J is the vector of diffusion flux in gm cm^{-2} sec^{-1} (or moles cm^{-2} sec^{-1}). If chemical reactions are occurring, they are embodied in a term for "sources" and "sinks," and the equation is

2) $$\frac{\partial}{\partial t} = -\nabla \cdot J + Q$$

where Q is the net rate of reaction yielding the substances in gm cm^{-a} sec^{-1} (moles cm^{-3} sec^{-1}). When the substance in the aggregate is removed by reaction rather than supplied, $Q < 0$. Then we must consider groups of substances which are similar to one another by chemical transformations. Then we would have simultaneous systems of equations like the foregoing for a set of concentrations $C_1, C_2, \ldots, C_n$. Then we find that Q will be different in each equation, and each Q_i will be a function $Q_i (C_1, C_2, \ldots, C_n)$ of several or all of the functions C_j. A lot of information may be obtained even from the reductionistically simple case in which each substance is treated independently. Here $Q_i = Q_i(C_i)$ or Q_i = constant = q_i. This particular situation may hold approximately for at least one of a group of related substances if all the others are occurring in sufficiently large amounts.

These large amounts are needed to override the quantic dimension and accelerate the mass to a point where the uncertainty dimension is overridden, and the equations of thermodynamics can ensue. At small amounts of enzyme and substrate (as in natural cells) we must use a quantic system of analysis. This can be overridden (as in the synaptic cleft) if a large amount of the enzyme is pushed into the cleft. We must realize that this large amount is an unnatural occurrence in most biological systems where only small numbers of enzymes are present. The use of a synthetic chemical also has side effects. We point the reader to Quantum Biology for a simplistic description of this process and the unnatural problems of synthetic pharmacology.

In order to solve the diffusion equation, we will find it necessary to construct an expression for the flux vector J. A satisfactory form can be given by Fick's law

$$J = -D\nabla C$$

where D is a constant referred to as the diffusion coefficient, and is in general different for each substance (and for each kind of cell or tissue). Thus the diffusion equation becomes

3) $$\frac{\partial \mathcal{H}}{\partial t} = D\nabla^2 C + Q$$

As previously indicated, a separate equation holds for each distinct phase (e.g., for the cell, the cell metabolites, and the cell's environment). On the surface (separating the phases), boundary conditions hold. In the diffusion problem, these express the condition so that the flux into the surface from one side equals the flux across the surface, which equals the flux away from the surface on the other side. In both phases (the interior of a cell and its environment, and denoting the corresponding C functions by C_i and C_e, and by $\partial/\partial V$), the normal derivative (with respect to the external normal to the surface), we then can construct

4) $$-D_i \frac{\partial C_i}{\partial V} = -D_e \frac{\partial C_e}{\partial V} = J_s$$

(at the surface)

We represent the surface flux in the form of

$$J_s = h_i C_i - h_e C_e$$

where h_i and h_e are constants (for each substance and each cell). If $h_i \cong h_e$, then

$$J_s = h(C_i - C_e)$$

and h represents the permeability coefficient. Often the solution of the diffusion equation, $C(x, y, z, t)$, with steadily increasing time approaches a stationary value $C(x, y, z)$, which represents a solution of the equation

$$D\nabla^2 C + Q = 0$$

obtained from the more general equation by setting $\partial C/\partial t$ equal to zero. Approximating the time required to reach practically this stationary state, we develop an approximate calculation to show that the time-dependant transient term of $C(x, y, z, t)$ is proportional to $e - \Delta^2$, where a is a measure of the linear dimensions to the cell. Since D for a number of important metabolites is known to be $\sim 10^{-7}$ cm^2 sec^{-1}, for a cell of linear dimensions $\sim 10^{-3}$ cm, we have $D/a^2 \sim 10^{-7}$ cm^{-2} sec^{-1}, for a case the transient term will drop to $1/e$ of its initial value in ten seconds, and become virtually negligible after one minute. Often our solutions may be treated to satisfaction in terms of the stationary diffusion equation.

The boundary condition solution satisfying the boundary conditions is readily found if the cell has a spherical shape. The polygonal shape of human cells offers a mathematical challenge solved only with the help of the golden mean of the Fibernaci series.

For the case where Q is a constant q, the solution is given by

5)
$$\left.\begin{aligned} C_e &= C_0 + \frac{9r_0^3}{3D_e} \cdot \frac{1}{r} \\ C_i &= C_0 + \frac{9r_0}{3h} + \frac{9}{6D_i}(r_0^2 - r^2) + \frac{9r_0^2}{3D_e} \end{aligned}\right\}$$

where the coordinate r is the radial distance from the center of the cell, or is the radius of the cell, and C_0 is the limiting concentration of the substance at a great distance from the cell.

We also can see from Quantum Biology, in our chapter on "Long Range Forces", how even entities at large distances in molecular terms can have effects on each other. This can be accounted for by our virtual photon effect, the Nelson effect, the tunnelling effect, and other dimensions in quantum analysis. So our process of biology must allow for this type of interaction, including magnetic and static in our long-range forces.

For $q > O$ the concentration distribution has a reductionistic maximum at the center of the cell, and decreases as one moves outward, with a discontinuity of $qr_0/3h$ at the surface. For $q < O$ there is a minimum at the center of the cell and an increase as one moves outward.

Nonspherical cells have the solution of the boundary value problem that rapidly becomes unmanageable with thermodynamic mathematics. Rashevsky provided a method of approximation that permits most problems to be handled with relative ease. Let us consider a cell of roughly oblong shape, with "half-width" r_2 and "half-length" r_1. Set the mean concentration of metabolite, halfway between periphery and center, be c. Let the average peripheral concentration inside the cell at the ends be c_1, at the "sides" be c_2, when the corresponding values just outside the cell are

c_1 and c_2. Setting δ as a length of cell dimensions, so that the distance from the cell in which the concentration changes from c_1 and c_2 to the limiting value c_0. The boundary conditions (two sets, one for the ends and one for the ends and one for the sides) take the form

6)
$$\left.\begin{aligned} 2D\,(\overline{c} - c_1) &= r_1 h(c_1 - c'_1) \\ 2D_i(\overline{c} - c_2) &= r_2 h(c_2 - c'_2) \\ \frac{2D_i}{r_1}(\overline{c} - c_2) &= \frac{D_e}{\delta}(c'_2 - c_0) \\ \frac{2D_i}{r_2}(\overline{c} - c_2) &= \frac{D_e}{\delta}(c'_2 - c_0) \end{aligned}\right\}$$

Fibernaci numbers fall out of this integer series, as predicted by Poisson's theorem. Thus, as we point out in *Bio-Quantum Matrix*, the Fibernaci series is integrally involved in biology.

The (nonstationary) diffusion equation becomes the equation of continuity.

7)
$$\frac{d\overline{c}}{dt} = q - 3D_i\left(\frac{\overline{c} - c_1}{r_1^2} + 2\,\frac{\overline{c} - c_2}{r_2^2}\right)$$

With the help of the boundary conditions this takes the form

8)
$$\frac{d\overline{c}}{dt} = q - \frac{\overline{c} - c_0}{\Lambda}$$

We can call the total diffusion resistance of the cell.

The continuity equation has a solution of

9)
$$\overline{c} = c_0 + \Lambda q - C\Lambda_e^{-t/\Lambda}$$

where C is a constant of integration. Stationary states have

$$\overline{c} = c_0 + \Lambda q - C\Lambda_e^{-t/\Lambda}$$

Division of cell and diffusion forces

The relation of cell movements and cell division are related to metabolic activity based on the production of concentration gradients and differences by metabolism. The ionic ramifications are profound. If all concentrations become equal to c_0 and $q = 0$, then the discontinuity $c_i - c_e$ at $r = r_0$ likewise vanishes with q. When the presence of gradients and surface discontinuities for nonvanishing q occurs, it leads to volume forces along with surface pressures of "osmotic" character.

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The thermodynamic surface pressure is given by

$$1) \qquad p_0 = \frac{RT}{M}(c_i c_e)$$

where c_i and c_e are evaluated at the cell surface; R is the gas constant, T the absolute temperature, and M the molecule weight of the solute. Volume is related to

$$2) \qquad p = \frac{RT}{M} c, \; F_v = -\frac{RT}{M} \nabla c$$

For a better calculation we can modify the distribution c by the molecule or particle accepting the bombardment (e.g., an enzyme or protein molecule). Thus the next approximate formula gives

$$3) \qquad F_V = \frac{3}{2} \cdot \frac{RT}{M} \alpha V \nabla c$$

for the force on a particle of volume V, where α is a constant ~1. Interdependence of c on q will provide the general result that the volume and surface forces proceed outward for $q > O$ and inward for $q > O$.

It is possible that these forces can cause division of the cell. The forces are analyzed by calculating the energy change ΔE which results when a spherical cell of radius r_0 separates into two equal spherical cells of radius $r_1 = 0.8r_0$. Our calculation uses use of the well-known construct of an imaginary expansion of the cell to infinity followed by condensation to two half-cells. The first component of the energy change is due to the surface tension. The second component is due to the surface pressure. The third component is due to the volume force on the enzyme molecules, giving

$$4) \qquad \Delta E = \Delta E_S + \Delta E_m + \Delta E_V = 1.12\pi\gamma r_0^2 - \frac{\pi RTqr_0^4}{2Mh} - \frac{3}{20} \cdot \frac{\pi RT\alpha\mu q r_0^5}{DM}$$

where γ is the surface tension in ergs cm^{-2}, D is an average of D_i and D_e, and μ is the relative volume occupied by the enzyme particles. For small r_0, $\Delta E > 0$; for larger values $\Delta E < 0$. There is thus a critical value r_0^* of r_0 for which $\Delta E = 0$, where the cell becomes unstable (if $q > O$) (see *Bio-Quantum Matrix*). Then r_0^* solves the cubic equation

$$5) \qquad 1.12\gamma - \frac{RTqr_0^2}{2Mh} - \frac{3}{20} \cdot \frac{RT\alpha\mu q r_0^3}{DM} = 0$$

Our solution is complex, but two simple limiting examples are easily studied.

I. If h is very large,

$$6) \qquad r_0^* = \sqrt[3]{\frac{7.5\gamma DM}{RT\alpha\mu q}}$$

II. If D is very large,

7) $$r_0^* = \sqrt{\frac{2.24\gamma Mh}{RTq}}$$

With plausible values of the constants ($\gamma \sim 1$; $\alpha\mu = 1$; $q = 10^{-6}$ gm cm^{-3} sec^{-1}; $M = 100$; and $D = 10^{-7}$ cm^2 sec^{-1}, $h = \infty$, or $h = 10^{-4}$ cm sec^{-1}, $D = \infty$), we get $r_0^* \sim 10^{-3}$ cm, which corresponds well to average cell sizes. Large variations in the constants result in relatively much smaller changes in r_0^*.

Analysis of the stability of the cell uses as a value the virtual work of small arbitrary deformations of the cell. We must analyze the redistribution of concentrations due to the deformation. The deformation can result from genetic or environmental conditions. The condition of instability renders to more complex expressions for r_0^*, but provides approximately the same numerical values. Our condition is (n an integer corresponding to a quantum equivalent)

$$\frac{RT}{M}\,\alpha\mu\,\frac{2hqr_0^2 + D_e(n+1)qr_0}{E_iD_en(n+1) + h[D_e(n+1) + D_in]r_0} \quad (n-1)$$

$$+\frac{2}{3}\times\frac{RT}{M}\times\frac{[D_in(n-1) - D_e(n^2-1)]qr_0}{D_0D_en(n+1) + h[D_e(n+1) + D_in]r_0} > \frac{2(n-1)(n+2)}{r_0^2}\,\gamma$$

Equations of this nature can be used in medicine to calculate disease states. The Academy software uses this equation from blood analysis.

A unique derivation arises if $q < O$. If certain relations among the constants hold, the condition of instability may result in a region between the lower and the higher values of r_0. Within the range of low to high values of r_0, an infinitesimal elongation of the cell results in a decrease of energy. But we have seen that for $q < O$ the division of the cell gives an increase of energy. Energy will not continue to decrease as the deformation goes on, and an intermediate, nonspherical equilibrium shape will result. Neither of these calculations is adequate to predict the entire course of deformation of a cell and its eventual division or stabilization in a nonspherical shape. Biology can envision a stable nonspherical shape by applying the laws of plastic flow, along with the approximation method for diffusion in nonspherical cells. Betti's theorem was first applied to the problem by G. Young. Betti's theorem calculates the average relative rate of change of any dimension of a body of any shape through the following sort of expression.

8) $$\frac{1}{l_z}\cdot\frac{dl_z}{dt} = \frac{1}{3\eta}\left\{\iiint_V [zZ - \tfrac{1}{2}(yY + xX)]dV + \iint_S [zZ_v - \tfrac{1}{2}(yY_v + xX_v)]dS\right\}$$

where l_z is the length of the body at time t in the direction of the z axis, X, Y, and Z are the components of the volume force in the x, y, and z directions, and X_v, Y_v and Z_v are the components of the surface pressure, and the integrals are extended over the volume V and surface S, respectively, of the body, whose viscosity is η. Viscosity thus effects shape, which effects the

EMR transfer of the morphic resonant cell. Viscosity and charge interact, as does viscosity and mass. In medicine viscosity is controlled mostly by sympathetic vs. parasympathetic balancing.

The noradrenergic vs. cholinergic hormonal interaction affects all cellular viscosity, as well as systemic interstitial flow.

To calculate the volume force we return to the previously cited expression,

$$F = -\frac{3}{2} \cdot \frac{RT\alpha\mu}{M} \nabla c$$

while the surface pressures on the ends and sides of the cell respectively are

9)

ENDS	$p_1 = \frac{RT}{M}(c_1 - c'_1)$	Greater in metabolism Lesser in mitosis
SIDES	$p_2 = \frac{RT}{M}(c_2 - c'_2)$	Greater in mitosis Lesser in metabolism

We put the z axis along the largest dimension of the cell, so that $l_z = r_1$. When we solve the concentrations by means of the approximate method as before, we obtain

10)
$$\frac{1}{r_1} \cdot \frac{dr_1}{dt} = \frac{RT}{2M\eta} \cdot \frac{[3\alpha\mu\delta h + (3\alpha\mu - 2)D_e]hD_iD_e(r_1 - r_2)(\bar{c} - C_0)}{(2D_iD_e + 2\delta D_ih + r_1hD_e)(2D_iD_e + 2\delta D_ih + r_2hD_e)}$$

A more general relation is obtained if we take into account the effect to surface tension, which produces at the "ends" a force $-2\gamma/r_2$, and along the "sides" a force $-\gamma(1/r_1 + 1/r_2)$, which results in a contribution to the relative rate of elongation of $-(\gamma/2\eta)(r_1 - r_2)/r_1r_2$. Introducing the approximate stationary value Δq for $\bar{c} - c_0$, we get, finally,

11)
$$\frac{1}{r_1} \cdot \frac{dr_1}{dt} = \frac{RT}{6M\eta} \cdot \frac{[3\alpha\mu\delta h + (3\alpha\mu - 2)D_e]r_1r_2(r_1 - r_2)q}{2(2D_iD_e + 2\delta D_ih + r_1hD_e)r_1 + (2D_iD_e + 2\delta D_ih + r_2hD_e)r_2}$$

$$-\frac{\gamma}{2\eta} \cdot \frac{r_1 - r_2}{r_1r_2}$$

Since $r_1 - r_2 > 0$, then for $q > 0$ one necessary condition for elongation to occur (since usually $3\alpha\mu - 2 < 0$) is

$$\delta > \frac{2 - 3\alpha\mu}{3\alpha\mu} \cdot \frac{D_e}{h}$$

Since δ is of the order of the cell size (e.g., $\delta \cong r_2$), this means that elongation will occur for sufficiently large cell sizes. As r_1 increases, r_2 decreases. The cell volume (i) remains

approximately constant during the elongation, r_2 is expressed in terms of r_1 ($r_2 \sim 1/\sqrt{r_1}$) because of the approximate expression for the cell volume.

12) $$V = \frac{4\pi}{3} r_1 r_2^2$$

Thus for very large values of r_1 (where $\delta \sim r_2$), dr_1/dt varies as $Ar_1^{1/2} - Br_1^{3/2}$ where A and B are constants. This expression will disappear for some sufficiently large value of r_1, so that the elongation will proceed only to a limited extent. However, Betti's formula gives only the average rate of elongation. The middle of the cell (subjected to the maximum force) will elongate and constrict faster than the ends. This process of elongation may continue at the middle even when the average elongation has reached its limit. The final stages of cell division may then be viewed as a dumbbell-shaped figure, essentially two spheres of radius r_2'', whose centers are separated by a distance r_1'' and connected by a cylindrical "neck" of radius r. The spheres can be separated by diffusion forces. This separation is due to metabolites produced in each sphere and affecting the other sphere. This provides the repulsion force between the spheres. An expression for the total force is

13) $$F = \frac{RT\pi\alpha\mu q(r_2'')^6}{6MD_e(h_1'')^2}$$

This force, when applied to the total surface of the end of the neck, πr^2, gives a surface pressure $F/\pi r^2$. The surface forces from surface tension in the neck are $-2\gamma/r$ dynes cm^{-2} at the ends, and $-\gamma/r$ on the lateral surface.

Betti's theorem outlines

14) $$\frac{1}{l} \cdot \frac{dl}{dt} = \frac{1}{3\pi\eta} \frac{F - \pi r\gamma}{r^2}$$

In a viscous incompressible body the relative lateral constriction is half the relative elongation,

15) $$\frac{1}{r} \cdot \frac{dr}{dt} = -\frac{1}{2l} \cdot \frac{dl}{dt}$$

Thus we have

$$\frac{dr}{dt} = P - \frac{Q}{r}$$

where

$$P = \frac{\gamma}{6\eta}, \quad Q = \frac{RT\alpha\mu q r_2''^6}{36\eta D_e M r_1''^2}$$

For constriction to occur, we must have always

$$Q/r > P$$

The differential equation is solved:

16) $$P(r - r') + Q \ln \frac{Q - Pr}{Q - Pr'} = P^2 t$$

where r' is the initial value of r. r vanishes and division is complete at a time τ given by

17) $$P^2\tau = Q \ln \frac{Q}{Q - Pr'} - Pr'$$

It is easy to see that τ is real and positive if $Q - Pr' > O$ and that τ decreases as $Q - Pr'$ increases. Time required to complete division is smaller, among other things, as the metabolic rate q increases. We can surmise that division will never occur if the metabolic rate is less than 0, for in this case $dr/dt > O$. This is evident for the need of our epigenesis or cross median in our hermitian matrix (see *Bio-Quantum Matrix*).

Control of cell polarity

Our attempts to understand self-regulation of cell polarity will be dependent on the effect of diffusion forces on a negative catalyst. Visualize a spherical cell whose hemispheres have an average concentration $\bar{c}_1$, and $\bar{c}_2$ of some metabolite. Let the reaction rate be q. The problem is treated as usual, but the internal flux $\pi r_0 D(\bar{c}_1 - \bar{c}_2)$ must be taken into account. We finally arrive at

1) $$\bar{c}_1 - \bar{c}_2 = \frac{r_0^2(2D + r_0 h)(q_1 - q_2)}{3D(2D + 3r_0 h)} \quad \frac{\text{Capacitance inside}}{\text{Capacitance outside}}$$

This vanishes if $q_1 = q_2$. The diffusion forces act on colloidal particles of mean concentration n, volume V, and weight M, to produce a concentration ratio in the two hemispheres

2) $$\frac{n_1}{n_2} = e^{-\bar{\alpha}(\bar{c}_1 - \bar{c}_2)}$$

where

$$\bar{\alpha} = \frac{3}{2} \cdot \frac{NV\alpha}{M}$$

Putting $x = \bar{c}_1 - \bar{c}_2$, and observing that $n = (n_1 + n_2)/2$, we can calculate

3) $$n_2 - n_1 = 2n \tanh (\tfrac{1}{2}\bar{\alpha}x)$$

If the particles act as negative catalyst on the reaction rate

$$q = q_0 - an$$

Then

4) $$q_1 - q_2 = a(n_2 - n_1)$$

Asymmetric distribution of the particles (from the elimination of the q's and n's from the above relations) can be observed to be

$$x = 2Aan \tanh (\tfrac{1}{2}\bar{\alpha}x)$$

where

$$A = \frac{r_0^2(2D + r_0h)}{3D(2D + 3r_0h)} \qquad \frac{\text{Capacitance inside}}{\text{Capacitance outside}}$$

Approximately, for small $\bar{\alpha}x$, this is

$$x = Aan\bar{\alpha}x\left(1 - \frac{1}{12}\bar{\alpha}^2x^2\right) \qquad \frac{\text{Capacitance inside}}{\text{Capacitance outside}}$$

This has a root (besides $x = O$),

$$x^* = \pm \frac{3(Aan\bar{\alpha} - 1)}{Aan\bar{\alpha}} \qquad \sqrt{\frac{\mu \text{ farads inside}}{\mu \text{ farads outside}}}$$

which is real and positive if $Aan\bar{\alpha} > 1$.

This particular root relates to a stable configuration, so that the asymmetry can be stable against the disturbances, e.i., division of the cell. A similar result is true for a cell with an impermeable membrane, in which the constant A is

$$A = \frac{r_0^2}{r_0^2b + 3D}$$

Potential capacitance and inductance inside match outside.

QUANTUM BIOPHYSICS

Cell permeability

To analyze the interface and membrane permeability in terms of kinetic theory we need to develop a calculation of the velocity distribution along with an electrical concentration gradient. We will use an adaptation of a procedure used by Lorentz in the theory of conductivity. This fits into our matrix (see *Bio-Quantum Matrix*). Letting the Maxwell distribution of velocities be $f_0(c)$, the perturbed distribution is approximately

1) $$f = f_0 + uF(c)$$

where u is the component of c in the direction of the gradient. Using the equation of Boltzmann to evaluate the correction term provides

2) $$F(c) = -\left(\frac{L}{C}\right)\partial f_0/\partial x$$

where L is the mean free path, and the x axis of a rectangular coordinate system has been placed in the direction of the gradient. We can calculate the diffusion current J.

3) $$J = \iiint_{-\infty}^{+\infty} uf\,du\,dv\,dw = \frac{L}{3}\sqrt{\frac{8kT}{\pi m}}\,\partial n/\partial x$$

where m is molecular mass, T absolute temperature, n is concentration at x, and k is Boltzmann's constant. This is similar to Fick's law if the diffusion coefficient D is

$$D = \frac{L}{3}\left(\frac{8kT}{\pi m}\right)^{1/2}$$

The matrix allows us to see the quantic probability of enviro-cellular interaction. Only through a quantic perspective can we intuit cell permeability.

The effect of phase boundary, where the integral splits into two parts, produces parameters of the distribution for molecules approaching from one phase, and are in general different from those for approaching from the other side. We construct values at the boundary in the "left" and "right" phases by subscripts 1 and 2, in order.

A field with potential $V(x)$ acts inside a phase, and adds $-Mn\partial V/\partial x$ to the expression for J, where the mobility $M = D/kt$. At the boundary, V may undergo a finite change, and a potential barrier may also occur. We will let the potential in phase 1 at the boundary be V_1, in phase 2 V_1, and the barrier V. Thus the potential jump going from 1 to 2 is $U_1 = V - V_1$, and from 2 to 1 is $U_2 = V - V_2$. The lower limits of the velocity integrals for J all given now by $\frac{1}{2}mc^2 = U_1$ and $\frac{1}{2}mc^2 = U_2$.

The diffusion current at the boundary is

$$J_S = a_1n_1 - a_2n_2$$

with

4)
$$a_1 = a\phi_1/[1 - \tfrac{1}{2}(\phi_1 + \phi_2)]$$

$$a_2 = a\phi_2/[1 - \tfrac{1}{2}(\phi_1 + \phi_2)]$$

$$a = \tfrac{1}{2}(2\pi kT/m)^{1/2}$$

$$\phi_1 = e^{-U1/kT}(1 + U_1/kT)$$

$$\phi_2 = e^{-U2/kT}(1 + U_2/kT)$$

The constants a_1 and a_2 are called the coefficients of permeability. We can see that values of the potentials can be chosen such that the flow will have a sign opposite to that of $n_1 - n_2$ ("anomalous" diffusion, diffusion against a gradient).

A membrane of finite but small thickness d, can apply the foregoing results. The potential barriers at the two boundaries are V and W, and the boundary potentials in the membrane are Vm_1 and Vm_2. We write $U_1 = V - V_1$, $U_2 = W - V_2$, $Um_1 = V - Vm_2$, $Um_2 = W - Vm_2$. The diffusion current in the membrane is

$$Jm = \frac{Dm(nm_1 - nm_2)}{d} : \sum_j \frac{\partial u \partial V}{\partial P_j \partial Q_j}$$

where D_m is the diffusion coefficient in the membrane. Observe the left and right boundary fluxes are equal to each other, to J_m, and to J_S (continuity of flux across the membrane),

$$J_{S1} = J_{S2} = J_m = J_S$$

we arrive at

$$J_S = \frac{(a_1/am_1)n_1 - (a_2/am_2)n_2}{1/am_1 + 1/am_2 + d/D_m}$$

with

6)
$$a_1 = \frac{a\phi_1}{1 - \tfrac{1}{2}(\phi_1 + \phi m_1)}, \qquad a_2 = \frac{a\phi_2}{1 - \tfrac{1}{2}(\phi_2 + \phi m_2}$$

$$am_1 = \frac{a\phi m_1}{1 - \tfrac{1}{2}(\phi_1 + \phi m_1)}, \qquad am_2 = \frac{a\phi m_2}{1 - \tfrac{1}{2}(\phi_2 + \phi m_2}$$

$$\phi_1 = e^{-U1/kT}(1 + U_1/kT), \qquad \phi_2 = e^{-U2/kT}(1 + U_2/kT)$$

$$\phi m_1 = e^{-Um1/kT}(1 + Um_1/kT), \qquad \phi m_2 = e^{-Um2/kT}(1 + Um_2/kT)$$

QUANTUM BIOPHYSICS

Excitation and conduction in the neurone

One biophysical theory of nerve activity is a modification by Rashevsky of a theory posited by Blair. Central to the theory is that of a pair of antagonistic "factors" which we will call "excitatory" and "inhibitory", represented by e and j, respectively. The nature of the factors is incomplete, though an analogy of antagonistic ions is possible.

When excitation I is applied, it is assumed that both e and j increase at a rate proportional to I, and decrease at a rate proportional to the excess of e and j compared to their respective resting values e_0 and j_0. Observe

1) $$\frac{de}{dt} = KI - k(e - e_0), \quad \frac{dj}{dt} = MI - m(j - j_0)$$

Each of these factors has quantic considerations.

where K, M, k, and m are constants (within the restraints of indeterminacy). The requirement for excitation of the nerve is $e \geq j$; hence, of course, $e_0 < j_0$. When a constant current is applied at $t = O$, we calculate

2) $$e = e_0 + \frac{KI}{k}(1 - e^{-kt})$$

$$j = j_0 + \frac{MI}{m}(1 - e^{-mt})$$

Conditionally the following factors must be related.

$$m < k, \; M < K, \; \frac{K}{k} \leq \frac{M}{m}, \; \frac{K}{k} \sim \frac{M}{m}$$

These factors, when viewed as quantic levels, allow for hermitian plotting, and a new description of excitation neurology results. Excitation will occur at the cathode only when the current is connected, and at the anode only when it is disconnected, provided I is great enough. The intensity-time curve for cathode excitation (from e to j) is

3) $$I = \frac{j_0 - e_0}{(K/k)(1 - e^{-kt}) - (M/m)(1 - e^{-mt})}$$

and at the anode at disconnect, which is why we need to disconnect the reading in EAV. This resets the clock.

4) $$I = \frac{j_0 - e_0}{(M/m)e^{-mt} - (K/k)e^{-kt}}$$

The current threshold or rheobase values at the cathode and anode, respectively (from $\epsilon = j$ and $d\epsilon/dt$), are

5a) $$R_c = \frac{j_0 - \epsilon_0}{(K/k)[1 - (M/K)^{k/(k-m)}] - (M/m)[1 - (M/K)^{m/(k-m)}]}$$

5b) $$R_a = \frac{j_0 - \epsilon_0}{(M/m)(M/K)^{m/(k-m)} - (K/k)(M/K)^{k/(k-m)}}$$

with the approximate value

$$R_c \sim [(j_0 - \epsilon_0)/K]k,\ R_a \sim [j_0 - \epsilon_0)/M]m$$

Solving a slowly rising current, $I = \lambda t$, presents

6) $$\epsilon = \epsilon_0 + \frac{K\lambda}{k}\left(t - \frac{1}{k}\right)(1 - e^{-kt})$$

$$j = j_0 + \frac{M\lambda}{m}\left(t - \frac{1}{m}\right)(1 - e^{-mt})$$

For sufficiently small λ, no excitation occurs as long as $K/k \leq M/m$. In alternating current, $I = I_0 \sin \omega$, a solution obtained under the condition $K/k = M/m$ gives a relationship between the threshold value of I_0 and the frequency ω.

$$\frac{I_0}{R_c} = \left(1 + \frac{\omega^2}{k^2}\ 1 + \frac{m^2}{\omega^2}\right)$$

With values in hermitian steps, this equation evolves into a matrix, where

$$R_c = \frac{j_0 - \epsilon_0}{K - M}\,k$$ (see *Bio-Quantum Matrix*)

We can solve without restriction $K/k = M/m$. We find an interesting relation derived from our theory that in between the duration $\bar{t}$ of a constant current pulse and the threshold intensity I is required to produce anodic excitation at break, accounting for the medication phenomenon of EAV.

8) $$I_c = \frac{(1 - e^{-k\bar{t}})^{1/[(k/m)-1]}}{(1 - e^{-m\bar{t}})^{1/[1-(m/k)]}}\left(\frac{k}{m}\right)^{1/[(k/m)-1]}$$

QUANTUM BIOPHYSICS

All theories of neural excitation are quantically phenomenological. The theory of conduction of the excitation along the nerve is more physical. Conduction is seen as a quantum "fixed" core conductor. The nerve is viewed as a cylinder with a core of radius r and specific resistance ρ, surrounded by a sheath of thickness δ and specific resistance $\bar{\rho}$. Also $\delta \ll r$. Ignoring the distributed capacity of the fiber, the distribution of current is given at $t = 0$ by

9) $$i(x) = Ie^{-\alpha x}$$

where I is the current at the initially excited region, x is from the excited region to a point along the nerves, and

$$\alpha = \sqrt{\frac{\gamma + 1}{\gamma} \cdot \frac{2\rho}{\delta \bar{\rho} r}}$$

where γ is the ratio of resistance per unit length of the core to resistance per unit length of the sheath.

The distribution is conducted down the nerve, so that at any later time we have at any point a distribution,

10) $$i(S) = Ie^{-\alpha S}$$

where S is the distance between the point we referred to and the excited region at the moment t. When the velocity of propagation is $v(t)$, then at a point x_0 we have

$$S = x_0 - \int_{t_1} v(t)dt = x_0 - u(t)$$

where t_1 is the time from application of current I to occurrence of excitation at the electrode, producing

$$t_1 = \frac{1}{k} \log \frac{KI}{KI - k\epsilon_1}$$

where $\epsilon_1 = \epsilon^{\bullet} - \epsilon_0$, and $\epsilon^{\bullet}$ is the value of ϵ at the electrode when $\epsilon = j$. From $t = 0$ to t_1, the current at x_0 is $Ie^{-\alpha x}0$. After t_1, it varies responsively to

11) $$i(x_0,t) = {}^{+\alpha u(t)}$$

Excitation at the point x_0 by the local current $i(x_0,t)$ is defined by these differential equations

12)
$$\left.\begin{aligned} \frac{d\epsilon}{dt} &= Ki - k(\epsilon - \epsilon_0) \\ \frac{dj}{dt} &= Mi - m(j - j_0) \end{aligned}\right\}$$

Solving, and putting $e(x_0,t) = j(x_0,t)$ for excitation, it can be demonstrated in the differential equation

$$13)\qquad \alpha \frac{dv}{dt} = -\alpha^2 v^2 - \left(m + k - \frac{K - M}{j_0 - e_0} I\right)\alpha v - \left(mk + \frac{Mk - Km}{J_0 - e_0} I\right)$$

Provided (as is probably the case, from available values of the constants),

$$\Delta = a^2 - 4b > 0$$

the right side of the differential equation has two real roots,

$$14)\qquad \alpha v_1 = \tfrac{1}{2}(a - \sqrt{\Delta}),\ \alpha v_2 = \tfrac{1}{2}(a + \sqrt{\Delta})$$

and

$$-a = m + k - \frac{K - M}{j_0 - e_0} I,\quad b = mk + \frac{Mk - km}{j_0 - e_0} I$$

The velocity v(t) is given by

$$15)\qquad v = \frac{v_1 - A v_2 e^{\sqrt{\Delta}t}}{1 - A e^{\sqrt{\Delta}t}}$$

and

$$A = e^{-\sqrt{\Delta}t}1\ \frac{(m + \alpha v_2)\,[j_1(m + \alpha v_1) - MI]}{(m + \alpha v_1)\,[j_1(m + \alpha v_2) - MI]}$$

$$j_1 = j^{\bullet} - j_0$$

At $t = t_1$,

$$v_1 < v < v_2$$

With increasing t_1, v approaches v_2, which is a stable value. This sets up the procedures of cybernetic feedback, resonance in the circuit, and Fourier interaction. This has medical implications (see *Quantum Biology*).

The old style formulas of biology were based on a thermodynamic philosophy and an antropic calculus. These formulas mostly used a differential equation depicting physical change over time. This is not a proper description for a neg-entropic circumstance, which living biology clearly is (see *Quantum Biology*). A better mathematical describer is the Poisson bracket. Poisson formulas use an indeterminate relation of momentum, position, energy or time. Also Poisson formulas use the boundary layer implication. This implies that there is indeed a large shift of phenomena in crossing the boundary layer. This happens as we cross from the thermodynamic dominance of the environment to the quantic control of the intercellular activity. So our

conversion to quantum biophysics will often use this conversion. In the Poisson bracket, if F and G are functions of $[P_j, Q_j]$, then the Poisson bracket of F and G is defined as:

$$[F, G] = \sum_j \left(\frac{\partial F}{\partial Q_j} \frac{\partial G}{\partial P_j} - \frac{\partial F}{\partial P_j} \frac{\partial G}{\partial Q_j} \right) = \sum_j \frac{\partial(F, G)}{\partial(Q_j, P_j)} = - [G, F]$$

Poisson's theorem states that the Poisson bracket of two first integrals of a hamiltonian system is again a first integral. This is the supposition that defines our matrix (see *Bio-Quantum Matrix*).

QUANTUM BIOPHYSICS

Chapter 2

FORMULAS TO DESCRIBE QUANTIC PHENOMENA OF BIOLOGY

Behavior and the structure of the central nervous system

One biophysical theory of the behavior of organisms with a central nervous system is based on what might be called the quantum network theorem: here the units of the central nervous system follow the same simple laws as isolated peripheral neurones, and that the complexities of behavior result from the interaction of such units arranged in networks of varying degrees of complexity (fractal dynamics). Human emotion and thought are thus the results of complex quantum patterns producing chaos reactions. The quantic order principles then sort out the chaos, and behavior results.

It is known that a constant physiological stimulus produces a multitude of nerve impulses rather than a single impulse. The frequency v of the many pulses is independent of S complying with the "all-or-none law". Let us now review the simplicity of neuronal fibers. Later we will introduce the grand biological organic regulator functions.

Intensity of excitation of a fiber is E, by

1) $$E = Iv$$

and the relation between v and S is

$$v = \alpha(S - h)$$

where h is the threshold of the fiber and α a constant of the fiber, producing

2) $$E = \alpha I(S - h) = \beta(S - h)$$

The neuroelement demonstrates factors e and j according to the differential equations

3) $$\frac{de}{dt} = AE - ae, \quad \frac{dj}{dt} = BE - bj$$

The neuroelements may have been divided into three classes: excitatory, inhibitory, and indeterminate, according as the asymptotic values of e or j or vice versa. This is dependent on certain relationships among the constants. A version of this classification occurs if the neuroelements produce only one factor, either e or j alone; such neuroelements are excitatory or inhibitory. Indeterminacy produces a third variable which allows us to realize that we can't escape the Heisenberg principle (see *Quantum Biology*).

Another theorem is required to establish the effects of the neuroelements in the network on one another. Consider the neuroelements as linear (possibly with collateral branches). Neuroelements are polar: one end receives the stimulus, and this is carried along the element to its other end. The other end may make a connection with the stimulus-receiving and of a second element neuron. These connections are most often multiple, i.e., more than one neuroelement enters or leaves a connection. We surmise that at any connection, if $e > j$, then $e - j$ acts as the stimulus intensity S for any neuroelement exiting the connection (it is understood that if several neuroelements enter the connection, their contributions to e and j are additive in a hermitian sense). (See *Bio-Quantum Matrix*.)

Examples are:

I. Reaction time. Imagine a network in which two elements **I** and **III** converge on an element **II**. Allow **I** to be purely excitatory and **III** be simply excitatory. Suppose a warning stimulus S_3 is applied to **III** at a time t_w units before S_1 is applied to **I**. Then the reaction time t_r for response to S_1 via **I** and **II** is related to t_w, by

$$4) \qquad t_r = t_0 - \frac{1}{a_1} \log \left[M + J(e^{-b3^t w} - e^{-a3^t w})\right]$$

where

$$M = 1 - \frac{a_1 h_2}{A_1 E_1}, \quad J = \frac{A_3 E_3 a_1}{A_1 E_1 a_3}$$

and t_0 is the constant time from conduction on the efferent side and delays at the end organs.

II. Discrimination. Discrimination problems of various sorts can be presented in terms of networks with fundamentally similar characteristics : series of excitatory neuroelements run parallel to one another, and send collateral branches, both excitatory and inhibitory, to each other's connections. A simple example consists of n elements I connecting with n elements II at connections $c_i (i = 1, \ldots, n)$. A branch of each element i of I connects at c_i to a set of inhibitory elements III joining every connection $c_h (h \neq i)$. Every c_i receives an excitatory path from the periphery and $n - 1$ inhibitors from other neuroelements.

When all stimuli contain the same intensity S, we see for $e - j$ at c_i (asymptotically)

$$5) \qquad e - j = \left(\frac{A_e}{a_e} - \frac{B_e}{b_e}\right) E_1 + (n - 1) \left(\frac{Aj}{aj} - \frac{B_j}{b_j}\right) E_3$$

with

$$E_1 = \alpha_1 I_1 (S - h_1)$$

$$E_3 = \alpha_3 I_3 [P \alpha_1 I_1 (S - h_1) - h_3]$$

$$P = \frac{A_e}{a_e} - \frac{B_e}{b_e}$$

Allow the subscripts e and j to refer respectively to excitatory and inhibitory parameters, the subscripts 1 and 3 to element **I** and **III**. If

$$h_1 < S < h_1 + \frac{h_3}{P \alpha_1}$$

then $E_3 = 0$ and $e - j > 0$. Provided

$$S > h_1 + \frac{h_2}{P\alpha_1 I_1}$$

only if $h_2 < h_3$, then $e - j > h_2$, and all II pathways are excited. When

$$S > h_1 + \frac{h_2}{P\alpha_1 I_1}$$

then, for sufficiently large n, $e - j < 0$; i.e., if

$$n > 1 + \frac{P}{Q} \cdot \frac{\alpha_1 I_1}{\alpha_3 I_3} \cdot \frac{S - h_1}{P\alpha_1 I(S - h_1) - h_3}$$

and

$$Q = -\begin{pmatrix} A_j & B_j \\ a_j & b_j \end{pmatrix}$$

Here complete inhibition occurs at all c_i. However, if $m < n$ of the pathways are stimulated with $S' > S$, then at the c_i^m connections of these m paths

6) $$(e - j)_m = PE'_1 - (m - 1)QE'_3 - (n - m)QE_3$$

while at the other n - m connections c_i^{n-m},

7) $$(e - j)_{n-m} = PE_1 - (n - m - 1)QE_3 - mQE'_3$$

provided

$$E'_1 = \alpha_1 I_1(S' - h'), \quad E'_3 = \alpha_3 I_3(PE'_1 - h_3)$$

and the other symbols are as before, demonstrating

8) $$(e - j)_{n-m} < P\alpha_1 I_1(S - h_1) - (n - 1)Q\alpha_3 I_3[P\alpha_1 I_1(S - h_1) - h_3]$$

since $S' > S$. So $(e - j)_{n-m} < 0$ for the same conditions as made $e - j < 0$ before. Then $(e - j)_m > h_2$ when

$$S' > h_1 + \frac{h_2 + Q\alpha_3 I_3[(n - m)P\alpha_1 I_1(S - h_1) - (n - 1)h_3]}{P\alpha_1 I_1[1 - (m - 1)Q\alpha_3 I_3]}$$

If S' is sufficiently greater then S, the m pathways will act, while the n - m fail to act to S.

III. Self-exciting circuits. Imagine a closed circuit consisting of pure excitatory elements **I** and **II**. Our differential equations turn out to be

9) $$\frac{de_1}{dt} = AE_2 - ae_1, \quad \frac{de_2}{dt} = AE_1 - ae_2$$

$E = \alpha I(S - h)$ leads to approximate the absurd result that E_1 and E_2 become infinite if the circuit is excited at all. This is not absurd in our quantum matrix. The next best approximation is

$$E = \frac{1}{\theta}\left[1 - e^{-\alpha\theta(S-h)}\right]$$

producing

10) $$\left.\begin{aligned} \frac{de_1}{dt} &= \frac{AI_2}{\theta_2}\left[1 - e^{-\alpha\theta_2(t_2-h_2)}\right] - ae_1 \\ \frac{de_2}{dt} &= \frac{AI_1}{\theta_1}\left[1 - e^{-\alpha\theta_1(t-h_1)}\right] - ae_2 \end{aligned}\right\}$$

An analytic solution cannot be found to our quantic system. A graphical analysis is readily carried out in terms of e_1 and e_2 as Cartesian coordinates in a plane are confusing, and cannot describe this system. We will need to pursue matrix algebra instead. Graphically setting $de_1/dt = 0$ and $de_2/dt = 0$, we derive two curves in this plane, which in general intersect in two points. One of these points represents a stable equilibrium and the other an unstable one, while a third stable point is $e_1 = e_2 = 0$. There is a curve passing through the unstable point, which divides the positive quadrant of the plane into two regions, such that, starting at any point in one region, one passes to the origin, while from any point in the second region one arrives at the stable nonzero equilibrium. Thus, if the circuit is sufficiently excited by some external stimulus, it will arrive at a stable excitatory equilibrium, in which it will remain unless externally inhibited.

IV. Conditioned reflexes. Imagine two pathways, one consisting of elements $\mathbf{I}^u$ and $\mathbf{II}^u$, the other of elements $\mathbf{I}^c$ and $\mathbf{II}^c$, with **I-II** connections c_u and c_c, respectively. Allow $\mathbf{II}^u$ and $\mathbf{II}^c$ to meet at a connection c, which leads by further paths to a response R. A collateral of $\mathbf{I}^u$ leads to c_c. Also connected to c_c is a self-exciting circuit C. The external excitation needed to start C is h^*, and the stable excitation value of C is e_0. We see that pathway $\mathbf{I}^c$ has threshold h_c, while $\mathbf{II}^c$ has threshold h'. Construct for E_u and E_c the exponential expression of the preceding paragraph; the values of the constants are such that the limiting values of E_u and E_c, I_u/θ_u and I_c/θ_c, satisfy

$$P\frac{I_c}{\theta_c} < h', \quad P = \frac{A_e}{a_e} - \frac{B_e}{b_e}, \quad P\frac{I_c}{\theta_c} < h^*, \quad P\frac{I_u}{\theta_u} < h^*$$

but

$$P\left(\frac{I_u}{\theta_u}+\frac{I_c}{\theta_c}\right)>h^*,\quad P\frac{I_c}{\theta_c}+\epsilon_0>h'$$

If $S_u > h_u$ is applied to $\mathbf{I}^u$, R results. But S_c applied to $\mathbf{I}^c$, no matter how strong, does not give R. But if S_u and S_c are applied simultaneously for a sufficient time, $\epsilon \cdot j$ at c_c will be $P(E_u + E_c)$; and for sufficiently large S_u and S_c to bring E_u and E_c close to their limiting values I_u/θ_u and I_c/θ_c, this $\epsilon \cdot j$ will exceed h^*. Now C is an excited state with $\epsilon = \epsilon_0$, even when external stimuli are removed. When S_c is now applied alone, ϵ at c_c is $PE_c + \epsilon_0$; and by the last inequality, for sufficiently large S_c, this will exceed h', and elicit R_1. This simple scheme presents an example of the conditioned reflex.

V. Learning. One biophysical theory of learning utilizes the properties of the self-exciting circuit. This is part of a larger cycle that has been compared with feedback with cybernetic feedback in electronic network systems. If one of two states is to be learned (as in many experimental psychology), we can imagine a pair of parallel pathways, each containing several elements and indeterminate elements in series. One path comes from stimulus S_c and terminating in response R_c ("correct" response to choice) the other path going from S_w to R_w ("wrong" response to choice). (The usual cross-inhibitory elements run from the I-II connections c_c and c_w to higher connections in the pathways.) R_c allowing to produce the event R_1 and R_w produce R_2. Thus R_1 ("reward") acts as stimulus to a pathway which includes a self-exciting circuit C, and terminates with an excitatory element at c_c; R_2 ("punishments") serves as stimulus to a path which includes a self-exciting circuit C', and terminates with an inhibitory element at c_w. (C and C' actually consist of two large groups of circuits arranged in parallel, and having a distribution of threshold values, so that they will not all be simultaneously activated at once. Neural connections will be activated in increasing numbers with concurrent repetition of the stimulus to them from R_1 and R_2.) Now S_c and S_w are achieved at almost the same time on many successive occasions. Response strength is random at first, but C and C' are progressively activated. R_c is reinforced and that of R_w is weakened. Our equation relating the number of wrong responses w and number of trials n is

$$11)\qquad w=\frac{1}{k(b-\beta)}\log\frac{2be^{k(\epsilon_{0c}-\epsilon_{0w})}}{2be^{k(\epsilon_{0c}-\epsilon_{0w})}-(b-\beta)(1-e^{-kbn})}$$

Here ϵ_{0c} and ϵ_{0w} are the initial values of ϵ at C_c and C_w, b is the increase in ϵ at c_c per correct response, β is the decrease in ϵ at c_w per wrong response, and k is a constant.

An equation depicting N choices, with M associations to be learned, allow for prompting by the experimenter in a fraction $(1 - f)$ of the trials, considering also the effect of M on the parameter b, producing

$$12)\qquad w=\frac{(N-1)e^{\varphi M}}{\eta A}\log\frac{N}{e^{-\eta nc-\varphi M}+N-A}$$

and

$$A = Nf - f - \beta/b$$

and φ and η are constants.

QUANTUM BIOPHYSICS

In developing a quantic predictability of neural nets, we need to review the previous biophysics of behavior work, consisting of constructing networks and seeing what kind of behavior they produce. Treatment by McCulloch and Pitts shows a manner of the inverse problem. Thus in given behavior patterns we determine the corresponding network. We use the analogy between two-valued logic and all-or-none character of nerve activity. First number the neurones. We show by "$N_1(t)$" the proposition "Neurone #1 fires at time t." In the same way we write "$\sim N_2(t)$" for "Neurone #2 does not fire at time t," the symbol ~ being the classical negation sign of symbolic logic in the Russell-Whitehead notation. Using "V", the classical disjunctive symbol ("... or ..., or both") parameters are defined. The synaptic delay is a unit of time. Inhibition appears absolute, because if any inhibitory neuron ends on a second neuron, the inhibitory neuron firing will always inhibit the second neurone. It has been shown that nothing would be essentially altered in the results if one abandons this assumption. The threshold of a neuron, being quantic, is taken to be an integer θ. This quantic event is identified with the number of terminal bulbs synapsing on it from other (excitatory) neurones. These excitatory neurons must be excited simultaneously in order to stimulate it. Our construct facilitates diagrammatic matrix representation of networks. Imagine now that neurone 1 terminates on neurone 2 with a number of terminal bulbs equal to θ for #2. The necessary and sufficient condition for #2 to fire at t is simply that #1 fired at t - 1.

13) $$N_2(t). \equiv . N_1(t - 1)$$

where $\equiv$ is the logical sign of equivalence ("if and only if"), and the dots follow the dot signatures of Russell and Whitehead. If $\theta = 2$, and neurons 1 and 2 terminate on 3 with only one terminal bulb each, both must fire simultaneously.

14) $$N_3(t) \equiv . N_1(t - 1) \cdot N_2t - 1)$$

If 1 and 2 synapse on 3 with two bulbs each, and $\theta = 2$, the firing of either will excite 3.

15) $$N_3(t). \equiv . N_1(t - 1) V N_2(t - 1)$$

If 1 synapses on 3 with two bulbs ($\theta = 2$), and 2, an inhibitory neurone, synapses on 3, then 1 must fire while 2 is not firing to excite 3.

16) $$N_3(t). \equiv . N_1(t - 1) \cdot \sim N_2(t - 1)$$

These basic circuits are useful building blocks for constructing more complex circuitry, as we will show. Let us introduce the function (operator) "S", defined by

$$N_2(t). \equiv . SN_1(t)$$

so that a sentence like $N_2(t). \equiv . N_1(t - 1)$ becomes

17) $$N_2(t). \equiv . SN_1(t)$$

Repetitions of the operation are designated by powers.

18) $$S[SN_1(t)]. \equiv > S^2N_1(t)$$

The operator S commutes with . and V.

Thus any network can be designated by a number of equivalences, as just shown, one for each neurone in the net excepting the first ones (the peripheral afferents, designated by the fact

that no neurone of the net ends on them). (We temporarily neglect nets containing cycles in this presentation, since their theory is a far more elaborate one). When the equivalence for $N_i(t)$ contains on the right side N_j, provided $j(\neq i)$ is not a peripheral afferent. If it is not a peripheral afferent, then N_j can be eliminated by its own equivalence. This elimination can be processed consistently and with a unique result. The elimination proceeds until the Ns of peripheral afferents appear on the sides (since no cycles occur in the nets). A temporal positional expression results which expresses each $N_i(t)$ as a disjunction of conjunctions of propositions of the form $S^n N_k(t)$ and their negations, where $n \geq 1$ and k is a peripheral afferent. The disjunction can have no term consisting wholly of negations.

An illustration of the above is shown from the way we treat the "illusion of heat and cold." When a cold object is touched briefly to the skin and removed, a sensation of heat is felt; only cold is felt if the contact is more prolonged. Numbering the cutaneous heat and cold receptor neurones 1 and 2, the corresponding central neurones provide activity, giving the heat and cold sensations 3 and 4, respectively.

This is displayed in equation terms as

19)
$$\left.\begin{aligned} N_3(t) :\!= :N_1(t-1) \cdot V \cdot N_2(t-3) \cdot \sim N_2(t-2) \\ N_4(t) :\!= :N_2(t-2) \cdot N_2(t-1) \end{aligned}\right\}$$

where we assume the required contact for cold sensation to be two synaptic delays as against one for heat. These relations can be constructed and revised with the aid of the operator S.

20)
$$N_3(t). :\!= .S\{N_1(t) V S[(SN_2(t) \cdot \sim N_2(t)]\}$$

$$N_4(t). :\!= .S\{[SN_2(t)] \cdot N_2(t)\}$$

Connecting neurones 1, 2, 3, 4, presents difficulty with introducing other neurones, if necessary. The normal forms for the network will contain the above constructs. We contact nets for the partial expressions. We start with those included in the largest number of brackets and produce outward.

If we introduce a neurone a, upon which two terminal bulbs from neurone 2 synapse (assume for simplicity $\theta = 2$ for all neurones of the net), then

$$N_a(t). :\!= .SN_2(t)$$

We can insert the expression above. Let a single bulb from a and a single bulb from 2 terminate on 4, yielding

$$N_4(t). :\!= .S[N_a(t) \cdot N_2(t)]. :\!= .S[(SN_2(t)) \cdot N_2(t)]$$

Now insert neurone b, receiving an inhibitory terminal from 2 and two excitatory terminals from a. Then

$$N_b(t). :\!= >S[N_a(t) \cdot \sim N_2(t)]$$

Now let neurones 1 and b each send two terminals to 3. Finally

21)
$$N_3(t). :\!= .S[N_1(t) V N_b(t)]. :\!= S\{N_1(t) V S[(SN_2(t) \cdot \sim N_2(t)]\}$$

Our solution of the problem is complete, since our quantically-constructed network leads to the desired expression for $N_3(t)$ and $N_4(t)$.

QUANTUM BIOPHYSICS

Let us discuss the nature of the logical formalism for cyclic nets. When a self-exciting circuit is firing at time t, it is not true (as it is for simple neurones) that neurons are stimulated at $t - 1$. We can see that the neurons must have been stimulated at $t - 1$ or some earlier moment. By introducing the logical existential operator $\exists$, we show that $(\exists x)N(x)$ means, "There is an x for which $N(x)$ holds." With the aid of this operator, some simple examples of cyclic nets are outlined. Let neurone 1 end on neurone 2 with terminals less than θ in number. Let 1 also end on a self-exciting circuit (with threshold number of terminals). Each neurone of the circuit will send a branch to 2; the total number of terminals from this source equals or exceeds θ. We demonstrate this circuit by

22) $$N_2(t) \equiv (\exists x)N_1(t - x - 1)$$

Now let neurone 1 have a branch to a self-exciting circuit, each neurone of which sends a branch to 1, producing

23) $$N_1(t) \equiv (\exists x)N_1(t - x - 2)$$

Cycle nets may have N_i expressed in terms of N_i, which is never true for noncyclic nets.

QUANTUM BIOPHYSICS

This is an excerpt from the PROMORPHEUS that explains the workings of the Quantum Med C.I.

HYSTERESIS

The state of any cell is determined not only by its instantaneous surrounding conditions but also by its past history. The conditions previous to those happening in the cell now set up an electro-chemical-physical system that shows hysteresis. The properties and reaction of any system are determined not merely by its present surroundings but also by the conditions in its environment and past history.

In our study of the central nervous system we will need to adapt some very complex forms of hysteresis study. We shall attempt to develop special mechanisms that will offer explanations for some of our quantic phenomena. This allows us to develop some of the different equations into a matrix.

The dictionary definition of hysteresis is: "The time lag exhibited by a body in reacting to changes in the forces, especially magnetic forces affecting it. The phenomena exhibited by a system, often a ferromagnetic or imperfectly elastic material, in which the reaction of the system to changes is dependent upon its past reactions to change." Our analysis of biology must embody the hysteresis of the past profile, and our embodiment of a new medicine would also need to take into account the past history of the patient.

Any system that is capable of several configurations of equilibrium for a given external set of sequences exhibits a pattern of hysteresis. The hysteresis pattern can have hills, valleys and geography, and can consist of ups, downs and different trends. This type of hysteresis pattern allows the Academy program to chart the readings by looking at the hysteresis reactions of the patient and comparing them to average components.

If a disturbance brings the system from an equilibrium configuration **A** to another equilibrium configuration **B**, either may bring the system from a configuration **C** into a configuration **D**. Or it may be inadequate to displace the system from **C**. This depends on the relative stability of configurations **A**, **B**, **C** and **D**.

Let $\lambda_1, \lambda_2, \dots, \lambda_n$ be the quantities that describe the configuration of the system, and let $\eta_1, \eta_2, \dots, \eta_m$ be those quantities that describe the external conditions. For instance, λ may be the concentration ratio of two reversibly-interacting substances which constitute the system, while η may represent the external temperature. The equilibrium configuration is characterized by a minimum of some function, which we shall denote by G (for instance, the potential energy in mechanical systems, the negative of the entropy, or the free energy in thermodynamics, etc.). This function G is a function of the λ_i and η_k and the equilibrium is determined by *n* equations

1) $$\frac{\partial G}{\partial \lambda_i} = 0$$

which determine the values of λ_i for prescribed η_k. For stability of equilibrium it is sufficient that the matrix

2) $$\frac{\partial^2 G}{\partial \lambda_i \partial \lambda_j}$$

be positive definite.

If equations **1)** have *s* solutions,

$$\lambda_1^1, \lambda_2^1, \dots, \lambda_n^1$$

3)

$$\lambda_1^2, \lambda_2^2, \ldots, \lambda_n^2$$

. . . . . .

$$\lambda_1^s, \lambda_2^s, \ldots, \lambda_n^s$$ (see *Bio-Quantum Matrix*)

satisfying conditions **2)**, then in the $n + 1$ dimensional space the hypersurface

4) $$\lambda_0 = G(\lambda_1, \lambda_2, \ldots, \lambda_n, \eta_1, \eta_2, \ldots, \eta_m),$$

which depends on the m parameters η_k, has relative minima for such values of λ_i as given by equation 3.

If the parameters η_k vary continuously, the hypersurface **(4)** is deformed. In general, not only does such a deformation result in the change of the coordinates **3)** of the minima, but those minima themselves may change by becoming more or less pronounced, owing to a change of λ_0. The situation is illustrated for the two-dimensional case by Fig. 1 ($n = m = 1$).

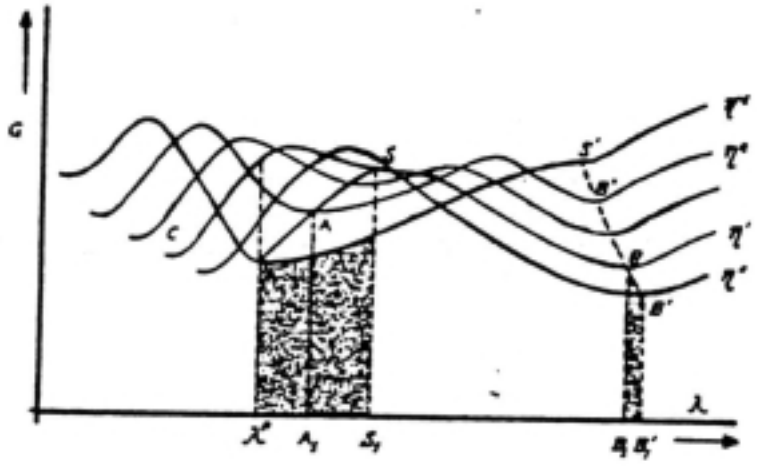

Fig. 1

Let the system be in the configuration **A** for the value η^0 of the parameter. If η varies from η^0 to η', the equilibrium value of λ which corresponds to the minimum **A** moves along $\mathbf{A_1S_1}$.

As long as equation 2 is satisfied, all such variations of the system are reversible, because they form a succession of stable equilibria. However, a variation of the minima involves, in general, a variation of $\partial^2 G/\partial\lambda_i\partial\lambda_j$ as well as of higher derivatives of G; and it may happen that for some values of η_k the minima of the hypersurface **4)** degenerate into saddle-points. If for the value η_k^0 the system has a configuration of equilibrium, corresponding to a minimum **A** of λ_0 and if the η_k's vary in such a way that they take values η_k' for which this particular minimum **A** degenerates into a saddle-point (inflection-point in a two-dimensional case), then the system "jumps over" into a next equilibrium configuration, **B**, as soon as the values η_k' are reached (Fig. 1). Of course, the "jump" may occur both "forward" (Fig. 1) or "backward" (Fig. 2).

A further variation of η_k in the same direction (that is, from η to η'' in Figs. 1 and 2) causes the equilibrium value of λ to move along $\mathbf{B_1B_1'}$.

In all cases, however, the "jumping" is an irreversible process. If after such a "jump" the $_k$'s vary in the reverse direction, the configuration-point of the system moves along **B′B″**. When the original value η_k^0 is reestablished, the system has an equilibrium configuration different from the original. It now requires a change of η_k in the opposite direction (η^{-1}, Fig. 1) in order to bring the system back into the original configuration, **A**. It may happen, however, that no variation of η_k is possible to bring the system back to **A** once it has been displaced into another minimum of G.

An important property of such systems is not only that the previous sequence of values of η determines the present state of the system but that this present state depends also on the speed with which η varies through that

sequence. We must remember that whenever any system is displaced from its equilibrium configuration, it always takes a finite time to reach the equilibrium again.

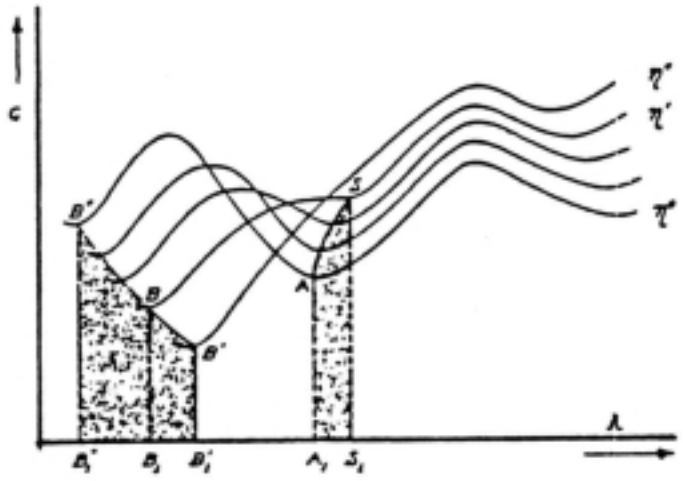

Fig. 2

If the variation of η_k is very slow as compared with the speed of "adjustment" of the system to its equilibrium, then everything happens as discussed above. At each moment the system has a configuration, corresponding to the values of η_k at this moment and to the initial configuration of the system. If, however, η_k varies very rapidly, the following may happen (Fig. 1).

Let the system have originally the configuration **A′** so that for a slow variation of the parameter η the configuration-point would have moved along **A′S**. The η_k's have reached such values η_k' for which the system would already have "jumped over" to **B**. However, if the variation of η is very rapid, λ will have, at that moment, a value still close to the original λ^p. However, to this value, λ^p of λ corresponds, for the value η_k', such a part of the curve which lies much nearer to a minimum **C** than to **B**. Therefore, while for a slow variation of η the system will jump over into **B**, for a very rapid variation of η it will jump over into **C**.

Such very complex physicochemical systems as are exemplified by living organisms are likely to possess many equilibria configurations and to exhibit hysteresis. The above-discussed dependence of the final state of a system on the rate of variation of the external parameters suggests an interesting possibility for the interpretation of the failure to produce any organism artificially. The evolution of the organic world took millions of years. Starting with some particular configuration of organic molecules, the slow changes in the environment resulted finally in the formation of a simplest living cell. It may be quite possible for us to obtain in the laboratory the same original configuration of organic molecules and subject them to exactly the same variations of the environment. Yet the end-result may be quite different unless those changes are so slow as to require millions of years. The slowness of the geological changes may be the thing responsible for the origin of life on our planet.

In some cases, the equilibrium configuration is defined not in terms of an extremum of a function but in more kinetic terms, such as the configuration, for which the reaction velocities or velocities of change of the variables λ_i are zero. Formally, this case can sometimes be reduced to the foregoing one by the following consideration:

The velocity of change of a λ_i is, in general, a function of all the λ_j's; thus

$$\frac{d\lambda_i}{dt} = \mu_i(\lambda_1, \lambda_2, \dots, \lambda_n).$$

In equilibrium we have

$$5) \qquad \nu_i(\lambda_1, \lambda_2, \dots, \lambda_n) = \frac{\partial \lambda_i}{dt} = 0$$

If $\partial v_i/\partial\lambda_j = \partial v_j/\partial\lambda_i$, then, introducing

6) $$G = -\int\sum_{i=1}^{i=n} v_i d\lambda_i,$$

we find that **5)** becomes identical with **1)**. Because

$$\frac{\partial^2 G}{\partial\lambda_i\partial\lambda_j} = -\frac{\partial v_i}{\partial\lambda_j} = -\frac{\partial v_j}{\partial\lambda_i}$$

the requirement **2)** is replaced by the requirement that the matrix

7) $$-\frac{\partial v_i}{\partial\lambda_j}$$

should be positive definite.

Let us now consider the following structure, which is suggested by some neurological observations: An arrangement of neuroelements forming a "closed circuit", as represented by Fig. 3, has frequently been observed and described. In this arrangement one neuroelement is stimulated by another; and the latter, in turn, stimulates the first neuroelement. Various possible significance of such an arrangement have been discussed. Let us consider it from the point of view which interests us.

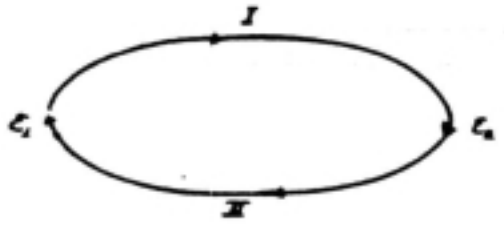

Fig. 3

Let the threshold of **I** be h_1, and that of **II** be h_2. In the absence of any external stimulation, neither of the two neuroelements will be excited. However, at the left end let an amount of $(\epsilon - j)_1$ be present such that $(\epsilon - j)_1 > h_1$. This will produce a finite intensity of excitation E_1 in **I**, which, in its turn, will result in a production of $(\epsilon - j)_2$ at the right end. If $(\epsilon - j)_1 - h_1$ is sufficiently small, E_1 also will be sufficiently small, and therefore $(\epsilon - j)_2$ will be less than h_2. Hence, **II** will not be excited. When under those conditions $(\epsilon - j)_1$ again acquires the value zero, E_1 becomes zero. Everything returns to its original state of nonexcitation. However, let $(\epsilon - j)_1$ exceed h_1 by such a large amount that E_1 and, therefore, also $(\epsilon - j)_2$ become so large that $(\epsilon - j)_2 > h_2$. Then **II** will also become excited with an intensity E_2, which will result in the production of additional $(\epsilon - j)_1$ at the left end. This, in its turn, will result in an increase of E_1 and therefore in an increase of $(\epsilon - j)_2$. The latter again increases E_2, and the process will then tend automatically to infinity if the linear relation between intensity of stimulation and intensity of excitation holds exactly. Actually E_1 and E_2 tend to upper limits, I_1/θ_1 and I_2/θ_2. Therefore, the above-described "self-energizing" process will also actually stop when E_1 and E_2 cannot increase any further, in spite of an increase of $(\epsilon - j)$. But, if we now bring the initial $(\epsilon - j)_1$ back to zero, it is possible that the additional $(\epsilon - j)_1$ produced by E_2 will be large enough to maintain E_1 excited and that the system will remain in a continuous state of excitation even in the absence of an external stimulus.

These rather crude general considerations are borne out by mathematical analysis. To simplify the problem, we shall here discuss in detail only the limiting case in which both **I** and **II** produce only the excitatory factor ϵ. We shall denote the value of ϵ at the left end (Fig. 3) by ϵ_1 and that at the right by ϵ_2. Furthermore, we shall introduce a simplification which considerably reduces the mathematical complexity of the problem. We shall assume that both **I** and **II** are very short and that the velocity of propagation of the excitation in both the pathways is very large, so that the time t which it takes for any variation of intensity of excitation at one end to reach the other is very small. In fact, we consider it to be so small that during this time neither ϵ_1 nor ϵ_2 can change appreciably. We have

8)
$$\frac{d\epsilon_1}{dt} = AE_2 - a\epsilon_1$$
$$\frac{d\epsilon_2}{dt} = AE_1 - a\epsilon_2$$

Substituting for E_1 and E_2, we obtain

9)
$$\frac{d\epsilon_1}{dt} = \frac{AI_2}{\theta_2}[1 - e^{-a\theta(\epsilon 2 - h2)}] - a\epsilon_1,$$
$$\frac{d\epsilon_2}{dt} = \frac{AI_1}{\theta_1}[1 - e^{-a\theta(\epsilon 2 - h2)}] - \theta\epsilon_1,$$

The analytic solution of the nonlinear system **9)** is not known. We shall, therefore, investigate its property by a graphical method. The derivative $d\epsilon_1/dt \geq 0$ when

$$\frac{AI_2}{\theta_2}[1 - e^{a\theta 2(\epsilon 2 - h2)}] - a\epsilon_1 \geq 0$$

or when

10)
$$\epsilon_1 \leq \frac{AI_2}{a\theta_2}[1 - e^{-a\theta 2(\epsilon 2 - h2)}]$$

Consider ϵ_1 and ϵ_2 as Cartesian coordinates in a plane. The equality sign in **10)** gives the equation of a line which is zero for $\epsilon_2 = h_2$ and tends asymptotically to $AI_2/a\theta_2$ with increasing ϵ_2. It is represented by the solid line in Fig. 4. For all points below that line, $d\epsilon_1/dt > 0$; for all points above it, $d\epsilon_1/dt < 0$. Similarly, $d\epsilon_2/dt \geq 0$ when

$$\frac{AI_1}{\theta_1}[1 - e^{-a\theta 1(\epsilon 1 - h1)}] - a\epsilon_2 \geq 0,$$

which may be written

$$e^{-a\theta 1(\epsilon 1 - h1)} \leq 1 - \frac{a\theta_1\epsilon_2}{AI_1} = \frac{AI_1 - a\theta_1\epsilon_2}{AI_1} < 1.$$

Taking logarithms, we obtain

$$-a\theta_1(\epsilon_1 - h_1) \leq \log \frac{AI_1 - a\theta_1\epsilon_2}{AI_1} < 0.$$

Hence

11) $$\epsilon_1 \geq h_1 + \frac{1}{a\theta_1} \log \frac{AI_1}{AI_1 - a\theta_1\epsilon_2}.$$

The sign of equality in **11)** gives the equation of a line shown by the broken line in Fig. 4. For $\epsilon_2 = 0$, $\epsilon_1 = h_1 > 0$. As ϵ_2 increases, ϵ_1 also increases. When $\epsilon_2 = AI/a\theta_1$, the dominator of the log becomes zero and $\epsilon_1 = \infty$. For still larger values of ϵ_2, ϵ_1 has no real values.

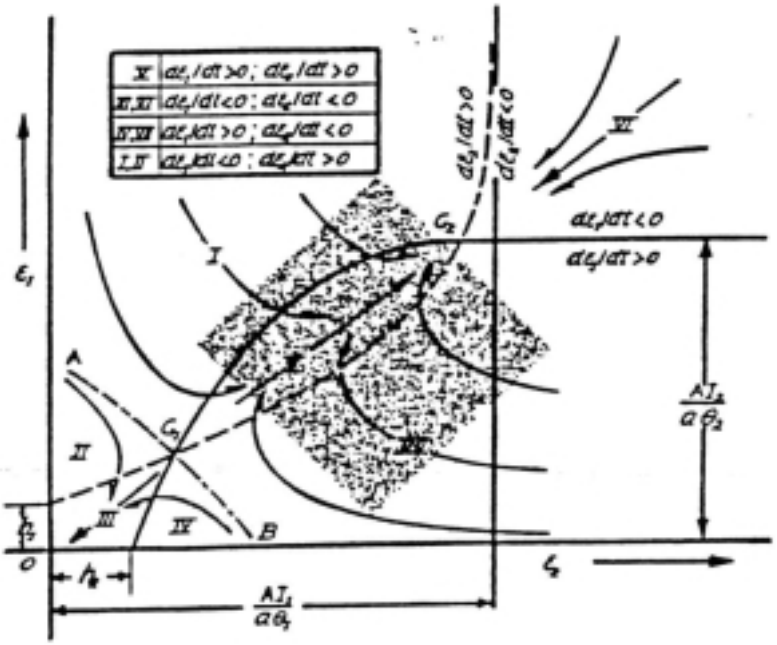

Fig. 4

For all points to the right of the curve, $d\epsilon_2/dt < 0$; for all points to the left, $d\epsilon_2/dt > 0$.

If, as represented by Fig. 4, the two curves intersect at all for $\epsilon_1 > 0$ and $\epsilon_2 > 0$, then they intersect at two points, G_1 and G_2. For values of ϵ_1 and ϵ_2 corresponding to these two points $d\epsilon_1/dt = 0$ and $d\epsilon_2/dt = 0$. Hence the system does not change and is in equilibrium. It is, however, seen from inspection of Fig. 4 that, while the configuration G_2 is stable, G_1 is unstable. Let the configurational point (ϵ_1, ϵ_2) of the system be displaced from G_2 into region **VI**. Here, as we see, $d\epsilon_1/dt < 0$ and $d\epsilon_2/dt < 0$.; therefore both ϵ_1 and ϵ_2 will decrease until they reach G_2, as shown by the arrows. If the point (ϵ_1, ϵ_2) is in region **V**, then $d\epsilon_1/dt > 0$ and $d\epsilon_2/dt > 0$, and the system moves again to G_2. In region **I**, $d\epsilon_1/dt < 0$ but $d\epsilon_2/dt > 0$; the configurational point moves, as indicated by the arrows, until it comes into region **V**, where it moves, as we have seen, to G_2. In region **VII**, $d\epsilon_1/dt > 0$ and $d\epsilon_2/dt < 0$, and we have a similar situation. Fig. 4 indicates clearly that, while for any small displacement from G_2 the system returns to G_2, for any small displacement from G_1 it will move either to $\epsilon_1 = \epsilon_2 = 0$ or to G_2. The only exception is for displacements along the line **AB**, for which the system does return to G_1.

The foregoing results can be demonstrated analytically by expanding the right-hand side of **9)** around G_1 and G_2 and keeping only the lower terms. We then obtain in the immediate vicinity of G_1 and G_2 for ϵ_1 and ϵ_2 a system of ordinary linear equations, the stability of showed solutions is determined and studied in the usual way. In this way it is also proved that the slope of the line **AB** at the point G_1 is equal to $-\alpha_1 I_1/\alpha_2 I_2$.

Thus the system considered has, in this case, in the absence of any external stimulation, the two stable states of equilibrium. One corresponds to $\epsilon_1 = \epsilon_2 = 0$; the other, to $\epsilon_1 = \epsilon_{01}$; $\epsilon_2 = \epsilon_{02}$. Then there is a line **AB** of unstable equilibrium, diving the two states. As soon as, by any external disturbance, the system which was originally in a state $\epsilon_1 = \epsilon_2 = 0$ is brought into a state represented by a point to the right of **AB**, it "tips over" into $G_2(\epsilon_{01}, \epsilon_{02})$ and remains there after the removal of the external disturbance.

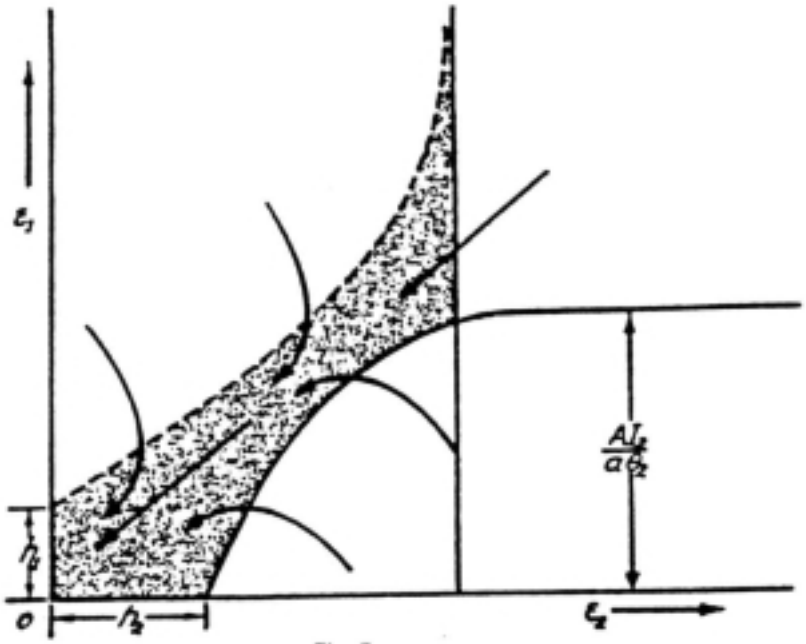

Fig. 5

If, as represented by Fig. 5, the full and broken lines do not intersect at all, then, in the absence of any external stimulation, the only stable state is $\epsilon_1 = \epsilon_2 = 0$. Whether we shall have the case of Fig. 4 or that of Fig. 5 depends merely on the numerical values of the constants involved in our equations. The physical meaning of the case represented by Fig. 5 is that the limiting value I_1/θ_1 of E_1 is so small that, even when it is reached, $\epsilon_2 = (A/a)E_1 = AI_1/a\theta_1$ is still less than h_2, and therefore **II** does not get excited; or that the limiting value I_2/θ_2 of E_2 is too small to excite **I**.

In the more general case, then **I** and **II** each produce both ϵ and j, we shall have fundamentally a similar situation, though the problem becomes much more complex because we are dealing now with four variables. A detailed study of it will probably reveal some interesting mathematical and biological peculiarities.

From all the foregoing it is clear that the particular relation between **E** and **S** is not at all essential for the results obtained. Any relation between **E** and **S**, such that **E** eventually increases more slowly than **S**, will give the same result. It is not even necessary, so far as those results are concerned, that **E** have an upper limit for infinite **S**.

The above-considered system, when it is in the state G_2, represents a source of spontaneous nerve activity in the absence of any external stimulation. This may have a bearing on spontaneous activities of the brain centers, as observed in the autonomous system and as revealed in the cortex by electric measurements.

A more detailed analytical study of the circuit discussed here has been made by A. S. Householder. H. D. Landahl, A. S. Householder and G. Sacher have studied more complex circuits which contain both excitatory and inhibitory neuroelements.

Discrimination of Relations.

Consider a stimulus **S** being conditioned to some response **R**. To each intensity S_i of the stimulus there corresponds a definite number N_i of neuroelements in the nerve centers, which are conditioned to **R**, so that $N_i > N_k$ if $S_i > S_k$. In this way, we may condition **R** to a specific absolute intensity S_r of the stimulus, by differential inhibition against stimuli S_i, S_k, etc.

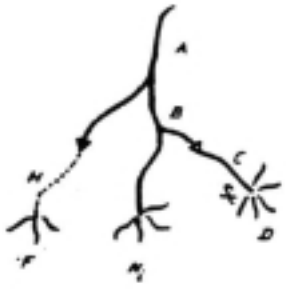

Fig. 1

Let the afferent pathway **A** (Fig. 1), carrying the excitation due to the stimulus **S**, excite through a collateral pathway **B** a fiber **C**, which is of the intermediate type, with

1) $$B_j < A_j;\ b_j < a_j;\ \frac{A_j}{a_j} < \frac{B_j}{b_j}.$$

Let **C** excite, through the connection S_c, a center **D**, consisting of a group of neuroelements. If a constant stimulus S_k is suddenly established at $t = 0$, then at the connection s_c the variation of ϵ and j will be represented by Fig. 2. Because of **1)**, ϵ will first exceed j, but when the asymptotic state is reached, we shall again have $\epsilon < j$. If, after the asymptotic state is reached, we suddenly increase S_k to $S_i > S_k$ and keep S_i constant, ϵ and j will vary, as represented by Fig. 2,

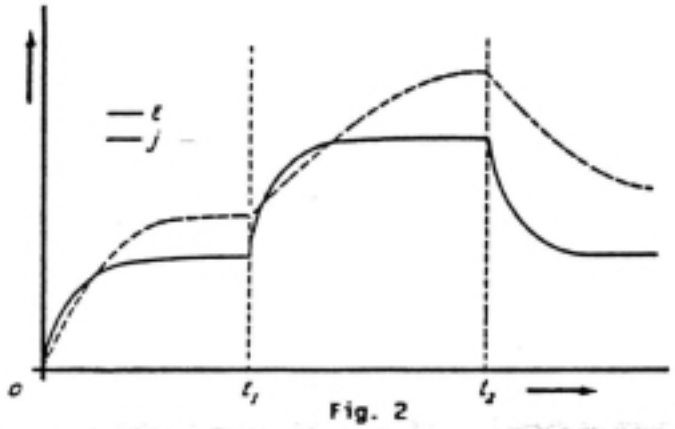

Fig. 2

in the interval from t_1 to t_2. That is, again for a short time there will be $\epsilon - j > 0$, followed by a state of inhibition, provided that $S_i - S_k$ is sufficiently large. If, on the contrary, we decrease **S** from S_i to $S_m < S_i$, ϵ and j will vary, as shown in Fig. 2, to the right of the point t_2, and no excitation will occur. If $S_i - S_k$ exceeds a certain value Δ, which depends on the absolute value of S_k and on the thresholds of the center **D**, then a sudden transition from S_k to $S_i > S_k$ will be accompanied by a short excitation of **D**. But a transition from S_i to $S_k < S_i$ will not be accompanied by such an excitation.

Let us now present to the subject a pair of stimuli S_i and $S_k < S_i$, alternatively, and combine the stimulus S_i with an unconditioned stimulus, producing the response **R**. Then **R** will become conditioned to the absolute value of S_i.

However, if we present each time, during the process of conditioning, a different pair, S_m and $S_r > S_m$, and always combine the stronger stimulus with the unconditioned stimulus for **R**, then, since every time different neuroelements, N_m, N_r,etc., are involved, the absolute value of the stimulus **S** does not become conditioned to **R**. But every time a stronger stimulus is presented after a weaker one, **D** is excited, provided that the difference between the stimuli as large enough. Hence, **D** becomes conditioned to **R**.

If we now present alternately a pair of stimuli, S_p and $S_q > S_p$, which were never used during the process of conditioning, then presentation of S_q after S_p will produce **R** via **D**. But the presentation of S_p after S_q will not do that, since **D** then remains unexcited. We have here a response to the abstract relation "larger than".

This simple scheme leads to the following consequences. The presentation of a single stimulus of sufficient intensity is accompanied by an excitation of **D**. Therefore, an animal or subject trained to respond to a single stimulus S_i, will, when presented alternately with two other stimuli, S_p and $S_q > S_p$, always choose the bigger one, S_q. In some cases this may perhaps actually be so. In cases when this does not hold, we must complicate our scheme somewhat. We may, for instance, assume that a spontaneously and constantly excited center excites an inhibitory pathway which normally inhibits **D**. A stimulus **S**, through a proper connection, may inhibit the inhibitory pathway and thus disinhibit **D**. If, however, the time τ which it takes to disinhibit **D** by **S** is longer than the interval during which $\epsilon - j > 0$, then a continuous presentation of S_i does not excite **D**, unless S_i is repeated at intervals shorter than τ.

Several other complications and generalizations of this scheme are apparent and suggest a number of mathematical investigations to derive relations between the thresholds Δ of discrimination, the interval between presentation of the two stimuli, etc.

Connecting the pathway **A** (Fig. 1) to a center **F**, through a pathway **H** of the ordinary inhibitory type, results in an excitation of **F** only when a weaker stimulus is presented after a stronger one. In this way we obtain a mechanism corresponding to the relation "smaller than".

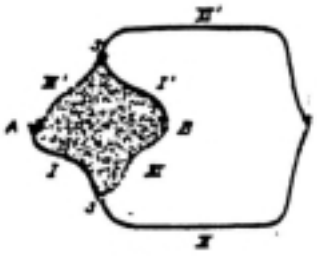

Fig. 3

Now, consider two centers, **A** and **B**, in a state of constant excitation with intensities $\mathbf{E}_A$ and $\mathbf{E}_B$. Those excitations act as stimuli on the two pathways **I** and **III**, of which the first is an excitatory, the other an inhibitory, pathway and both of which lead to the connection *s* with an excitatory pathway **II**. In a rather wide range of values of **S** we may then have, with good approximation,

$$2) \qquad \mathbf{E} = \mathbf{I}\alpha h \log \frac{\mathbf{S}}{h}$$

Referring again to Fig. 3 and remembering that the role of **S** is now played by $\mathbf{E}_A$ and $\mathbf{E}_B$, we have

$$3) \qquad \mathbf{E}_1 = \mathbf{I}_1\alpha_1 h_1 \log \frac{\mathbf{E}_A}{h_1}; \qquad \mathbf{E}_3 = \mathbf{I}_3\alpha_3 h_3 \log \frac{\mathbf{E}_B}{h_3}.$$

Let

$$4) \qquad \alpha_1 = \alpha_3 = \alpha; \qquad \mathbf{I}_1 = \mathbf{I}_3 = \mathbf{I}; \qquad h_1 = h_3 = h.$$

At *s* pathway **I** gives

$$5) \qquad (\epsilon - j)_1 = \mathbf{P}\mathbf{I}\alpha h \log \frac{\mathbf{E}_A}{h} > 0,$$

and pathway **III** gives

$$6) \qquad (\epsilon - j)_3 = \mathbf{Q}\mathbf{I}\alpha h \log \frac{\mathbf{E}_B}{h} < 0,$$

The total amount of $\epsilon - j$ at *s* is equal to

$$7) \qquad \epsilon - j = \mathbf{I}\alpha h \left(\mathbf{P} \log \frac{\mathbf{E}_A}{h} - \mathbf{Q} \log \frac{\mathbf{E}_B}{h} \right).$$

If, now, besides **4)** we also have, in this particular case, **P** = **Q**, then

$$8) \qquad \epsilon - j = \mathbf{P}\mathbf{I}\alpha h \log \frac{\mathbf{E}_A}{\mathbf{E}_B}$$

The intensity of excitation E_2 of pathway II being a function of $\epsilon - j$ only is, as we see, a function of the ratio E_A/E_B of the excitation of the two centers **A** and **B** and is independent of the absolute values of E_A and E_B. If $E_A < E_B$, pathway II is, however, unexcited, $\epsilon - j$ being negative. However, by considering a perfectly symmetric arrangement of another set of pathways, I', III', and II' (Fig. 3), corresponding identically with pathways I, III, and II, we shall find, by a similar argument, that the pair of pathways II and II' is always excited in the same way for a constant ratio E_A/E_B, regardless of the absolute values of E_A and E_B.

BIOLOGICAL PROCESS	QUANTIC OR THERMODYNAMIC	CORRECTION/ TREATMENT
Thought	Quantic	Counseling
Circulation	Thermodynamic	Diet & Exercise
Heart Muscle	Electrical Dynamic	Homeopathy
Liver Function Conjunctivity	Quantic	Homeopathy
Kidney Function	Thermodynamic	Nutrition
Immunology	Quantic	Homeopathy
Endocrinology	Quantic	Homeopathy
Kinesiology	Quantic Thermodynamic Electrical	Massage Chiropractic Homeopathy
Digestion	Quantic Thermodynamic Electrical	Nutrition
Genetics	Quantic	Homeopathy
Sensory	Electrical	Homeopathy
Neurology	Electrical	Homeopathy

BIO-ENERGETIC-THERAPEUTICS

To determine what energetic therapy is best for what condition takes some degree of difficulty. The Quantum Med C.I. uses various forms of therapy. These therapies are computer cybernetic loops of treatment patterns followed by signal monitoring in a continuous loop. The treatment differ in pattern intensity and other electrical variance. We can take this opportunity to describe the treatments realizing that the actual specifics of the loops and therapies must not be revealed to protect the proprietary nature of the work.

The system has been labeled as the CLASP program because of its ability to handshake with the patients body and thus self correct or adjust to the patient. The device self calibrates and alters its treatments to fit the patient.

These programs use a variety of algorithmic mathematical variations of cybernetic interaction. The Mathematical formulas outlined in this book from fuzzy numbers to harmonic resonance are all used in the computer program in analysis and treatment. I can assure you that the answers to all questions are in this text. Please read it all before you ask questions on how the Quantum Med C.I. works. But for a brief description:

ELECTROACUPUNCTURE

In this therapy we now the fuzzy band boundaries of the normal meridians and points on the meridians. This has been calculated from years of research. The factors of hydration , capacitance, inductance set the pattern in general. The computer must perform several fuzzy calculations to perform the function. The computer generates a sine or square wave signal that tests the meridians. The frequency should pass through the system and return unchanged to the computer. If the signal is absorbed by the system or is potentiated or amplified then the meridian or point is over or under charged. An improper point is then treated with resonance till the proper response is achieved. If any point is uncorrectable during the time limit or if an alarm response develops during treatment then the computer will record those uncorrected points and display them on a screen.

RIFE THERAPY

Rife developed the idea of using frequencies to treat the diseases of the body. He tested many frequencies and their effects on different diseases in people. He found that different infective organisms also could be destroyed or controlled by electrical frequencies. He postulated the possibility that viruses could be destroyed by certain frequencies. The perfect resonance would shatter the virus like a certain sound can destroy a glass. These harmonics frequencies also can be used to test the polarity of different glandulars. The Quantum Med C.I. starts at a low frequency and raises the frequency noticing the reactivity of the patient at each shift. Frequencies where the patient has excess reaction determines the polarity of the specific organs in the freq. band. The computer notes the excess reaction freq. and allows for correction of the aberration reaction. This happens through a stabilization pattern of harmonic frequencies in the near freq. areas. These harmonic related frequencies then can sedate high reaction. Direct freq. therapy on weak reactive points can correct them. This can detect and correct hysteresis disturbances and various inductive and capacitance disorders. The formulas in this chapter are utilized in the computer program. The principles of harmonics and fourier analysis are utilized as well

COLOR THERAPY

The beneficial therapies of color have been utilized by the Germans for years. By using these frequencies, beneficial results can be achieved. This perhaps the softest and

most noninvasive of all the therapies. Color reaction can be tested to determine the color which is most reactive to the patient.

SCALER

A scaler wave results from two equal but opposite waves interacting. The neutralization produces an infrared wave with nonhertzian components. These scaler waves have positive effects on biology and disease. By imputing a signal and a reverse equal signal the cancellation produces the null field or scaler function. Since the cancellation of the energy in normal space is transferred into the other dimensions and since the chakra are connections to these other dimensions, our scaler wave treatments can correct and treat the chakra. Our research has validated the hypothesis. In the International Journal of the Medical Science of Homeopathy we further analyze the scaler treatments. We refer you to this study for consideration.

ALLERGY DESENSITIZATION

The existence of an allergy seems to be connected with emotional stress. Allergens have distinct trivector fields, the reactive organs have distinct fields, as does the reactive symptoms. By using the electrical therapy to induce desensitization in the organs and the organism we can lower antibodies and mast cells reactivity. This is combined with NLP techniques of reprogramming stress reaction to deepen the effect. The end result is a powerful desensitization of allergic reaction. After 3 to 4 sessions allergic symptoms can be treated.

TRIVECTOR AND BICOM MORA LIKE THERAPY

There are a wide variety of frequencies running through the body. There are frequencies that are essential for life and necessary for health. Other frequencies are associated with cancer or other disease states. Some researchers have found that by using a band wave separator they could separate these frequencies. The healthy frequencies are amplified and the unhealthy frequencies are inverted. This is the basis of the Bicom or Mora type therapy. By charting these frequencies with the trivector field we can achieve a superior response over the mora and Bicom devices used in the past. This takes a fast acting response of a cybernetic loop within a computer to maximize the refined therapy. The units sold mostly in Germany in the past are one way treatments that are flawed by the lack of cybernetic interaction. Our cybernetic loop of check and double check allows for a self adjusting program that can more accurately treat the energetic dysfunctions.

NEURO-LINGUISTIC-PROGRAMMING

The science of NLP has snowballed for decades. It has gained tremendous popularity. The basis is the idea that emotional or physical traumas effect our neurology. The ideas and thoughts shape our minds and come out in our interaction. Using NLP techniques coupled with electrical stimulation for reshaping of neurology we can effect behavioral change. This allows us to maximize emotional and mental treatments.

SUMMARY

1. *Phase space reaction is time dependent. The magnetic reaction of a body must measured over a time phase for best measurement due to the hysteresis.*

2. *Using advanced mathematical algorithmic techniques such as outlined in this book we can assemble and direct an interactive computer module capable of treating and diagnosing the human body.*

Chapter 4

NONLINEAR DYNAMICS OF FRACTAL THEORY FOR BIOLOGY

Linear relationships occur when two variables have distinct mathematical fluctuations that change in a linear fashion. Poincaré realized that if we have two variables, a linear relationship can ensue, as they can be directly or inversely related to each other.

When we have three variables, Poincaré observed, an interesting thing happens. In the three-body problem factors have a peculiar unpredictability, and follow rather strange dynamics. When there are more than three, the factors become even more absurd. They seem to follow a different type of bifurcation formula that can only be called fractal, which can be calculated with *fuzzy arithmetic*, or *fuzzy numbers*. They follow nonlinear dynamics.

The researchers who discovered this over thirty years ago called this *chaotic dynamics*, and chaos theory ensued. Chaos theory has come to such a revolutionary point in science that in order for anyone to call himself "learned", he must know about fractal dynamics and chaos theory.

We wish to point the reader to a simple explanation of fractals and chaos theory outlined in *Quantum Biology*. There we proceed through some initial stages in the field of nonlinear dynamics. In this treatise we wish to further the discussion, and bring about some biological examples of chaos theory.

This new revolution in mathematics and science has shaken engineering physics to the quick. The implications for biology are even more shattering, in that the simple types of reductionistic studies that led to synthetic pharmacology must now be challenged. The dramatic amount of iatrogenic disease that has ensued because of these synthetic pharmaceuticals must also be challenged. Perhaps reactivation of naturopathy and homeopathy can be achieved through this dynamics.

Our development of this theory and the periodic attractor and phase portrait of the point attractor will allow us to see that biology really does not follow the reductionistic linear dynamics that has yielded experimentation resulting in synthetic pharmacology. Now biology is faced with a revolutionary concept; the concept of a nonlinear complexity, chaos, fractal dynamics, and finally quantum theory. The revolutionary concern is that modern medicine is so deeply entrenched in linear dynamics that dramatic problems are generated.

Dramatic amounts of iatrogenic disease, social problems, and extreme immune deficiency can be attributed to modern medicine and its simplistic, reductionistic drive toward profitability for the chemical cartel. It is the purpose of this document to start to outline a quantum biophysics, so we can understand a more complex, reverent system of biology based on a realization of the uncertainty, the complexity, and the grandeur of the biological machine known as the human being.

In Chapter 5 ("The Fuzzy Arithmetic of Uncertainty") we can see how the maximum/minimum and ideal values can generate a trinary system of understanding, which in our trinary logic system can have unique activity. If we can look at life as having strange, and perhaps even chaotic, attractors and repellors, we can then intuit how these multiple attractors and repellors can influence the factors of health and disease. In the book, "Nonlinear Dynamics and Chaos", by Thompson and Stewart, we find a simple explanation of these fractal phenomena. The following includes excerpts from this book, which is published by Wiley in 1986. This brief introduction to fractal dynamics will allow us to construct some basic medical models within our developing quantic system.

> "The theory of any function begins naturally with its qualitative aspect, and thus the problem which first presents itself is the following: Construct the curves defined by differential equations.
>
> This qualitative study, once completed, will be of the greatest utility for the numerical calculation of the function.
>
> Furthermore, this qualitative study will be in itself of primary interest. Many important questions in Analysis and Mechanics in fact reduce to just this."
>
> *Henri Poincaré*

QUANTUM BIOPHYSICS

An Overview of Nonlinear Phenomena

We aim to give a general outline of nonlinear dynamics, which is an essential prerequisite to our more advanced studies including our goal of understanding chaotic motions. This chapter provides a quick overview of the nonlinear dynamics field, before we begin our more detailed presentation.

Undamped, Unforced Linear Oscillator

We start our overview by looking at the undamped, unforced linear oscillator of Fig. 1. The equation chosen for this first illustration has the stiffness constant $4\pi^2$, which makes the periodic time equal to unity. The solution of such an equation is simply a sine wave, the constant amplitude and phase of which are determined by the starting values of x and $\dot{x}$. So, once started, we have a constant sine wave that persists for all time, and there is no transient or decay of any kind. The periodic time, unity in the present example, is a constant independent of the starting conditions, the amplitude of the motion, and the time.

A typical plot of x against the time t is shown, resulting from the starting condition $(x, \dot{x})$ equal to (1, 0) at the time t = 0. Along with the other, mainly nonlinear, problems considered in this chapter, this solution was obtained by numerical time integration using a fourth-order Runge-Kutta routine on a desk-top Hewlett-Packard computer with the step size indicated, here $\Delta t = 0.02$.

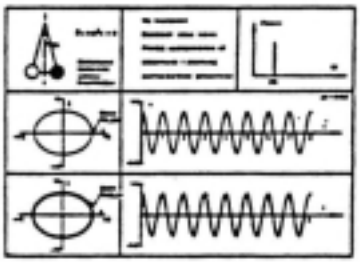

Fig. 1

If we plot not x against t but $\dot{x}$ against x, we have the phase portrait shown on the left. Starting as before at (1, 0) we now have the closed ellipse shown, the representative point moving continuously round and round this closed orbit as the time goes to infinity. The power spectrum of this response is simply a spike (or delta function) at the circular frequency of 2π radians per second.

We must finally ask the question: what would happen if we changed the starting condition by a small amount? The answer is illustrated, where we show both the *fundamental* reference motion starting at (1, 0) and a perturbed motion starting at (1.02, 2). We see that we have two sine waves running in step with just a small difference in amplitude and phase resulting from the slightly different starting values of x and $\dot{x}$. They continue to run nicely in step for all time because the period of oscillation of the two motions is the same (and equal to unity, as we have seen). So a starting perturbation is preserved, and the fundamental motion is *neutrally stable* in a dynamical sense.

In the left-hand phase space, the two motions appear as neatly nesting ellipses. All possible motions of this linear oscillator are indeed represented by a complete family of nesting ellipses, which represent the full phase portrait of the system. The orbit passing through any particular starting point $(x, \dot{x})$ defines the subsequent unique motion of the oscillator.

This linear oscillator models in an approximate fashion many basic physical systems, such as the free motions of a simple hanging pendulum. The modelling is, however, unrealistic in two

important ways. First, it ignores the damping action of inevitable dissipative forces, such as air resistance in the example of the laboratory pendulum. In the absence of impressed driving forces, the motions of all real macroscopic mechanical systems will eventually decay, as with a free experimental pendulum, so our present equation fails to model this vital aspect. Secondly, all real biological systems will have some degree of nonlinearity, which in itself modifies the behavior in important ways. Large-amplitude oscillations of an undamped pendulum are for example governed by a nonlinear differential equation that we shall examine next: a linear approximation to the behavior of a pendulum is only valid for small angles of oscillation.

The two unrealistic approximations of *linearized stiffness* and *zero damping* will be removed in turn, so we look next at the large-amplitude, nonlinear motion of an undamped pendulum.

Undamped, Unforced Nonlinear Oscillator

The undamped, unforced nonlinear system of Fig. 2 represents the *exact* equation of motion of a simple pendulum undergoing arbitrarily large oscillations. This equation in terms of the angle x is easily derived using Newton's law of motion for the bob by resolving perpendicular to the light string to eliminate the unknown tension: alternatively it can be derived by Lagrangian or Hamiltonian energy methods. The length of the pendulum, relative to the gravitational constant, has been chosen to make the coefficient equal to $4\pi^2$. So for small oscillations we could *linearize* the equation by approximating sin x to x, and retrieve the linear oscillator of our earlier discussion, with periodic time equal to unity.

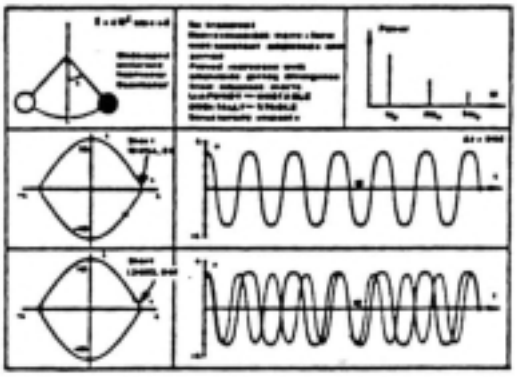

Fig. 2

The solution of this nonlinear differential equation can be obtained after some algebra in terms of elliptic integrals: alternatively the equation can be easily integrated numerically on a digital computer as we have done here. Depending on the starting conditions of $(x, \dot{x})$ we now find a steady undamped oscillation corresponding to the motion of our idealized undamped pendulum. A *given motion* from a given start thus exhibits no transient or decay, just a steady waveform of constant amplitude and constant period. The waveform is not, however, sinusoidal, and could in fact be decomposed by Fourier analysis into a fundamental harmonic plus odd higher harmonics: this gives rise to the power spectrum shown with a large spike at a certain circular frequency ωF and smaller spikes at 3, 5, 7, ..., etc., times this value. Biological systems display a Fibernaci set 3, 5, 8, 13, 21... which forces stability.

The central waveform shows the steady oscillation starting at (3.054, 0) corresponding to the pendulum starting from rest with $\dot{x} = 0$ at a value of $x = 3.054 \times 180)/\pi = 175°$. To visualize this physically we must suppose that the heavy pendulum bob is supported not by a string, which could become slack, but by a light rigid rod pivoted to the fixed support. Because this rigid-link pendulum would be in (unstable) equilibrium at $x = 180°$, the motion begins very slowly and the

waveform is very flat and quite noticeably nonsinusoidal. The corresponding $\dot{x}(x)$ phase picture is shown to the left-hand side: the closed trajectory is quite clearly not elliptical, and has a high curvature on the x axis corresponding to the proximity of an unstable equilibrium state. The biological attractor and repellor system needs the extra energy of neg-entropy, which is supplied by food, natural nutrition, and prayer (see *Bio-Quantum Matrix*).

Now the periodic time of a given motion is constant as we have just seen, but the period of different motions *increases* with the amplitude. It is clear for example that a start very close to $x = 180°$ will give a motion with a very large period, since at the end of each big swing the pendulum will almost come to rest in the inverted position: indeed the periodic time goes to infinity as the amplitude approaches π. Notice that the periodic time of our displayed waveform is about 3, compared with the periodic time of unity for the small-amplitude linearized motions.

This variation of period with amplitude gives rise to a new phenomenon when we consider a perturbed motion. Fig. 2 shows the fundamental motion just considered together with a perturbed motion starting from slightly different initial conditions. Because these new conditions give rise to a motion with a slightly different amplitude, the perturbed waveform has a slightly different period. So we have a *beat* phenomenon and the two motions drift in and out of phase with one another. This means that, although the two waveforms will eventually resynchronize, there is an initial *divergence* from adjacent starts. This makes the fundamental oscillatory motion unstable in the strict sense of Liapunov. In the left-hand phase diagram however, in which the *time* discrepancies of the two motions are not visible, the two closed *orbits* are seen to lie everywhere close to one another: in recognition of this fact the fundamental motion is said to be *orbitally stable*.

For the motions under consideration, the phase portrait of the present undamped nonlinear oscillator consists of nesting closed orbits. For small oscillations these are roughly elliptical corresponding to the nearly sinusoidal waveform, but they become increasingly distorted with increasing curvature near the x axis for the largest non-sinusoidal motions.

The steady undamped oscillations of our first two examples are not typical of real undriven systems. Clearly the smallest trace of dissipation will give damped waveforms, and the nest of closed orbits in the phase space will become *inward spirals*. The fact that the topological nature (closure) of the phase orbits can be destroyed by even infinitesimal damping is recognized by declaring the pathological undamped systems to be *structurally unstable*.

We shall now be concerned with *typical* damped systems, and we start by looking at the behavior of a damped linear system.

Damped, Unforced Linear Oscillator

We consider then the differential equation of Fig. 3, which is written in a rather standard form, with ζ representing the damping factor, namely the ratio of the actual damping to the critical damping at which oscillatory behavior ceases. We can think of this equation as representing the motion of a mass constrained by a linear elastic spring in parallel with a dashpot full of oil, which is assumed to provide a force apposing the instantaneous velocity.

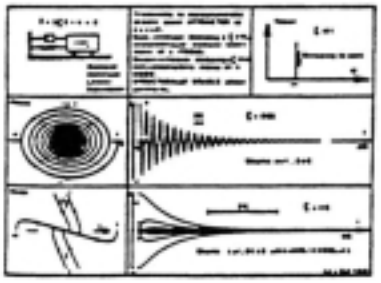

Fig. 3

An analytical solution of this linear differential equation is readily written down: for light damping with $\zeta < 1$ we have an exponentially damped sine wave, while for heavy damping with $\zeta > 1$ we have a non-oscillatory exponential decay.

A typical lightly damped waveform is shown in the middle picture, starting at $x = 1$, $\dot{x} = 0$. The decaying wave has a constant period, defined for example by successive crossings of the time axis, which is nevertheless slightly dependent on the value of $\dot{x}$. With the light damping shown, the period is essentially unchanged from the period, 2π, of the corresponding undamped system obtained by setting $\dot{x} = 0$. For light damping the power spectrum will be roughly a single spike decaying to zero along with the wave amplitude.

The corresponding phase portrait on the left is now a spiral, heading inward toward the asymptotically stable equilibrium state at the origin (0, 0). The full linear phase portrait, termed a focus, is a set of intertwining, noncrossing spirals. Every motion here represents a transient to the asymptotically stable equilibrium state of rest at the origin, which for obvious reasons is called a *point attractor*. The whole phase portrait is now *structurally stable* since for finite damping the spiralling form cannot be topologically changed by *any* infinitesimal changes to the system.

The pictures for heavier supercritical damping shown in Fig. 4 give the waveform and phase trajectories for six alternative starts. The system moves back to its stable state of rest in a direct non-oscillatory fashion, and the whole phase portrait is called a *node*. Once again, we have a structurally stable point attractor at (0, 0) capturing all motions of the system.

Since all motions decay to rest, fundamental and perturbed motions coalesce as time goes to infinity, and starting perturbations are lost.

Damped, Unforced Nonlinear Oscillator

To conclude our examination of unforced (undriven) systems, we look now at a damped nonlinear problem, typified by the pendulum of Fig. 4. This is the large-amplitude pendulum of our earlier discussion, now with the modelling of air drag by a realistic velocity-squared law: notice that the damping force proportional to $\dot{x}^2$ has to be entered into the differential equation of motion as $\dot{x}|\dot{x}|$ to ensure that it is always opposing the velocity. Having put on this quadratic damping, we should perhaps emphasize that the form of damping is largely irrelevant to the following discussion, the salient points being just as well illustrated by the use of linear damping: the computed traces relate, however, to the quadratic damping.

Clearly we once again have transients to the asymptotically stable hanging equilibrium state representing a point attractor in the phase space.

The central waveform damps and becomes increasingly sinusoidal as x becomes small, while the power spectrum is a decaying set of spikes as shown. The phase portrait is a spiral, becoming increasingly elliptical as the trajectories approach the central attractor. A little linear damping would be needed to make this portrait structurally stable near the origin.

As with the undamped pendulum suffering large-amplitude oscillations, adjacent starts still exhibit a temporary beating character with an associated initial divergence due to the variation of the period with amplitude. But initial perturbations are eventually lost as all motions coalesce in the unique hanging state.

This local phase portrait is a set of intertwining spirals with all motions captured by the central attractor. The full phase portrait of a pendulum including high-velocity motions passing through the inverted state is most nicely seen in a cylindrical phase space, and will be presented later.

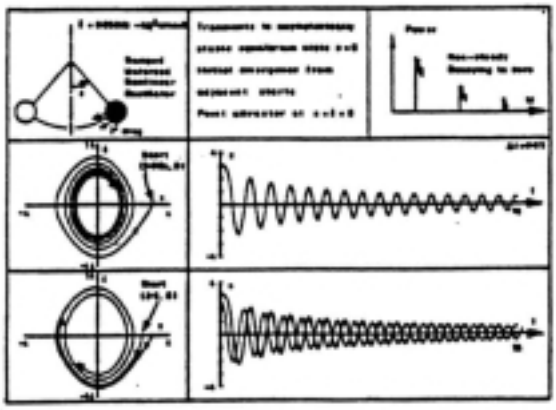

Fig. 4

Forced Linear Oscillator

We have so far looked only at autonomous unforced systems with zero on the right-hand side of the equation, but we turn now to sinusoidally driven nonautonomous oscillators. Damping, we have seen, is an essential ingredient of good modelling, so we shall start by looking at the damped, forced linear oscillator of Fig. 5. This would be an adequate mathematical model of a pin-ended steel beam driven to small-amplitude lateral oscillations by an electromagnet carrying s sinusoidal alternating current. Here physical damping would arise from air resistance and internal material dissipation. The numerical coefficients have been chosen to provide a sharp frequency contrast between the transient and the steady-state solution, and the damping ratio of the unforced left-hand side is 0.1.

This is a classical resonance problem of engineering texts, and the well known analytical solution is easily written down. It is the algebraic sum of the so-called particular integral (PI) and the complementary function (CF). The CF is just the solution obtained by setting the left-hand side of the equation to zero: that is to say it is the exponentially damped sinusoidal solution of the unforced autonomous system. It has the usual two arbitrary constants of amplitude and phase obtained by applying the starting conditions to the *whole* solution. With the present choice of constants the CF is a high-frequency sine wave with quite a heavy rate of damping.

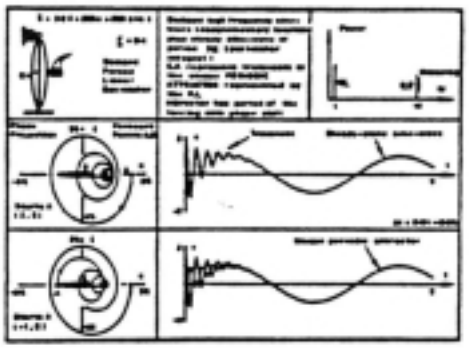

Fig. 5

The PI is a particular (known) solution of the whole equation, being in fact a steady undamped sine wave with the same frequency as the forcing term with which it has a fixed phase difference. The amplitude of the PI depends crucially on the ratio of the forcing frequency to the

natural frequency of the autonomous left-hand side, being large when this ratio is close to one so that we have a condition of resonance. The conventional engineering resonation response curves simply plot the magnitude of the PI against this frequency ratio, giving for light damping a sharp peak at unity.

We should emphasize here, however, that from the qualitative dynamics point of view it is irrelevant whether the system is 'at resonance' or not. With the particular coefficients chosen, our illustration is well away from the resonant condition, but the discussion of the system's behavior is essentially unrelated to this fact.

Since the analytical solution is just the algebraic sum of the CF and the PI, it is clear that the former damped sine wave represents a decaying transient, which leaves the PI as the unique final steady state: this is the reason for the engineer's consuming interest in the amplitude of the PI. A waveform starting at (2, 0) is shown in the central figure and we see clearly the high-frequency transient leading rapidly to the steady sinusoidal state described by the PI.

Now a forced system such as this has a three-dimensional phase space defined by the coordinates (x, $\dot{x}$, t), the essence of phase spaces being that they are full of *non-crossing* trajectories. It is sometimes convenient, however, just to plot the *phase projection* (x, $\dot{x}$) and accept the fact that trajectories will appear to cross in this projection. The phase projection corresponding to the drawn waveform is thus shown to the left-hand side. The high-frequency transient appears as decaying circles, and the final steady state as a very long, think ellipse pointing along the x axis.

It is also helpful in the phase projection to make a dot, or small circle, whenever the forcing cycle is about to commence, at t equal to multiples of the forcing period, here 2π. This is the so-called Poincaré section and is represented by points **A** and **B** in the present time integration. Since the final steady state is here an oscillation with the same period as the forcing, the final steady-state mapping will be the constant repetition of a fixed point, here quite close to **B**.

The lower pictures show, superimposed, the effect of a completely different start. As dictated by the analytical solution, the different transients resulting from different integration constants in the CF lead merely to the same *unique periodic attractor* corresponding to the PI. As we have seen, this attractor is sinusoidal with the period of the forcing, but with a constant phase shift. The power spectrum will be predominantly two spikes at the forcing frequency and at the natural autonomous frequency, the latter decaying as the transient is lost.

Forced Nonlinear Oscillator: Periodic Attractors

Just as a stiffness nonlinearity introduced new phenomena into the response of an unforced oscillator, so a nonlinearity generates new features in a driven system. So we look now at the damped, forced nonlinear oscillator illustrated in Fig. 6. This is the sinusoidally (here co-sinusoidally) forced Duffing equation with a linear and a cubic stiffness. This could be used to model the moderately large bending deflections of an electromagnetically driven steel beam held pinned to fixed supports as shown. These fixed supports induce a membrane tension at finite deflections, which gives a hardening nonlinear stiffness modelled for moderately large deflections by the cubic term.

For such a driven nonlinear oscillator, closed-form analytical solutions are not available and recourse *must* inevitably be made to numerical time integrations. Just as with the preceding linear system, transients are observed, but after these have decayed we now find that there are two alternative stable steady states denoted here by **A** and **B**. The first plot of x against t shows these two steady oscillatory states, the starting points to eliminate transients having been found by previous trial computations. We see that the large-amplitude motion **A** and the small-amplitude motion **B** both have the same period as the forcing term and are therefore fundamental *harmonics* as opposed to subharmonics: they are noticeably out of phase with one another. The

corresponding steady-state phase projections are shown in the left-hand phase diagram, each closed orbit having one Poincaré mapping denoted by a circle because the motions have the period of the forcing: these mapping points show where the system is whenever the time is a multiple of 2π.

These two steady-state solutions, **A** and **B**, can be seen on the resonance response diagram at the top right. This is a plot of the response amplitude against the ratio of the forcing frequency to the natural frequency of the autonomous system: this ratio is 1.6 for the parameters adopted. Now in a linear resonance problem we have a vertical resonant peak, but the positive cubic stiffness of our Duffing's equation curves the peak to the right giving a domain of frequency ratio with three steady states. The steady state of intermediate amplitude is unstable and so is not observed in a normal time integration, leaving us with the two alternative stable solutions **A** and **B**.

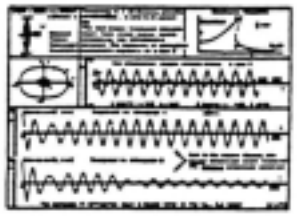

Fig. 6

Now which of these two coexisting periodic attractors is picked up in a given time integration depends on the starting conditions, and two transient motions are illustrated. Starting with $(x, \dot{x})$ equal to (10, 0) gives a transient leading to attractor **A** while starting at (11, 0) gives a transient leading to attractor **B**. Notice that due to the phase chosen, the *larger*-amplitude start leads to the *smaller*-amplitude solution. The more obvious converse could equally apply, the final motion adopted being as much governed by phase as by amplitude.

Clearly in the space of the starting values of $(x, \dot{x})$ at $t = 0$ there will be *domains of attraction* such that motions originating in the domain of **A** lead after the decay of transients to solution **A**, while motions starting in the catchment region of **B** lead to the periodic attractor **B**. Between the domains of attraction (catchment regions) will be a separatrix curve, and it is clear that our two rather close starts straddle this separator. The domains of attraction tend to have a complex spiral form, which accounts for the sensitivity to both phase *and* amplitude previously mentioned.

This multiplicity of alternative stable attracting solutions (often more than the present two) dependent on the starting conditions, which is not encountered in the linear resonance problem with its unique periodic attractor, is typical of nonlinear driven oscillators.

We come at last to the equation that gives rise, as the reader might expect, to a chaotic solution governed by a strange attractor.

Forced Nonlinear Oscillator: Strange Attractor

We see that one version of the driven Duffing equation studied extensively by Ueda differs from our previous damped, forced nonlinear oscillator in having no linear stiffness. This would in fact arise physically if we had a beam loaded to precisely its (Euler) buckling load: at buckling the linear stiffness has dropped to zero due to the destabilizing action of the axial compressive load, and the nonlinear stiffness can be modelled locally by the cubic term.

Once again analytical solutions are impossible, and digital computations show that after transients have decayed, the system settles down to a condition of steady-state chaos. In contrast to the point and cyclic attractors that we have so far examined, this convergence to chaos is said to be governed by a *chaotic attractor*. These chaotic or strange attractors can coexist with other

periodic steady states, with appropriate domains of attraction, etc., but for the coefficients chosen here there is in fact just a unique chaotic attractor that captures all motions of the system. The middle trace shows a rather brief but fairly obvious transient from (0, 0) lasting visibly for only about five forcing cycles of period 2π. The steady-state chaos covering the remaining 45 forcing cycles has a fairly regular though non-periodic appearance, and we notice that the positive x peaks synchronize approximately with the start of a forcing cycle for which t is a multiple of 2π.

The steadiness of this final chaotic state is reflected in a stationary power spectrum and a *typical* spectrum of chaos. This is due to Ueda, and is for a slightly different set of coefficients, with 0.1 and 12 replacing the 0.05 and 7.5 of our equation. We see spikes at the forcing frequency and odd multiples of this frequency (typical of a non-sinusoidal periodic wave with the period of the forcing) plus, however, regions of 'white noise' extended broadband peaks.

The bottom trace shows a more dramatic transient, generated by starting at large amplitude at an inconvenient phase. The high frequency is a natural consequence of the large x, because the effective stiffness increases as x^2. However, even after this start, the recognizable pattern of the steady-state chaos soon emerges.

We recollect that the phase space of this driven oscillator is three-dimensional, spanned by $(x, \dot{x}, t)$, and the Poincaré mapping is generated by the successive intersections of a trajectory with the $t = 2i\pi$ sections, where $i = 0, 1, 2, \ldots$. Here the dots build up to form a complete shape with what is thought to be the fractal structure of a Cantor set. All the points lie in the positive x regime, corresponding to our earlier observation that in the final state the positive x peaks synchronize with the beginning of the forcing cycle.

Transients would appear as rather scattered dots outside this attractor, but as we have seen, the mapping points are very quickly attracted into this set. The Poincaré section, often itself referred to as the attractor of the chaotic motion, is really just a cross-section of the full attracting structure, which is a fixed geometric form in the full three-dimensional phase space to which all trajectories are finally attracted. It is the continuous stretching and folding of the sheets of this attractor that produces the turbulent mixing motions characteristic of chaotic dynamics.

Evolving Ecological Systems

Lotka-Volterra Prey-Predator Equations

The dynamical behavior governing the growth, decay, and general evolution of interacting biological species is perhaps most easily modelled by the Lotka-Volterra prey-predator equations. These can be written as

1)
$$\dot{X} = K_1AX - K_2XY$$
$$\dot{Y} = K_2XY - K_3BY$$

where X is the population of the prey, say rabbits, Y is the population of the predator, say foxes, and A, B, K_1, K_2 and K_3 are positive constants. These nonlinear coupled evolution equations form an interesting and instructive introduction to population dynamics. They have been used for many years to model many basic biological phenomena such as biological clocks and time-dependent neural networks. They can be shown to exhibit closed oscillations similar to the stable vibrations of the undamped pendulum.

Stability of the Steady State

By equating the rates to zero we obtain, apart from the trivial and uninteresting solution $X = 0$, $Y = 0$, the single steady-state solution

2) $$X_s = \frac{K_3 B}{K_2} \quad \text{and} \quad Y_s = \frac{K_1 A}{K_2}$$

such that, if the population had initially these values, the numbers of prey and predator would remain constant in time according to this deterministic model. In a more realistic stochastic model, random fluctuations would have to be incorporated.

To examine the stability of this steady state, we write

3) $$X = X_s + x$$
$$Y = Y_s + y$$

assuming that the increments x and y are small quantities so that after substitution into equation 1 their products can be ignored.

We thus obtain the *linearized* variational equations

4) $$\dot{x} = -K_3 B y$$
$$\dot{y} = +K_1 A x$$

which describe small population changes around the steady state. Eliminating y between these two equations gives

5) $$\ddot{x} + K_1 K_3 A B x = 0$$

which is the familiar equation of a simple harmonic oscillator of circular frequency

6) $$\omega = (K_1 K_3 A B)^{\frac{1}{2}}$$

and periodic time $T = 2\pi/\omega$.

Phase Trajectories

The phase trajectories in (X, Y) space are thus concentric ellipses for small deviations from (X_s, Y_s), and the steady state is thus neutrally stable. For larger finite oscillations about (X_s, Y_s), the phase trajectories are no longer elliptical, but they remain closed curves with, however, a continuous change in the periodic time. The large- and small-amplitude behavior is thus entirely analogous to that of the *undamped* pendulum.

We should note carefully here that a linear prediction of elliptical centers does not in general guarantee centers in the corresponding nonlinear system. Exclusively nonlinear damping in a mechanical system could, for example, give asymptotically stable 'foci', even though the linearization, with no dampening predicted centers.

Because of the constantly varying periodic time, the dynamical motions along the phase trajectories are themselves only *orbitally stable*, and random stocbastic disturbances will induce a constant drifting between orbits.

Three phase trajectories are shown in Fig. 7, for which the constants have been set equal to unity, i.e.

$$K_1A = K_3B = K_2 = 1$$

giving the steady state

$$X_s = Y_s = 1$$

The linear theory ellipses become, in this case, circles.

The phase space (X, Y) is in reality filled with an infinity of such nesting phase trajectories, each with its own periodic time, and the trajectory through any starting point summarizes the dynamical evolution of the ecosystem. Thus if the system starts away from the steady state, S, it will exhibit undamped oscillations about (X_s, Y_s), the amplitude of the oscillations being governed by the original departure from S.

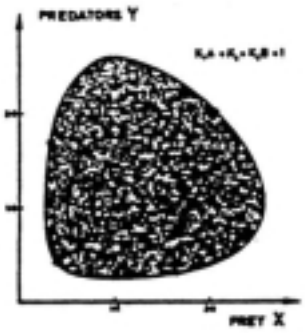

Fig. 7

Structural Stability

One acknowledged deficiency of the Lotka-Volterra equations is thus that they have the structural instability of the *undamped* conservative mechanical system, the phase trajectories of which can be topologically changed by the introduction of infinitesimal viscous damping.

A more realistic set of equations could be expected to yield not an infinity of neutrally stable trajectories but structurally stable *focuses* and *limit cycles*. An attracting limit cycle would, for example, give rise to more coherent cyclic behavior with a well-defined periodic time T. Despite this lack of structural stability, the usefulness of the Lotka-Volterra equations in predicting prey-predator oscillations in a remarkably simple manner is widely acknowledged.

Plant-herbivore evolution

We now look at the dynamic behavior of a structurally stable ecological model, the plant-herbivore system. This system explores the interaction between plants and grazing animals.

Of the many models available, one will suffice to illustrate the behavior of this type of system:

$$7) \qquad \frac{dV}{dt} = r_1V(1 - V/K) - c_1H[1 - \exp(-d_1V)]$$

and

$$8) \qquad \frac{dH}{dt} = H\{ - a + c_2[1 - \exp(- d_2V)]\}$$

where V is the standing crop of plants, H the size of herbivore population, r_1 the intrinsic rate of increase of plants, K the maximum ungrazed plant density, c_1 the maximum rate of food intake per herbivore, d_1 the grazing (searching) efficiency of the herbivore when vegetation is sparse, a the rate at which herbivores decline when the vegetation is burned out or grazed flat, c_2 the rate at which this decline is ameliorated at high plant density, and d_2 the demographic efficiency of the herbivore (its ability to multiply when vegetation is sparse).

The modelling takes into consideration the two assumptions that the herbivores do not interfere with each other's search for food, and that the animals range free of persecution. Depending on the values of its parameters, the system may be characterized by a stable equilibrium point, or by a stable limit cycle whose amplitude may be so severe as to produce extinction.

The first equation (7) expresses the rate of change of vegetation by two terms, the first depicting logistic growth and the second the rate of grazing. Equation 8 summarizes the rate of change of the herbivore population H in terms of their intrinsic ability to multiply, as modified by the availability of food. Herbivores can increase at a maximum rate of $\{- a + c_2 [1 - \exp(- d_2V)]\}$, which in most circumstances will equal their intrinsic rate of increase, r_2 ($r_2 = c_2 - a$), because at high plant density the term inside the square brackets will tend to unity.

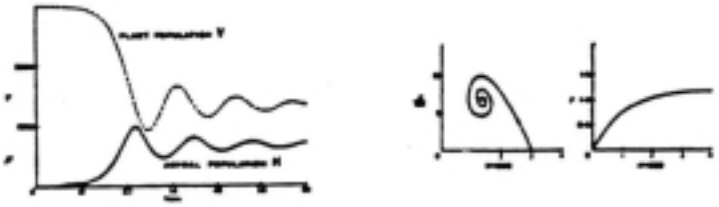

Fig. 8

Fig. 8 shows the growth of a population of herbivores, and the resultant changes in plant density, as the two variables spiral toward their mutual equilibrium point. For this illustration, the parameter values are: $r_1 = 0.8$, $K = 3000$, $c_1 = 1.2$, $d_1 = 0.001$, $a = 1.1$, $c_2 = 1.5$, and $d_2 = 0.001$. Although this example is largely imaginary, it can be thought of, without contradicting current knowledge, as representing white-tailed deer colonizing a mosaic of grassland and forest. Wildlife managers will recognize the growth curve as a deer eruption.

Further information on nonlinear behavior in ecological models, including a study of chaotic fluctuations in Canadian lynx populations based on skin records of the Hudson's Bay Company, can be found in a recent survey paper by Schaffer (1985).

Competing Point Attractors

Nonlinear Potential

A suitable total potential energy function is

$$9) \qquad V = 1\tfrac{1}{2}ax^2 + \tfrac{1}{4}bx^4$$

where a and b are positive. The corresponding force is

10) $$\frac{dV}{dx} = -ax + bx^3$$

with equilibria (zero force) at

11) $$x = 0 \quad \text{and} \quad x = \pm \sqrt{a/b}$$

So we can consider the corresponding damped oscillator described by the equation

$$m\ddot{x} + c\dot{x} - ax + bx^3 = 0$$

Relaxation Oscillations and Heartbeat

The second-order oscillator equation

1) $$\ddot{x} + F(\dot{x}) + \omega^2 x = 0$$

with a nonlinear damping function F was introduced by Lord Rayleigh (1896, cf §68a) as a model of a vibrating clarinet reed or a violin string. The function $F(\dot{x})$ might for example be polynomial as in the model of wind-induced galloping. A nonlinear damping function that exerts a force always opposed to the direction of velocity will yield qualitative behavior like a linearly damped system. However, the behavior of solutions of equation 1 is qualitatively different from a damped linear oscillator if F sometimes acts with the same direction as the velocity $\dot{x}$, indicating the presence of an energy source. In qualitative studies, it is usual to follow Rayleigh and consider a polynomial F with linear and cubic terms only. The final behavior of equation 1 may then be a limit cycle in the autonomous case, as we have seen.

Upon differentiating equation 1 with respect to time, and substituting v for $\dot{x}$ above, we obtain

2) $$\dot{v} + F'(v)\dot{v} + \omega^2 v = 0$$

Choosing $F(v) = \alpha(v^3/3 - v)$ leads to the Van der Pol equation

3) $$\dot{v} + \alpha(v^2 - 1)\dot{v} + \omega^2 v = 0$$

This equation was extensively studied by Van der Pol both theoretically and in analogue simulation using vacuum-tube circuits, where the function F corresponds to the nonlinear characteristic of a triode tube. Van der Pol observed that limit cycle oscillations of equation 3 are nearly sinusoidal functions of time when α is small compared with ω, but approach a square wave when α becomes large, as illustrated in Fig. 9. This latter, highly nonlinear oscillation was called a *relaxation oscillation* by Van der Pol, because each half-cycle corresponds to a build-up of charge on a capacitance C with relaxation time r = RC. Thus the frequency of the relaxation oscillation is determined not by the restoring force reflected in ω^2 but by a relaxation time.

This feature of relaxation oscillations makes them particularly susceptible to looking at some external driving frequency, even when the external frequency differs widely from the natural frequency of the unforced relaxation oscillations. As Van der Pol noted, 'it is a well known fact that outer circumstances may much easier influence a resistance than a mass or elasticity'. Relaxation oscillators are ideally suited to control systems in which an input stimulus

should produce a response of fixed amplitude but adaptable frequency or repetition rate. An example is the beating of the heart: it is known that each contraction of the ventricle is stimulated by a nerve impulse generated upon contraction of the auricle. Van der Pol and Van der Mark (1928) constructed an electrical circuit composed of coupled relaxation oscillators, which they proposed as a qualitative model for the beating heart. They reported that, by adjusting the coupling from one oscillator to the other, convincing simulations of both normal heartbeat and of certain disorders were observed.

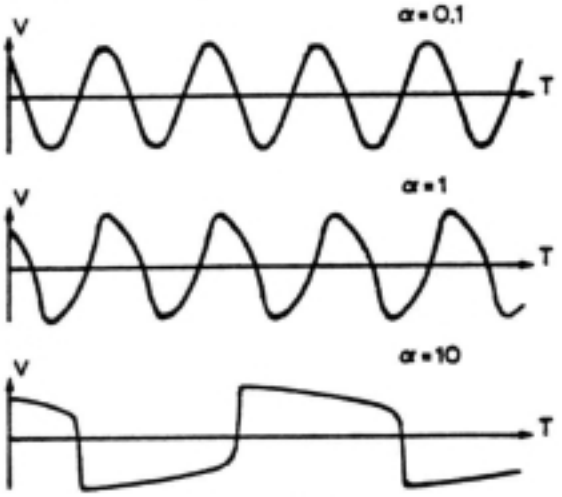

Fig. 9

A closer connection between the heartbeat and the Van der Pol equations was discovered by FitzHugh (1961) and pursued by Nagumo *et al.* (1962). FitzHugh suggested a variant of the Van der Pol equation as a simplification of the successful model of nerve axon response developed by Hodgkin and Huxley (1952) consisting of a system of four first-order ordinary differential equations. It is interesting to note that although the Hodgkin-Huxley equations are in part derivable from Maxwell's electromagnetic field equations applied to a cylindrical model of the nerve axon (see for example Scott (1975)), the crucial step taken by Hodgkin and Huxley was the inference of electrodynamic characteristics of the nerve membrane from detailed experimental studies of excised animal axons, and not from electrochemical first principles. The FitzHugh-Nagumo equations are thus an inspiring example of a qualitative model derived from observation of dynamic behavior, rather than from fundamental physical laws. This approach will undoubtedly be of particular importance in the growing fields of nonlinear dynamics of biological, ecological, and social phenomena. Another example of this phenomenological approach to nonlinear model-making can be found in Abraham *et al.* (1985).

The equations proposed by FitzHugh are based on the two first-order equations

$$\dot{v} = \alpha w - F(v)$$

$$\dot{w} = - v/\alpha$$

which are equivalent to equation 3 with $\omega = 1$. FitzHugh added additional terms to obtain

4)
$$\dot{v} = \alpha(w + z) - F(v)$$

$$\dot{w} = -(v - a + bw)/\alpha$$

where a and b are fixed parameters and z is stimulus intensity. A detailed discussion of the phase-plane behavior of these equations in terms familiar to physiologists will be found in FitzHugh (1961).

Finally, we note that Rǫssler *et al.* (1978) reported finding a variety of subharmonic responses in numerical simulations of the periodically forced system

5) $$\dot{x} = (y - 1.5) + (x - x^3/3) - A \sin(0.2t)$$

$$\dot{y} = -[x - 0.467 + 0.8(y - 1.5)]/9$$

These subharmonic responses are similar to arrhythmias observed in malfunctioning hearts. In addition, chaotic response was found in a narrow range of parameters near A = 0.045. Similar results have been obtained by Guevara *et al.* (1981). These observations may well be related to chaotic behavior of stimulated nerve tissue described in Glass *et al.* (1983) and Hayashi *et al.* (1983); see also Holden and Winlow (1983).

Limit Cycles in Autonomous Systems

We move now to a discussion of cyclic attractors, looking at limit cycles exhibited by autonomous unforced dynamical systems.

The single limit cycle and its stability characteristic are discussed first, with an example drawn from a neural model of brain activity. The generation of a trace of limit cycles by a Hopf bifurcation is next illustrated with reference to chemical oscillations. We finally consider multiple coexisting limit cycles, arising for example in the wind-induced galloping of bluff elastic bodies.

The Single Attractor

Asymptotically stable equilibrium states are not the only attractors that can arise in a two-dimensional dissipative phase space. A second type of attractor is the stable *limit cycle*, namely a steady closed oscillation that attracts all adjacent motions. To get a single stable limit cycle it is necessary to ensure that the origin (0, 0) is unstable so that trajectories of small amplitude move outward, while ensuring at the same time that trajectories of large amplitude move inward.

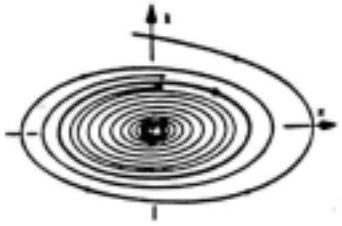

Fig. 10

We consider, then, the oscillator

$$m\ddot{x} - c\dot{x} + d\dot{x}^3 + kx = 0$$

and typical trajectories are shown in Fig. 10. For very small amplitudes we can linearize the above differential equation, by dropping the $d\dot{x}^3$ term, and we then have an unstable focus, the negative linear damping giving trajectories spiraling outward away from the central point *repellor*. For large amplitudes the nonlinear term dominates, ensuring that all motions of the system tend toward a stable steady-state oscillation, the heavily drawn limit cycle. This is the only attractor of this phase portrait, and the whole phase space is its domain of attraction.

Stability of a Limit Cycle

Three typical attracting limit cycles in a three-dimensional phase space are shown schematically in Fig. 11. To discuss the stability of such a cycle, it is simplest to consider the intersection of adjacent trajectories with a Poincaré section as shown, giving rise to a mapping A → B, etc. Linearizing the problem for small deviations from the central limit cycle, a stability discussion then hinges on an inspection of the Poincaré characteristic multipliers as indicated.

For the untwisted nodal cycle of the top diagram, the two characteristic multipliers are both real and positive corresponding to inward flows on the fast and slow insets.

For the spiral cycle, the adjacent trajectories approach the limit cycle in an oscillatory fashion, as shown. The characteristic multipliers are now complex as indicated in the (I, R) Argand diagram.

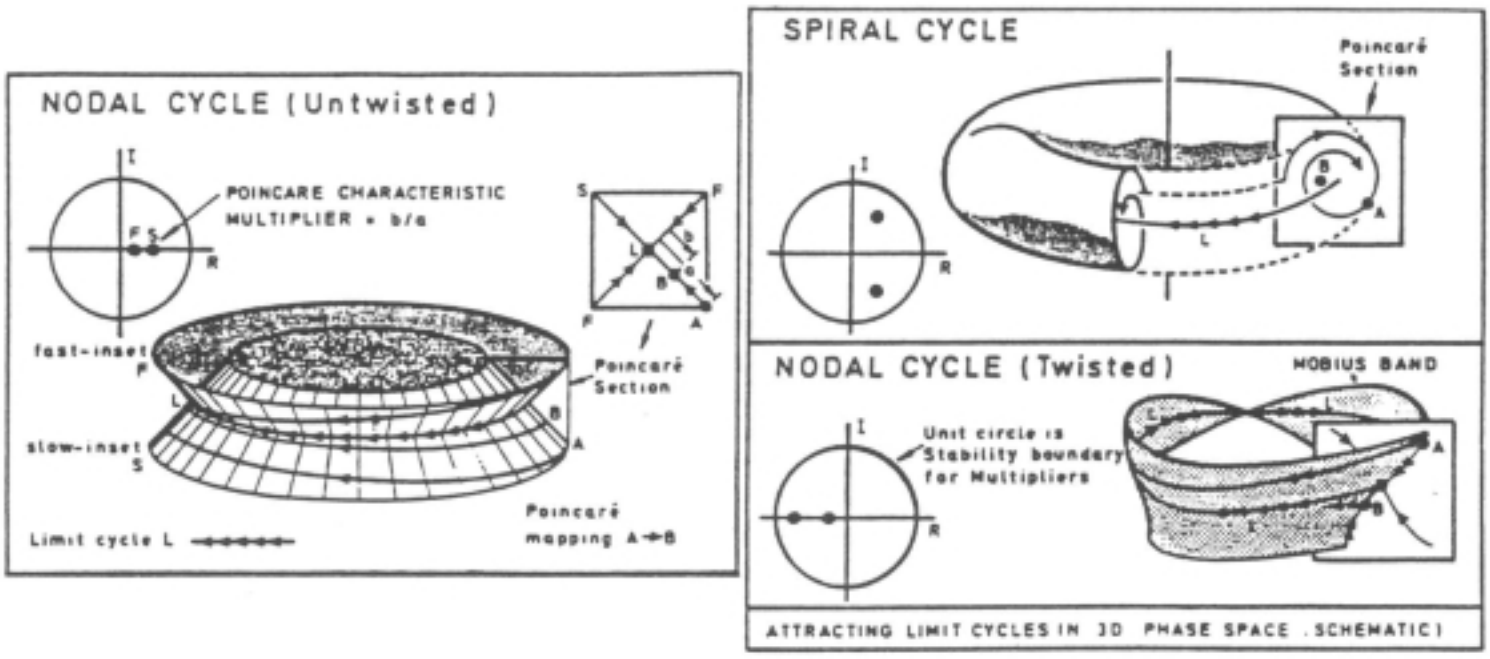

Fig. 11

A particularly interesting cycle is the twisted nodal one, corresponding to a pair of real but negative multipliers. The fast and slow insets are now Mobius bands as drawn, resulting in a mapping A → B that alternates across the central fixed point on successive returns.

In the Argand diagram, the stability boundary for the Poincaré characteristic multipliers is the unit circle, the transit of a root outward through this circle signalling the loss of stability of the central limit cycle.

Limit Cycle in a Neural System

We choose now to illustrate the dynamical behavior of a mathematical model of man's brain, as an example of a system exhibiting cyclic attractors. Here the relationships between the apparently simple activity of the individual neurons and the high levels of organization associated with thought and consciousness are only just beginning to be explored.

Dynamical equations of populations of excitatory and inhibitory neurons have been developed to model the neural tissue of the brain. For spatially localized populations, coupled

nonlinear differential equations are obtained, and have been studied using phase-plane methods and numerical analysis. *Folds* in the steady-state solutions are found to generate multiple hysteresis phenomena, while *limit cycles*, modelling brain rhythms, are observed in which the frequency of oscillation is found to be a monotonic function of a stimulus intensity.

The Brain and Central Nervous System

The brain can be highly idealized as a network of *neurons connected in a random manner by synapses*. When a neuron *fires*, the stimulus is transmitted through the *synaptic* connections to adjacent neurons, which may then be induced to fire after the synaptic *delay*.

The neuron population can be divided into *excitatory* neurons, which give out a positive stimulus when they fire, and *inhibitory* neurons, which give out a negative stimulus. A neuron will fire when the sum of the received stimuli exceeds a certain *threshold* value: and having once fired it remains inactive for a certain *refractory* period, even if it receives a stimulus above its threshold. Such a discrete *neural net* can be readily modelled on a digital computer, and waves of firing activity have been observed in computer simulations.

Mechanics of Excitation and Inhibition

The dynamical 'continuum' model illustrated here introduces as two fundamental variables E(t), the proportion of excitatory cells firing per unit time, and I(t), the proportion of inhibitory cells firing per unit time. We assume that E and I at time $(t + \tau)$ after a *delay* τ will be equal to the proportion of cells that are *sensitive* and also receive at least *threshold* excitation.

Non-sensitive cells are those that, having recently fired, cannot fire again for their *refractory* period. Thus, if the absolute refractory period is r, the proportion of sensitive excitatory cells can be approximated as

$$E_s = 1 - r_e E$$

with a similar expression for I_s. Notice that the refractory period for E is r_e, which might be different from r_i.

Now the expected proportions of the subpopulations receiving at least threshold excitation per unit time will be a mathematical *function* of E and I, which for the excitatory cells is

$$\mathcal{S}_e(x) = \mathcal{S}_e[c_e E - g_e I + P(t)]$$

and for the inhibitory cells is

$$\mathcal{S}_i(x) = \mathcal{S}_i[c_i E - g_i I + Q(t)]$$

Here the coefficients are constants representing the average number of synapses per cell, and P(t) and Q(t) are *external* excitations.

The *response functions* $\mathcal{S}(x)$ will depend on the probability distribution of neural thresholds. It is argued that they will have the *sigmoidal* shape of an integral sign, rising monotonically with x from zero and becoming asymptotic to a value equal to or near to unity as x tends to infinity. In the analytical work they are taken as (Wilson and Cowan, 1972)

$$\mathcal{S}(x) = \frac{1}{1 + \exp[-a(x - \theta)]} - \frac{1}{1 + \exp(a\theta)}$$

with different values of the constants a and θ for the two types of neurons.

Now if the probability of a cell being sensitive is independent of the probability that it is currently excited above its threshold, we can multiply our probabilities to get, with some time *coarse-graining* assumptions,

$$E(t + \tau_e) = (k_e - r_e E)\, \mathcal{S}_e[c_e E - g_e I + P(t)]$$

$$I(t + \tau_i) = (k_i - r_i I)\, \mathcal{S}_i[c_i E - g_i I + Q(t)]$$

Here k_e and k_i replace unity in our earlier expressions for E_s and I_s: they are in fact very close to unity, being defined as

$$k = \mathcal{S}(\infty)$$

They are part of a small adjustment to make E = I = 0 a stable *resting* state under zero external excitation.

If we now write the Taylor approximation

$$E(t + \tau_e) = E(t) + \frac{dE}{dt}\,\tau_e$$

and likewise for I, we have our final differential equations

$$\tau_e \frac{dE}{dt} = -E + (k_e - r_e E)\, \mathcal{S}_e[c_e E - g_e I + P(t)]$$

$$\tau_i \frac{dI}{dt} = -I + 9k_i - r_i I)\mathcal{S}_i[c_i E - g_i I + Q(t)]$$

It can be shown that this present model can exhibit a *damped* oscillatory response to *impulsive* external stimulation, as indeed could be demanded of a satisfactory model.

Moreover, with Q equal to zero and P equal to a certain constant value, the model can, with an appropriately chosen set of coefficients, exhibit a stable limit cycle as shown in the two-dimensional (E, I) phase space of Fig. 12. These limit cycles arising from a realistic neural model provide a concrete physiological base for the study of electroencephalogram (EEG) rhythms, such as the important alpha rhythms. Hermonal systems are part of this regulatory mechanism. The attractor/repellor system consists of chemical, electrical, magnetic, static, photonic, morphic resonant, other-dimensioanl and other systems. To reduce our observations to just chemical or hormonal is the clasic mistake of reductionism. Hormones are only part of a more complex system of biology.

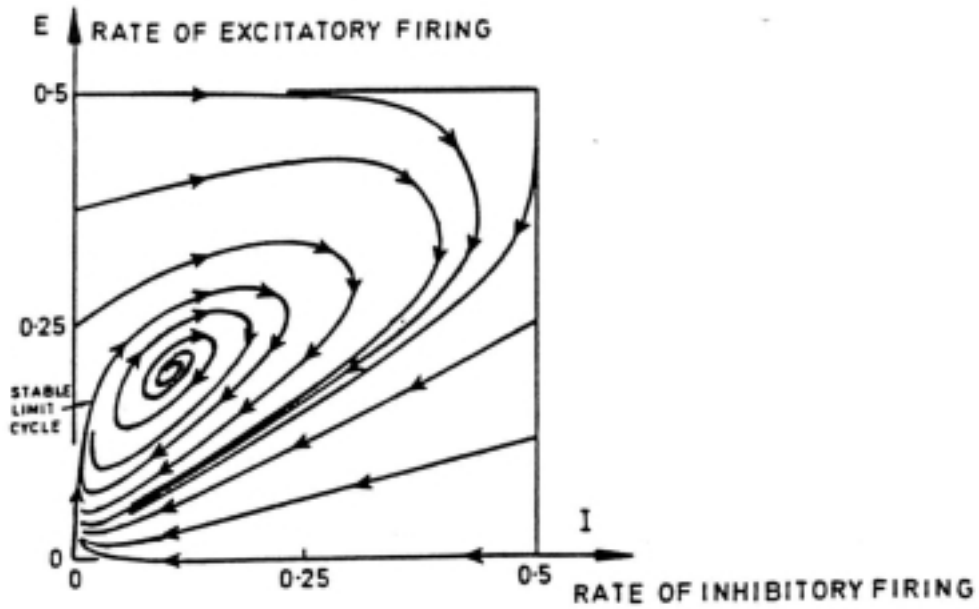

Fig. 12

Bifurcations of a Chemical Oscillator

It is well established that the kinetics of chemical reactions are governed by nonlinear differential equations. Reacting chemical systems are thus capable of exhibiting a wealth of both temporal and spatial bifurcation phenomena.

The Belousov-Zhabotinsky reaction, which involves the complex cerium-catalyzed bromination and oxidation of malonic acid by a sulphuric acid solution of bromate, is a well studied confirming this conclusion. With no spatial variations in a stirred flow reactor, it can exhibit complex oscillations and even chaotic phase motions.

Not surprisingly it can also undergo spatial evolutions. For example, a shaken homogeneous chemical mixture, if left in a shallow dish, can organize itself into spiral patterns. Because such a dish is essentially a closed system, this self-organization is here only temporary and eventually the system reverts to a homogeneous state: the chemical 'organism' dies! A permanently organized state can, however, be maintained if appropriate chemicals are fed continuously into and out of such a system.

The Brusselator Model Chemical Reaction

We shall focus our attention here on a trimolecular model system, the so-called *Brusselator*, which is one of the simplest to exhibit these phenomena. The *real* Belousov-Zhabotinsky reaction is by contrast an exceedingly complex reaction, which is even now not fully understood. This model considers the hypothetical reactions (Nicolis and Prigogoine, 1977)

$$A \rightarrow X$$

$$B + X \rightarrow Y + D$$

$$2X + Y \rightarrow 3X$$

$$X \rightarrow E$$

the trimolecular step being seen in the third reaction. Here A, B, D, and E are initial and final products, whose concentrations are imagined to be imposed as constants throughout. All reaction steps are here assumed to be irreversible with rate constants equal to unity.

Using the same letters to denote the *concentrations* of the chemicals, the rate of production of X in the first reaction is simply A, while the rate of loss of X in the second equation is the product BX. The net rate of production of X in the third trimolecular step is X^2Y, and finally the rate of loss of X in the fourth reaction is X.

Thus we can write

$$\dot{X} = A - (B + 1)X + X^2Y$$

and similarly

$$\dot{Y} = BX - X^2Y$$

These are the coupled nonlinear rate equations that must be solved for the time evolution of X and Y with A and B prescribed constants.

Setting the time derivatives equal to zero gives us the primary solution of the thermodynamic branch

$$X = A, \quad Y = B/A$$

and we write

$$X = A + x, \quad Y = (B/A) + y$$

where x and y are now changes in concentration from the primary values. The evolution equations are now

$$\dot{x} = x(B - 1) + y(A^2) + [x^2(B/A) + 2xyA + x^2y]$$

$$\dot{y} = x(-B) + y(-A^2) - [x^2(B/A) + 2xyA + x^2y]$$

and for a linear stability analysis we need retain only the terms in x and y and ignore higher-order terms in x^2, xy, and x^2y, given in square brackets. The linear equations can therefore be written in the standard form

$$\dot{x} = c_{11}x + c_{12}y$$

$$\dot{y} = c_{21}x + c_{22}y$$

where

$$c_{11} = B - 1, \quad c_{12} = A^2$$

$$c_{21} = -B, \quad c_{22} = -A^2$$

and the characteristic equation becomes

$$\lambda^2 - \lambda(c_{11} + c_{22}) + c_{11}c_{22} - c_{12}c_{21} = 0$$

where the required coefficients are

$$c_{11}c_{22} - c_{12}c_{21} = A^2$$

and

$$-(c_{11} + c_{22}) = 1 + A^2 - B$$

Since **A** is necessarily positive, we can never have a static instability at which the first coefficient would have to vanish, but we see that the vanishing of the second coefficient predicts a dynamic instability at

$$B^c = 1 + A^2$$

QUANTUM BIOPHYSICS

This is an excerpt from the PROMORPHEUS book that explains the functions of the Quantum Med

THE FUZZY ARITHMETIC OF UNCERTAINTY

"Fuzzy numbers" was developed as a way of dealing with the real world, where exact relationships do not often happen. In the field of fractal and chaos dynamics we found that certain biological processes, as well as other real processes, do not follow distinct, entropic or thermodynamic laws. Rather, through bifurcation points and period doubling, they have peculiar phenomena.

The field of fuzzy numbers has led to the development of superb video equipment that can focus in and more closely approximate the function of normal biological optics, which work on uncertainty, through receiving numbers and treating them as probabilities rather than exactitudes. Included in some of the initial work from over a decade ago on fuzzy numbers were the papers by Kaufmann, Tanaka, Mizumoto, Nahmias, Dubois and Prade. This allows for the autofocus functions. Machines like the Bicom, Mora, Rife and others use direct non autofocusing equipment. The Odds of picking up a camera and having it focus first time are extremely improbable. These non automatic devices are just as improbable and thus not only inaccurate but even possibly dangerous. The Quantum Med C.I. however uses a autofocusing technique that allows for precise energetic medicine therapy. By using the technology in this chapter we can perfect energetic medicinefor the future.

The basic concept of a fuzzy number is that it contains an integral as a special case. Fuzzy arithmetic subsumes integral arithmetic. The case in point is not merely that integral arithmetic is a special case of fuzzy arithmetic. We will develop the point that fuzzy arithmetic approximates more of a language that has a far greater expressive power than integral arithmetic. This is due to the gradation of membership in a fuzzy set. Thus a fuzzy number may be expressed in linguistic terms. Indeed, linguistics is itself a study of fuzzy arithmetic.

A fuzzy number can be an expression in linguistic terms, making it possible to compute with words rather than numbers. The fuzziness of a fuzzy number provides additional degrees of freedom for representing various types of uncertainty as nonuniform possibility distributions over the real line. One important property of fuzzy numbers is their closure under linear combinations. This allows for simplistic computation. If A and B are triangular numbers, a linear combination of them is triangular as well.

This property, which is similar to the closure property of Gaussian probability distributions makes it possible to characterize fuzzy numbers by a small number of parameters. This leads to the theory of the so-called L and R numbers developed by Dubois and Prade.

As we have developed in all our books, we must include uncertainty in our definitions of biology, as well as in our definitions of all physics. With the environment of the world becoming more uncertain, this will promote the use of an uncertainty relationship in our relationship, which can be utilized through fuzzy number dynamics.

In the past, the world must have seemed much simpler. Scientists attempted to reduce all complex phenomena to its simplest projections. This reductionism robbed us of safety in our biology and our medicine. Man's limited intellectual states caused him to view things in simplistic ways as he looked for push-pull, and ignored some of the uncertainty relationships or anything that didn't quite fit into his physics or cosmology. With present-day awareness, we are starting to realize that complex situations need complex analyses, and that uncertainty comes in. As Poincaré said, once we go past the two-body problem into a three-body problem, permutations have some strange implications.

In analysis of biology, with its million-body problem, we must develop different ways of analyzing. It is the point of this chapter to briefly summarize some of the fuzzy number formulas that can be utilized in transposing our biological matrices.

The reader may assume that this uncertainty leads into utter chaos; nothing could be further from the truth. The uncertainty of exactitude is what we are talking about. We will find that through this uncertainty there is an organization that expresses itself and allows for the development of a physics and a biology that are not utterly random chaos, but have a large degree of precision in their outcomes.

As Einstein pointed out, God does not play dice with the universe. God has some control over indeterminacy and its organization. We have outlined this in the *Quantum Biology section* as the *Nelson effect*. There seems to be some type of virtual photon or tunnelling effect of the photon in helping to control this indeterminacy. The simple fact is that in order for us to deal with any type of biological analysis, we must now enter into fuzzy arithmetic, and develop quantic analyses. This is the purpose of this book. Let us return to fuzzy numbers.

Excerpts of this chapter are taken from Kaufmann and Gupta's book, "Introduction to Fuzzy Arithmetic". In the book's preface, the question is asked: "How, with very few words, would you be able to summarize the subjective construction of a fuzzy number?" The answer given is: What is the smallest number given to this uncertain number? What is the highest? Further, if we were authorized to give one and only one value, what value should we give? Obviously, with these three values, different from each other, we can construct a triangular fuzzy number." We would look for the highest, the lowest, and some point in between. Later, if we wish, we may construct some refinements that are convenient or subjectively convenient to the fuzzy number. This is the development of a concept that allows us to understand the processes of biology, which are not under thermodynamic control, but quantic control. They need to be analyzed with quantum physics, and can be adapted to a fuzzy number set.

The system of biology has developed a torus in which there are maximum and minimum values for every subset. In the *Bio-Quantum Matrix* section many of these maximum and minimum values are outlined, and the torus (special attractor) is the ideal level of these values. Thus for whole blood potassium, the ideal level of whole blood potassium should be approximately 31 equivalents. Low numbers representing life-threatening values around 10. High numbers representing life-threatening values are around 55. The ideal value for serum levels of potassium is around 4.5. Low values are approximately 1, and high values are approximately 15. Thus we have generated three numbers for each of these situations, all reflecting the blood level of potassium.

With this type of fuzzy number, we can start to understand how the special attractor of the body tries to balance the potassium levels, both in whole blood and in serum. Our fuzzy arithmetic is an ideal dynamics for understanding this type of process, as it suits the situation of biology, which has a high and low number for everything, as well as an ideal. Also, biology develops in a quantic procedure, and must have uncertainty plotted into its dynamics.

SELECTED CLINICAL LABORATORY TESTS– REFERENCE VALUES

Reference Values for Blood (B), Plasma (P), and Serum (S)

Test	Normal Adult Range	
	Conventional Units	SI Units
Acetoacetate plus acetone (B)	Negative	
Aldolase (S)	1.0-8.0 u./L	16.6-135 nkat/L*
Aminotransferase (S)		
Alanine (ALT, SGPT)	5-30 u./L	83-500 nkat/L*
Aspartate (AST, SGOT)	5-25 u./L	83-415 nkat/L*
Ammonia (B)	11-35 µmol/L	11-35 µmol/L
Amylase (S)	60-160 u./dL	111-296 u./L
Ascorbic Acid (B)	0.4-1.5 mg/dL	23-85 µmol/L
Bilirubin (S)		
Direct (Conjugated)	0.1-0.4 mg/dL	1.7-6.8 µmol/L
Total	0.3-1.1 mg/dL	5.1-19.0 µmol/L
Blood volume	8.5-9.0% of body weight (kg)	80-85mL/kg
Calcium (S)		
Ionized	2.1-2.6 mEq/L 4.25-5.25 mg/dL	1.05-1.30 mmol/L
Total	4.6-5.5 mEq/L 9.2-11.0 mg/dL	2.3-2.75 mmol/L
Carbamazepine (P)	3.12 µg/mL	12.75-51.0 µmol/L
CO_2 content (S)	24-30 mEq/L	24-30 mmol/L
CO (B)	<5% of total Hb	
Carotenoids (S)	0.5-3.0 µg/mL	0.9-5.6 µmol/L
Ceruloplasmin (S)	27-37 mg/dL	1.8-2.5 µmol/L
Chloride (S)	96-106 mEq/L	96-106 mmol/L
Cholesterol (S)	120-220 mg/dL	3.1-5.68 mmol/L
CK (S)		
Female	10-70 u./L	166-1167 nkat/L*
Male	25-90 u./L	416-1500 nkat/L*
CK isoenzymes (S)	5% MB or less	
Copper (S)	70-155 µg/dL	11-24 µmol/L
Creatinine (S)	<1.5 mg/dL	<133 µmol/L
Digoxin (S)		
Therapeutic	0.8-2.0 ng/mL	1.0-2.6 nmol/L
Toxic	>2.5 ng/mL	>3.2 nmol/L
Ethanol (B)	Negative	
Glucose, fasting (P)	75-105 mg/dL	4.2-5.8 mmol/L
Iron (S)		
Total	50-150 µg/dL	9-27 µmol/L
Binding capacity	250-410 µg/dL	45-73 µmol/L
Lactate (B)		
Venous	4.5-20 mg/dL	0.5-2.2 mmol/L
Arterial	4.5-14.4 mg/dL	0.5-1.6 mmol/L
Lactic dehydrogenase (S)	50-115 u./L	833-1917 nkat/L*
Lead (B)	0-50 µg/dL	0-2.4 µmol/L
Lipase (S)	0-1.5 u. (Cherry-Crandall)	0.1.5 u. (Cherry-Crandall)
Lithium (S)		
Therapeutic	0.5-1.4 mEq/L	0.5-1.4 mmol/L
Toxic	2.0 mEq/L	> 2.0 mmol/L

QUANTUM BIOPHYSICS

Reference Values for Blood (B), Plasma (P), and Serum (S)		
Test	Normal Adult Range	
	Conventional Units	SI Units

Magnesium (S)	1.3-2.1 mEq/L 1.8-3.0 mg/dL	0.7-1.1 mmol/L
5'-Nucleotidase (S)	1-12 u./L	16.6-200 nkat/L*
Osmolality (S)	280-295 mOsm/kg serum water	280-295 mmol/kg serum water
Oxygen saturation (B)		
Arterial	96-100%	0.96-1.00
Pco_2 (B)	35-45 mm Hg	4.7-6.0 kPa
pH (B)	7.35-7.45	7.35-7.45
Po_2 (B)	75-100 mm Hg	10.0-13.3 kPa
Phenobarbital (S)		
Therapeutic	15-50 µg/mL	65-215 µmol/L
Toxic	> 50 µg/mL	> 215 µmol/L
Phenytoin (S)		
Therapeutic	5-20 µg/mL	20-79 µmol/L
Toxic	> 20 µg/mL	> 79 µmol/L
Phosphatase, acid (S)	0.2-1.8 IU/L	3.3-30 nkat/L
Phosphatase, alkaline (S)	23-71 IU/L	383-1185 nkat/L
Phosphorus, inorganic (S)	3-4.5 mg/dL 1-1.5 mEq/L	1.0-1.5 mmol/L
Potassium (S)	3.5-5.0 mEq/L	3.5-5.0 mmol/L
Primidone (S)		
Therapeutic	5-12 µg/mL	23-55 µmol/L
Toxic	> 15 µg/mL	> 69 µmol/L
Procainamide (S)		
Therapeutic	4-10 µg/mL	17-42 µmol/L
Toxic	> 16 µg/mL	> 68 µmol/L
Protein (S)		
Total	6.0-8.0 gm/dL	60-80 gm/L
Albumin	3.5-5.5 gm/dL	35-55 gm/L
Globulin	2.0-3.5 gm/dL	20-35 gm/L
Electrophoresis		
Globulin	0.1-0.4 gm/dL	1-4 gm/L
α_1	0.4-1.1 gm/dL	4-11 gm/L
α_2	0.5-1.6 gm/dL	5-16 gm/L
ß	0.5-1.4 gm/dL	5-14 gm/L
γ		
Pyruvic acid (B)	0.3-0.9 mg/dL	0.03-0.10 mmol/L
Quinidine (S)		
Therapeutic	1.2-4.0 µg/mL	3.7-12.3 µmol/L
Toxic	> 10 µg/mL	> 30 µmol/L
Salicylate (P)		
Analgesic	20-100 µg/mL	145-724 µmol/L
Anti-inflammatory	150-300 µg/mL	1086-2172 µmol/L
Toxic	> 300 µg/mL	> 2172 µmol/L
Sodium (S)	135-145 mEq/L	135-145 mmol/L
Sulfate (S)	2.9-3.5 mg/dL	0.3-0.36 µmol/L
Triglycerides (S)	35-160 mg/dL	0.40-1.81 mmol/L
Urea nitrogen (S)	8-23 mg/dL	2.9-8.2 mmol/L
Uric acid (S)	3-7 mg/dL	0.18-0.42 mmol/L
Vitamin A (S)	20-60 µg/dL	0.7-2.1 µmol/L
Vitamin D derivatives (S)		
1.25 dihydroxy	20-45 pg/mL	48-108 pmol/L
25-hydroxy	25-40 ng/mL	62.5-100 nmol/L

SELECTED CLINICAL LABORATORY TESTS– REFERENCE VALUES (Cont'd)

Reference Values for Blood (B), Plasma (P), and Serum (S)

Test	Normal Adult Range	
	Conventional Units	SI Units
Acetone plus acetoacetate	Negative	
Amylase	1-17 u./h	1-17 u./h
Calcium	< 300 mg/day	< 7.5 mmol/day
Catecholamines		
Epinephrine	< 10 µg/day	< 55 nmol/day
Norepinephrine	< 100 µg/day	< 590 nmol/day
Chorionic gonadotropin	Negative	
Copper	0-50 µg/day	0-0.8 µmol/day
Coproporphyrin	30-250 µg/day	46-380 nmol/day
Creatine		
Females	< 100 mg/day	< 0.76 mmol/day
Males	< 40 mg/day	< 0.30 mmol/day
Creatinine	14-26 mg/kg/day	0.12-0.23 mmol/kg/day
Cystine or cysteine	Negative	
Hemoglobin and myoglobin	Negative	
17-Hydroxycorticosteroids	2-9 mg/day	5.5-25 µmol/day
5-Hydroxyindoleacetic acid	2-9 mg/day	10-47 µmol/day
17-Ketosteroids	4-18 mg/day	14-62 µmol/day
	< 0.08 µg/mL or	
Lead	< 120 µg/day	< 0.39 µmol/L
Phosphorus, inorganic	0.4-1.3 gm/day	13-42 mmol/day
Porphobilinogen	negative	
Protein	< 150 mg/day	< 150 mg/day
Sugar, quantitative glucose	Negative	
	0.1-0.8 EU/2h	0.1-0.8 EU/2h
Urobilinogen	0.5-4.0 EU/day	0.5-4.0 EU/day
Uroporphyrin	< 50 µg/day	< 60 nmol/day
Vanillylmandelic acid (VMA)	1-9 mg/day	5-45 µmol/day

DEFINITIONS AND MAIN PROPERTIES OF FUZZY NUMBERS

INTRODUCTION

The concept of uncertain or fuzzy numbers may be presented in many ways. In this book we consider a fuzzy number to be an extension of the concept of the interval of confidence, which is familiar to anyone who has computed using imprecise data in simple or complex systems. This extension is based on a natural and very simple idea. Instead of considering the interval of confidence at one unique level, it is considered at several levels and more generally at all levels from 0 to 1. We consider the maximum of presumption to be at level 1 and the minimum of presumption to be at level 0. The level of presumption 0 gives a restrictive hypothesis. Similarly, the level of presumption α, $\alpha \in [0, 1]$ gives an interval of confidence $A_\alpha = [a_1(^\alpha), a_2(^\alpha)]$, which is a monotonic decreasing function of α; that is,

$$(\alpha' > \alpha) \rightarrow (A_{\alpha'} \subset A_\alpha),$$

or

$$(\alpha' > \alpha) \rightarrow ([a_1(\alpha'), a_2(\alpha')] \subset [a_1(\alpha), a_2(\alpha)],$$

for every $\alpha, \alpha' \in [0, 1]$.

The expressions level of presumption or presumption level are well suited to the concept of fuzzy numbers. We must remember, however, not to confuse fuzzy numbers with random numbers (more usually called random variables). Uncertainty and randomness are two very different and important concepts. They can be used together, but should not be confused. This is the difference between entropy and neg-entropy. God does not play dice with the universe.

INTERVAL OF CONFIDENCE

Consider a situation in which the value is uncertain. Suppose that the information available is such that we can accept that the uncertain value belongs to the referential set R (a set of real numbers). In many situations encountered by scientists it is possible to locate the value inside a closed interval of R; that is, an *interval of confidence* of R: $[a_1, a_2]$. We are thus certain that the value is greater than or equal to a_1 and smaller than or equal to a_2. This kind of statement often occurs in science and engineering. Now we need to add it to biology. In this case we use the symbol

$$A = [a_1, a_2].$$

Generally the numbers a_1 and a_2 are finite, but in some cases it is useful, or even necessary, to consider that $a_1 = -\infty$ and/or $a_2 = \infty$. In other cases, instead of considering a closed interval, we consider open intervals by using the notation

$]a_1, a_2]$ or $(a_1, a_2]$:	open at the left,
$[a_1, a_2[$ or $[a_1, a_2)$:	open at the right,
$]a_1, a_2[$ or (a_1, a_2):	open at the left and at the right; that is, open.

Note, however, that it is preferable to use brackets to indicate an open interval rather than using parentheses. Note also that the symbol $x \in [a_1, a_2]$ denotes the fact that x is an uncertain value.

Next we discuss several options for affecting the interval of confidence.

Addition

Assume two intervals of confidence in R:

1) $$A = [a_1, a_2]$$

and

2) $$B = [b_1, b_2].$$

Hence, if

3) $$x \in [a_1, a_2]$$

and

4) $$y \in [b_1, b_2],$$

then

5) $$x + y \in [a_1 + b_1, a_2 + b_2].$$

Symbolically, we write

6) $$A\ (+)\ B = [a_1, a_2]\ (+)\ [b_1, b_2] = [a_1 + b_1, a_2 + b_2].$$

Thus biological systems can have additive results, and compatible systems can positively affect their sum.

The proof of this is trivial, because if $x \geq a_1$ and $y \geq b_1$, $(x + y) \geq (a_1 + b_1)$, and because $x \leq a_2$ and $y \leq b_2$, then $(x + y) \leq (a_2 + b_2)$.

Subtraction

If $x \in [a_1, a_2]$ and $y \in [b_1, b_2]$, then $(x - y) \in [a_1 - b_2, a_2 - b_1]$. In fact, we must subtract the largest value in $[b_1, b_2]$ from a_1 and the smallest in $[b_1, b_2]$ from a_2. Again, we can write this symbolically as follows:

$$a\ (-)\ b = [a_1, a_2]\ (-)\ [b_1, b_2] = [a_1 - b_2, a_2 - b_1]$$

Reduction to a Certain Number

If a certain number is a singleton in R, we write $L = [\ell, \ell]$, or, using the relation between the singleton and its unique element, $\ell = [\ell, \ell]$. We may then write

7) $$0 = [0, 0]$$

and

8) $$1 = [1, 1].$$

To add an ordinary positive number to an interval of confidence we must move the interval to the right, and to subtract we must move it to the left by adding the corresponding negative number.

Image

If $x \in [a_1, a_2]$, then $-x \in [-a_2, -a_1]$. Hence, if A is an interval of confidence, its image is defined as

$$A^{\cdot} = [-a_2, -a_1],$$

and, note that

9) $$A\ (+)\ A^{\cdot} = [a_1, a_2]\ (+)\ [-a_2, -a_1] = [a_1 - a_2, a_2 - a_1] \neq 0.$$

Properties and Structure

Using equations 1 through 6 and 9, the following properties can be proved:

$\forall A, B, C \subset R$:

10) $$A\ (+)\ B = B\ (+)\ A, \quad \text{(commutative)},$$

11) $$A (+) (B (+) C) = (A (+) B) (+) C, \quad \text{(associative)},$$

If a neutral, a number 0, exits at the left and another neutral at the right to equation 7, then

12) $$A (+) 0 = 0 (+) A = A.$$

The image, however, is not symmetric in the sense of the set theory; that is,

13) $$A (+) A^{-} = A^{-} (+) A \neq 0$$

(see equation 9). This property shows that the set of the interval of confidence in R has a nonoidal structure (semi-group) for addition, but does not have a group structure. This monoid is commutative.

Subtraction is not, however, monoidal or associative, which may be proved easily.

EXAMPLE 1

Consider the following numerical example:

A = [3.52, 5.83], B = [-2.24, 6.04], and C = [-4, -1.17]. Then

$$A (+) B = [3.52, 5.83] (+) [-2.24, 6.04]$$

$$= [3.52 - 2.24, 5.83 + 6.04]$$

$$= [1.28, 11.87].$$

$$A (-) B = [3.52, 5.83] (-) [-2.24, 6.04]$$

$$= [3.52 - 6.04, 5.83 + 2.24]$$

$$= [-2.52, 8.07].$$

$$(A (+) B) - C = ([3.52, 5.83] (+) [-2.24, 6.04]) (-) [-4, -1.17]$$

$$= [1.28, 11.87] (-) [-4, -1.17]$$

$$= [1.28 + 1.17, 11.87 + 4]$$

$$= [2.45, 15.87].$$

$$A^{-} = [-5.83, -3.52].$$

$$A (+) A^{-} = [3.52, 5.83] (+) [-5.83, -3.52]$$

$$= [-2.31, 2.31].$$

Multiplication

If the intervals of confidence belong to R^*, and if $x \in [a_1, a_2]$ and $y \in [b_1, b_2]$, then $x \cdot y \in [a_1 \cdot b_1, a_2 \cdot b_2]$. We can therefore write

14)
$$A (\cdot) B = [a_1, a_2] (\cdot [b_1, b_2] = [a_1 \cdot b_1, a_2 \cdot b_2].$$

When A and B belong to R instead of R^*, the result is more complicated because a_1, a_2, b_1, and b_2 can be negative, and nine combinations are therefore possible.

Division

Division is defined here only in R^*:

$$A (:) B = [a_1, a_2] (:) [b_1, b_2] = [a_1/b_2, a_2/b_1].$$

If $b_1 = 0$, the upper bound increases to $+\infty$. If $b_1 = b_2 = 0$, the interval of confidence is extended to $+\infty$.

Inverse

If $x \in [a_1, a_2] \subset R^*_0$, then $1/x \in [1/a_2, 1/a_1]$, and

$$A^{-1} = [a_1, a_2]^{-1} = [1/a_2, 1/a_1].$$

Properties and Structure

$\forall A, B \subset R^*$:

$$A (\cdot) B = B (\cdot) A \qquad \text{(commutative)}$$

This property is obvious from equation 14. Associativity must be proved, however, since it is not as obvious.

$\forall A, B, C \subset R^*$:

$$(A (\cdot) B) (\cdot) C = A (\cdot) (B (\cdot) C).$$

Indeed.

$$([a_1, a_2] (\cdot) [b_1, b_2]) (\cdot) [c_1, c_2] = [a_1 \cdot b_1, a_2 \cdot b_2] (\cdot) [c_1, c_2] = [a_1 \cdot b_1 \cdot c_1, a_2 \cdot b_2 \cdot c_2]$$

Also,

$$[a_1, a_2] (\cdot) ([b_1, b_2] (\cdot) [c_1, c_2]) = [a_1, a_2] (\cdot) [b_1 \cdot c_1, b_2 \cdot c_2]$$

$$= [a_1 \cdot b_1 \cdot c_1, a_2 \cdot b_2 \cdot c_2].$$

Therefore,

$$([a_1, a_2] (\cdot) [b_1, b_2] (\cdot) [c_1, c_2] = [a_1, a_2] (\cdot) [b_1, b_2] (\cdot) [c_1, c_2]).$$

If a neutral exists at the left and a second neutral exists at the right for multiplication, this number is 1. (equation 8), that is,

$$A (\cdot) 1 = 1 (\cdot) A = A.$$

The inverse is not symmetric in the sense of set theory; that is,

$$A (\cdot) A^{-1} = [a_1, a_2] (\cdot) [1/a_2, 1/a_1]$$
$$= [a_1/a_2, a_2/a_1] \neq 1.$$

The set of the interval of confidence in R^+ has, therefore, a monoidal structure (semi-group) for multiplication but not group structure. This monoid is commutative.

EXAMPLE 2

Look at the following numerical example:
A = [2.62, 3.55], B = [0.77, 4.50], and C = [3.11, 4.86]. Then

$$\begin{aligned}
A (\cdot) B &= [2.62, 3.55] (\cdot) [0.77, 4.50] \\
&= [2.0174, 15.9750]. \\
A (\cdot) B (\cdot) C &= [2.0174, 15.9750] (\cdot) [3.11, 4.86] \\
&= [6.274114, 638500]. \\
A (:) B &= [2.62, 3.55] (:) [0.77, 4.50] \\
&= [2.62/4.50, 3.55/0.77] \\
&= [0.58222, 4.61038]. \\
A^{-1} &= [1/3.55, 1/2.62] = [0.28169, 0.38167].
\end{aligned}$$

Multiplication by a Nonnegative Number

Suppose that $k \in R^*$. We may then write

$$k = [k, k]$$

and then

$\forall A \in R^*$:

$$k \cdot A = k \cdot [a_1, a_2]$$
$$= [k, k] (\cdot) [a_1, a_2]$$
$$= [ka_1, ka_2].$$

Division by $k > 0$ is equivalent to multiplication by $1/k$.

Intervals of Confidence in Z (Integers)

We recall that

15) $$Z = \{..., -3, -2, -1, 0, 1, 2, 3,...\},$$

and

16) $$N = \{0, 1, 2, 3,...\}.$$

Although we are actually misusing one of our definitions, we employ the term *interval of confidence* for A when a_1 and a_2 belong to Z and are the lower and upper bounds of a sequence of integers ranging from a_1 to a_2. For instance,

17) $$A = [-3, 2] = \{-3, -2, -1, 0, 1, 2\}.$$

As far as the addition of two intervals of confidence in Z is concerned, by definition, if $x \in [a_1, a_2]$ and $y \in [b_1, b_2]$, then $(x + y) \in [a_1 + b_1, a_2 + b_2]$. It is easy to check that this structure is still a commutative monoid in Z. We note that the opposite does not exist in N.

For the operation of multiplication we consider at this point only the referential N, for which we have a commutative monoid. By definition, if $x \in [a_1, a_2]$ and $y \in [b_1, b_2]$, then $x \cdot y \in [a_1 \cdot b_1, a_2 \cdot b_2]$, where

$$[a_1 \cdot b_1, a_2 \cdot b_2] = \{a_1 \cdot b_1, a_1 \cdot b_1 + 1, a_1 \cdot b_1 + 2,..., a_2 \cdot b_2 - 2, a_2 \cdot b_2 - 1, a_2 \cdot b_2\}$$

The inverse is not defined for multiplication in N because we would have to pass from N to R^*.

The multiplication of an interval of confidence in N by a number $k \in N$ does not cause any problems since

18) $$k = [k, k].$$

If $k \in Z$, $k < 0$, we use Z instead of N.

Except for trivial cases, the process of dividing an interval of confidence belonging to Z by another leads to a subset of R.

EXAMPLE 3

Consider the following numerical example:

$$\begin{aligned} A &= [-3, 2] = \{-3, -2, -1, 0, 1, 2\}, \\ B &= [1, 4] = \{1, 2, 3, 4,\}. \\ A\ (+)\ B &= [-3, 2]\ (+)\ [1, 4] \\ &= [-2, 6] = \{-2, -1, 0, 1, 2, 3, 4, 5, 6\}. \\ C &= [3, 5]. \\ B\ (\cdot)\ C &= [1, 4]\ (\cdot)\ [3, 5] \end{aligned}$$

$= [3, 20] = \{3, 4, 5, \ldots, 18, 19, 20\}.$

$3 = [3, 3],$

$3 (\cdot) B = [3, 3] (\cdot) [1, 4]$

$= [3, 12] = \{3, 4, 5, \ldots, 10, 11, 12\}.$

Let us now discuss the maximum and minimum of two intervals of confidence. We consider only R, but our conclusions also apply to Z.

Let us recall the meaning of the symbols $\wedge$ and $\vee$. Consider two numbers in R, such that, by definition,

$$a \wedge b = \text{Min}(a, b) = a, \text{ if } a \leq b,$$
$$= b, \text{ if } b \leq a.$$
$$a \vee b = \text{Max}(a, b) = b, \text{ if } a \leq b.$$
$$= a, \text{ if } b \leq a.$$

Now let us consider two intervals of confidence in R. $A = [a_1, a_2]$ and $B = [b_1, b_2]$. We introduce two operators $(\wedge)$ and $(\vee)$ as follows:

$$A (\wedge) B = [a_1, a_2] (\wedge) [b_1, b_2]$$
$$= [a_1 \wedge b_1, a_2 \wedge b_2].$$
$$A (\vee) B = [a_1, a_2] (\vee) [b_1, b_2]$$
$$= [a_1 \vee b_1, a_2 \vee b_2].$$

Misusing the term (because intervals of confidence are not totally ordered but only partially ordered), we call the operation $(\wedge)$ the *minimum* of A and B and the operation $(\vee)$ the *maximum* of A and B. We note that $(\wedge)$ and $(\vee)$ satisfy the commutative and associative properties, but a finite neutral does not exist.

EXAMPLE 4

$A = [-3, 5], b = [2, 6], c = [-4, 7].$

$A (\wedge) B = [-3, 5] (\wedge) [2, 6]$

$= [-3 \wedge 2, 5 \wedge 6] = [-3, 5].$

$A (\vee) B = [-3, 5] (\vee) [2,6]$

$= [-3 \vee 2, 5 \vee 6] = [2, 6].$

$A (\wedge) C = [-3, 5] (\wedge) [-4, 7]$

$= [-3 \wedge -4, 5 \wedge 7] = [-4, 5].$

$A (\vee) C = [-3, 5] (\vee) [-4, 7]$

$= [-3 \vee -4, 5 \vee 7] = [-3, 7].$

$B (\wedge) C = [2, 6] (\wedge) [-4, 7]$

$= [2 \wedge -4, 6 \wedge 7] = [-4, 6].$

$B (\vee) C = [2 \vee) [-4, 7]$

$= [2 \vee -4, 6 \vee 7] = [2, 7].$

Since the theory of the intervals of confidence has many interesting applications, we next consider a generalization of it.

UNCERTAIN NUMBERS OR FUZZY NUMBERS

Interval of confidence is one way of reducing the uncertainty of using lower and upper boundarys. It is a practical and logical process for treating uncertainty with whatever information is available. This information

can be objective (we are certain that the dimension has a position between the two measured data), or subjective (the information is obtained from experience or from the opinion of the experts).

Let us relate the concept of the interval of confidence to another called the *level of presumption*. Let us assume, for example, that a certain job is to be completed between two dates, say May 5 and May 31. This is an interval of confidence. On the other hand, let us assume that this same job is to be completed on May 25, a possible date. The interval of confidence in the first case is [May 15, May 31] while in the second case it is [May 25, May 25]. If we wish, we may assign two levels of confidence to these two situations, 0 for [May 5, May 31] and 1 for May 25, May 25]. These two levels of confidence are in fact levels of presumption, and we can represent them by [0, 1]. Of course, there is no reason why we should limit ourselves to only the two values 0 and 1. We could have selected a much larger set of values such as

$\forall \alpha_1, \alpha_2 \in [0, 1]$:

$$(\alpha_1 < \alpha_2) \Leftrightarrow ([a_1(\alpha_2), a_2(\alpha_2)] \subset [a_1(\alpha_1), a_2(\alpha_1)]).$$

This means that if α increases, the interval of confidence never increases. Such a situation is shown in Fig. 1.

Two concepts have been associated in this discussion, the interval of confidence and the level of presumption. The coupling between the level α of presumption and the interval of confidence at level α will be a way defining the concept of an *uncertain number* or a *fuzzy number*. This association corresponds to the natural, often implicit, mechanism of human thinking in the subjective estimation of a value for a dimension, and can also be representative of unconscious thought, as well.

The curve that represents the modification of the interval of confidence from 0 to 1 can be one of two types. It may be a smooth curve as shown in Fig. 1 or it may have a deflection in its slope, resulting in a flat region as is shown in Fig. 2.

The concept of an uncertain number or a fuzzy number can be defined in R or Z, R* or N, in every referential set that is totally ordered (linearly ordered). In this book we study the theory of such numbers. Many of their properties are novel and have interesting applications.

For biology and medicine, the Academy software analyses blood, urine, diet, bio-electrical parameters, medical history, and other inputs in a trinary or indeterminate (fuzzy number set) collection of numbers. This calculation then can be affected by the trained practitioners whose results can have profound medical implications.

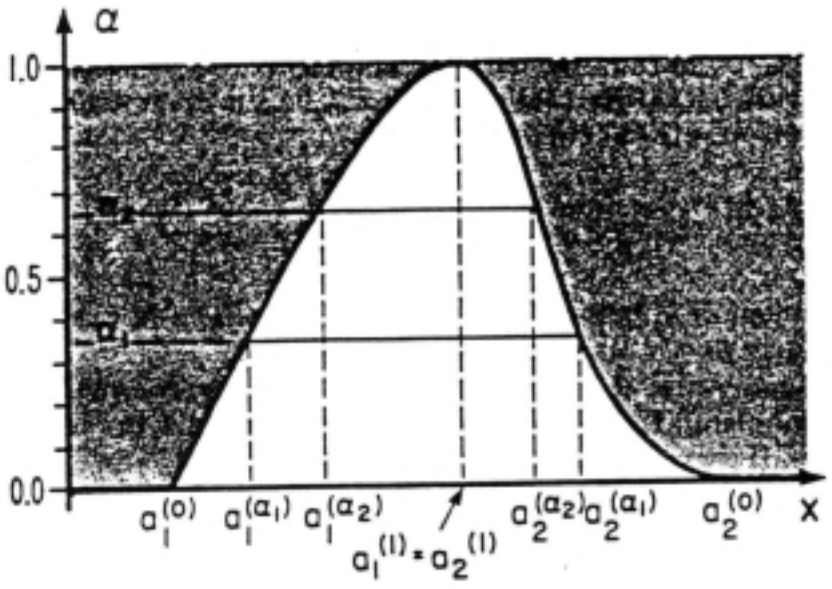

Fig. 1 Definition of fuzzy numbers

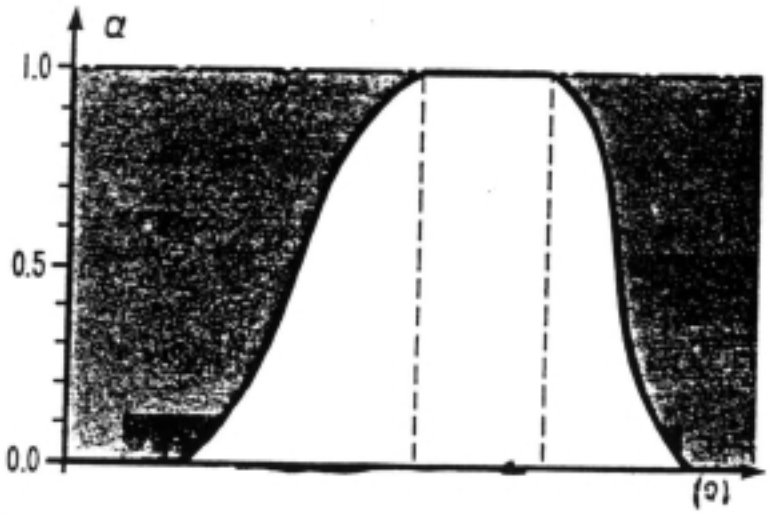

Fig. 2 Fuzzy number with a flat region

The word *fuzzy* was first introduced by Zadeh in his landmark paper "Fuzzy Sets". He used this word to generalize the mathematical concept of set to one of *fuzzy set* or *fuzzy subset*, where in a fuzzy set, a *membership function* is defined for each element of the referential set. (In Boolean algebra this concept is usually called the *characteristic function*). The membership function takes its values in the interval $[0,1] \subset R^+$ instead of [0,1] as in Boolean algebra. Since the appearance of Zadeh's paper, more than 4,000 papers and books have appeared on the theory of this topic and its applications. The field is growing exponentially. More recently, additional important works on the concept of fuzzy numbers have been written by Nahmias in the United States, by Dubois and Prade in France, and by several other authors.

Now Nelson offers a practical bio-medicine concept on this theme. We now present a concept of a fuzzy number as presented using the couple: level of presumption and interval of confidence. This is not, however, the classical way of introducing a fuzzy number, and we will introduce this concept from the viewpoint of fuzzy set theory. With this in mind, let us first explain how to distinguish the concept of fuzzy number from the concept of fuzzy set.

Let E be a referential set (for example, R or Z0. An ordinary subset, A, of this referential set is defined by its characteristic function.

$\forall x \in E$:

$$\mu_A(x) \in \{0,1\},$$

which shows that an element of E belongs to or does not belong to A according to the value of the characteristic function (1 or 0.

For the same referential set E a fuzzy subset A will be defined by its characteristic function, called the membership function, which takes its values in the interval [0, 1] instead of in the binary set {0, 1}.

$\forall x \subset E$:

$$\mu_A(x) \in [0, 1],$$

that is, that the elements of E belong to **A** with a level located in [0, 1]. This extension from ordinary subsets to fuzzy subsets is specified by the use of a boldface letter.

Fig. 3 shows an ordinary subset in R, and Fig. 4 shows a fuzzy subset in R.

We recall the two properties previously discussed so that we may define the concept of uncertain numbers or fuzzy numbers from the concept of fuzzy subset. These properties are the convexity and the normality of a fuzzy subset.

A fuzzy subset $\mathbf{A} \subset R$ is convex if and only if every ordinary

$$A_\alpha = \{x | \mu_A(x) \geq \alpha\}, \qquad \alpha \in [0, 1],$$

subset is convex; that is, if it is a closed interval of R. Fig. 5 shows a convex fuzzy subset.

Another definition that we may use is

$\forall x^{(1)}, x^{(2)} \in R$:

$$\mu_A[\lambda x^{(1)} + (1 - \lambda)x^{(2)}] \geq \mu_A(x^{(1)}) \wedge \mu_A(x^{(2)}),$$

$\forall \lambda \in [0, 1]$.

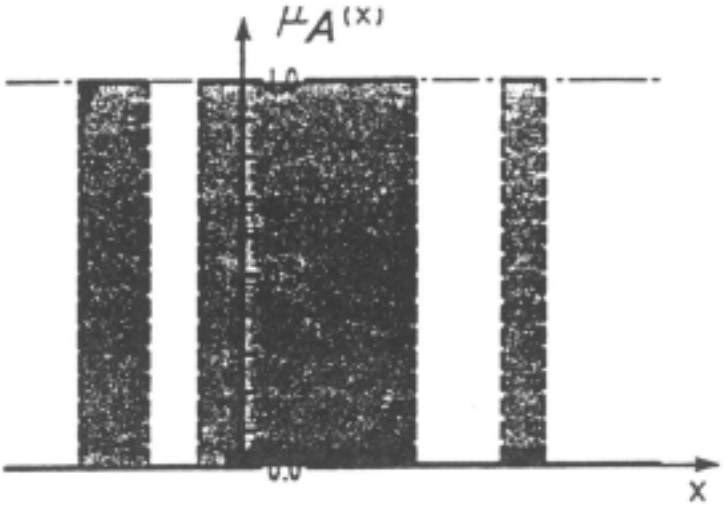

Fig. 3 An ordinary subset in R

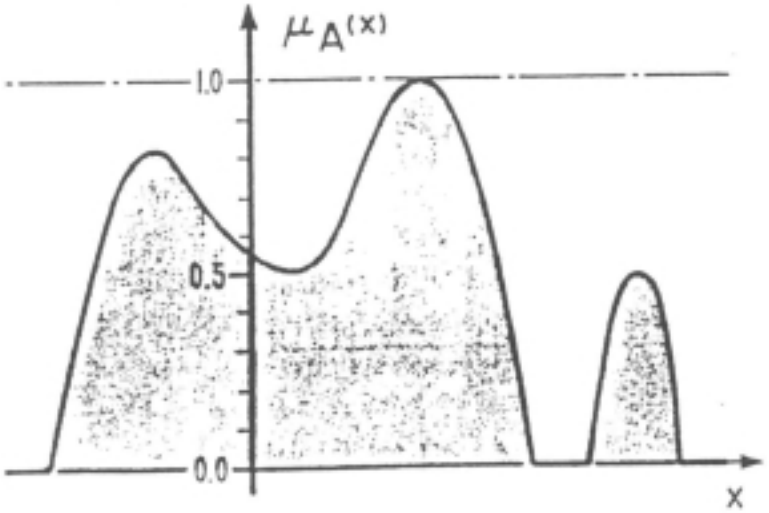

Fig. 4 A fuzzy subset in R

We now define normality. A fuzzy subset $A \subset R$ is normal if and only if $\forall x \in R$:

$$\bigvee_{n} \mu_A(x) = 1.$$

This means that the highest value of $\mu_A(x)$ is equal to 1. This maximum may or may not be unique. Fig. 5 shows a nonormal fuzzy subset, and Fig. 6 shows a normal fuzzy subset.

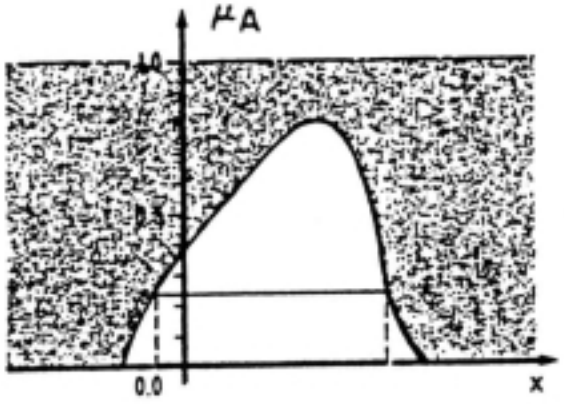

Fig. 5 A convex fuzzy subset (nonnormal)

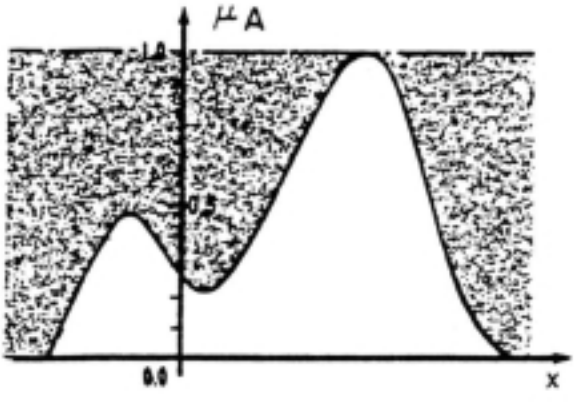

Fig. 6 A fuzzy subset (normal)

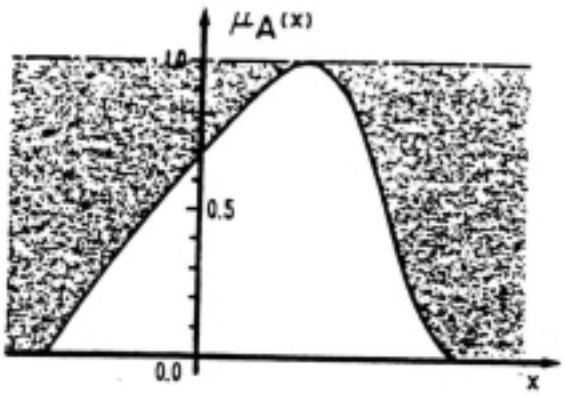

Fig. 7 A convex and normal fuzzy set

Fig. 7 A convex and normal fuzzy set

We are now able to give a definition for uncertain or fuzzy numbers. A fuzzy number in R is a fuzzy subset of R that is convex and normal; this is shown in Fig. 7. Thus a fuzzy number can be considered a generalization of the interval of confidence. It is not, however, a random variable. A random variable is defined in terms of the theory of probability, which has evolved from theory of measurement. A random variable is an objective datum, whereas a fuzzy number is a subjective datum. It is a valuation, not a measure. However, we describe an association between random variables and fuzzy numbers that may be very useful for many practical problems.

ADDITION OF FUZZY NUMBERS

In section (1.2) we showed how to add two intervals of confidence. The addition of fuzzy numbers follows the same process, but level by level. For example, let **A** and **B** be two fuzzy numbers and A_α and B_α their intervals of confidence for the level of presumption α, $\alpha \in [0, 1]$. We can then write

19) $$A_\alpha (+) B_\alpha = [a_1(\alpha), a_2(\alpha)] (+) [b_1(\alpha), b_2(\alpha)] = [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)].$$

If **A**, **B** $\subset$ R, then for the intervals of confidence at the level α, we may define the following ordinary subsets A_α and B_α:

20) $$A_\alpha = \{x \mid \mu_A(x) \geq \alpha\},$$
21) $$B_\alpha = \{x \mid \mu_B(x) \geq \alpha\}.$$

Let us now consider another method for the addition of fuzzy numbers. Let

A, **B** $\subset$ R, $\quad \forall x, y, z \in R$:

22) $$\mu_{A(+)B}(z) = \bigvee_{z = x + y} (\mu_A(x) \wedge \mu_B(y)).$$

We will now prove that equations 19 and 22 describe the same operation. From equations 20 and 21 we can write, by nesting, that

23) $$A = \bigcup_{\alpha} \alpha \cdot A_\alpha = \bigcup_{\alpha} \alpha \cdot [a_1(\alpha), a_2(\alpha)].$$

24) $$B = \bigcup_{\alpha} \alpha \cdot B_\alpha = \bigcup_{\alpha} \alpha \cdot [b_1(\alpha), b_2(\alpha)].$$

It is easy to prove that equations 19 and 22 are as valid for numbers in Z as in N, as has been described in equations 15 - 18. Two examples will clarify this situation.

25) $$\begin{aligned} \mu_A(x) &= 1, \quad \text{if } x \in [a_1(\alpha), a_2(\alpha)], \\ &= 0, \quad \text{if } x \notin [a_1(\alpha), a_2(\alpha)], \\ \mu_B(x) &= 1, \quad \text{if } x \in [b_1(\alpha), b_2(\alpha)] \\ &= 0, \quad \text{if } x \notin [b_1(\alpha), b_2(\alpha)]. \end{aligned}$$

Note that we have used symbolic writing in equations 23, 24 and 25. We can also write that

$$\begin{aligned} \mu_A (+)_B(z) &= 1 \quad \text{if } z \in [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)], \\ &= 0 \quad \text{if } z \notin [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)]. \end{aligned}$$

Now let us return to equation 22 and apply it to every level α. We find that

$\forall x, y, z \in R$:

26) $$\mu A_\alpha(+)B_\alpha (z) = \bigvee_{z = x + y} (\mu A_\alpha(x) \wedge \mu B_\alpha(y)).$$

For all values of x and y such that

$$\mu A_\alpha(x) = 1 \text{ and } \mu B_\alpha(x) = 1,$$

the right side of equation 26 gives 1. If this is not true, it gives 0, and since $z = x + y$, we write

$$z \in [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)].$$

Referring to equations 23 and 24 we write

27) $$A_\alpha (+) B_\alpha = \bigcup_{\alpha} \alpha \cdot [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)].$$

Fig. 8 shows the addition of two fuzzy numbers.

It is easy to prove that equations 19 and 25 are valid for numbers in Z as in N reporting to equations 15 - 18. Two examples will clarify this.

EXAMPLE 5

Assume the two triangular fuzzy numbers shown in Fig. 9 and compute their sum, where $\mu_A(x)$ and $\mu_B(x)$ are defined as follows:

$\forall x \in R$:

28)
$$\begin{aligned} \mu_A(x) &= 0, && x \le -5, \\ &= x/3 + 5/3, && -5 \le x \le -2, \\ &= -x/3 + 1/3, && -2 \le x \le 1, \\ &= 0, && x \le 1, \end{aligned}$$

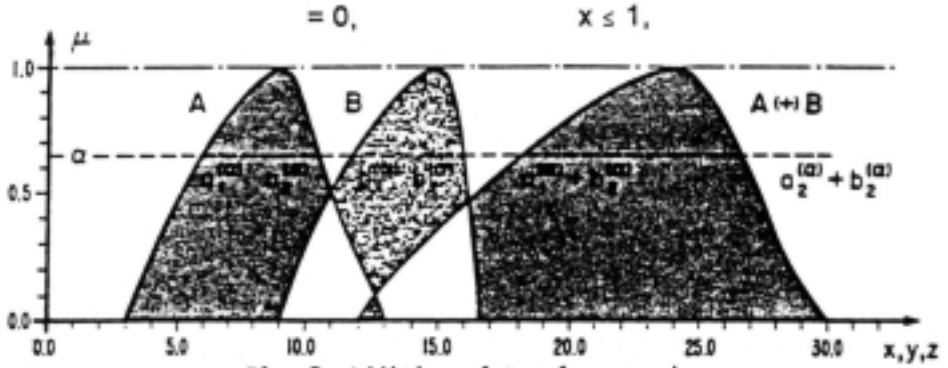

Fig. 8 Addition of two fuzzy numbers

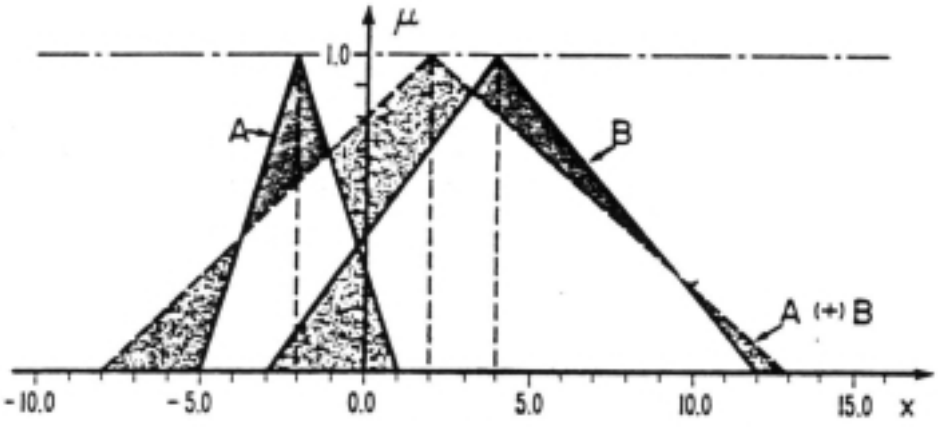

Fig. 9 Addition of two triangular fuzzy numbers (Example 5)

and

29)
$$\begin{aligned} \mu_B(x) &= 0, && x \le -3, \\ &= x/7 + 3/7; && -3 \le x \le 4, \\ &= -x/8 + 12/8, && 4 \le x \le 12, \\ &= 0, && x \le 12. \end{aligned}$$

To compute the intervals of confidence for each level α the triangular shapes will be described by functions of α in the following manner:

From equation 28,

$$\alpha = a_1(\alpha)/3 + 5/3$$

and

$$\alpha = -a_2(\alpha)/3 + 1/3.$$

Hence, the interval of confidence at the level α is given by

30)
$$\begin{aligned} A\alpha &= [a_1(\alpha), a_2(\alpha)] \\ &= [3\alpha - 5, -3\alpha + 1]. \end{aligned}$$

From equation 29,

$$\alpha = b_1(\alpha)/7 + 3/7$$

and

$$\alpha = -b_2(\alpha)/8 + 12/8.$$

Therefore

31) $$B_\alpha = [b_1(\alpha), b_2(\alpha)] = [7\alpha - 3, -8\alpha + 12],$$

Adding equations 30 and 31 gives

32) $$A_\alpha (+) b_\alpha = [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)] = [3\alpha - 5, -3\alpha + 1] (+) [7\alpha - 3, -8\alpha + 12] = [10\alpha - 8, -11\alpha + 13].$$

From

$$a_1(\alpha) + b_1(\alpha) = 10\alpha - 8$$

and

$$a_1(\alpha) + b_2(\alpha) = -11\alpha + 13,$$

We obtain

$$\mu_A (+)_B(x) = \begin{cases} 0, & x \le -8, \\ x/10 + 8/10, & -8 \le x \le 2, \\ -x/11 + 13/11, & 2 \le x \le 13, \\ 0, & x \le 13. \end{cases}$$

These computations were very simple because of the triangular shapes that were used. A similar procedure can be used, however, for any other shape.

EXAMPLE 6

Consider the following numerical example, with a fuzzy number in N:

	0	1	2	3	4	5	6	7	8	
A =	0	0.1	0.3	0.8	1	0.7	0.3	0	0	...

	0	1	2	3	4	5	6	7	8	
B =	0	0.3	0.6	1	0.7	0.2	0.1	0	0	...

Table 1

	0	1	2	3	4	5	6	7
1					1			

	0	1	2	3	4	5	6	7
				1				

.9					1				
.8				1	1				
.7				1	1	1			
.6				1	1	1			
.5				1	1	1			
.4				1	1	1			
.3			1	1	1	1	1		
.2			1	1	1	1	1		
.1		1	1	1	1	1	1		
0	1	1	1	1	1	1	1	1	
	0	0.1	0.3	0.8	1	0.7	0.3	0	

(+)

			1				
			1				
			1	1			
		1	1	1			
		1	1	1			
		1	1	1			
	1	1	1	1			
	1	1	1	1	1		
	1	1	1	1	1	1	
1	1	1	1	1	1	1	1
0	0.3	0.6	1.0	0.7	0.2	0.1	0

Table 1 (cont.)

=

1	2	3	4	5	6	7	8	9	10	11	12	13
						1						
						1						
					1	1						
					1	1	1	1				
				1	1	1	1	1				
				1	1	1	1	1				
				1	1	1	1	1				
		1	1	1	1	1	1	1	1			
		1	1	1	1	1	1	1	1	1		
	1	1	1	1	1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1	1	1	1	1	1
0	0.1	0.3	0.3	0.6	0.8	1	0.7	0.7	0.3	0.2	0.1	0

To compute the sum of the interval of confidence at level α, we shall use equation 19 to obtain Table 1. Hence

$$C = A \,(+)\, B,$$

or, alternatively,

33)

	1	2	3	4	5	6	7	8	9	10	11	12	13
C =	0	0.1	0.3	0.3	0.6	0.8	1	0.7	0.7	0.3	0.2	0.1	0

Note that we could have computed the sum given in Table 1 by using equation 22. Using these computations, we obtain the following set of equations:

$\mu_c(1) = (0 \wedge 0.3) \vee (0 \wedge 0.1) = 0,$
$\mu_c(2) = (0 \wedge 0.6) \vee (0.1 \wedge 0.3) \vee (0.3 \wedge 0) = 0.1,$
$\mu_c(3) = (0 \wedge 1) \vee (0.1 \wedge 0.6) \vee (0.3 \wedge 0.3) \wedge (0.8 \wedge 0) = 0.3,$
$\mu_c(4) = (0 \wedge 00.7) \vee (0.1 \wedge 1) \vee (0.3 \wedge 0.6) \vee (0.8 \wedge 0.3) \vee (1 \wedge 0) = 0.3,$
$\mu_c(5) = (0 \wedge 0.2) \vee (0.1 \wedge 0.7) \vee (0.3 \wedge 1) \vee (0.8 \wedge 0.6) \vee (1 \wedge 0.3) \vee (0.7 \wedge 0) = 0.6,$
$\mu_c(6) = (0 \wedge 0.1) \vee (0.1 \wedge 0.2) \vee (0.3 \wedge 0.7) \vee (0.8 \wedge 1) \vee (1 \wedge 0.6) \vee (0.7 \wedge 0.3) \vee (0.3 \wedge 0) = 0.8,$
$\mu_c(7) = (0 \wedge 0) \vee (0.3 \wedge 0.3) \vee (0.7 \wedge 0.6) \vee (1 \wedge 1) (0.8 \wedge 0.7) \vee (0.3 \wedge 0.2) \vee (0.1 \wedge 0.1) \vee (0 \wedge 0) = 1,$
$\mu_c(8) = (0.1 \wedge 0) \vee (0.3 \wedge 0.1) \vee (0.8 \wedge 0.2) \vee (1 \wedge 0.7) \vee (0.7 \wedge 1) \vee (0.3 \wedge 0.6) \vee (0 \wedge 0.3) = 0.7,$
$\mu_c(9) = (0.3 \wedge 0) \vee (0.8 \wedge 0.1) \vee (1 \wedge 0.2) \vee (0.7 \wedge 0.7) \vee (0.3 \wedge 1) \vee (0 \wedge 0.6) = 0.7,$
$\mu_c(10) = (0.8 \wedge 0) \wedge (1 \wedge 0.1) \vee (0.7 \wedge 0.2) \vee (0.3 \wedge 0.7) \vee (0 \wedge 1) \vee = 0.3,$
$\mu_c(11) = (1 \wedge 0) \vee (0.7 \wedge 0.1) \vee (0.3 \wedge 0.2) \vee (0 \wedge 0.7) = 0.2,$
$\mu_c(12) = (0.7 \wedge 0) \vee (0.3 \wedge 0.1) \vee (0 \wedge 0.2) = 0.1,$
$\mu_c(13) = (0.3 \wedge 0) \vee (0 \wedge 0.1) = 0.$

As can be seen, this is the same result as in 33.

A fuzzy number in R may be added to a fuzzy number in Z by transforming the integer fuzzy number to one that is continuous by interval. Let us consider the number

-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4
0	0.1	0.1	0.2	0.3	0.3	0.5	0.5	0.6	0.8	0.9	1

34)

5	6	7	8	9	10	11	12	13	
0.9	0.7	0.4	0.4	0.3	0.2	0.2	0.1	. 0	...

Fig. 10 A fuzzy number in Z

This number is represented in Fig. 10. The number 34 becomes then a fuzzy number in R.

A problem of concern at this point is this: If **A** and **B** are fuzzy numbers, is **A** (+) **B** also a fuzzy number? In other words, is **A** (+) **B** convex and normal? What we have done is reversed the process and explained addition before we have proved it. What we will have to do now is give two simple, easy-to-prove theorems.

THEOREM 1

If **A** and **B** are fuzzy numbers in R, then **A** (+) **B** is also a fuzzy subset in R that is convex.

Proof:

Consider two levels α and α', where $\alpha' > \alpha$. We may then write

$$
\begin{gathered}
A_\alpha = [a_1(\alpha), a_2(\alpha)], \\
B_\alpha = [b_1(\alpha), b_2(\alpha)], \\
A_{\alpha'} = [a_1(\alpha'), a_2(\alpha')], \\
B_{\alpha'} = [b_1(\alpha'), b_2(\alpha')], \\
(\alpha' > \alpha) \rightarrow ([a_1(\alpha'), a_2(\alpha')] \subset [a_1(\alpha), a_2(\alpha)]), \\
(\alpha' > \alpha) \rightarrow ([b_1(\alpha'), b_2(\alpha')] \subset [b_1(\alpha), b_2(\alpha)]).
\end{gathered}
\tag{35}
$$

By construction,

$$A_\alpha \,(+)\, B_\alpha = [a_1(\alpha) + b_1(\alpha),\ a_2(\alpha) + b_2(\alpha)]$$

and

$$A_{\alpha'} \,(+)\, B_{\alpha'} = [a_1(\alpha') + b_1(\alpha'),\ a_2(\alpha') + b_2(\alpha')].$$

Referring to equation 35, we have

$$
\begin{gathered}
(\alpha' > \alpha) \rightarrow ([a_1(\alpha') + b_1(\alpha'),\ a_2(\alpha') + b_2(\alpha')] \\
\subset [a_1(\alpha) + b_1(\alpha),\ a_2(\alpha) + b_2(\alpha)]).
\end{gathered}
$$

Monotonicity and convexity are therefore preserved by addition.

THEOREM 2

If **A** and **B** are fuzzy numbers in R, then **A** (+) **B** is a fuzzy subset in R, which is normal.

Proof:

At the level $\alpha = 1$, we have

$$A_\alpha = 1 = [a_1(1), a_2(1)]$$

and

$$B_\alpha = 1 = [b_1(1), b_2(1)].$$

Then

$$A_{\alpha=1} (+) B_{\alpha=1} = [a_1(1) + b_1(1), a_2(1) + b_2(1)] \neq \varnothing.$$

Hence **A** (+) **B** is normal.

This proves that if **A** and **B** are fuzzy numbers in R, **A** (+) **B** is also a fuzzy number.

Let us now examine the algebraic properties of addition for fuzzy numbers. It is sufficient to return to equations 10 - 13 and to consider intervals of confidence for each level α. We have, therefore, for all **A**, **B**, and **C** fuzzy numbers in R

$$\mathbf{A} (+) \mathbf{B} = \mathbf{B} (+) \mathbf{A}, \quad \text{(commutative)},$$
$$(\mathbf{A} (+) \mathbf{B}) (+) \mathbf{C} = \mathbf{A} (+) (\mathbf{B} (+) \mathbf{C}), \quad \text{(associative)}$$

If a neutral exists at the left and at the right, it is the ordinary number 0. Thus

$$\mathbf{A} (+) 0 = 0 (+) \mathbf{A} = \mathbf{A}.$$

The image is not symmetric, however.

$$\mathbf{A} (+) \mathbf{A}^- = \mathbf{A}^- (+) \mathbf{A} \neq 0$$

where

$$\mu_{A^-}\alpha(x) = [-a_2(\alpha), -a_1(\alpha)].$$

This shows that fuzzy numbers have a monoidal structure for addition that is commutative. It can be verified easily that it is true not only in R, but also in Z, R^*, and N.

Subtraction

The definition of addition can also be extended to the definition of subtraction. Consider the following definitions and symbols.

$\forall \alpha \in [0, 1]$:

$$\mathbf{A} (-) \mathbf{B} = [a_1(\alpha), a_2(\alpha)] (-) [b_1(\alpha), b_2(\alpha)]$$
$$= [a_1(\alpha) - b_2(\alpha), a_2(\alpha) - b_1(\alpha)],$$

or

$\forall x, y, z \in R$:

$$\mu_{A-B}(z) = \bigvee_{z = x - y} (\mu_A(x) \wedge \mu_B(y)).$$

Subtraction is, in fact, the addition of the image of B^- to **A**, where

$\forall \alpha \in [0, 1]$:

$$B^-_\alpha = [-b_2(\alpha), -b_1(\alpha)].$$

Subtraction is neither commutative nor associative. It is defined in Z as in R, but not in R^+ or N because negative numbers could appear. We now give two examples involving subtraction.

EXAMPLE 7

Let us consider two fuzzy numbers with a triangular shape as shown in Fig. 11.

$\forall x \in R$:

37)
$$\begin{aligned} \mu_A(x) &= 0, && x \leq 7, \\ &= x/7 - 1. && 7 \leq x \leq 14, \\ &= -x/5 + 19/5, && 14 \leq x \leq 19, \\ &= 0, && x \geq 19, \end{aligned}$$

38)
$$\begin{aligned} \mu_B(x) &= 0, && x \leq 3, \\ &= x/2 - 3/2, && 3 \leq x \leq 5, \\ &= -x/5 + 10/5, && 5 \leq x \leq 10, \\ &= 0, && x \geq 10. \end{aligned}$$

Now using equation 37, let

$$\alpha = a_1(\alpha)\, 7 - 1,$$
$$\alpha = - a_2(\alpha)/5 + 19/5.$$

from which

$$A_\alpha = [a_1(\alpha), a_2(\alpha)] = [7\alpha + 7, - 5\alpha + 19]$$

Now using equation 38, we obtain

39)
$$\alpha = b_1(\alpha)/2 - 3/2,$$
$$\alpha = -b_2(\alpha)/5 + 10/5,$$

and

40)
$$B_\alpha = [b_1(\alpha), b_2(\alpha)] = [2\alpha + 3, -5\alpha + 10].$$

Subtracting equation 40 from 39 gives

$$\begin{aligned} A_\alpha \,(-)\, B_\alpha &= [7\alpha + 7, -5\alpha + 19] \,(-)\, [2\alpha + 3, -5\alpha + 10], \\ &= [7\alpha + 7 - (-5\alpha + 10), -5\alpha + 19 - (2\alpha + 3)], \\ &= [12\alpha - 3, -7\alpha + 16]. \end{aligned}$$

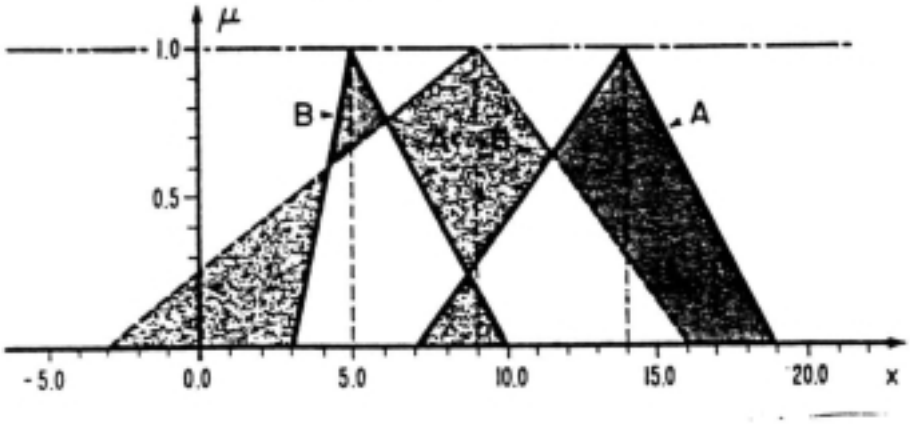

Fig. 11 Subtraction of two fuzzy numbers (Example 7)

Thus if we define

$$a_1(\alpha) - b_2(\alpha) = 12\alpha - 3,$$
$$a_2(\alpha) - b_1(\alpha) = -7\alpha + 16,$$

we obtain

$$\begin{aligned} \mu_{A(-)B}(x) &= 0, && x \le -3, \\ &= x/12 + 3/12, && -3 \le x \le 9, \\ &= -x/7 + 16/7, && 9 \le x \le 16, \\ &= 0, && x \ge 16. \end{aligned}$$

EXAMPLE 8

To see more clearly what it is that we have been doing, we now consider a numerical example in Z, which is given as follows:

Let

A =

-3	-2	-1	0	1	2	3	4	
0	0.1	0.3	0.7	0.9	1.0	0.5	0	...

B =

-2	-1	0	1	2	3	4	
0	0.1	0.6	1.0	0.8	0.3	0	...

Then we have **A** (-) **B** as shown in Table 2.

Table 2

	-3	-2	-1	0	1	2	3	4
1						1		
.9					1	1		
.8					1	1		
.7				1	1	1		
.6				1	1	1		
.5				1	1	1	1	
.4				1	1	1	1	
.3			1	1	1	1	1	
.2			1	1	1	1	1	
.1		1	1	1	1	1	1	
0	1	1	1	1	1	1	1	1
	0	0.1	0.3	0.7	0.9	1	0.5	0

(-)

-2	-1	0	1	2	3	4
			1			
			1			
			1	1		
			1	1		
		1	1	1		
		1	1	1		
		1	1	1		
		1	1	1	1	
		1	1	1	1	
	1	1	1	1	1	
1	1	1	1	1	1	1
0	0.1	0.6	1	0.8	0.3	0

=

-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6
								1					
							1	1					
						1	1	1					
					1	1	1	1					
					1	1	1	1	1				
					1	1	1	1	1	1			
					1	1	1	1	1	1			
			1	1	1	1	1	1	1	1			
			1	1	1	1	1	1	1	1			
		1	1	1	1	1	1	1	1	1	1		
1	1	1	1	1	1	1	1	1	1	1	1	1	1
0	0	0.1	0.3	0.3	0.7	0.8	0.9	1	0.6	0.5	0.1	0	0

$\mu_{A(-)B}(-7)$ $= 0 \wedge 0 = 0,$

$\mu_{A(-)B}(-6)$ $= (0 \wedge 0.3) \vee (0.1 \wedge 0) = 0.$

$\mu_{A(-)B}(-5)$ $= (0 \wedge 0.8) \vee (0.1 \vee 0.3) \vee (0.3 \wedge 0) = 0.1,$

$\mu_{A(-)B}(-4)$ $= (0 \wedge 1) \vee (0.1 \wedge 0.8) \vee (0.3 \wedge 0.3) \vee (0.7 \wedge 0) = 0.3,$

$\mu_{A(-)B}(-3) = (0 \wedge 0.6) \vee (0.1 \wedge 1) \vee (0.3 \wedge 0.8) \vee (0.7 \wedge 0.3) \vee (0.9 \wedge 0) = 0.3,$
$\mu_{A(-)B}(-2) = (0 \wedge 0.1) \vee (0.1 \wedge 0.6) \vee (0.3 \wedge 1) \vee (0.7 \vee 8) \vee (0.9 \wedge 0.3) \vee (1 \wedge 0) = 0.7,$
$\mu_{A(-)B}(-1) = (0 \wedge 0) \vee (0.1 \wedge 0.1) \vee (0.3 \wedge 0.6) \vee (0.7 \wedge 1) \vee (0.9 \wedge 0.8) \vee (1 \wedge 0.3) \vee (0.5 \wedge 0) = 0.8,$
$\mu_{A(-)B}(0) = (0.1 \wedge 0) \vee (0.3 \wedge 0.1) \vee (0.7 \wedge 0.6) \vee (0.9 \wedge 1) \vee (1 \wedge 0.8) \vee (0.5 \wedge 0.3) \vee (0 \wedge 0) = 0.9,$
$\mu_{A(-)B}(1) = (0.3 \wedge 0) \vee (0.7 \wedge 0.1) \vee (0.9 \wedge 0.6) \vee (1 \wedge 1) \vee (0.5 \wedge 0.8) = 1,$
$\mu_{A(-)B}(2) = (0.7 \wedge 0) \vee (0.9 \wedge 0.1) \vee (1 \wedge 0.6) \vee (0.5 \wedge 0.8) = 0.6,$
$\mu_{A(-)B}(3) = (0.9 \wedge 0) \vee (1 \wedge 0.1) \vee (0.5 \wedge 0.6) = 0.5,$
$\mu_{A(-)B}(4) = (1 \wedge 0) \vee (0.5 \wedge 0.1) \vee 0.1,$
$\mu_{A(-)B}(5) = (0.5 \wedge 0) = 0.$

MULTIPLICATION OF FUZZY NUMBERS

At this point we consider multiplication in R^* and N. Let us consider two fuzzy numbers **A** and **B** in R^*. From the level α of presumption, we can write

41) $$A_\alpha (\cdot) B_\alpha = [a_1(\alpha), a_2(\alpha)] (\cdot) [b_1(\alpha), b_2(\alpha)] = [a_1(\alpha) \cdot b_1(\alpha), a_2(\alpha) \cdot b_2(\alpha)].$$

Multiplication can also be given by

$\forall x, y, z \in R^*$:

42) $$\mu_{A(\cdot)B}(z) = \bigvee_{z = x \cdot y} (\mu_A(x) \wedge \mu_B(y)).$$

Equations 41 and 42 are equivalent, and this may be proven in the same way as was given for addition in the previous section.

EXAMPLE 9

For this example we again use triangular fuzzy numbers because they are so easy to work with.

$\forall x \in R^*$:

43) $$\mu_A(x) = \begin{cases} 0, & x \le 2, \\ x - 2, & 2 \le x \le 3, \\ -x/2 + 5/2, & 3 \le x \le 5, \\ 0, & x \ge 5. \end{cases}$$

44) $$\mu_B(x) = \begin{cases} 0, & x \le 3, \\ x/2 - 3/2, & 3 \le x \le 5, \\ -x + 6, & 5 \le x \le 6, \\ 0, & x \ge 6. \end{cases}$$

Multiplication of two fuzzy numbers (Example 9)

For the level α in Fig. 12 and using equation 43 we have

45) $$\alpha = a_1(\alpha) - 2,$$

and

$$\alpha = -a_2(\alpha)/2 + 5/2.$$

Hence

$$A_\alpha = [\alpha + 2, -2\alpha + 5].$$

Using equation 44 we also have

$$\alpha = b_1(\alpha)/2 - 3/2 \quad \text{and} \quad \alpha = -b_2(\alpha) + 6. \text{ Hence}$$
$$B_\alpha = [2\alpha + 3, -\alpha + 6].$$

Thus we obtain the multiplication

$$A_\alpha (\cdot) B_\alpha = [\alpha + 2)\, 2\alpha + 3), (-2\alpha + 5)\, (-\alpha + 6)]$$
$$= [2\alpha^2 + 7\alpha + 6, 2\alpha^2 - 17\alpha + 30].$$

We now have two equations to solve, namely,

46) $$2\alpha^2 + 7\alpha + 6 - x = 0$$

and

47) $$2\alpha^2 - 17\alpha + 30 - x = 0.$$

We will retain only two roots in [0, 1]. For equation 46

$$\alpha = (-7 + 1 + 8x)/4.$$

and for equation 47

$$\alpha = (17 - 49 + 8x)/4.$$

Finally,

$\forall x \in R^+$:

$$\mu_{A(\cdot)B}(x) \quad = 0 \qquad\qquad x \le 6,$$
$$= (-7 + 1 + 8x)/4, \qquad 6 \le x \le 15,$$
$$= (17 - 49 + 8x)/4, \qquad 15 \le x \le 30,$$
$$= 0, \qquad\qquad x \ge 80.$$

The resulting multiplication curve is shown in Fig. 12. Note that A (·) B does not yield a triangular shape.

EXAMPLE 10

In N let us use

48)

A =

2	3	4	5	6
0	0.4	1	0.7	0

49)

B =

2	3	4	5	6	7
0	0.1	0.8	1	0.3	0

Using equation 41 we obtain the result shown in Table 3. We thus find that

A (·) B =

8	9	10	11	12	13	14	15	16	17	18	19
0	0.1	0.1	0.1	0.4	0.4	0.4	0.4	0.8	0.8	0.8	0.8

20	21	22	23	24	25	26	27	28	29	30	31
1	0.7	0.7	0.7	0.7	0.7	0.3	0.3	0.3	0.3	0.3	0

We now examine how equation 42 may be used. Consider Fig. 10, where we showed how a fuzzy number in Z can be transformed to a fuzzy number in R. The fuzzy numbers increase monotonically to the left of the normal values ($\mu = 1$) and decrease monotonically to the right of the normal values. Let us now do the following:

1. At the left let us take into account all couplets in the parenthesis in (1.42), where $x \cdot y \le z$.
2. At the right let us take into account all couplets where $x \cdot y \ge z$. To simplify the process, omit from consideration any couplets where at least one zero exists. Conversely,

Table 3

3 4 5 3 4 5 6

1		1	
.9		1	
.8		1	
.7		1	1
.6		1	1
.5		1	1
.4	1	1	1
.3	1	1	1
.2	1	1	1
.1	1	1	1
0	1	1	1
	0.4	1	0.7

(·)

		1	
		1	
	1	1	
	1	1	
	1	1	
	1	1	
	1	1	
	1	1	1
	1	1	1
1	1	1	1
1	1	1	1
0.1	0.8	1	0.3

Table 3 (cont.)

=

9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
											1										
											1										
							1	1	1	1	1										
							1	1	1	1	1	1	1	1	1	1					
							1	1	1	1	1	1	1	1	1	1					
							1	1	1	1	1	1	1	1	1	1					
			1	1	1	1	1	1	1	1	1	1	1	1	1	1					
			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
			1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
0.1	0.1	0.1	0.4	0.4	0.4	0.4	0.8	0.8	0.8	0.8	1	0.7	0.7	0.7	0.7	0.7	0.3	0.3	0.3	0.3	0.3

we compute values of z for which $\mu = 1$. This will show what value of z occurs when we pass from the left to the right of the maximum. For this purpose, let us use 48 and 49.
The value $\alpha = 1$ exists only for the couplet (4, 5). Hence

$$\mu_{A(\cdot)B}(z) = \mu(x \cdot y = 20) = \mu(4 \cdot 5) = 1.$$

Since 20 has not been included up to this point, we shall apply rule 1 to the left of 20 and rule 2 beyond 20.

$$\mu(9) = {}^{3\times3}(0.4 \wedge 0.1) = 0.1,$$

$$\mu(10) = {}^{3\times3}(0.4 \wedge 0.1) = 0.1,$$

$$\mu(11) = {}^{3\times3}(0.4 \wedge 0.1) = 0.1,$$

$$\mu(12) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 0.1) = 0.4,$$

$$\mu(13) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 0.1) = 0.4,$$

$$\mu(14) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 0.1) = 0.4,$$

$$\mu(15) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 3) \vee {}^{3\times5}(0.4 \wedge 1) \vee {}^{5\times3}(0.7 \wedge 0.1) = 0.4,$$

$$\mu(16) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 3) \vee {}^{3\times5}(0.4 \wedge 1) \vee {}^{5\times3}(0.7 \wedge 0.1) \vee {}^{4\times4}(1 \wedge 0.8) = 0.8,$$

$$\mu(17) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 3) \vee {}^{3\times5}(0.4 \wedge 1) \vee {}^{5\times3}(0.7 \wedge 0.1) \vee {}^{4\times4}(1 \wedge 0.8) = 0.8,$$

$$\mu(18) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 3) \vee {}^{3\times5}(0.4 \wedge 1) \vee {}^{5\times3}(0.7 \wedge 0.1) \vee {}^{4\times4}(1 \wedge 0.8) \vee {}^{3\times6}(0.4 \wedge 0.3) = 0.8,$$

$$\mu(19) = {}^{3\times3}(0.4 \wedge 0.1) \vee {}^{3\times4}(0.4 \wedge 0.8) \vee {}^{4\times3}(1 \wedge 3) \vee {}^{3\times5}(0.4 \wedge 1) \vee {}^{5\times3}(0.7 \wedge 0.1) \vee {}^{4\times4}(1 \wedge 0.8) \vee {}^{3\times6}(0.4 \wedge 0.3) = 0.8,$$

Beyond z = 20, we find

$$\mu(21) = {}^{4\times6}(1 \wedge 0.3) \vee {}^{5\times5}(0.7 \wedge 1) \vee {}^{5\times6}(0.7 \wedge 0.3) = 0.7,$$

$$\mu(22) = {}^{4\times6}(1 \wedge 0.3) \vee {}^{5\times5}(0.7 \wedge 1) \vee {}^{5\times6}(0.7 \wedge 0.3) = 0.7,$$

$${}^{4\times6} \quad {}^{5\times5} \quad {}^{5\times6}$$

$\mu(23) = (1 \wedge 0.3) \vee (0.7 \wedge 1) \vee (0.7 \wedge 0.3) = 0.7,$

$$\mu(24) = \overset{4 \times 6}{(1 \wedge 0.3)} \vee \overset{5 \times 5}{(0.7 \wedge 1)} \vee \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.7,$$

$$\mu(25) = \overset{5 \times 5}{(0.7 \wedge 1)} \vee \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.7,$$

$$\mu(26) = \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.3,$$

$$\mu(27) = \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.3,$$

$$\mu(28) = \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.3,$$

$$\mu(29) = \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.3,$$

$$\mu(30) = \overset{5 \times 6}{(0.7 \wedge 0.3)} = 0.3,$$

$\mu(z > 30) = 0.$

This computation could have been presented more simply, but all of the details were given here to show you how it is done.

We will now present two theorems, as we did for addition.

THEOREM 3

If **A** and **B** are fuzzy numbers in R^*, then **A** $(\cdot)$ **B** is a fuzzy subset that is convex. The proof here is limited to R^*, but we show elsewhere that this property is also true in R. This proof is very similar to that for the addition of numbers in R^*.

THEOREM 4

If **A** and **B** are fuzzy numbers in R^*, then **A** $(\cdot)$ **B** is a fuzzy subset that is normal.

Proof:

This proof is also very similar to that for the addition of numbers in R^*.

We now give some algebraic properties.

$\forall$ **A, B, C** $\subset R^*$:

$$\mathbf{A} (\cdot) \mathbf{B} = \mathbf{B} (\cdot) \mathbf{A} \quad \text{(commutative)},$$
$$(\mathbf{A} (\cdot) \mathbf{B}) (\cdot) \mathbf{C} = \mathbf{A} (\cdot) (\mathbf{B} (\cdot) \mathbf{C}) \quad \text{(associative)}$$

If a neutral exists at the left and at the right, it is the ordinary number 1.

$$\mathbf{A} (\cdot) 1 = 1 (\cdot) \mathbf{A} = \mathbf{A}.$$

If we represent the inverse of **A** by $\mathbf{A}^{-1}$, the inverse is not symmetric. That is,

$$\mathbf{A} (\cdot) \mathbf{A}^{-1} = \mathbf{A}^{-1} (\cdot) \mathbf{A} \neq 1,$$

where

$$A_\alpha^{-1} = [1/a_2(\alpha), 1/a_1(\alpha)].$$

This calculation shows that fuzzy numbers have a monoidal structure for multiplication and that this monoidal structure is commutative.

Division

Division of two fuzzy numbers is defined in R^+ by

$$\mathbf{A} (:) \mathbf{B} = [a_1(\alpha), a_2(\alpha)] (:) [b_1(\alpha), b_2(\alpha)] = [a_1(\alpha)/b_2(\alpha), a_2(\alpha)/b_1(\alpha)], \quad b_2(\alpha) > 0, \quad \forall \alpha \in [0, 1],$$

or

$\forall x, y, z \in R^+$:

$$\mu_{A(:)B}(z) = \bigvee_{z = x/y} (\mu_A(x) \wedge \mu_B(y)).$$

Division, as has been mentioned previously, is a multiplication by the inverse; that is, by

50) $$B_\alpha^{-1} = [1/b_2(\alpha), 1/b_1(\alpha)], \quad b_2(\alpha) > 0, \quad \forall \alpha \in [0, 1].$$

Division is not, however, associative or commutative. In connection with this let us study an example in R^+.

EXAMPLE 11

We now consider a numerical example. Let us use the triangular shape shown in Fig. 13, and let

$\forall x \in R^+$:

51)
$$\begin{aligned} \mu_A(x) &= 0, && x \leq 18, \\ &= x/4 - 18/4, && 18 \leq x \leq 22, \\ &= -x/11 + 3, && 22 \leq x \leq 33, \\ &= 0, && x \geq 33. \end{aligned}$$

52)
$$\begin{aligned} \mu_B(x) &= 0, && x \leq 5, \\ &= x - 5, && 5 \leq x \leq 6, \\ &= -x/2 + 4, && 6 \leq x \leq 8, \\ &= 0, && x \geq 8. \end{aligned}$$

In equation 51, let $\alpha = a_1(\alpha)/4 - 18/4$ and $\alpha = -a_2(/11 + 3$, from which

$$A_\alpha = [4\alpha + 18, -11\alpha + 33].$$

In 52, let $\alpha = b_1(\alpha) - 5$ and $\alpha = -b_2(\alpha)/2 + 4$, from which

$$B_\alpha = [\alpha + 5, -2\alpha + 8].$$

Thus

$$A_\alpha (:) B_\alpha = [4\alpha + 18, -11\alpha + 33] (:) [\alpha + 5, -2\alpha + 8]$$

$$= \frac{4\alpha + 18}{-2\alpha + 8}, \frac{-11\alpha + 33}{\alpha + 5}$$

Fig. 13 Division of fuzzy numbers (Example 11)

We thus find

$\forall x \in R$:

$$\mu_{A(:)B}(x) = 0 \qquad x \le 9/4,$$

$$= \frac{8x - 18}{2x + 4} \qquad 9/4 \le x \le 11/3,$$

$$= \frac{-5x + 33}{x + 11}, \qquad 11/3 \le x \le 33/5,$$

$$= 0, \qquad x \ge 33/5.$$

Remark

Note that $(A (:) B) (\cdot) B \neq A$. Indeed,

$$A_\alpha (:) B_\alpha = \frac{a_1(\alpha)}{b_2(\alpha)}, \frac{a_2(\alpha)}{b_1(\alpha)},$$

$$(A_\alpha (:) B_\alpha) (\cdot) B_\alpha = \frac{a_1(\alpha)}{}, \frac{a_2(\alpha)}{} (\cdot) [b_1(\alpha), b_2(\alpha)]$$

$$b_2(\alpha) \quad b_1(\alpha)$$

$$= \frac{a_1(\alpha)b_1(\alpha)}{b_2(\alpha)}, \quad \frac{a_2(\alpha)b_2(\alpha)}{b_1(\alpha)}$$

$$\neq [a_1(\alpha), a_2(\alpha)]; \quad \text{i.e.,} \neq A_\alpha$$

This is also true for addition and subtraction.

$$(\mathbf{A}\ (\text{-})\ \mathbf{B})\ (\text{+})\ \mathbf{A} \neq \mathbf{A}.$$

That is,

$$A_\alpha\ (\text{-})\ B_\alpha = [a_1(\alpha) - b_2(\alpha),\ a_2(\alpha) - b_1(\alpha)],$$
$$(A_\pi\ (\text{-})\ B_\alpha)\ (\text{+})\ B_\pi = [a_1(\alpha) - b_2(\alpha),\ a_2(\alpha) - b_1(\alpha)]\ (\text{+})\ [b_1(\alpha),\ b_2(\alpha)]$$
$$= [a_1(\alpha) - b_2(\alpha) + b_1(\alpha),\ a_2(\alpha) - b_1(\alpha) + b_2(\alpha)]$$
$$\neq [a_1(\alpha),\ a_2(\alpha)].$$

Multiplication of a Fuzzy Number by an Ordinary Number

Let **A** be a fuzzy number in R and k an ordinary number $k \in R^*_0$.

$\forall A \subset R$:

$$k \cdot A_\alpha = [k, k]\ (\cdot)\ [a_1(\alpha), a_2(\alpha)]$$
$$= [ka_1(\alpha), ka_2(\alpha)],$$

or

$\forall x \in R$:

$$\mu_{k \cdot A}(x) = \mu_A\ (x/k).$$

53)

EXAMPLE 12

Consider the numerical example shown in Fig. 14.

$\forall x \in R$:

$$\mu 3 \cdot {}_A(x) = 0, \qquad x \leq -3,$$
$$= x/9 + 1/3, \qquad -3 \leq x \leq 6,$$
$$= -x/18 + 4/3, \qquad 6 \leq x \leq 24,$$
$$= 0, \qquad x \geq 24.$$

Distributivity in R^*

We now prove that

$\forall$ A, B, C $\subset R^*$:

$$(A (+) B) (\cdot) C = (A (\cdot) C) (+) (B (\cdot) C).$$

In fact,

Fig. 14 Multiplication of fuzzy number by an ordinary number (Example 12)

$$\begin{aligned}(A (+) B) (\cdot) C &= ([a_1(\alpha), a_2(\alpha)] (+) [b_1(\alpha), b_2(\alpha)] (\cdot) [c_1(\alpha), c_2(\alpha)] \\ &= [a_1(\alpha) + b_1(\alpha), a_2(\alpha) + b_2(\alpha)] (\cdot) [c_1(\alpha), c_2(\alpha)] \\ &= [a_1(\alpha) \cdot c_1(\alpha) + b_1(\alpha) \cdot c_1(\alpha), a_2(\alpha) \cdot c_2(\alpha) + b_2(\alpha) \cdot c_2(\alpha)]\end{aligned}$$

and

$$\begin{aligned}(A (\cdot) C) (+) (B (\cdot) C) &= ([a_1(\alpha), a_2(\alpha)] (\cdot) [c_1(\alpha), c_2(\alpha)]) \\ &\quad + ([b_1(\alpha), b_2(\alpha)] (\cdot) [c_1(\alpha), c_2(\alpha) \\ &= [a_1(\alpha) \cdot c_1(\alpha) + b_1(\alpha) \cdot c_1(\alpha), a_2(\alpha) \cdot c_2(\alpha) \\ &\quad + b_2(\alpha) \cdot c_2(\alpha)].\end{aligned}$$

That is,

$$(A (+) B) (\cdot) C = (A (\cdot) C) + (B (\cdot) C).$$

On the contrary,

54) $$(A (\cdot) B) (+) C \neq (A (+) C) (\cdot) (A (+) B),$$

because

$$(a \cdot b) + c \neq a \cdot c + b \cdot c.$$

MINIMUM AND MAXIMUM OF FUZZY NUMBERS

Now consider two fuzzy numbers **A** and **B** in R that are not necessarily comparable.

$$A_\alpha = [a_1(\alpha), a_2(\alpha)]$$

and

$$B_\alpha = [b_1(\alpha), b_1(\alpha)].$$

If

$\forall\, \alpha \in [0,1]$:

$$a_1(\alpha) \le b_1(\alpha) \text{ and } a_2(\alpha) \le b_2(\alpha),$$

55)

we can write $\mathbf{A} \le \mathbf{B}$.

If condition 55 or the inverse condition passing from $\le$ to $\ge$ is not satisfied, then **A** and **B** are not comparable. Fuzzy numbers do not have the structure of total order (linear order): they have only partial order.

We define the fuzzy minimum of **A** and **B** as the fuzzy number

$\forall\, \alpha \in [0, 1]$:

$$\begin{aligned} A_\alpha \,(\wedge)\, B_\alpha &= [a_1(\alpha), a_2(\alpha)] \,(\wedge)\, [b_1(\alpha), b_2(\alpha)] \\ &= [a_1(\alpha) \wedge b_1(\alpha), \alpha_2(\alpha) \wedge b_2(\alpha), \end{aligned} \qquad 56)$$

and the fuzzy maximum of **A** and **B** as the fuzzy number

$\forall\, \alpha \in [0, 1]$:

$$\begin{aligned} A_\alpha \,(\vee)\, B_\alpha &= [a_1(\alpha), a_2(\alpha)] \,(\wedge)\, [b_1(\alpha)] \\ &= [a_1(\alpha) \vee b_1(\alpha), a_2(\alpha) \vee b_2(\alpha)]. \end{aligned} \qquad 57)$$

The same symbols $(\wedge)$ and $(\vee)$ will be used also for representing the minimum and maximum of the fuzzy numbers **A** and **B**.

Figs. 15 and 16 illustrate definitions 56 and 57. These properties can be presented in another way:

$\forall\, x, y, z \subset R$:

$$\mu_{A(\wedge)B}(z) = \bigvee_{z = x \wedge y} (\mu_A(x) \wedge \mu_B(y))$$

and

$$\mu_{A(\vee)B}(z) = \bigvee_{z = x \vee y} (\mu_A(x) \vee \mu_B(y))$$

EXAMPLE 13

Let us now look at the example illustrated in Fig. 17(A), where

$\forall\, x \subset R$:

$$\mu_A(x) = 0, \qquad x \le -2,$$

EXAMPLE 14

Let us consider another example in z.

	-2	-1	0	1	2	3	4
A =	0.2	0.3	0.5	1	0.5	0	0

	-2	-1	0	1	2	3	4
B =	0	0.5	1	0.7	0.6	0.4	0.1

Obviously these two fuzzy numbers are not comparable (see Table 4).

Table 4

	-2	-1	0	1	2	3
1				1		
.9				1		
.8				1		
.7				1		
.6				1		
.5			1	1	1	
.4			1	1	1	
.3		1	1	1	1	
.2	1	1	1	1	1	
.1	1	1	1	1	1	
0	1	1	1	1	1	1
	0.2	0.3	0.5	1	0.5	0.0

(∧)

-1	0	1	2	3	4
	1				
	1				
	1				
	1	1			
	1	1	1		
1	1	1	1		
1	1	1	1	1	
1	1	1	1	1	
1	1	1	1	1	
1	1	1	1	1	1
1	1	1	1	1	1
0.5	1	0.7	0.6	0.4	0.1

=

-2	-1	0	1	2	3	4
		1				
		1				
		1				
		1	1			
		1	1			
	1	1	1	1		
	1	1	1	1		
	1	1	1	1		
1	1	1	1	1		
1	1	1	1	1		
1	1	1	1	1	1	1
0.2	0.5	1	0.7	0.5	0	0

A (∧) B =

-2	-1	0	1	2	3	4
0.2	0.5	1	0.7	0.5	0	0

Alternatively, we will use the minimum set squares and the maximum set squares to obtain the minimum and the maximum values. Thus, we have Table 5 (page 117). We can very easily validate the following properties in R and Z.

60) **A (∧) B = B (∧) A,**

61) **A (∨) B = B (∨) A,**

62) **(A (∧) B) ∧ C = A (∧) (B ∧ C),**

63) **(A (∨) B) ∨ C = A (∨) (B ∨ C),**

64) **A (∧) A = A,**

65) **A (∨) A = A,**

66) **A (∨) (A (∧) B) = A.**

67) **A (∧) (A (∨) B) = A,**

68) $A \vee (B \wedge C) = (A \vee B) \wedge (A \vee C)$,

69) $A \wedge (B \vee C) = (A \wedge B) \vee (A \wedge C)$,

Table 4 (cont.)

	-2	-1	0	1	2	3
1				1		
.9				1		
.8				1		
.7				1		
.6				1		
.5			1	1	1	
.4			1	1	1	
.3		1	1	1	1	
.2	1	1	1	1	1	
.1	1	1	1	1	1	
0	1	1	1	1	1	1
	0.2	0.3	0.5	1	0.5	0.0

$\vee$

	-1	0	1	2	3	4
		1				
		1				
		1				
		1	1			
		1	1	1		
	1	1	1	1		
	1	1	1	1	1	
	1	1	1	1	1	
	1	1	1	1	1	
	1	1	1	1	1	1
	1	1	1	1	1	1
	0.5	1	0.7	0.6	0.4	0.1

Table 4 (cont.)

=

-2	-1	0	1	2	3	4
			1			
			1			
			1			
			1			
			1	1		
		1	1	1		
		1	1	1	1	
	1	1	1	1	1	
	1	1	1	1	1	
	1	1	1	1	1	1
1	1	1	1	1	1	1
0	0.3	0.5	1	0.6	0.4	0.1

A (∨) B =	-2	-1	0	1	2	3	4
	0	0.3	0.5	1	0.6	0.4	0.1

We see from properties 60 - 69 that the fuzzy maximum and fuzzy minimum have a distributive lattice structure in R or Z.

Until now we have used the symbols (∧) and (∨) to refer to the minimum and the maximum. We could have used the terms the lower bound and upper bound instead.

Table 5

A (∧) B =	-2	-1	0	1	2	3	4
	0.2	0.5	1	0.7	0.5	0	0

Table 5 (cont.)

A (∨) B =	-2	-1	0	1	2	3	4
	0	0.3	0.5	1	0.6	0.4	0.1

A LARGE SAMPLE OF SOME NOVEL CONCEPTS AND TOOLS

INTRODUCTION

The uncertainty that arises from human thought processes and the randomness associated with experiments are often confused by social scientists and even mathematicians, scientists, and engineers. The fact that this confusion exists is unfortunate, but understandable. For example, some observations obtained from a system are precise, while some are measurable only in a statistical sense, and others cannot be measured at all. Some of the data obtained in this manner are hybrid; that is, their components are not homogeneous but a blend of precise and fuzzy information.

Hybrid data lead to hybrid operations and hybrid numbers, which are very recent developments and appear to be suitable for dealing with large-scale systems. An introduction to these concepts is given in this chapter. We will show that these concepts can be associated with Monte Carlo method.

UNCERTAINTY AND RANDOMNESS: HYBRID NUMBERS

A fuzzy number is not a measurement. It is a function $\mu_A(x)$ and corresponds to both convex and normal fuzzy subsets. In other words, a fuzzy number is a subjective valuation assigned by one or more human operators. It is a quasi estimation of a number based on natural limits.

We will examine the addition of fuzzy and random data. In order to do this, we denote a fuzzy number by a boldface letter, for example, **A**. An ordinary capital letter, for example, A, is used to denote a random variable, and a lowercase letter, say a, is used to denote a special value of a random variable.

We begin our analysis by reviewing the addition of fuzzy and random variables. In the referential set R, we have a fuzzy number **A** with membership function $\mu_A(x)$ and a random variable L whose probability is given by the density function $f_L(x)$, where x is a value of L in R. We want to add **A** and L.

Suppose that $f_L(x)$ has a convex shape. Let the maximum value of $f_L(x)$ be

$$\max_x f_L(x).$$

Divide the function $f_L(x)$ by the maximum value and define the new function $\mu_L(x)$, which is both convex and normal. By this process we substitute the fuzzy number **L** for the random variable L, which allows **L** to be added to any other fuzzy number by the operation of max-min convolution. We therefore have

70)
$$\mu_L(x) = \frac{f_L(x)}{\max_x f_L(x)},$$

and addition with a fuzzy number **A**.

$\forall\, x, y, z \in R$:

71)
$$\mu_{A(+)L}(z) = \bigvee_{z = x + y} (\mu_A(x) \wedge \mu_L(y)).$$

Fig. 28 Stable and unstable segments in the interval of confidence *x*

Now let us shift $[\beta_1, \beta_1 + 1]$ in the opposite direction, from $+\infty$ to $-\infty$ along the 0-b axis. We see then that from $+\infty$ to b_1, $\psi([\beta_1, \beta_1 + 1])$ increases regularly and monotonically. Thus, if $\beta_1 \geq b_1$, then

$$= \psi([\beta_1, \beta_1 + 1]) = [\phi_2(\beta_1), \phi_2(\beta_1 + 1)].$$

If $\beta_1 < b_1 < \beta_1 + 1$, ψ is not regular,

$$\psi([\beta_1, \beta_1 + 1]) = [\phi_1(\beta_1), (x'_1)] \cup [x_1, \phi_2(\beta_1 + 1)],$$

where $x'_1 = \phi_1(b_1)$ and the two segments $[\phi_1(\beta_1), x'_1]$ and $[x_1, \phi_2(\beta_1 + 1]$ are disjoint $(x'_1 < x_1)$.

Finally, if $\beta_1 + 1 < b_1$, $\psi([\beta_1, \beta_1 + 1])$ becomes regular again,

$$\psi([\beta_1, \beta_1 + 1]) = [\phi_1(\beta_1), \phi_1(\beta_1 + 1)].$$

As we have just seen, a catastrophe induces a disjunction into the interval of confidence.

Thus we can see that our fuzzy numbers not only allowed us to calculate some processes of biology, but to see through our catastrophe relationship how the interaction of various entities can produce disease and how the fuzzy arithmetic and logic can allow us to determine the process of disease in diagnosis and treatment. Our fuzzy numbers can also tell us where intervention might need to be applied, or the nature of that intervention.

Our fuzzy number arithmetic can be put into computerized systems for analysis such as the Quantum Med C.I. * device or the Maitreya software, which take in blood analysis, urine analysis, height, weight, medical history, symptomatology, food consumption, and so on; which allow the computer to diagnose conditions.

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Chapter 6

DNA, RNA AND PROTEIN

Before we go into the concepts of DNA, RNA and protein, let us review some of the acid-base concepts we have outlined in previous books.

Acid-Base Concepts

Ionization of Water

Water dissociates into hydronium (H_3O^+) and hydroxyl (OH^-) ions. For simplicity, we refer to the hydronium ion as a hydrogen ion (H^+) and write the equilibrium as

$$H_2O \rightleftharpoons H^+ + OH^-$$

The equilibrium constant K_{eq} of this dissociation is given by

1) $$K_{eq} = \frac{[H^+][OH^-]}{[H_2O]}$$

in which the terms in brackets denote molar concentrations. Because the concentration of water (55.5 M) is changed little by ionization, expression 1 can be simplified to give

2) $$K_w = [H^+][OH^-]$$

in which K_w is the ion product of water. At 25° C, K_w is 1.0×10^{-14}.

Note that the concentrations of H^+ and OH^- are reciprocally related. If the concentration of H^+ is high, then the concentration of OH^- must be low, and vice versa. For example, if $[H^+] = 10^{-2}$ M, then $[OH^-] = 10^{-12}$ M.

Definition of Acid and Base

An acid is a proton donor. A base is a proton acceptor.

$$\text{Acid} \rightleftharpoons H^+ + \text{base}$$

$$\underset{\text{Acetic acid}}{CH_3\text{-}COOH} \rightleftharpoons H^+ + \underset{\text{Acetate}}{CH_3\text{-}COO^-}$$

$$\underset{\text{Ammonium ion}}{NH_4^+} \rightleftharpoons H^+ + \underset{\text{Ammonia}}{NH_3}$$

The species formed by the ionization of an acid is its conjugate base. Conversely, protonation of a base yields its conjugate acid. Acetic acid and acetate ion are a conjugate acid-base pair.

Definition of pH and p<u>K</u>

The pH of a solution is a measure of its concentration of H^+. The pH is defined as

3) $$pH = \log_{10} \frac{1}{[H^+]} = -\log_{10}[H^+]$$

The ionization equilibrium of a weak acid is given by

$$HA \rightleftharpoons H^+ + A^-$$

The apparent equilibrium constant K for this ionization is

4) $$K = \frac{[H^+][A^-]}{[HA]}$$

The p*K* of an acid is defined as

5) $$pK = -\log K = \log \frac{1}{K}$$

Inspection of equation 4 shows that the p*K* of an acid is the pH at which it is half dissociated.

Henderson-Hasselbalch Equation

What is the relationship between pH and the ratio of acid to base? A useful expression can be derived from equation 4. Rearrangement of that equation gives

6) $$\frac{1}{[H^+]} = \frac{1}{K} \frac{[A^-]}{[HA]}$$

Taking the logarithm of both sides of equation 6 gives

7) $$\log \frac{1}{[H^+]} = \log \frac{1}{K} + \log \frac{[A^-]}{[HA]}$$

Substituting pH for log $1/[H^+]$ and p*K* for log $1/K$ in equation 7 yields

8) $$pH = pK + \log \frac{[A^-]}{[HA]}$$

which is commonly known as the Henderson-Hasselbalch equation.

The pH of a solution can be calculated from equation 8 if the molar proportion of A^- to HA and p*K* of HA are known. Consider a solution of 0.1 M acetic acid and 0.2 M acetate ion. The p*K* of acetic acid is 4.8.

Hence, the pH of the solution is given by

$$pH = 4.8 + \log \frac{0.2}{0.1} = 4.8 + \log 2$$

$$= 4.8 + 0.3 = 5.1$$

Conversely, the pK of an acid can be calculated if the molar proportion of A^- to HA and the pH of the solution are known.

Buffering Power

An acid-base conjugate pair (such as acetic acid and acetate ion) has an important property: it resists changes in the pH of a solution. In other words, it acts as a *buffer*. Consider the addition of OH^- to a solution of acetic acid (HA):

$$HA + OH^- \rightleftharpoons A^- + H_2O$$

A plot of the dependence of the pH of this solution on the amount of OH^- added is called a *titration curve* (Fig. 1). Note that there is an inflection point in the curve at pH 4.8, which is the pK of acetic acid. In the vicinity of this pH, a relatively large amount of OH^- produces little change in pH. In general, a weak acid is most effective in buffering against pH changes in the vicinity of its pK value.

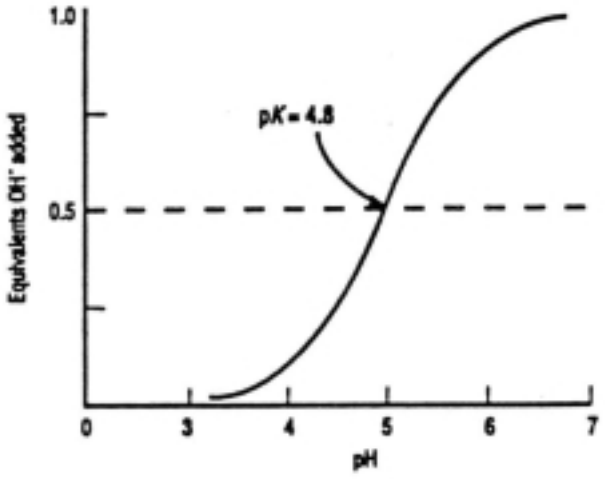


Figure 1
Titration curve of acetic acid.

pK Values of Amino Acids

An amino acid such as glycine contains two ionizable groups: an α-carboxyl group and a protonated α-amino group. As base is added, these two groups are titrated (Fig. 2). The pK of the α-COOH group is 2.3, whereas that of the α-NH_3^+ group is 9.6. The pK values of these groups in other amino acids are similar. Some amino acids, such as aspartic acid, also contain an

ionizable side chain. The pK values of ionizable side chains in amino acids range from 3.9 (aspartic acid) to 12.5 (arginine).

Figure 2
Titration of the α-carboxyl and α-amino groups of an amino acid.

Table 1
pK values of some amino acids

	pK values (25° C)		
Amino acid	*α-COOH group*	*α-NH_3^+ group*	*Side chain*
Alanine	2.3	9.9	
Glycine	2.4	9.8	
Phenylalanine	1.8	9.1	
Serine	2.1	9.2	
Valine	2.3	9.6	
Aspartic acid	2.0	10.0	3.9
Glutamic acid	2.2	9.7	4.3
Histidine	1.8	9.2	6.0
Cysteine	1.8	10.8	8.3
Tyrosine	2.2	9.1	10.9
Lysine	2.2	9.2	10.8
Arginine	1.8	9.0	12.5

Source: After J. T. Edsall and J. Wyman. Biophysical Chemistry (Academic Press, 1958), ch. 8.

As we have discussed, we also need to analyze some of the energy, time and space concepts, to allow us to understand some of the DNa functions.

QUANTUM BIOPHYSICS

SPACE, TIME AND ENERGY

In considering molecular structure, it is important to have a sense of scale (Fig. 3). The angstrom (Å) unit, which is equal to 10^{-10} meter (m) or 0.1 nanometer (nm), is customarily used as the measure of length at the atomic level. The length of a C--C bond, for example, is 1.54 Å. Small biomolecules, such as sugars and amino acids, are typically several angstroms long. Biological macromolecules, such as proteins, are at least tenfold larger. For example, hemoglobin, the oxygen-carrying protein in red blood cells, has a diameter of 65 Å. Another tenfold increase in size brings us to assemblies of macromolecules. Ribosomes, the protein-synthesizing machinery of the cell, have diameters of about 300 Å. The range from 100 Å (10 nm) to 1000 Å (100 nm) also encompasses most viruses. Cells are typically a hundred times as large, in the range of micrometers (μm). For example, a red blood cell is 7 μm (7×10^4 Å) long. It is important to note that the limit of resolution of the light microscope is about 2000 Å (0.2 μm), which corresponds to the size of many subcellular organelles. Mitochondria, the major generators of ATP in aerobic cells, can just be resolved by the light microscope. Most of our knowledge of biological structure in the range from 1 Å (0.1 nm) to 10^4 Å (1 μm) has come from electron microscopy and x-ray diffraction.

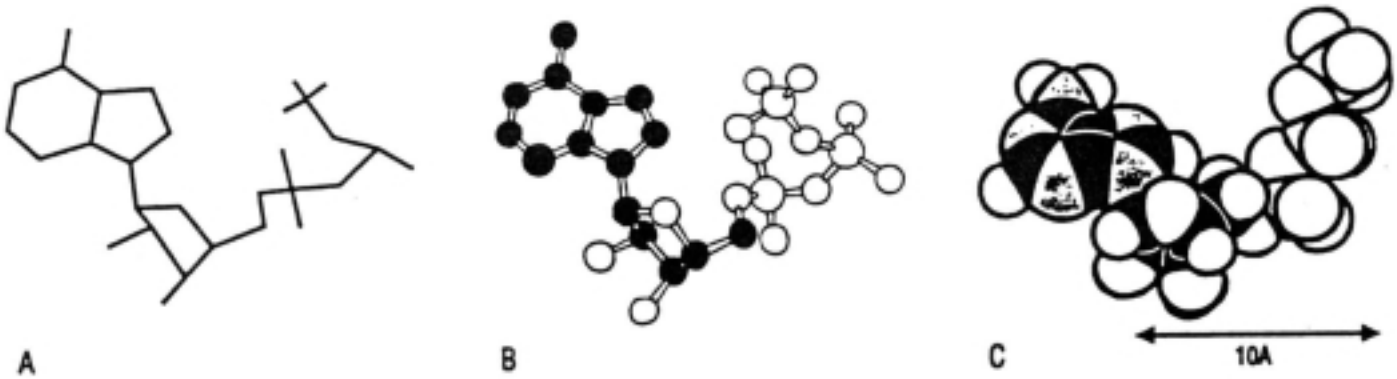


Figure 3
Comparison of (A) skeletal, (B) ball-and-stick, and (C) space-filling models of ATP. Hydrogen atoms are not shown in models A and B.

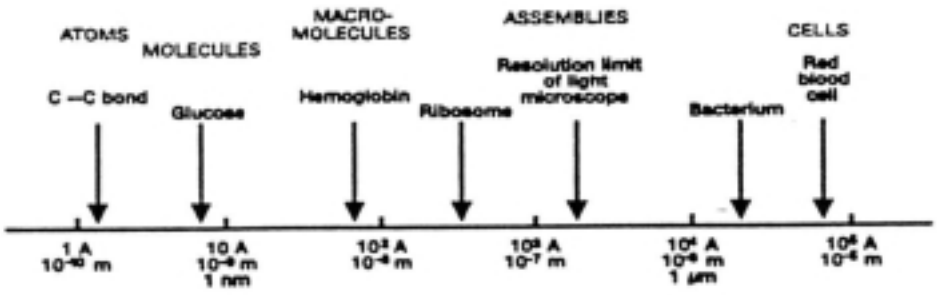


Figure 4
Dimensions of some biomolecules, assemblies, and cells.

The molecules of life are constantly in flux. Chemical reactions in biological systems are catalyzed by enzymes, which typically convert substrate into product in milliseconds (ms, 10^{-3} s). Some enzymes act even more rapidly, in times as short as a few microseconds (μs, 10^{-6} s). Many conformational changes in biological macromolecules also are rapid. For example, the unwinding

of the DNA double helix, which is essential for its replication and expression, is a microsecond event. The rotation of one domain of a protein with respect to another can take place in only nanoseconds (ns, 10^{-9} s). Many noncovalent interactions between groups in macromolecules are formed and broken in nanoseconds. Even more rapid processes can be probed with very short light pulses from lasers. It is remarkable that the primary event in vision-- a change in structure of the light-absorbing group-- occurs within a few picoseconds (ps, 10^{-12} s) after the absorption of a photon (Fig. 5). From such brevity to the scale of evolutionary time, biological systems span a broad range. Life on Earth arose some 3.5×10^{9} years ago, or 1.1×10^{17} s ago.

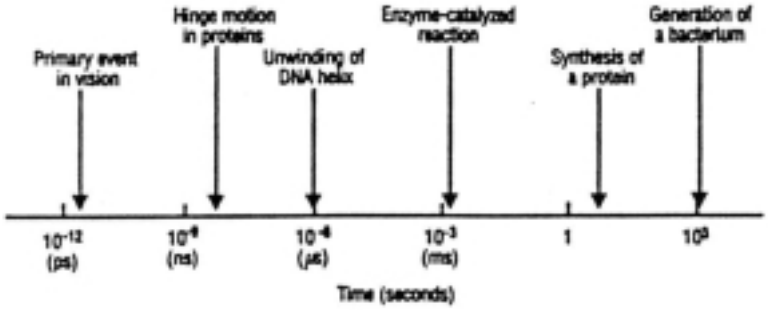


Figure 5
Typical rates of some processes in biological systems.

We shall be concerned with energy changes in molecular events (Fig. 6). The ultimate source of energy for life is the sun. The energy of a green photon, for example, if 57 kilocalories per mole (kcal/mol). ATP, the universal currency of energy, has a usable energy content of about 12 kcal/mol. In contrast, the average energy of each vibrational degree of freedom in a molecule is much smaller, 0.6 kcal/mol at 25° C. This amount of energy is much less than that needed to dissociate covalent bonds (e.g., 83 kcal/mol for a C--C bond). Hence, the covalent framework of biomolecules is stable in the absence of enzymes and inputs of energy. On the other hand, noncovalent bonds in biological systems typically have an energy of only a few kilocalories per mole, so that thermal energy is enough to make and break them. An alternative unit of energy is the joule, which is equal to 0.239 calorie.

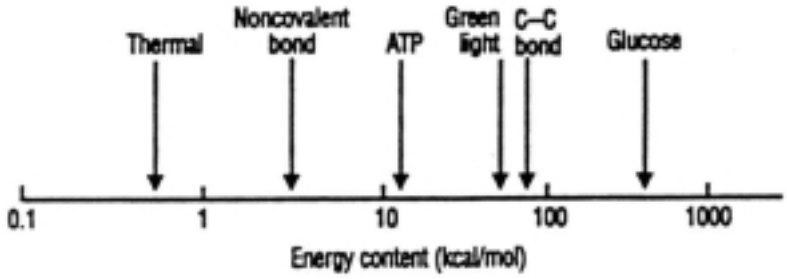


Figure 6
Some biologically important energies.

QUANTUM BIOPHYSICS

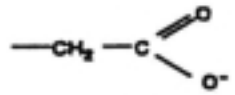
REVERSIBLE INTERACTIONS OF BIOMOLECULES ARE MEDIATED BY THREE KINDS OF NONCOVALENT BONDS

Reversible molecular interactions are at the heart of the dance of life. Weak, noncovalent forces play key roles in the faithful replication of DNA, the folding of proteins into intricate three-dimensional forms, the specific recognition of substrates by enzymes, and the detection of signal molecules. Indeed, all biological structures and processes depend on the interplay of noncovalent interactions as well as covalent ones. The three fundamental noncovalent bonds are *electrostatic bonds*, *hydrogen bonds*, and *van der Waals bonds*. They differ in geometry, strength, and specificity. Furthermore, these bonds are profoundly affected in different ways by the presence of water. Let us consider the characteristics of each:

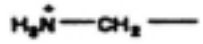
1. *Ionic bonds*. A charged group on a substrate can attract an oppositely-charged group on an enzyme. The force of such an *electrostatic attraction* is given by Coulomb's law:

$$F = \frac{q_1 q_2}{r^2 D}$$

in which q_1 and q_2 are the charges of the two groups, r is the distance between them, and D is the dielectric constant of the medium. The attraction is strongest in a vacuum (where D is 1) and is weakest in a medium such as water (where D is 80). This kind of attraction is also called an ionic bond, salt linkage, salt bridge, or ion pair. The distance between oppositely-charged groups in an optimal electrostatic attraction is 2.8 Å.



Negatively charged group of a substrate



Positively charged group of an enzyme

2. *hydrogen bonds* (or proton bonds) can be formed between uncharged molecules as well as charged ones. In a hydrogen bond, a *hydrogen atom is shared by two other atoms*. The atom to which the hydrogen is more tightly linked is called the hydrogen donor, whereas the other atom is the hydrogen acceptor. The acceptor has a partial negative charge that attracts the hydrogen atom. In fact, a hydrogen bond can be considered an intermediate in the transfer of a proton from an acid to a base. It is reminiscent of a ménage à trois.

The donor in a hydrogen bond in biological systems is an oxygen or nitrogen atom that has a covalently-attached hydrogen atom. The acceptor is either oxygen or nitrogen. The kinds of hydrogen bonds formed and their bond lengths are given in Table 2. The bond energies range

Table 2
Typical Hydrogen Bond lengths

Bond	*Length (Å)*
O--H...O	2.70
O--H...O$^-$	2.63
O--H...N	2.88
N--H...O	3.04
N$^+$--H...O	2.93
N--H...N	3.10

from about 3 to 7 kcal/mol. Hydrogen bonds are stronger than van der Waals bonds but much weaker than covalent bonds. The length of a hydrogen bond is intermediate between that of a covalent bond and a van der Waals bond. *An important feature of hydrogen bonds is that they are highly directional*. The strongest hydrogen bonds are those in which the donor, hydrogen and acceptor atoms are collinear. The α-helix, a recurring motif in proteins, is stabilized by hydrogen bonds between amide (--NH) and carbonyl (--CO) groups (Fig. 7). Another example of the importance of hydrogen bonding is the DNA double helix, which is held together by hydrogen bonds between bases on opposite strands.

Figure 7
Schematic diagram of hydrogen bonding between an amide and a carboxyl group in an α-helix of a protein.

3. *Van der Waals bonds*, a nonspecific attractive force, come into play when any two atoms are 3 to 4 Å apart. Though weaker and less specific than electrostatic and hydrogen bonds, van der Waals bonds are no less important in biological systems. The basis of a van der Waals bond is that the distribution of electronic charge around an atom changes with time. At any instant, the charge distribution is not perfectly symmetric. This transient asymmetry in the electronic charge around an atom encourages a similar asymmetry in the electron distribution around its neighboring atoms. The resulting attraction between a pair of atoms increases as they come closer, until they are separated by the van der Waals *contact distance* (Fig. 8). At a shorter distance, very strong repulsive forces become dominant because the outer electron clouds overlap. The contact distance between an oxygen and carbon atom, for example, is 3.4 Å, which is obtained by adding 1.4 and 2.0 Å, the contact radii (Table 3) of the O and C atoms.

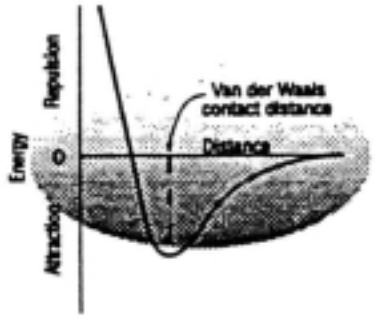


Figure 8
Energy of a van der Waals interaction as a function of the distance between two atoms.

Table 3
Van der Waals contact radii of atoms (Å)

Atom	*Radius*
H	1.2
C	2.0
N	1.5
O	1.4
S	1.85
P	1.9

The van der Waals bond energy of a pair of atoms is about 1 kcal/mol. It is considerably weaker than a hydrogen or electrostatic bond, which is in the range of 3 to 7 kcal/mol. A single van der Waals bond counts for very little because its strength is only a little more than the average thermal energy of molecules at room temperature (0.6 kcal/mol). Furthermore, the van der Waals force fades rapidly when the distance between a pair of atoms becomes even 1 Å greater than their contact distance. It becomes significant only when numerous atoms in one of a pair of molecules can simultaneously come close to many atoms of the other. This can happen only if the shapes of the molecules match. In other words, effective van der Waals interactions depend on *steric complementarity*. Though there is virtually no specificity in a single van der Waals interaction, *specificity arises when there is an opportunity to make a large number of van der Waals bonds simultaneously*. Repulsions between atoms closer than the van der Waals contact distance are as important as attractions for establishing specificity.

THE BIOLOGICALLY-IMPORTANT PROPERTIES OF WATER ARE ITS POLARITY AND COHESIVENESS

Water profoundly influences all molecular interactions in biological systems. Two properties of water are especially important in this regard:

1. *Water is a polar molecule.* The shape of the molecule is triangular, not linear, and so there is an asymmetrical distribution of charge. The oxygen nucleus draws electrons away from the hydrogen nuclei, which leaves the region around those nuclei with a net positive charge. The water molecule is thus an electronically-polar structure.

2. *Water molecules have a high affinity for each other.* A positively-charged region in one water molecules tends to orient itself toward a negatively-charged region in one of its neighbors. Ice has a highly regular crystalline structure in which all potential hydrogen bonds are made (Fig. 9). Liquid water has a partly ordered structure in which hydrogen-bonded clusters of molecules are continually forming and breaking up. Each molecule is hydrogen bonded to an average of 3.4 neighbors in liquid water, compared with 4 in ice. *Water is highly cohesive.*

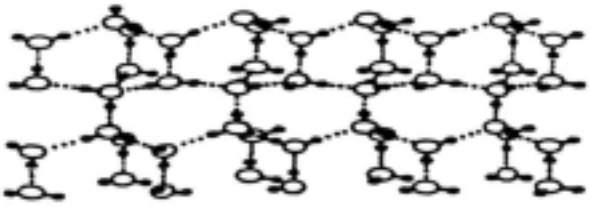


Figure 9
Structure of a form of ice. [After L. Pauling and P. Pauling. Chemistry (W. H. Freeman, 1975), p. 289.]

WATER SOLVATES POLAR MOLECULES AND WEAKENS IONIC AND HYDROGEN BONDS

The polarity and hydrogen-bonding capability of water make it a highly interacting molecule. Water is an excellent solvent for polar molecules. The reason is that water greatly weakens electrostatic forces and hydrogen bonding between polar molecules by competing for their attractions. For example, consider the effect of water on hydrogen bonding between a carbonyl and an amide group (Fig. 10). The hydrogen atoms of water can replace the amide hydrogen group as hydrogen-bond donors, and the oxygen atom of water can replace the carbonyl oxygen as the acceptor. Hence, a strong hydrogen bond between a CO and an NH group forms only if water is excluded.

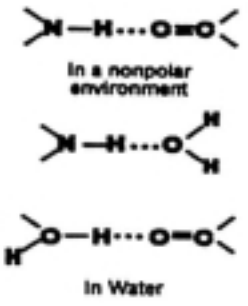


Figure 10
Water competes for hydrogen bonds.

Water diminishes the strength of electrostatic attractions by a factor of 80, the dielectric constant of water, compared with the same interaction in a vacuum. Water has an unusually high dielectric constant (Table 4) because of its polarity and capacity to form oriented solvent shells around ions (Fig. 11). These oriented solvent shells produce electric fields of their own, which oppose the fields produced by the ions. Consequently, electrostatic attractions between ions are markedly weakened by the presence of water.

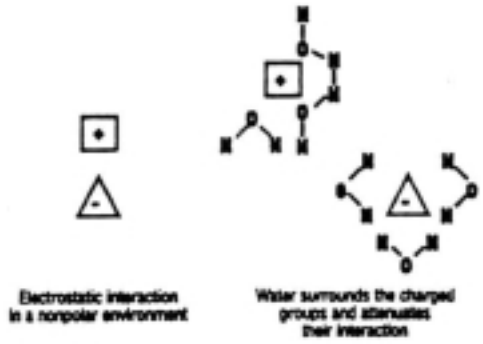


Figure 11
Water attenuates electrostatic attractions between charged groups.

The existence of life on Earth depends critically on the capacity of water to dissolve a remarkable array of polar molecules that serve as fuels, building blocks, catalysts, and information carriers. High concentrations of these molecules can coexist in water, where they are free to diffuse and find each other. However, the excellence of water as a solvent poses a problem, for it also weakens interactions between polar molecules. Biological systems have solved this problem by creating water-free microenvironments where polar interactions have maximal strength. We shall see many examples of the critical importance of these specially-constructed niches in protein molecules.

Table 4
Dielectric constants of some solvents at 20° C

Substance	*Dielectric constant*
Hexane	1.9
Benzene	2.3
Diethyl ether	4.3
Chloroform	5.1
Acetone	21.4
Ethanol	24
Methanol	33
Water	80
Hydrogen cyanide	116

HYDROPHOBIC ATTRACTIONS: NONPOLAR GROUPS TEND TO ASSOCIATE IN WATER

The sight of dispersed oil droplets coming together in water to form a single large oil drop is a familiar one. An analogous process occurs at the atomic level: *nonpolar molecules or groups tend to cluster together in water*. These are called *hydrophobic attractions*. In a figurative sense, water tends to squeeze nonpolar molecules together.

Let us examine the basis of hydrophobic attractions, which are a major driving force in the folding of macromolecules, the binding of substrates to enzymes, and the formation of membranes that define the boundaries of cells and their internal compartments. Consider the introduction of a single nonpolar molecule, such as hexane, into some water. A cavity in the water is created, which temporarily disrupts some hydrogen bonds between water molecules. The displaced water molecules then reorient themselves to form a maximum number of new hydrogen bonds. This is accomplished at a price: the number of ways of forming hydrogen bonds in the cage of water around the hexane molecule is much fewer than in pure water. The water molecules around the hexane molecule are much more ordered than elsewhere in the solution. Now consider the arrangement of two hexane molecules in water. Do they sit in two small cavities (Fig. 12A) or in a single larger one (Fig. 12B)? The experimental fact is that the two hexane molecules come together and occupy a single large cavity. This association releases some of the more ordered water molecules around the separated hexanes. In fact, the basis of a hydrophobic attraction is this enhanced freedom of released water molecules. *Nonpolar solute molecules are driven together in water not primarily because they have a high affinity for each other but because water bonds strongly to itself.*

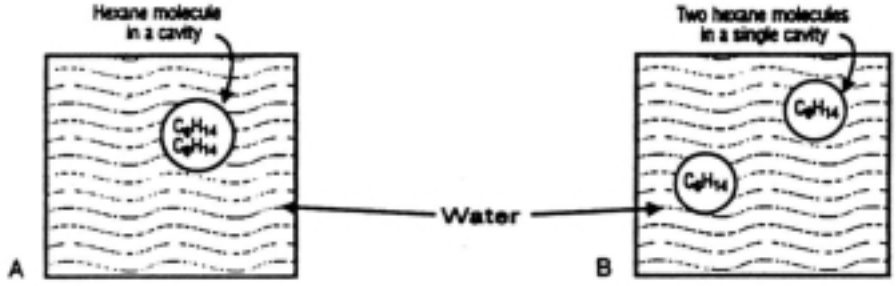


Figure 12
A schematic representation of two molecules of hexane in a small volume of water: (A) the hexane molecules occupy different cavities in the water structure, or (B) they occupy the same cavity, which is energetically more favored.

Proteins are very important in biological process. They fill many different types of functions, including:

1. *Enzymatic catalysis*. Nearly all chemical reactions in biological systems are catalyzed by specific macromolecules called enzymes. Some of these reactions, such as the hydration of carbon dioxide, are quite simple. Others, such as the replication of an entire chromosome, are highly intricate. Enzymes exhibit enormous catalytic power. They usually increase reaction rates by at least a millionfold. Indeed, chemical transformations *in vivo* rarely proceed at perceptible rates in the absence of enzymes. Several thousand enzymes have been characterized, and many of them have been crystallized. The striking fact is that nearly all known enzymes are proteins. Thus, proteins play the unique role of determining the pattern of chemical transformations in biological systems.

2. *Transport and storage*. Many small molecules and ions are transported by specific proteins. For example, hemoglobin transports oxygen in erythrocytes, whereas myoglobin, a related protein, transports oxygen in muscle. Iron is carried in the plasma of blood by transferrin and is stored in the liver as a complex with ferritin, a different protein.

3. *Coordinated motion*. Proteins are the major component of muscle. Muscle contraction is accomplished by the sliding motion of two kinds of protein filaments. On the microscopic scale, such coordinated motions as the movement of chromosomes in mitosis and the propulsion of sperm by their flagella also are produced by contractile assemblies consisting of proteins.

4. *Mechanical support*. The high tensile strength of skin and bone is due to the presence of collagen, a fibrous protein.

5. *Immune protection*. Antibodies are highly specific proteins that recognize and combine with such foreign substances as viruses, bacteria, and cells from other organisms. Proteins thus play a vital role in distinguishing between self and nonself.

6. *Generation and transmission of nerve impulses*. The response of nerve cells to specific stimuli is mediated by receptor proteins. For example, rhodopsin is the photoreceptor protein in retinal rod cells. Receptor proteins that can be triggered by specific small molecules, such as acetylcholine, are responsible for transmitting nerve impulses at synapses-- that is, at junctions between nerve cells.

7. *Control of growth and differentiation*. Controlled sequential expression of genetic information is essential for the orderly growth and differentiation of cells. Only a small fraction of the genome of a cell is expressed at any one time. In bacteria, repressor proteins are important control elements that silence specific segments of the DNA of a cell. In higher organisms, growth and differentiation are controlled by growth factor proteins. For example, nerve growth factor guides the formation of neural networks. The activities of different cells in multicellular organisms are coordinated by hormones. Many of them, such as insulin and thyroid-stimulating hormone, are proteins. Indeed, proteins serve in all cells as sensors that control the flow of energy and matter.

PROTEINS ARE RICH IN HYDROGEN-BONDING POTENTIALITY

What are the forces that determine the three-dimensional architecture of proteins? All reversible molecular interactions in biological systems are mediated by three kinds of forces: *electrostatic bonds*, *hydrogen bonds* and *van der Waals* bonds. We have already seen hydrogen bonds between main-chain NH and CO groups at work in forming α helixes and ß sheets. In fact, side chains of eleven of the twenty fundamental amino acids also can participate in hydrogen bonding. It is convenient to group these residues according to their hydrogen-bonding potentialities:

1. The side chains of tryptophan and arginine can serve as *hydrogen-bond donors only*.

2. Like the peptide group itself, the side chains of asparagine, glutamine, serine, and threonine can serve as *hydrogen-bond donors and acceptors*.

3. The hydrogen-bonding capabilities of lysine (and the terminal amino group), aspartic and glutamic acid (and the terminal carboxyl group), tyrosine, and histidine vary with pH. These groups can serve as both acceptors and donors over a certain range of pH, and as acceptors or donors (but not both) at other pH values, as shown for aspartate and glutamate in Fig. 13. *The hydrogen-bonding modes of these ionizable residues are pH-dependent.*

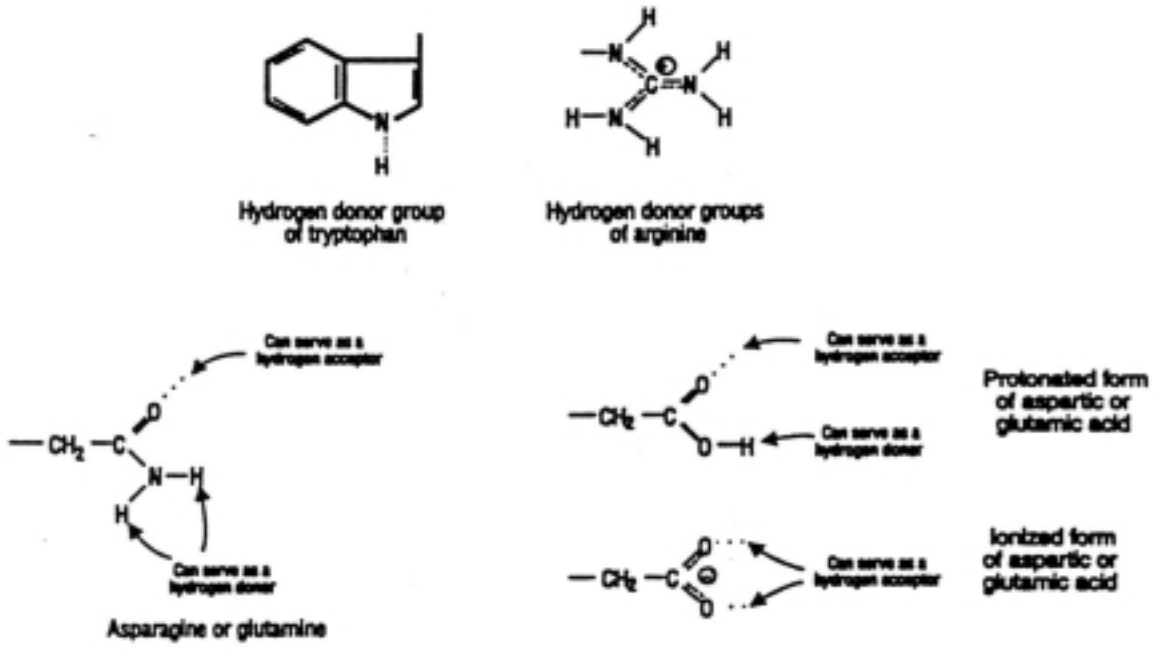


Figure 13
Hydrogen-bonding groups of several side chains in proteins.

POLYPEPTIDE CHAINS CAN REVERSE DIRECTION BY MAKING ß-TURNS

Most proteins have compact, globular shapes due to numerous reversals of the direction of their polypeptide chains. Analyses of the three -dimensional structures of numerous proteins have revealed that many of these chain reversals are accomplished by a common structural element called the *β-turn*. The essence of this hairpin turn is that the CO group of residue (n + 3) (Fig. 14). Thus a polypeptide chain can abruptly reverse its direction. ß-turns are also known as *reverse turns* or *hairpin bends*.

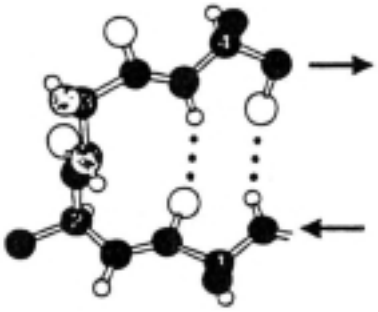


Fig. 14
Structure of a ß-turn. The CO group of residue 1 of the tetrapeptide shown here is hydrogen bonded to the NH group of residue 4, which results in a hairpin turn.

We can see that there is a relation of the amino acid sequence of a protein on ribonuclease. Ribonuclease is a single polypeptide chain that consists of 124 amino acid residues. Ribonuclease has four disulfide bonds that can be cleaved reversibly by reducing them with such an agent as ß-mercaptoethanol. This will form mixed disulfides with cysteine side chains. Thus it can help to repair certain RNA disturbances. In the presence of an excess of ß-mercaptoethanol the mixed disulfides will be reduced, and there will be a resultant of a protein in which the disulfides and cystines are fully converted into sulfahydrols and cysteines.

It has been discovered that ribonuclease at 37° C and a pH of 7 cannot be readily reduced by the ß-mercaptoethanol unless the protein is partially enfolded by agents such as urea arguanadine hydrochloride. The mechanism is not completely understood, but has quantic implications. Experiments have proven that the information needed to specify the complex three-dimensional structure of the ribonuclease is contained in its amino acid sequence. Other studies have shown that other proteins also have sequence-specific conformation.

There have been 104 wrong pairings found in scrambled ribonuclease. Then it was found that this scrambled ribonuclease will spontaneously convert into a fully active natoribonuclease when trace amounts of the ß-mercaptoethanol were added to the oquious solution surrounding the protein. Thus the added trace amounts of the ß-mercaptoethanol, which in large amounts have a denaturing effect on the ribonuclease, can have a very stabilizing effect, and return the structure to a native structure, usually within about ten hours in a laboratory experiment.

The process of accomplishing this is driven wholly by a decrease in free energy as the scrambled conformations are converted into stable native enzymes. The native form of ribonuclease appears to be thermodynamically the most stable structure. Anfinsen (1964) wrote o this, "It struck me recently that one should really consider the sequence of a protein molecule, about to fold into a precise geometric form, as a line of melody written in canon form and so designed by Nature to fold back upon itself, creating harmonic chords of interaction consistent biological function. One might carry the analogy further by suggesting that the kinds of chords formed in a protein with scrambled disulfide bridges, such as I mentioned earlier, are dissonant, but that, by giving an opportunity for rearrangement by the addition of mercaptoethanol, they modulate to give the pleasing harmonies of the native molecule. Whether or not some conclusion can be drawn about the greater thermodynamic stability of Mozart's over Schoenberg's music is something I will leave to the philosophers of the audience."

Thus, as we have proven in biology, there can be a dose response curve that can have paradoxical effects from low amounts to high amounts, and the ß-mercaptoethanol offers biology and homeopathy an interesting form of treatment to help correct some of the metabolic problems caused by dysfunctioning RNA. It must be noted that mercaptoethanol is a very potent, very odorous compound. Extremely small amounts can produce vast odors, causing dramatic disturbances. One drop of mercaptoethanol was powerful enough to close an entire pharmaceutical unit and make twelve employees go home because of the extreme odor. Thus in trace amounts this formula can be very prolific and powerful, and it can help to balance RNA and protein metabolism. With this in mind, the experimenters recommend a 9x to 12x of mercaptoethanol to produce the desired effects.

All reactions in biological systems are catalyzed by proteins which we call enzymes. Enzymes and proteins have an extreme energetic component, and have magnetic influence, as well as electrical influence. The catalytic power of proteins comes from their capacity to bind substrate molecules in precise orientation, and to stabilize transition states in the making and breaking of the chemical bonds. The interaction of these proteins, being energetic as well as chemical, can be understood in the quantic system, and also through our energetic medicine. Any of a million examples would be enough to prove this point.

The amino acid sequence determines the quality of the protein, and this is determined by the different genes. Thus the RNA and DNA set up a sequence of amino acid sequences, which is controlled by heredity and determines the rest of biology.

AMINO ACID SEQUENCES PROVIDE MANY KINDS OF INSIGHTS

1. *The sequence of a protein of interest can be compared with all other known ones to ascertain whether significant similarities exist. Does this protein belong to one of the established families?* For example, myoglobin and hemoglobin belong to the globin family. Chymotrypsin and trypsin are members of the serine protease family, a clan of proteolytic enzymes that have a common catalytic mechanism based on a reactive serine residue. A search for kinship between a newly sequenced protein and several thousand previously sequenced ones takes about twenty minutes on a personal computer. Quite unexpected results sometimes emerge from such comparisons. For example, a viral protein that produces cancer in susceptible hosts was found to be nearly identical to a normal cellular growth factor. This startling finding advanced the understanding of both oncogenic viruses (cancer-producing viruses) and the normal cell cycle. Comparison of amino acid sequences has also revealed that many larger proteins of higher organisms are built of domains that have come together by the fusion of gene segments. Proteins with new properties have arisen from novel combinations of these modules.

2. *Comparison of sequences of the same protein in different species yields a wealth of information about evolutionary pathways.* Genealogical relations between species can be inferred from sequence differences between their proteins, and the time of divergence of two evolutionary lines can be estimated because of the clocklike nature of random mutations. For example, a comparison of serum albumins of primates indicates that human beings and African apes diverged only five million years ago, not thirty million years ago as was previously thought. These sequence analyses have opened a new perspective on the fossil record and the pathway of human evolution.

3. *Amino acid sequences can be searched for the presence of internal repeats.* Many proteins apparently have arisen by duplication of a primordial gene followed by its diversification. For example, antibody molecules are built of a series of similar domains, each consisting of about 108 residues (Fig 15). Each 25-kd light chain of antibodies is constructed from two of these

modules, and each 50-kd heavy chain from four of them. The amino acid sequences of proteins express their evolutionary history.

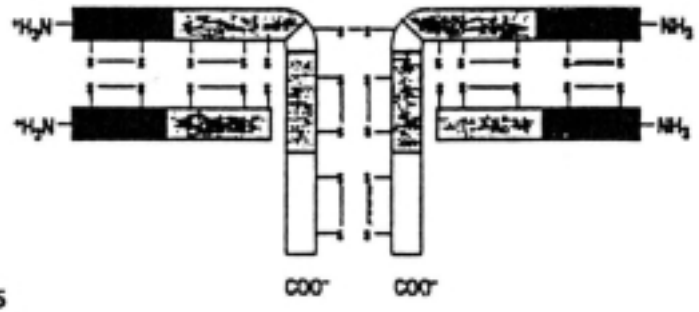


Figure 15
Antibody molecules consist of domains that are variations on a common theme produced by gene duplication and diversification. The pattern of disulfide bonds within the domains has been highly conserved.

4. *Amino acid sequences contain signals that determine the destination of proteins and control their processing.* Many proteins designed for export from a cell or for a membrane location contain a signal sequence, a stretch of about twenty hydrophobic residues near the amino terminus. Potential sites for the addition of carbohydrate units to asparagine residues can be identified by finding Asn-X-Ser and Asn-X-Thr in the sequence (X denotes any residue). Pairs of basic residues, such as Arg-Arg, mark potential sites of proteolytic cleavage, as in proinsulin, the precursor of insulin.

5. *Sequence data provide a basis for preparing antibodies specific for a protein of interest.* Specific antibodies can be very useful in determining the amount of a protein, ascertaining its distribution within a cell, and cloning its gene.

6. *Amino acid sequences are also valuable for making DNA probes that are specific for the genes encoding the corresponding proteins.* Protein sequencing is an integral part of molecular genetics, just as DNA cloning is central to the analysis of protein structure and function.

Another type of protein that can be described is the antibody. Antibodies can be quantitated, localized and highly specific.

PROTEINS CAN BE QUANTITATED AND LOCALIZED BY HIGHLY SPECIFIC ANTIBODIES

An *antibody* is a protein synthesized by an animal in response to the presence of a foreign substance, called an *antigen*. Antibodies (also called *immunoglobulins*) have specific affinity for the antigens that elicited their synthesis. Proteins, polysaccharides, and nucleic acids are effective antigens. Antibodies can also be formed to small molecules, such as synthetic peptides, provided that the small molecules are attached to a macromolecular carrier. The group recognized by an antibody is called an *antigenic determinant* (or *epitope*). Animals have a very large repertoire of antibody-producing cells, each producing antibody of a single specificity. An antigen acts by stimulating the proliferation of the small number of cells that were already forming complementary antibody. The major type of antibody in blood plasma is *immunoglobulin G*, a 150-kd protein containing two identical sites for the binding of antigen (Fig. 16).

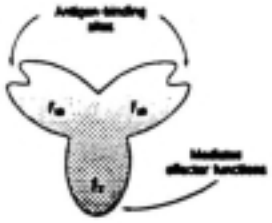


Figure 16
Diagram of immunoglobulin G (IgG), the major class of antibody molecules in blood plasma. IgG contains two antigen-binding F_{ab} units and an F_c unit that mediates effector functions such as the lysis of cell membranes.

Antibodies that recognize a particular protein can be obtained by injecting the protein into a rabbit twice, three weeks apart. Blood is drawn from the immunized rabbit several weeks later and centrifuged. The resulting serum, called an *antiserum*, usually contains the desired antibody. The antiserum or its immunoglobulin G fraction can be used directly. Alternatively, antibody molecules specific for the antigen can be purified by affinity chromatography. Antibodies produced in this way are *polyclonal*-- that is, they are products of many different populations of antibody-producing cells and hence differ somewhat in their precise specificity and affinity for the antigen. A major advance of recent years is the discovery of a means of producing *monoclonal antibodies* of virtually any desired specificity. Monoclonal antibodies, in contrast with polyclonal ones, are homogeneous because they are synthesized by a population of identical cells (a clone). Each such population is descended from a single *hybridoma cell* formed by fusing an antibody-producing cell with a tumor cell that has the capacity for unlimited proliferation.

Closely related proteins can be distinguished by antibodies; indeed, a difference of just one residue on the surface can be detected. Antibodies can be used as exquisitely specific analytic reagents to quantitate the amount of a protein or other antigen. In a *solid-phase immunoassay*, antibody specific for a protein of interest is attached to a polymeric support such as a sheet of polyvinylchloride. A drop of cell extract or a sample of serum or urine is laid on the sheet, which is washed after formation of the antibody-antigen complex. Antibody specific for a different site on the antigen is then added, and the sheet is again washed. This second antibody carries a radioactive or fluorescent label so that it can be detected with high sensitivity. The amount of second antibody bound to the sheet is proportional to the quantity of antigen in the sample. The sensitivity of the assay can be enhanced even further if the second antibody is attached to an enzyme such as alkaline phosphatase. This enzyme can rapidly convert an added colorless substrate into a colored product, or a nonfluorescent substrate into an inversely fluorescent product. Less than a nanogram (10^{-9} g) of a protein can readily be measured by such an *enzyme-linked immunosorbent assay* (ELISA), which is rapid and convenient. For example, pregnancy can

be detected within a few days after conception by immunoassaying urine for the presence of human chorionic gonadotropin (hCG), a 37-kd protein hormone produced by the placenta.

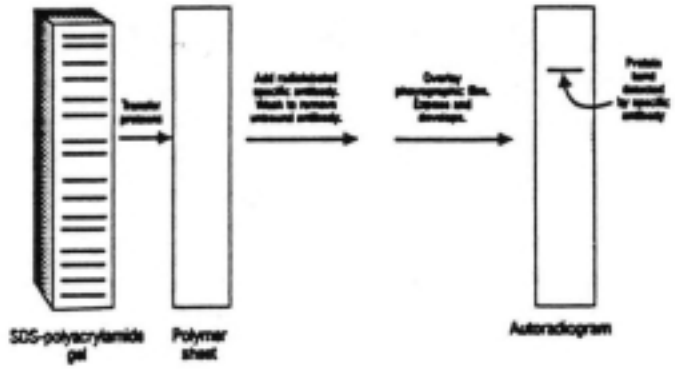


Figure 17
Detection of a protein on a gel by Western blotting. Proteins on an SDS-polyacrylamide gel are transferred to a polymer sheet and stained with radioactive antibody. A dark band corresponding to the protein of interest appears in the autoradiogram.

Very small quantities of a protein of interest in a cell or in body fluid can be detected by an immunoassay technique called *Western blotting* (Fig. 17). A sample is electrophoresed on an SDS polyacrylamide gel. The resolved proteins on the gel are transferred (by blotting) to a sheet to make them more accessible for reaction with a subsequently added antibody that is specific for the protein of interest. The antibody-antigen complex on the sheet then can be detected by rinsing the sheet with a second antibody specific for the first (e.g., goat antibody that recognizes mouse antibody). A radioactive label on the second antibody produces a dark band on x-ray film (an autoradiogram). Alternatively, an enzyme on the second antibody generates a colored product, as in the ELISA method. Western blotting makes it possible to find a protein in a complex mixture, the proverbial needle in a haystack. This technique is used advantageously in the cloning genes.

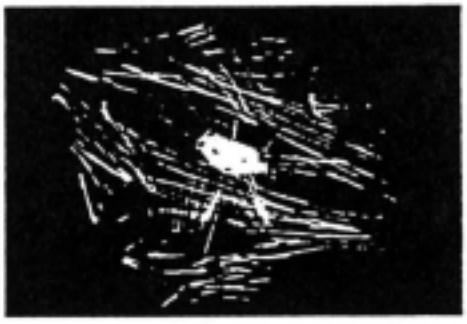


Figure 18
Fluorescence micrograph of actin filaments in a cell stained with an antibody specific to actin.

Antibodies are also valuable in determining the spatial distribution of antigens. Cells can be stained with fluorescent-labeled antibodies and examined by *fluorescence microscopy* to reveal the localization of a protein of interest. For example, arrays of parallel bundles are evident in cells stained with antibody specific for action, a protein that polymerizes into filaments (Fig 18). Active filaments are constituents of the cytoskeleton, the internal scaffold of cells that controls their shape and movement. The finest resolution of fluorescence microscopy is about 0.2 μm (200 nm or 2000 Å) because of the wavelength of visible light. Finer spatial resolution can be achieved by electron microscopy using antibodies tagged with electron-dense markers. For example,

ferritin conjugated to an antibody can readily be visualized by electron microscopy because it contains an electron-dense core of iron hydroxide. Clusters of gold can also be conjugated to antibodies to make them highly visible under the electron microscope. *Immunoelectron microscopy* can define the position of antigens to a resolution of 10 nm (100 Å) or finer (Fig. 19).

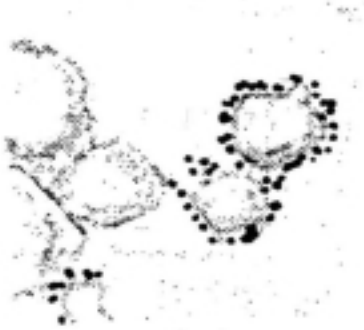


Figure 19
The opaque 150 Å (15 nm) diameter particles in this electron micrograph are clusters of gold atoms bound to antibody molecules. These membrane vesicles from the synapses of neurons contain a channel protein that is recognized by the specific antibody.

QUANTUM BIOPHYSICS

RNA and DNA, the molecules of heredity, also are composed of many different factors. The DNA molecules carry the genetic information. The sugar and phosphate groups perform a very structural role and supply the backbone of this DNA system. Thus DNA is a very long, very skinny macromolecule that is made up of deoxyribonucleotides. Each is composed of a base, a sugar and a phosphate group.

DNA polymerases are the enzymes that allow DNA to replicated itself. The polymerases take instructions from the DNA templates. These polymerases also are specific enzymes that allow DNA to replicate. This replication must happen with an error of less than one per million in order to produce stable biology (see *Quantum Biology* and *Bio-Quantum Matrix*).

The genes of cells are made of DNA. Some viruses have RNA components in their cells, but most cells' genes are composed of DNA components. Thus DNA is a large molecule composed of deoxyribonucleotide units. The nucleotide will consist of a sugar, a phosphate group and a nitrogenous base. The sugar of DNA is deoxyribose. *Deox* demonstrates that the sugar lacks oxygen, because it is deoxyfied. Oxygen is present in the ribose, or the RNA component. The nitrogenous compound of the DNA is a derivative of *purine* or *pyrimidine*.

In DNA the purines can be *adenine*, *guanine*, *thymine*, or *cytosine*. These components of our DNA can be deficient in certain systems. Thus in homeopathy we can use the purines and pyrimidines of these different coding compounds to supply the needed material for DNA replication, construction and metabolism. Thus, as we've shown before with our mercaptoethanol, homeopathy might also supply some of the trace amounts of these compounds needed for genetic nutrition. In a deoxyribonucleotide, the first carbon atom of deoxoribose is bonded to the pyrimidine or the purine.

Thus these four compounds supply a four-part system of mathematics that allow for the different genetic codes. In the binary system of computers we use a 0-1 coding system that allows us to generate different numbers or letters. In DNA, instead of having a 0-1 component, we have a four-part system of the adenine, guanine, thymine and cytosine; thus supplying a very complicated yet quantic type of system that allows for DNA utilization. This is definitely quantic as Schrödinger supposed, and which we have proven in our *Quantum Biology* books. Half a thymine will not suffice; there is an entire thymine, guanine, adenine or cytosine. Half parts will not work.

The four nucleotide units in DNA are called *deoxyadenosine*, *deoxyguanosine*, *deoxythymidine*, and *deoxycytidine*. The nucleotide is a phosphide ester of the nucleoside. *Deoxyadenosine-5' triphosphate*, known as dATP, is an activated precursor in the synthesis of DNA. This can help supply the different energy. The number 5 tells us the atom of sugar, where the unprime number of the atom of the purine and pyrimidine ring appears. The d in front of the ATP tells us that there is no oxygen and that this is a sugar of deoxyribose. This distinguishes it from regular ATP, which is a ribose sugar used to supply energy.

The backbone of DNA is the phosphate groups linked to the deoxyribose. Thus these different sugars are joined in different bonds with the phosphodiesters in a bridge that allows for the structure of the DNA. The variable part of the DNA is the sequence of the four kinds of bases: A, G, C and T. Thus the nucleotide units are deoxified, and then allow for the structure ir the DNA. The DNA chain has polarity, and definitely has magnetic and electrostatic capacities.

Watson and Crick had the theory of a *double helix*. Some of the results of their work were

1. Two helical polynucleotide chains are coiled around a common axis. The chains run in opposite directions.

2. The purine and pyrimidine bases are on the inside of the helix, whereas the phosphate and deoxyribose units are on the outside. The planes of the bases are perpendicular to the helix axis. The planes of the sugars are nearly at right angles to those of the bases.

3. The diameter of the helix is 20 Å. Adjacent bases are separated by 3.4 Å along the helix axis and related by a rotation of 36 degrees. Hence, the helical structure repeats after ten residues on each chain; that is, at intervals of 34 Å.

4. The two chains are held together by hydrogen bonds between pairs of bases. Adenine is always paired with thymine. Guanine is always paired with cytosine.

5. The sequence of bases along a polynucleotide chain is not restricted in any way. *The precise sequence of bases carries the genetic information.*

The most important aspect of the DNA double helix is the specificity of the pairing of bases. Watson and Crick deduced that adenine must pair with thymine, and guanine with cytosine, because of steric and hydrogen-bonding factors.

Table 5
Sizes of DNA molecules

Organism	*Base pairs (in thousands, or kb)*	*Length (μm)*
Viruses		
Polyoma or SV40	5.1	1.7
λ phage	48.6	17
T2 phage	166	56
Vaccinia	190	65
Bacteria		
Mycoplasma	760	260
E coli	4,000	1,360
Eucaryotes		
Yeast	13.500	4,500
Drosophila	165,000	56,000
Human	2,900,000	990,000

Source: After A. Kornberg, DNA Replication (W. H. Freeman and Company, 1980, p. 20.

RNA TUMOR VIRUSES REPLICATE THROUGH DOUBLE-HELICAL DNA INTERMEDIATES

A number of RNA viruses produce malignant tumors after being injected into susceptible animal hosts. *Rous sarcoma virus* is one of the best-studied members of this group of *RNA tumor viruses*, which contain a single strand of RNA. A striking feature of RNA tumor viruses is that they replicate through *DNA* intermediates (Fig 20). The RNA of the virus particle, called the (+) strand, is delivered into the host cell. This (+) RNA is the template for the synthesis of a complementary (-) DNA strand by a *reverse transcriptase*, an enzyme that is brought into the cell by the virus particle for this special purpose. Reverse transcriptase is an *RNA-directed DNA polymerase*. In this case, genetic information flows from RNA to DNA, the *reverse* of the normal direction of information transfer (hence the name of the enzyme catalyzing this unusual step). The (-) DNA then serves as a template for the synthesis of (+) DNA. The resulting double-helical DNA version of the viral genome becomes incorporated into the chromosomal DNA of the host and is replicated along with the normal cellular DNA in the course of cell division. At some later time, the integrated viral genome is expressed to form viral (+) RNA and viral proteins, which assemble into new virus particles. RNA tumor viruses are also called *retroviruses* because their genetic information flows from RNA to DNA.

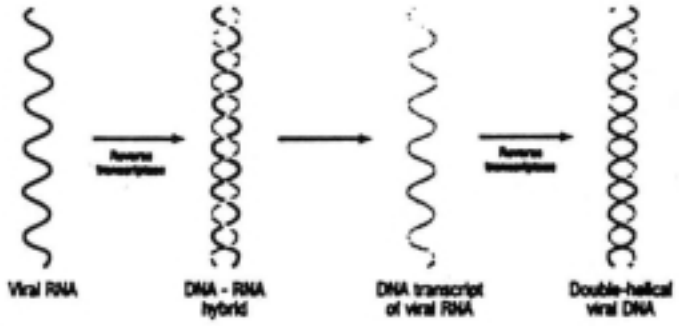


Figure 20
RNA tumor viruses replicate through double-helical DNA intermediates. DNA complementary to viral RNA is synthesized by reverse transcriptase, an enzyme brought into the cell by the infecting virus particle.

SEVERAL KINDS OF RNA PLAY KEY ROLES IN GENE EXPRESSION

RNA is a long, unbranched macromolecule consisting of nucleotides joined by 3' → 5' phosphodiester bonds. As the name indicates, the sugar unit in RNA is ribose. The four major bases in RNA are adenine (A), uracil (U), guanine (G), and cytosine (C). Adenine can pair with uracil, and guanine with cytosine. The number of nucleotides in RNA ranges from as few as seventy-five to many thousands. *RNA molecules are usually single stranded*, except in some viruses. Consequently, an RNA molecule need not have complementary base ratios. In fact, the proportion of adenine differs from that of uracil, and the proportion of guanine differs from that of cytosine, in most RNA molecules. However. However, *RNA molecules do contain regions of double-helical structure that are produced by the formation of hairpin loops* (Fig. 21). In these regions, A pairs with U, and G pairs with C. The base pairing in RNA hairpins is frequently imperfect. G can also form a base pair with U, but it is less strong than the GC base pair. Some of the apposing bases may not be complementary at all, and one or more bases along a single strand may be looped out to facilitate the pairing of the others. The proportion of helical regions in different kinds of RNA varies over a wide range; a value of 50% is typical.

Figure 21
RNA can fold back on itself to form double-helical regions

Cells contain several kinds of RNA (Table 6). *Messenger RNA* (mRNA) is the template for protein synthesis. An mRNA molecule is produced for each gene or group of genes that is to be expressed. Consequently, mRNA is a very heterogeneous class of molecules. In *E. coli*, the average length of an mRNA molecule is about 1.2 kb. *Transfer RNA* (tRNA) carries amino acids in an activated form to the ribosome for peptide-bond formation, in a sequence determined by the mRNA template. THere is at least one kind of tRNA for each of the twenty amino acids. Transfer RNA consists of about seventy-five nucleotides (having a mass of about 25 kd), which makes it the smallest of the RNA molecules. *Ribosomal RNA* (rRNA) is the major component of ribosomes, but its precise role in protein synthesis is not yet known. The finding of catalytic RNA makes this question even more intriguing. In *E. coli*, there are three kinds of rRNA, called 23S, 16S, and 5S RNA because of their sedimentation behavior. One molecule of each of these species of rRNA is present in each ribosome. Ribosomal RNA is the most abundant of the three types of RNA. Transfer RNA comes next, followed by messenger RNA, which constitutes only 5% of the total RNA. Eucaryotic cells contain additional small RNA molecules. *Small nuclear RNA* (snRNA) molecules, for example, participate in the splicing of RNA exons. A small RNA molecule in the cytosol plays a role in the targeting of newly synthesized proteins.

Table 6
RNA molecules in *E. coli*

Type	*Relative amount (%)*	*Sedimentation coefficient (S)*	*Mass (kd)*	*Number of Nucleotides*
Ribosomal RNA (rRNA)	80	23	1.2×10^3	3700
		16	0.55×10^3	1700
		5	3.6×10^1	120
Transfer RNA (rRNA)	15	4	2.5×10^1	75
Messenger RNA (mRNA)	5		Heterogeneous	

QUANTUM BIOPHYSICS

FORMULATION OF THE CONCEPT OF MESSENGER RNA

The concept of mRNA was formulated by Francois Jacob and Jacques Monod in a classic paper published in 1961. Because proteins are synthesized in the cytoplasm rather than in the nucleus of eucaryotic cells, it was evident that there must be a chemical intermediate, which they called the structural messenger, specified by the genes. What is the nature of this intermediate? An important clue came from their studies of the control of protein synthesis in *E. coli*. Certain enzymes in *E. coli*, such as those that participate in the uptake and utilization of lactose, are inducible-- that is, the amount of these enzymes increases more than a thousandfold if an inducer (such as isopropyl-thiogalactoside) is present. The kinetics of induction were very revealing. The addition of an inducer elicited maximal synthesis of the lactose enzymes within a few minutes. Furthermore, the removal of the inducer resulted in the cessation of the synthesis of these enzymes in an equally short time. These experimental findings were incompatible with the presence of stable templates for the formation of these enzymes. Hence, Jacob and Monod surmised that *the messenger must be a very short-lived intermediate*. They then proposed that the messenger should have the following properties:

1. The messenger should be a polynucleotide.

2. The base composition of the messenger should reflect the base composition of the DNA that specifies it.

3. The messenger should be very heterogeneous in size because genes (or groups of genes) vary in length. They correctly assumed that three nucleotides code for one amino acid and calculated that the molecular weight of a messenger should be at least a half million.

4. The messenger should be transiently associated with ribosomes, the sites of protein synthesis.

5. The messenger should be synthesized and degraded very rapidly.

It was apparent to Jacob and Monod that none of the known RNA fractions at that time met these criteria. Ribosomal RNA, then generally assumed to be the template for protein synthesis, was too homogeneous in size. Also, its base composition was similar in species that had very different DNA base ratios. Transfer RNA also seemed an unlikely candidate for the same reasons. In addition, it was too small. However, there were suggestions in the literature of a third class of RNA that appeared to meet the above criteria for the messenger. In *E. coli* infected with T2 bacteriophage, there was a new RNA fraction of appropriate size that had a very short half-life. Most interesting, the base composition of this new RNA fraction was like that of the viral DNA rather than like that of *E. coli* DNA.

1. *Ribosomes were not synthesized after infection*, as evidenced by the absence of "light" ribosomes.

2. RNA *was* synthesized after infection. Most of the radioactively-labeled RNA emerged in the "heavy" ribosome peak. Thus *most of the new RNA was associated with preexisting ribosomes*. Additional experiments showed that this new RNA turns over rapidly during the growth of phage.

3. The radioisotope ^{35}S appeared transiently in the "heavy" ribosome peak, which showed that *new proteins were synthesized in preexisting ribosomes*.

These experiments led to the conclusion that *ribosomes are nonspecialized structures which synthesize, at a given time, the protein dictated by the messenger they happen to contain.* Studies of uninfected bacterial cells also showed that messenger RNA is the information-carrying link between gene and protein. In a very short time, the concept of messenger RNA became a central facet of molecular biology.

QUANTUM BIOPHYSICS

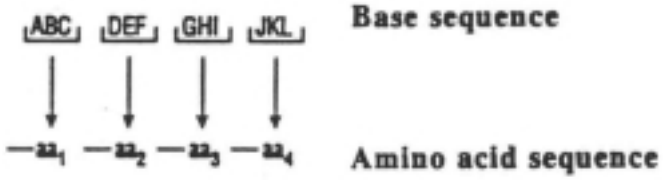
AMINO ACIDS ARE CODED BY GROUPS OF THREE BASES STARTING FROM A FIXED POINT

The *genetic code* is the relation between the sequence of bases in DNA (or its RNA transcripts) and the sequence of amino acids in proteins. Experiments by Francis Crick, Sydney Brenner, and others established the following features of the genetic code by 1961:

1. *What is the coding ratio?* A single-base code can specify only four kinds of amino acids because there are four kinds of bases in DNA. Sixteen kinds of amino acids can be specified by a two-base code (4 x 4 = 16), whereas sixty-four kinds of amino acids can be determined by a three-base code (4 x 4 x 4 = 64). Proteins are built from a basic set of twenty amino acids, and so it was evident from this simple calculation that three or more bases are probably needed to specify one amino acid. Genetic experiments then showed that *an amino acid is in fact coded by a group of three bases*. This group of bases is called a *codon*.

2. *Is the code nonoverlapping or overlapping?* In a nonoverlapping triplet code, each group of three bases in a sequence ABCDEF... specifies only one amino acid-- ABC specified the first, DEF the second, and so forth-- whereas in a completely overlapping triplet code, ABC specifies the first amino acid, BCD the second, CDE the third, and so forth.

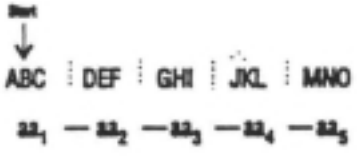
These alternatives were distinguished by studies by studies of the sequence of amino acids in mutants. Suppose that the base C is mutated to C'. In a nonoverlapping code, only amino acid 1 will be changed. In a completely overlapping code, amino acids 1, 2, and 3 will all be altered by a mutation of C to C'. Amino acid sequence studies of tobacco mosaic virus mutants and abnormal hemoglobins showed that alterations usually affected only a single amino acid. Hence, it was concluded that the *genetic code is nonoverlapping*.



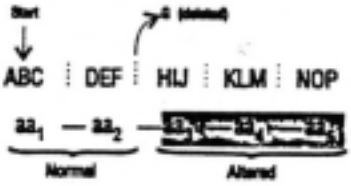
3. *How is the correct group of three bases read?* One possibility a priori is that one of the four bases (denoted as Q) serves as a "comma" between groups of three bases:

...QABCQDEFQGHIQJKLQ...

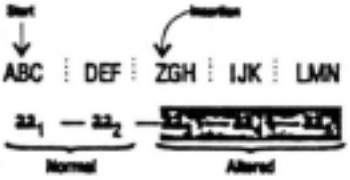
This turned out not be the case. Rather, *the sequence of bases is read sequentially from a fixed starting point*. There are no commas.



Suppose that a mutation deletes base G:



The first two amino acids in the resulting polypeptide chain will be normal, but the rest of the base sequence will be read incorrectly because *the reading frame has been shifted* by the deletion of G. Suppose instead that a base Z has been added between F and G:



This addition also disrupts the reading frame starting at the codon for amino acid 3. In fact, genetic studies of addition and deletion mutants revealed many of the features of the genetic code.

4. As mentioned earlier, there are sixty-four possible base triplets and twenty amino acids. Is there just one triplet for each of the twenty amino acids or are some amino acids coded by more than one triplet? Genetic studies showed that most of the sixty-four triplets do code for amino acids. Subsequent biochemical studies demonstrated that sixty-one of the sixty-four triplets specify particular amino acids. Thus, *for most amino acids, there is more than one code word.* In other words, the genetic code is *degenerate.*

MAJOR FEATURES OF THE GENETIC CODE

All sixty-four codons have been deciphered (Table 7). Sixty-one triplets correspond to particular amino acids, whereas three code for chain termination. Because there are twenty amino acids and sixty-one triplets that code for them, it is evident that the code is highly *degenerate.* In other words, *many amino acids are designated by more than one triplet.* Only tryptophan and methionine are coded by just one triplet. The other eighteen amino acids are coded by two or more. Indeed, leucine, arginine, and serine are specified by six codons each. Under normal physiological conditions, *the code is not ambiguous:* a codon designates only one amino acid.

Codons that specify the same amino acid are called *synonyms.* For example, CAU and CAC are synonyms for histidine. Note that synonyms are not distributed haphazardly throughout the table of the genetic code (Table 7). An amino acid specified by two or more synonyms occupies a single box (unless there are more than four synonyms). The amino acids in a box are specified by codons that have the same first two bases but differ in the third base, as exemplified by GUU, GUC, GUA, and GUG. Thus, *most synonyms differ only in the last base of the triplet.* Inspection of the code shows that XYC and XYU always code for the same amino acid, whereas XYG and XYA usually code for the same amino acid. The structural basis for these equivalences of codons will become evident when we consider the nature of the anticodons of tRNA molecules.

What is the biological significance of the extensive degeneracy of the genetic code? One possibility is that *degeneracy minimizes the deleterious effects of mutations.* If the code were not

degenerate, then twenty codons would designate amino acids and forty-four would lead to chain termination. The probability of mutating to chain termination would therefore be much higher with a nondegenerate code than with the actual code. It is important to recognize that chain-termination mutations usually lead to inactive proteins, whereas substitutions of one amino acid for another are usually rather harmless. *Degeneracy of the code may also be significant in permitting DNA base composition to vary over a wide range without altering the amino acid sequence of the proteins encoded by the DNA.* The [G] + [C] contents could code for the same proteins if different synonyms were consistently used.

Table 7
The genetic code

First position (5' end)	*Second position*				*Third position (3' end)*
	U	C	A	G	
U	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
	Leu	Ser	Stop	Stop	A
	Leu	Ser	Stop	Trp	G
C	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
	Leu	Pro	Gln	Arg	A
	Leu	Pro	Gln	Arg	G
A	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
G	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

Note: Given the position of the bases in a codon, it is possible to find the corresponding amino acid. For example, the codon 5' AUG 3' on mRNA specifies methionine, whereas CAU specifies histidine. UAA, UAG, and UGA are termination signals. AUG is part of the initiation signal, in addition to coding for internal methionines.

START AND STOP SIGNALS FOR PROTEIN SYNTHESIS

It has already been mentioned that *UAA, UAG, and* UGA designate chain termination. These codons are read not be tRNA molecules but rather by specific proteins called release factors. The start signal for protein synthesis is more complex. Polypeptide chains in bacteria start with a modified amino acid-- namely, formylmethionine (fMet). A specific tRNA, the initiator tRNA, carries fMet. This fMet-tRNA recognizes the codon AUG or, less frequently, GUG. However, AUG is also the codon for an internal methionine, and GUG is the codon for an internal valine. Hence, the signal for the first amino acid in the polypeptide chain must be more

complex than for all subsequent ones. *AUG (or GUG) is part of the initiation signal* (Fig. 22). In bacteria, the initiating AUG (or GUG) is preceded several nucleotides away by a purine-rich sequence that base-pairs with a complementary sequence in a ribosomal RNA molecule. In eucaryotes, the AUG closest to the 5' end of an mRNA is usually the start signal for protein synthesis. This particular AUG is read by an initiator tRNA charged with methionine.

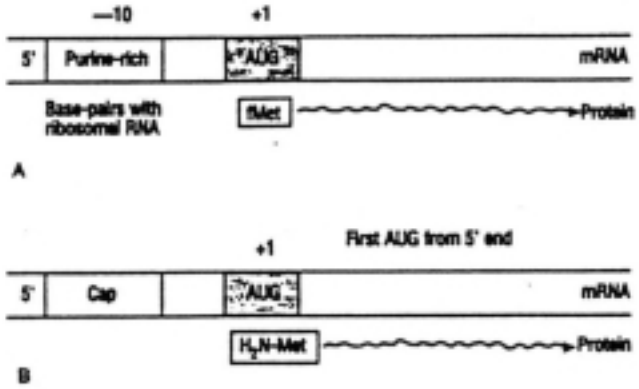


Figure 22
Start signals for the initiation of protein synthesis in (A) procaryotes and (B) eucaryotes. In eucaryotic mRNAs the 5' end, called a cap, contains modified bases.

THE GENETIC CODE IS NEARLY UNIVERSAL

The genetic code was deciphered by studies of trinucleotides and synthetic mRNA templates in cell-free systems derived from bacteria. Is the genetic code the same in all organisms? Analyses of spontaneous and specifically designed mutations in viruses, bacteria, and higher organisms have been highly informative. The base sequences of many solid-type and mutant genes are known, as are the amino acid sequences of their encoded proteins. In each case, the nucleotide change in the gene and the amino acid change in the protein are as predicted by the genetic code. Furthermore, mRNAs can be correctly translated by the protein-synthesizing machinery of very different species. For example, human hemoglobin mRNA is correctly translated by a wheat-germ extract. Bacteria efficiently express recombinant DNA molecules encoding human proteins such as insulin. These experimental findings strongly suggested that the genetic code is universal.

However, there was surprise when the sequence of human mitochondrial DNA became known. Human mitochondria read UGA as a codon for tryptophan rather than as a stop signal (Table 8). Another difference is that AGA and AGG are read as stop signals rather than as codons for arginine, and AUA is read as a codon for methionine instead of isoleucine. Mitochondria of other species, such as those of yeast, also have a genetic code that differs slightly from the standard one. Mitochondria can have a different genetic code from the rest of the cell because mitochondrial DNA encodes a distinct set of tRNAs. Do any cellular protein synthesizing systems deviate from the standard genetic code? Recent studies have revealed that ciliated protozoa read AGA and AGG as stop signals rather than as codons for arginine. Thus, the *genetic code is nearly but not absolutely universal*. Variations clearly exist in mitochondria and in species, such as siliates, that branches off very early in eucaryotic evolution. It is interesting to note that two of the codon reassignments in human mitochondria diminish the information content of the third base of the triplet (e.g., both AUA and AUG specify methionine). Most variations from the standard genetic code are in the direction of a simpler code.

Table 8
Distinctive codons of human mitochondria

Codon	*Standard Code*	*Mitochondrial code*
UGA	Stop	Trp
UGG	Trp	Trp
AUA	Ile	Met
AUG	Met	Met
AGA	Arg	Stop
AGG	Arg	Stop

Why has the code remained nearly invariant through billions of years of evolution, from bacteria to humans? A mutation that altered the reading of mRNA would change the amino acid sequence of most, if not all, of the proteins synthesized by that particular organism. Many of these changes would undoubtedly be deleterious, and so there would be strong selection against a mutation with such pervasive consequences.

PLASMIDS AND LAMBDA PHAGE ARE CHOICE VECTORS FOR DNA CLONING IN BACTERIA

Many plasmids and bacteriophages have been ingeniously modified to enhance the delivery of recombinant DNA molecules into bacteria and to facilitate the selection of bacteria harboring them. *Plasmids* are naturally occurring circular duplex DNA molecules ranging in size from two kilobases to several hundred kilobases. They carry genes for the inactivation of antibiotics, the production of toxins, and the breakdown of natural products. These *accessory chromosomes* can replicate independently of the host chromosome. In contrast with the host genome, they are dispensable under certain conditions. A bacterial cell may have no plasmids at all or it may house as many as twenty copies of a plasmid.

One of the most useful plasmids for cloning is pBR322, which contains genes for resistance to tetracycline and ampicillin (an antibiotic like penicillin). This plasmid can be cleaved at a variety of unique sites by different endonucleases, and DNA fragments inserted. Insertion of DNA at the EcoRI restriction site does not alter either of the genes for antibiotic resistance (Fig. 23). However, insertion at the HidIII, SAII, or BamHI restriction site inactivates the gene for tetracycline resistance, an effect called *insertional inactivation*. Cells containing pBR322 with a DNA insert at one of these restriction sites are resistant to ampicillin but sensitive to tetracycline, and so they can be readily *selected*. Cells that failed to take up the vector are sensitive to both antibiotics, whereas cells containing pBR322 without a DNA insert are resistant to both.

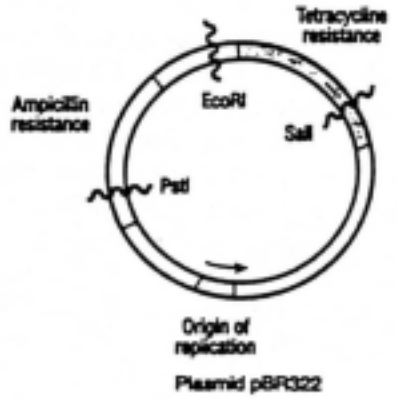


Figure 23
Genetic map of pBR322, a plastoid with two genes for antibiotic resistance.

Lambda (λ) *phage* is another widely-used vector (Fig. 24). This bacteriophage enjoys a choice of life styles: it can destroy its host or it can become part of its host. In the *lytic pathway*, viral functions are fully expressed: viral DNA and proteins are quickly produced and packaged into virus particles, which leads to the lysis (destruction) of the host cell and the sudden appearance of about 100 progeny virus particles, or *virions*. In the *lysogenic pathway*, the phage DNA becomes inserted into the host-cell genome and can be replicated together with host-cell DNA for many generations, remaining inactive. Certain environmental changes can trigger the expression of this dormant viral DNA, which leads to the formation of progeny virus and lysis of the host. Large segments of the 48-kb DNA of λ phage are not essential for productive infection and can be replaced by foreign DNA.

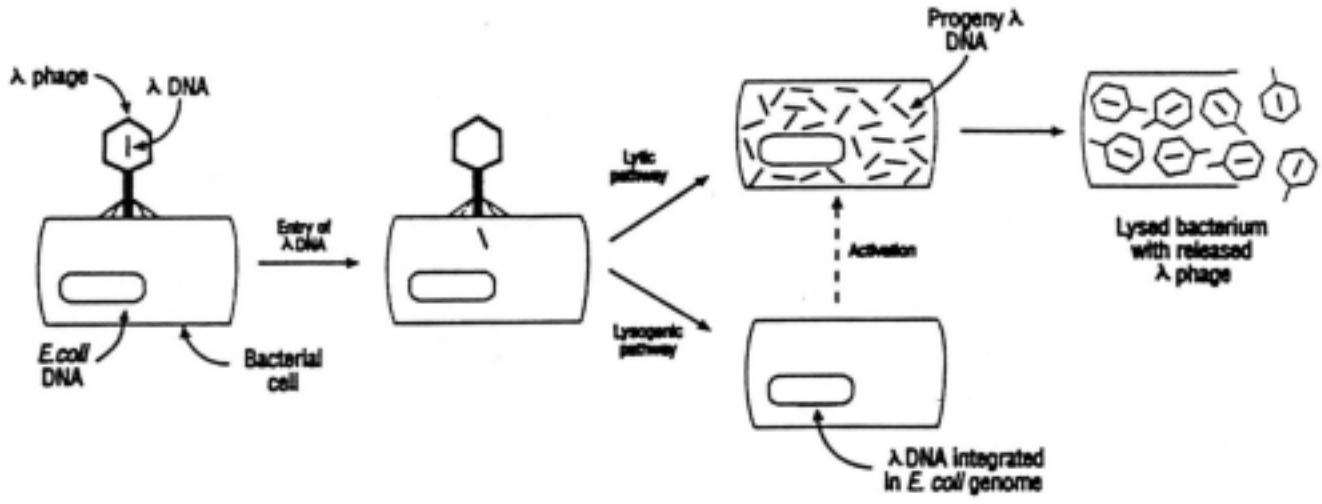


Figure 24
Lamda phage can multiply within a host and lyse it (lysic pathway) or its DNA can become integrated into the host genome (lysogenic pathway), where it is dormant until activated.

Mutant λ phages designed for the cloning of DNA have been constructed. One of the mutants, called λgt-λß, contains only two EcoRI cleavage sites instead of the five normally present (Fig. 25). After cleavage, the middle segment of this λ DNA molecule can be removed. The two remaining pieces of DNA have a combined length equal to 75% of a normal genome length. This amount of DNA is too little to be packaged into a λ particle. The range of lengths that can be readily packaged is from 75% to 105% of a normal genome length. However, *a suitably long DNA insert (such as 10 kb) between the two ends of λ DNA enables such a recombinant DNA molecule (93% of normal length) to be packaged*. Nearly all infective λ particles formed in this way will contain an inserted piece of foreign DNA. Another advantage of using these modified viruses as vectors is that they enter bacteria much more easily than do plasmids. A variety of λ mutants have been constructed for use as cloning vectors. One of them, called a *cosmid*, can serve as a vector for large DNA inserts (up to about 45 kb).

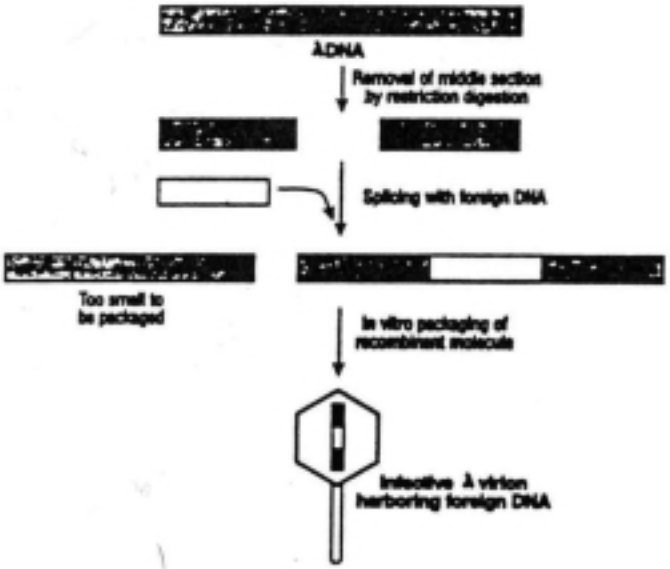


Figure 25
A mutant of λ phage can be used as a closing vector. The packaging process selects DNA molecules that contain an intert.

M13 phage is another very useful vector for cloning DNA. This filamentous virus is 900 nm long and only 9 nm wide (Fig. 26). Its 6.4-kb single-stranded circle of DNA is protected by a coat of 2710 identical protein subunits. M13 enters *E. coli* through the bacterial sex pilus, a protein appendage. The single-stranded DNA in the virus particle (called the + strand) is replicated by a double-stranded replicative form (RF) containing + and - strands, much as in ϕX174. Only the + strand is packaged into new virus particles. About a thousand progeny M13 are produced per generation. A striking feature of M13 is that it does not kill its bacterial host. Consequently, large quantities of M13 can be grown and easily harvested (1 g from 10 liters of culture fluid).

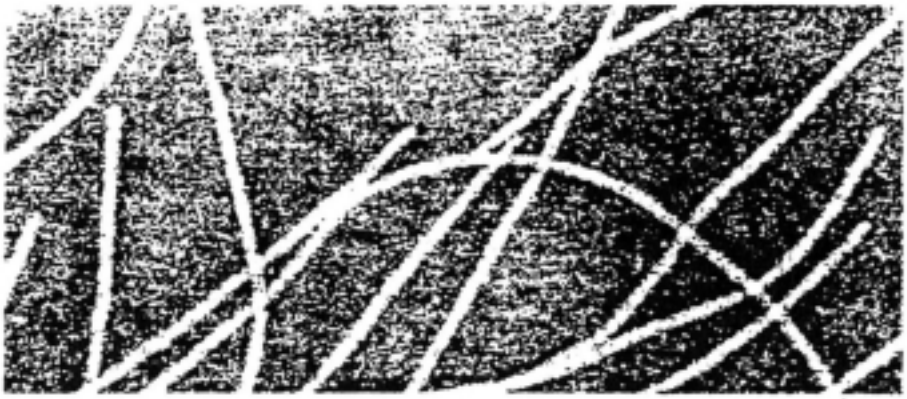


Figure 26
Electron micrograph of M13 filamentous phage.

M13 is prepared for cloning by cutting its circular double-stranded RF at a single site with a restriction enzyme. A double-stranded foreign DNA fragment produced by cleavage with the same restriction enzyme is then ligated to the cut RF ((Fig. 27). The foreign DNA can be inserted into the RF in two different orientations because the ends of both DNA molecules are the same. Hence, half of the new + strands packaged into virus particles will contain one of the strands of the foreign DNA, and half will contain the other strand. Infection of *E. coli* by a single virus particle will yield a large amount of single-stranded M13 DNA containing the same strand of the foreign DNA. The sequence in M13 DNA adjacent to the inserted DNA is known because it is the target for cleavage by the restriction enzyme. Consequently, a synthetic oligonucleotide with a complementary sequence can serve as a primer for dideoxy sequencing of any inserted DNA fragment. M13 is ideal for sequencing but not for long-term propagation of recombinant DNA, because inserts longer than about 1kb are not stably maintained.

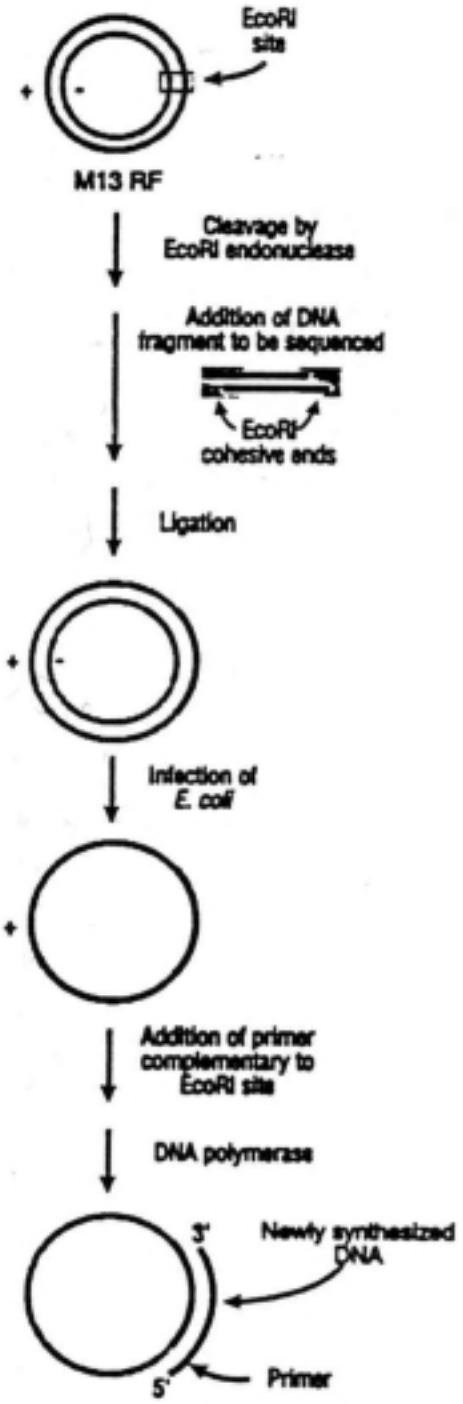


Figure 27
Sequencing by the dideoxy method of a DNA fragment inserted into M13 phage DNA. Synthesis of a new strand is primed by an oligonucleotide that is complementary to the restriction sequence adjacent to the inserted DNA.

TUMOR-INDUCING (TI) PLASMIDS CAN BE USED TO BRING NEW GENES INTO PLANT CELLS

The common soil bacterium *Agrobacterium tumefaciens* infects plants and introduces foreign genes into them (Fig. 28). A lump of tumor tissue called a *crown gall* grows at the site of infection. Crown galls synthesize opines, a group of amino acid derivatives that are metabolized in the infecting bacteria. In essence, the metabolism of the plant cell is diverted to satisfy the highly distinctive appetite of the intruder. The instructions for the synthesis of opines and the switch to the tumor state come from *Ti plasmids* (tumor-inducing plasmids) that are carried by *Agrobacterium*. A small portion of the Ti plasmid becomes integrated into the genome of infected plant cells; this 20-kb segment is called T-DNA (transferred DNA).

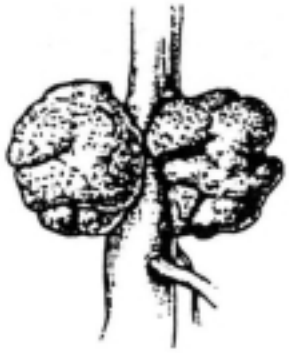


Fig. 28
Crown gall, a plant tumor, is caused by a bacterium (Agrobacterium tumefaciens) that carries a tumor-inducing plasmid (Ti plasmid).

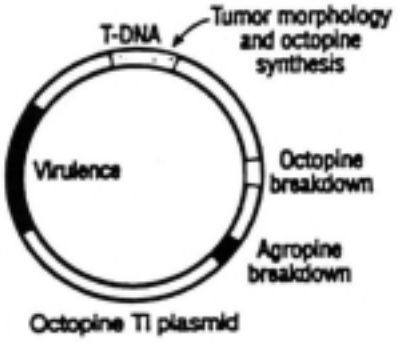


Figure 29
Agrobacteria containing Ti plasmids can deliver foreign genes into some plant cells. [After M. Chilton. A vector for new genes into plant. Copyright © 1983 by Scientific American, Inc. All rights reserved.]

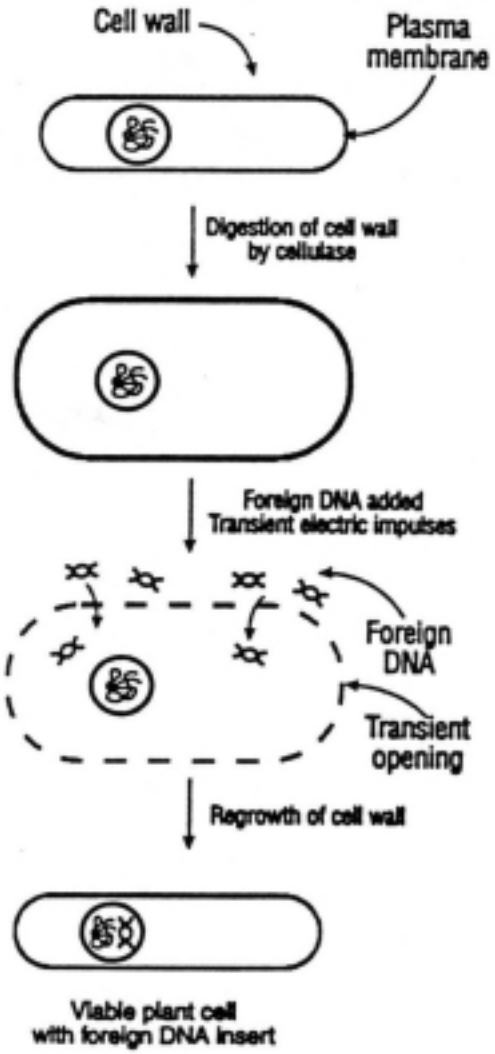


Figure 30
Foreign DNA can be introduced into plant cells by electroporation, applying intense electric fields to make their plasma membranes transiently permeable.

Ti plasmid derivates can be used as vectors to deliver foreign genes into plant cells (Fig. 29). First, a segment of foreign DNA is inserted into the T-DNA region of a small plasmid by restriction enzymes and ligaess. This synthetic plasmid is added to *Agrobacterium* colonies harboring naturally occurring Ti plasmids. By recombination, Ti plasmids containing the foreign gene are formed. These Ti vectors hold great promise for exploring the genomes of plant cells and modifying plants to improve their agricultural value and crop yield. However, they are not suitable for transforming all types of plants. Ti-plasmid transfer works with dicots (broad-leaved plants such as grapes) and a few kinds of monocots but not with economically important cereal monocots.

Foreign DNA has recently been introduced into cereal monocots as well as dicots by applying intense electric fields, a technique called *electroporation* (Fig. 30). First, the cellulose wall surrounding plant cells is removed by adding cellulases; this produces *protoplasts*, plant cells with exposed plasma membranes. Electric pulses then are applied to a suspension of protoplasts and plasmid DNA. Because high electric fields make membranes transiently permeable to large molecules, plasmid DNA molecules enter the cells. The cell wall is then allowed to reform, which results in viable plant cells. Maize cells and carrot cells have been stably transformed in this way with plasmid DNA that includes genes for resistance to antibiotics. Moreover, the plasmid DNA is efficiently expressed by the transformed cells.

THE TWENTY AMINO ACIDS THAT MAKE UP PROTEINS

Amino acids are the basic structural units of proteins. An α-amino acid consists of an amino group, a carboxyl group, a hydrogen atom, and a distinctive R group bonded to a carbon atom, which is called the α-carbon because it is adjacent to the carboxyl (acidic) group (Fig. 31). An R group is referred to as a *side chain* for reasons that will be evident shortly.

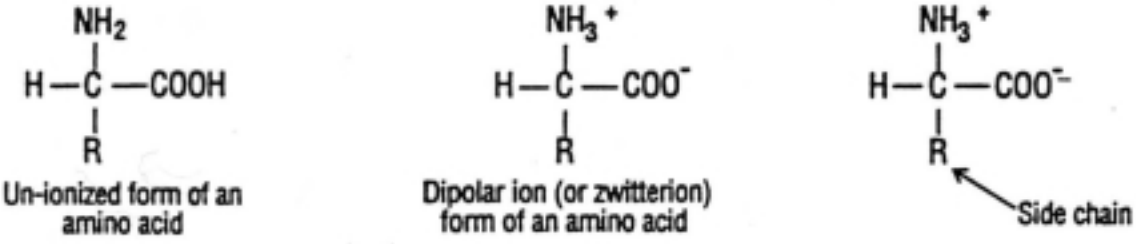


Figure 31
Structure of the un-ionized and zwitterion forms of an α-amino acid.

Amino acids in solution at neutral pH are predominantly *dipolar ions* (or *switterions*) rather than un-ionized molecules. In the dipolar form of an amino acid, the amino group is protonated (-NH_3^+) and the carboxyl group is dissociated (-COO-). The ionization state of an amino acid varies with pH (Fig. 32). In acid solution (e.g., pH I), the carboxyl group is un-ionized (-COOH) and the amino group is ionized (-NH_3^+). In alkaline solution (e.g., pH II, the carboxyl group is ionized (-COO-) and the amino group is un-ionized (-NH_2). For glycine, the p*k* of the carboxyl group is 2.3 and that of the amino group is 9.6. In other words, the midpoint of the first ionization is at pH 2.3, and that of the second is at pH 9.6.

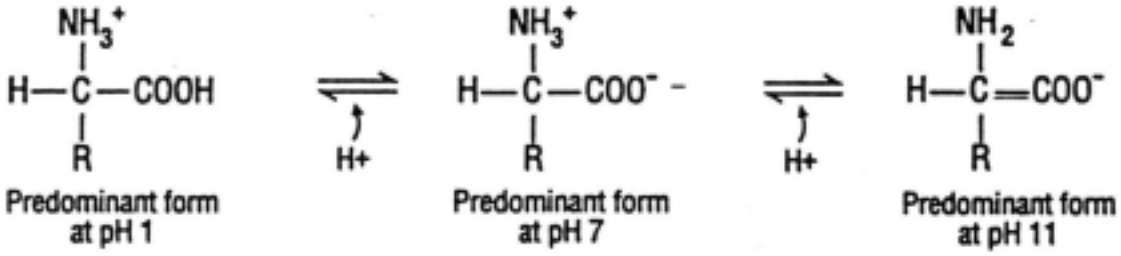


Figure 32
Ionization states of an amino acid depend on pH.

The tetrahedral array of four different groups about the α-carbon atom confers optical activity on amino acids. The two mirror-image forms are called the L-isomer and the D-isomer (Fig. 32). *Only L-amino acids are constituents of proteins.* Hence, the designation of the optical isomer will be omitted and the L-isomer implied in discussions of proteins herein, unless otherwise noted.

Twenty kinds of side chains varying in *size*, *shape*, *charge*, *hydrogen-bonding capacity*, and *chemical reactivity* are commonly found in proteins. Indeed, all proteins in all species, from bacteria to humans, are constructed from the same set of twenty amino acids. This fundamental alphabet of proteins is at least two billion years old. The remarkable range of functions mediated by proteins results from the diversity and versatility of these twenty kinds of building blocks. We

shall explore ways in which this alphabet is used to create the intricate three-dimensional structures that enable proteins to carry out so many biological processes.

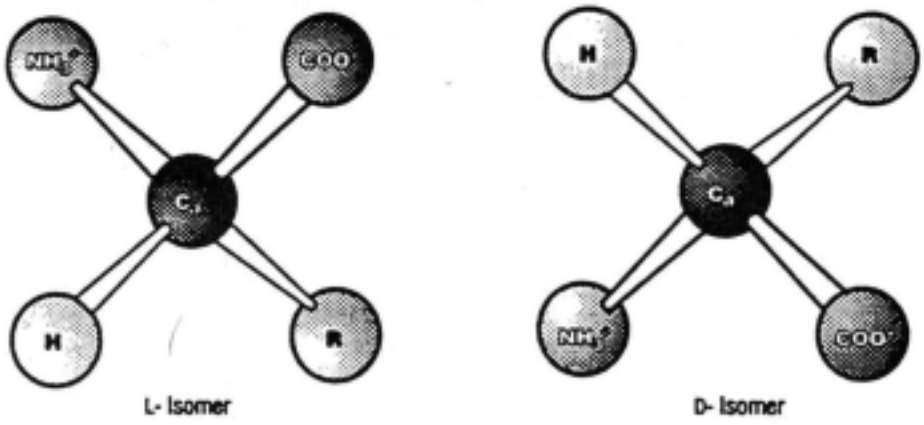


Figure 33
Absolute configurations of the L- and D-isomers of amino acids. R refers to the side chain.

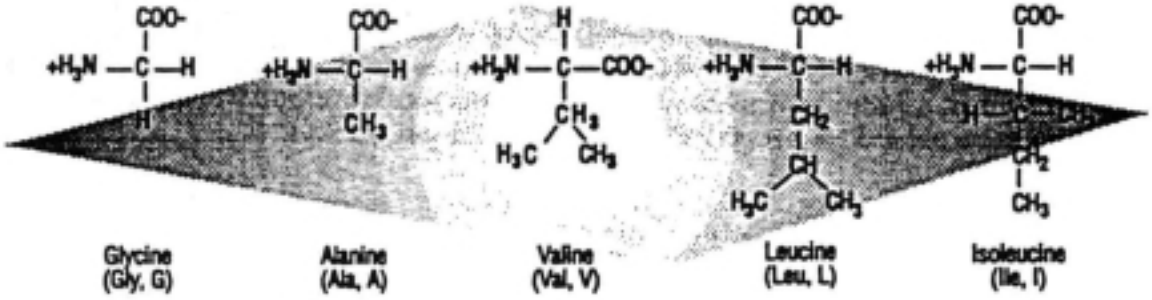


Figure 34
Amino acids having aliphatic side chains.

Let us look at this repertoire of amino acids. The simplest one is *glycine*, which has just a hydrogen atom as its side chain (Fig. 33). *Alanine* comes next, with a methyl group as its side chain. Larger hydrocarbon side chains (three and four carbons long) are found in *valine*, *leucine*, and *isoleucine*. These larger aliphatic side chains are *hydrophobic*-- that is, they have an aversion to water and like to cluster. As will be discussed later, the three-dimensional structure of water-soluble proteins is stabilized by the coming together of hydrophobic side chains to carbon side chains (Fig. 34) enable them to pack together to form compact structures with few holes.

Figure 35
Models of aliphatic amino acids

Proline also has an aliphatic side chain but it differs from other members of the set of twenty in that its side chain is bonded to both the nitrogen and α-carbon atoms. The resulting cyclic structure (Fig. 35) markedly influences protein architecture. Proline, often found in the bends of folded protein chains, is not averse to being exposed to water. Note that proline contains a secondary rather than a primary amino group, which makes it an *imino* acid.

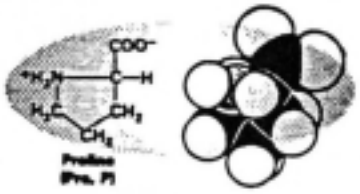


Figure 36
Proline differs from the other common amino acids in having a secondary amino group.

Three amino acids with *aromatic side chains* are part of the fundamental repertoire (Fig. 35). *Phenylalanine*, as its name indicates, contains a phenyl ring attached to a methylene ($-CH_2-$) group. *Tryptophan* has an indole ring joined to a methylene group; this side chain contains a nitrogen atom in addition to carbon and hydrogen atoms.

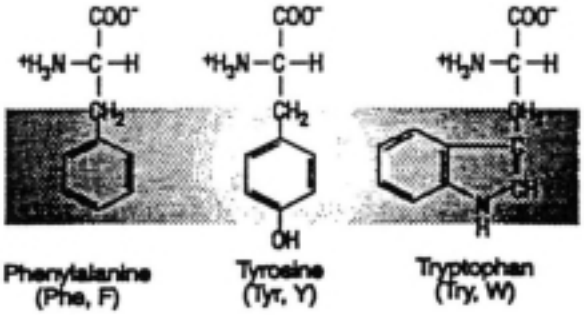


Figure 37
Phenylalanine, tyrosine, and tryptophan have aromatic side chains.

Phenylalanine and tryptophan are highly hydrophobic. The aromatic ring of *tyrosine* contains a hydroxyl group, which makes tyrosine less hydrophobic than phenylalanine. Moreover, this hydroxyl group is reactive, in contrast with the rather inert side chains of all the other amino acids discussed thus far. The aromatic rings of phenylalanine, tryptophan, and tyrosine contain delocalized pi-electron clouds that enable them to interact with other pi-systems and to transfer electrons.

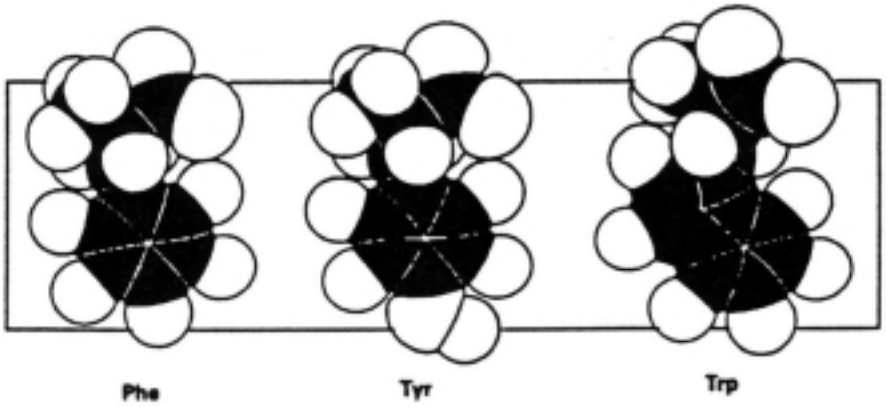


Figure 38
Models of the aromatic amino acids.

A *sulphur atom* is present in the side chains of two amino acids (Fig. 37). *Cysteine* contains a sulfhydryl group (-SH) and *methionine* contains a sulfur atom in a thioether linkage (-S-CH_3). Both of these sulfur-containing side chains are hydrophobic. The sulfhydryl group of cysteine is highly reactive. As will be discussed shortly, cysteine plays a special role in shaping some proteins by forming disulfide links.

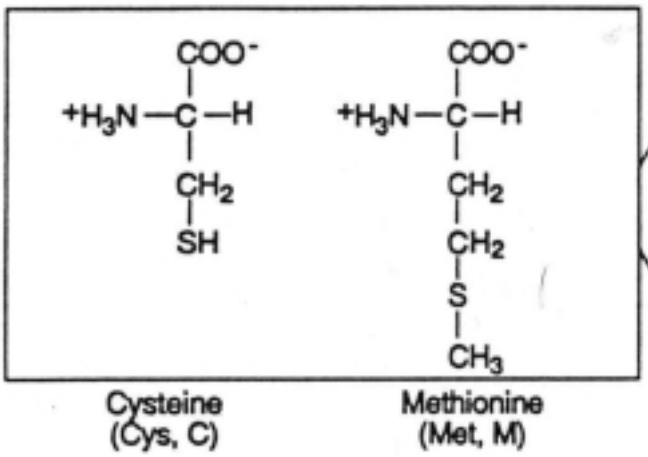


Figure 39
Cysteine and methionine have sulfur-containing side chains.

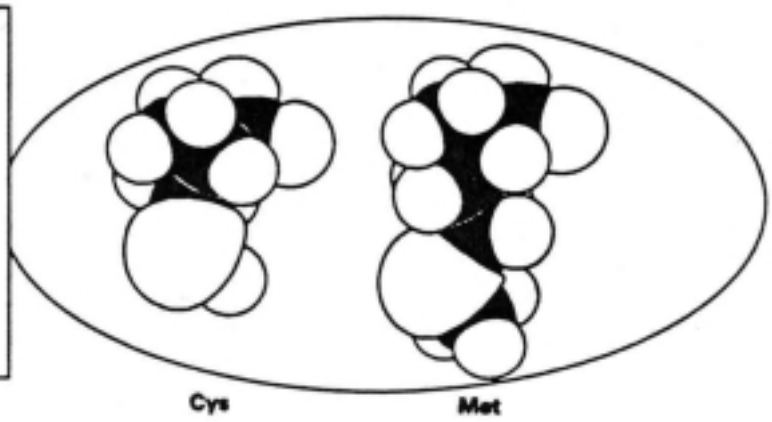


Figure 40
Models of cysteine and methionine.

Two amino acids, *serine* and *threonine*, contain aliphatic *hydroxyl groups* (Fig. 39). Serine can be thought of as a hydroxylated version of alanine, and threonine as a hydroxylated version of valine. The hydroxyl groups on serine and threonine make them much more *hydrophilic* (water-loving) and *reactive* than alanine and valine. Threonine, like isoleucine, contains two centers of asymmetry. All other amino acids in the basic set of twenty, except for glycine, contain a single asymmetric center (the α-carbon atom). Glycine is unique in being optically inactive.

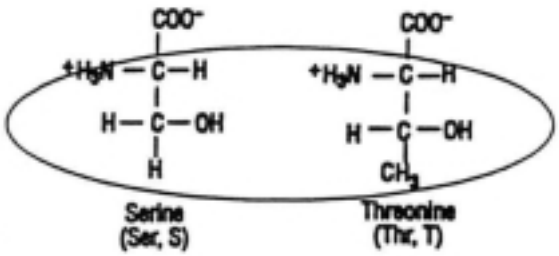


Figure 41
Serine and threonine have aliphatic hydroxyl side chains.

We turn now to amino acids with very polar side chains, which render them highly *hydrophilic*. *Lysine* and *arginine* are *positively charged* at neutral pH. *Histidine* can be uncharged or positively charged, depending on its local environment. Indeed, histidine is often found in the active sites of enzymes, where its imidazole ring can readily switch between these states to catalyze the making and breaking of bonds. These *basic amino acids* are depicted in Fig. 40. The side chains of arginine and lysine are the longest one in the set of twenty.

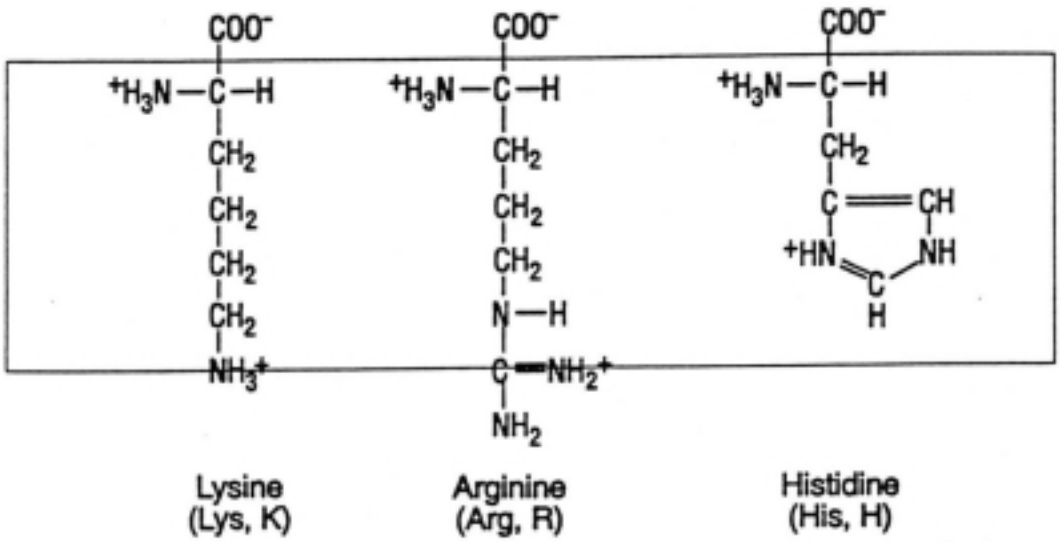


Figure 42
Lysine, arginine, and histidine have basic side chains.

The repertoire of amino acids also contains two with *acidic side chains*, *aspartic acid* and *glutamic acid*. These amino acids are usually called *aspartate* and *glutamate* to emphasize that their side chains are nearly always negatively charged at physiological pH (Fig. 42). Uncharged derivatives of glutamate and asparate are *glutamine* and *asparagine*, which contain a terminal amide group in place of a carboxylate.

Figure 43
Model of arginine. The planar outer part of the side chain, consisting of three nitrogens bonded to a carbon atom, is called a guanidinium group.

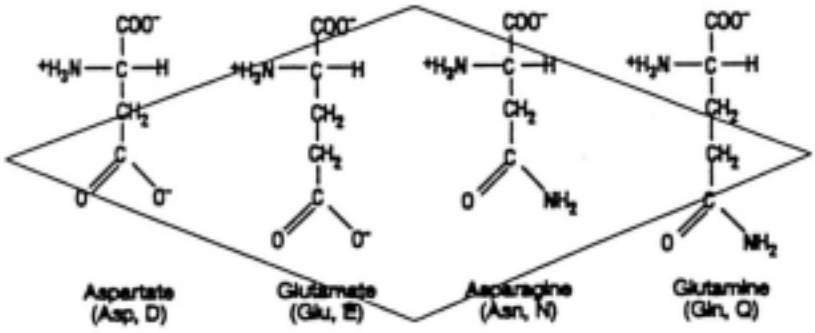


Figure 44
Acidic amino acids (aspartate and glutamate) and their amide derivatives (asparagine and glutamine).

Seven of the twenty amino acids have readily ionizable side chains. Equilibria and typical pK_a values for ionization of the side chains of arginine, lysine, histidine, aspartic and glutamic acids, cysteine, and tyrosine in proteins are given in Table 9. Two other groups in proteins, the terminal α-amino group and the terminal α-carboxyl group, can be ionized.

Figure 45
Model of glutamate.

Amino acids are often designated by either a three-letter abbreviation or a one-letter symbol to facilitate concise communication (Table 10). The abbreviation for amino acids are the first three letters of their names, except for tryptophan (Trp), asparagine (Asn), glutamine (Gln), and isoleucine (Ile). The symbols for the small amino acids are the first letters of their names (e.g., G for glycine and L for leucine); the other symbols have been agreed upon by convention. These abbreviations and symbols are an integral part of the vocabulary of biochemists.

Table 9
p*K* values of ionizable groups in proteins

Group	*Acid* $\rightleftharpoons$ *base* + H^+	*Typical* p*K*′
Terminal carboxyl		3.1
Aspartic and glutamic acid		4.4
Histidine		6.5
Terminal amino		8.0
Cysteine		8.5
Tyrosine		10.0
Lysine		10.0
Arginine		12.0

Table 10
Abbreviations for amino acids

Amino acid	*Three-letter abbreviation*	*One-letter symbol*
Alanine	Ala	A
Arginine	Arg	R
Asparagine	Asn	N
Aspartic acid	Asp	D
Asparagine or aspartic acid	Asx	B
Cysteine	Cys	C
Glutamine	Gln	Q
Glutamic acid	Glu	E
Glutamine or glutamic acid	Glx	Z
Glycine	Gly	G
Histidine	His	H
Isoleucine	Ile	I
Leucine	Leu	L
Lysine	Lys	K
Methionine	Met	M
Phenylalanine	Phe	F
Proline	Pro	P
Serine	Ser	S
Threonine	Thr	T
Tryptophan	Trp	W
Tyrosine	Tyr	Y
Valine	Val	V

$(\cdot)$	Product of fuzzy numbers by max-min convolution
(:)	Division of fuzzy numbers by max-min convolution
$(\wedge)$, $(\vee)$	Minimum (maximum) of fuzzy numbers by max-min convolution
$(+)_n$	Addition modulo n of two fuzzy numbers
$(\cdot)_n$	Multiplication modulo n of two fuzzy numbers
[+]	Addition of hybrid numbers
[a,b]	Interval of confidence
$\mu_A(x)$	Membership function for the element x with respect to the fuzzy subset A (level of presumption), level of a fuzzy number
(a - b)	Interval of confidence modulo 1
$A_n!$	Factorial builds with fuzzy number $A_n!$
(a_1, a_2, a_3)	Representation of a triangular fuzzy number
$\phi(X)$	Function of a fuzzy number X
$\delta(A, B)$	Distance between two fuzzy numbers A and B
$\delta_l(A)$	Left deviation of fuzzy number A
$\delta_r(A)$	Right deviation of fuzzy number A
$\delta(A)$	Deviation of fuzzy number A
$\iota(A, H)$	Agreement index of A with respect to H
poss (A, H)	Possibility of A with respect to H
$\succ$	Partial order relation
$\prec$	Partial order relation
$<$	Strict total order relation
$>$	Strict total order relation
$\in$	Membership
$\notin$	Nonmembership

$\subset$	Inclusion (is a subset of)
$\subset\subset$	Strict inclusion
$\not\subset$	Noninclusion
$\cup$	Union
$\cap$	Intersection
$\varnothing$	Empty subset
$\Rightarrow$	Metaimplication (one also says, usually but improperly, implication)
$\Leftrightarrow$	Logical equivalence
$\exists_x$	Existential qualifier (there exists an x)
iff	If and only if
$\forall_x$	Universal quantifier (for all x)
(a, b)	Interval of **R** "open on the left and on the right", thus $(x \mid a < x < b)$
(a, b]	Interval of **R** "open on the left and closed on the right", thus $(x \mid a < x \leq b]$
[a, b)	Interval of **R** "closed on the left and open on the right", thus $[x \mid a \leq x < b)$
[a, b]	Interval of **R** "closed on the left and on the right", thus $[x \mid a \leq x \leq b]$; one also says segment
max(X, Y)	
or $X \vee Y$	Maximum of X and Y
min(X, Y)	
or $X \wedge Y$	Minimum of X and Y

$\subset$	Inclusion (is a subset of)
$\subset\subset$	Strict inclusion
$\not\in$	Noninclusion
$\cup$	Union
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QUANTUM VIBRATIONAL MEDICINE

INTRODUCTION

Science has learned that our sensory perception is organized so that we actually live in a world of sensory illusion. We can accomplish our daily tasks because of this sensory illusion. Our eyes deceive us; they do not tell us the complete truth about the organization of the world around us. Our brains take in data and eschew it, so that we can exist in this world. Our minds progress into deeper and deeper patterns of psychological and intellectual development.

As we pointed out in *Quantum Biology,* the mind of roan has gone from thinking that the planet is completely flat to realizing that it is round (a three-dimensional sphere), and now man realizes a four-dimensional universe. Many researchers now speculate the existence of ten or more dimensions. This type of psychological, intellectual development brings us increasing data about the universe that our minds could not previously accept. So our hard-headed conservatism and viewpoints of the universe gradually yield to deeper understandings.

Much of science has struggled to accept some of the new electronic and quantum dynamics yielded by modern science. The existence of virtual photons, virtual reality and other dimensions becomes hard to accept in the light of perceptive experiences. Often statistically-lacking events are ignored as scientists try to cling to absolutely reproducible events as truth. In our book, *The Experimental Evidence for Homeopathy, "A* New Statistical Perspective"; we can see that statistics soften, and that many phenomena exist that are always absolutely- reproducible. The world does not exist with this definable property. Now we must look into the existence of the biophoton and the virtual photon, and how they can affect biology. This book is dedicated to the proposition of understanding vibrational medicine techniques through a quantum perspective.

The quantum electrodynamic effect, which was largely attributed to Feynman and won the Nobel Prize, has shaken up the world; now we understand that the photon is an integral agent of the universe, and that the photon can appear from nowhere in virtual form. Thus energy *can* be created from nothing, and the world of thermodynamics must be completely reanalyzed.

In the *Quantum Biology* treatise we show that the laws of thermodynamics do not apply to a biological system. With this new understanding we now want to lock at vibrational medicine. We realize that everything vibrates, and that using vibrational techniques in medicine can have medical implications.

This new description of medicine, physics and biology threatens modern-day understanding, and will develop much resistance. We only hope that the people who read this book and our other books will broaden their minds to this understanding and to a new dynamics.

As we have developed in our other books on *Quantum Biology* we can see that the body is indeed an energetic process. Simple reduction through chemistry (especially synthetic chemistry) is incompatible with the view of the body. In *An Advanced Treatise in Quantum Biology* we showed how the photon is a dynamic connective factor regulating life, metabolism and reproduction. This allows us to see that there is vibration happening in biology, in every aspect involving photons.

In the book *Towards a Bio-Quantum Matrix* we developed an Isaacsonian cataloging system through a quantum analysis, which showed how the matrices control biological function. What the matrices are actually doing is accounting for the transfer of mass, vibration., matter, viscosity and other factors.

Much has been made of vibrational medicine in the press through many alternative books. But what actually *is* the study of vibration? What are the vibrational factors of sound, electromagnetic radiation, light, electrons, protons, ions, mechanical vibration, and all the other different factors? What are their similarities and differences? Can we simply blanket everything under the category of "vibration" and put it all into one bin, or are there many types of vibration that will affect each other'' if so, what *are* the effects?

These are the various factors that we try to uncover in our development of a vibrational medicine. In this book we hope to analyze the theory of vibrations, show the theory in the biological system, and come up with systematic ways of developing vibrational medicine techniques for diagnosis and treatment of patients.

Also in this book we wish to further develop the research started in the *Quantum Biology* and *Bio-Quantum Matrix* books, to point out how the Nelson effect can determine the ability of an organism to affect indeterminacy in another place and time. This shaping of indeterminacy will allow for us to see that that is a key factor in biology, and that as Einstein speculated, "God does not play dice with the universe." 'When the original quantum researchers developed the principles of indeterminacy. they did not see that this indeterminacy could be shaped by consciousness. In Chapter 2 we attempt to outline a direction for a new science in which indeterminacy' is proven to he affected by an outside organism.

Thus total indeterminacy is perhaps an incorrect term; one that appalled Einstein. Einstein said that God does not play dice with the universe. He was right: yet Heisenberg and other indeterminacy quantum physicists were also right: there is indeterminacy happening at small levels. This is outlined in *Quantum Biology.* Yet, the organism seems to be able to shape and affect this indeterminacy.

Thus these two apparently contradictory statements may now be seen as reflections of a truism that can be blended into a new form of science and quantum biology, which now will culminate in the vibrational medicine..

There are three parts to the work done in the last several years by this author. In the *Quantum Biology* book we outline the biophoton effect and how all of the quantum theory, including indeterminacy, must be brought into an

understanding of biology. In *Bio-Quantum Matrix* we continue the discussion by showing that the matrix could be hypothesized where a control factor, or check sheet. or checkerboard could be developed by biology to control its electrons, protons, photon,, amino acids, hormone. enzymes, etc.; and that this type of check sheet must be in a nonlinear, noncontinuous fashion, such as a hermitian matrix. This could then be utilized through the indeterminacy principle in a trinary set of logic to show how biology truly follows.

In this book we will talk about quantifying the indeterminacy effect principle, which we have labeled the *Nelson effect.* It is measurable, discernible, and can be utilized to form a new type of consciousness medicine, which is a blend of many different spiritual, touch, healing, caring types of medicine that have existed before. This book seeks to outline how vibrational medicine can be used in many ways to develop a deeper respect for nature, a reverence for the natural system. and compassion for softer forms of non-synthetic medicine.

Einstein proposed that e = mc^2, and thus showed how matter and energy were simply the same thing in different forms. From this discussion of e = mc^2 we can see that energy and mass arc equivalent in some fashion. The real reason that the table appears solid under your hand is that the electrons which make up the table are traveling at 600 miles per second in their shells. This oscillatory phenomenon is indeed a vibration. 1n fact, some people have offered the opinion that mass dues not exist at all, but is simply energy at a concentrated vibration rate.

We do not yet have a unified field theory that can be connected with all phenomena. Since our knowledge is incomplete, we arc making a guess every time we enter discussions about physics and biology. In this book we wish to make yet another guess at a unified field theory.

Our field theory is based on the idea that biology is the solution for understanding the universe, and that the twenty-three chromosomes are of high importance in our development of a unified field theory. .

As we explore the phenomenon of vibration we also will look at the phenomena of vibrations in biology and their ability to dictate sickness and disease, as well as health. Our exploration will include some techniques that have been developed for vibrational medicine and also some prospects for the future, as well as the unveiling of current devices that are used in vibrational medicine.

Alternative medicine has struggled for years to see its ideas accepted by mainstream medicine. Much of this has to do with practitioners who pretend to be knowledgeable in science but do little to document such knowledge. To this end this author attempts to review the scientific side of hi. writings. This review is often long and laborious. I apologize to those who find this type of mathematical discourse unappealing. My goals are to:

1. Teach these who have no understanding of these areas.

2. Show the establishment that someone in the alternative profession is indeed knowledgeable of science.
3. Document thoroughly the transition in medicine.
4. Offer a scientifically plausible explanation for what many naturopathic, homeopathic, and acupuncture physicians know to be true.

5. Complete the quantum model of medicine, which needs a mathematical model.

Through good science we can make hypotheses that can be challenged with sound clinical statistics (see *The Experimental Evidence for Homeopathy).*

So now let’s explore vibrations and vibrational medicine.

Chapter 1

A NEW PARADIGM OF MEDICINE

In searching for vibrational techniques of diagnosis and treatment we must come upon some new theoretical explanations of the body that might differ from our old Newtonian dynamics, which are taught in most modern medical concepts.

In Dr. Gerber's book, "Vibrational Medicine", we see many different analyses of a new type of system that will have many exciting ramifications. In this book we find an outline of some ways that those same phenomena can be observed in light of modern physics.

Much of modern medicine rejects Einsteinian viewpoints of medicine in that it threatens many incomes, especially those of the synthetic chemical companies, which produce vast amounts of chemicals. This simple view of medicine was generated from a Newtonian model, and it is firmly etched in most doctors' minds as they go through the process of cutting up a cadaver, learning about anatomy, and assuming that the dead are the same as the living. They study disease, not health. They study synthetic vitamins, not natural vitamins. It must be pointed out that there has not been any major research done on the differences between a natural chemical, such as Digitalis, and its synthetic counterpart, Digoxin; or what Valarian might do opposed to Valium. This is a critical challenge to modern medicine (see *Towards a Bio-Quantum Matrix*, Chapter 15; and *The Experimental Evidence for Homeopathy*). Inside these books and other articles, such as "A New Perspective on Research", we see that there are some studies we can review which prove that natural compounds are superior to synthetics in clinical practice.

This severe chemical model limits what can be produced and published in journals. Most peer review journals are comprised by people who have been hand-picked because of their belief in a chemical paradigm. Thus many journals will not publish some of the articles that have been put into our series of books because these books challenge the thoughts of medicine and threaten the incomes of chemical cartels.

Challenging the thoughts of medicine requires proof. Much has happened in medicine that is under a speculation theme. Some factors in our books are also speculative, but it has been our endeavor to try to statistically challenge them whenever possible; not only by experimental double-blinds and placebo testing, but also by looking at factors of how successful a medical technique might be in a population. We also must look at these systems' ability to withstand the test of time. This is why much care has been given in the development of our books to analyze the physics and statistics to bring this understanding into our system. Then we can usher in our new paradigm.

To this end, let us now look at some of the different vibrational medicine techniques; the histories as well as the science that have been utilized in them, so that we can understand them better.

It must be pointed out that there are practitioners throughout the world utilizing these techniques in their medical practices; not experimenting on them, not proposing about them. Patients coming in day to day in large numbers are being treated by these techniques. Many of these techniques are called "quackery" by the establishment because they have not received "scientific validation". Yet day in and day out multitudes are treated, and results are developed beyond placebo.

We need to point out that gravity was real before it was validated scientifically. Many things are actually happening which need not be validated to be true. The vast majority of patients using these avant garde medical techniques are not hurt in any way. There is very little if any iatrogenic disease caused by these alternative vibrational medicine practitioners. In fact, the worst thing they could do would be to deprive their patients of proper medical care when they might need it.

The medical establishment makes much about cases in which children or adult patients die when medicine therapy is not given. Such a case happened in Denver, where a Christian Science family refused medical treatment for their child, using prayer instead. The child died, and the medical establishment sued the parents, as if no child had ever died in a hospital. The statistical truth is that mass numbers of patients including many children die every year in medical hospitals; many with similar conditions to the case in question. In fact, the child mortality rate in medical hospitals is approximately 3%. The child mortality rate of Christian Scientist children is .001%. With this in mind, a truly sophisticated mind would choose the lower statistic. The medical establishment only wins such cases because of its so-called intellectualism.

Years ago inside a maternity ward at a Denver hospital eight children died in the course of one week. The hospital decided that there must have been some infection involved (as the germ theory is usually the first to blame), so they used more harsh cleaners to make sure that the environment was more stable. The next week twelve children died, so they increased the cleaners again, making sure the diapers were absolutely sterile. The next week twenty children died. It was finally realized that the cause of the deaths was the toxic chemicals in the cleaning of diapers and cleaning of other places in the hospital. This situation was not taken to court; no one was prosecuted. Even though a greater number of children died than in the case of the Christian Scientists, still the system seems to try to take care of itself, and the people involved in it have a way of interpreting situations to their own favor.

Since the average person who gets medical care is hurt by that medical care, due either to inappropriate surgery or iatrogenic drug poisoning, we feel that 20% of people who go to modern medicine techniques are dealt with improperly, and are worse for the treatment. Perhaps it is not a bad idea that some of these patients go to vibrational medicine doctors. The vast majority of patients who go to this type of doctor will report that they are satisfied with their therapy. Many see their desired results.

The modern establishment in its analysis will often take the one or two caseloads of patients who might have been hurt or deprived of care and blow their analyses out of proportion. Whenever true statistical work is done to compare these populations in their success rates, we often see that the success rate is at least no different from conventional medicine and, in many studies, has been proven more effective.

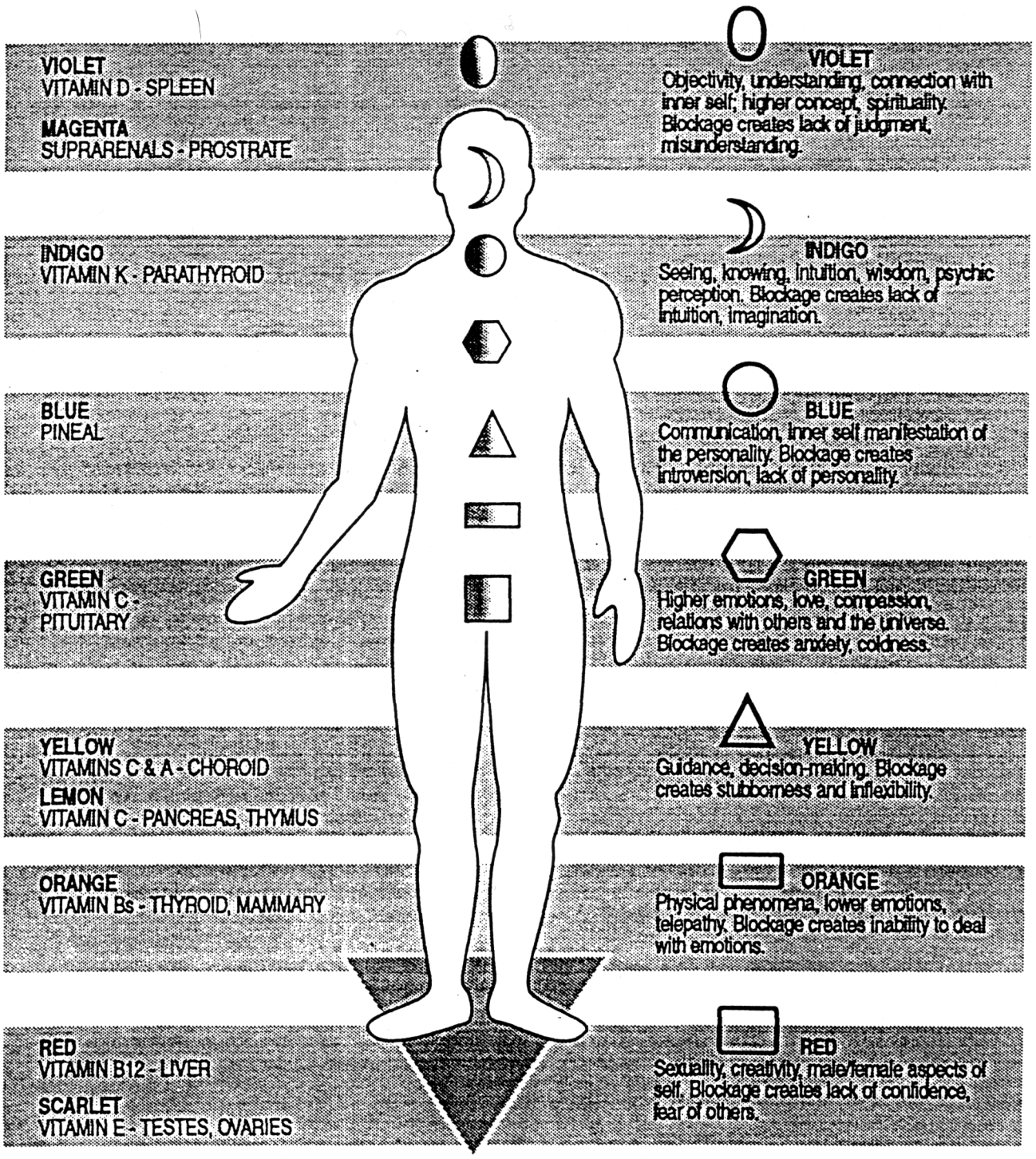
If we want to live by the statistical rule in charting out our techniques and therapies, we should also live by the statistical rule in whether we accept or reject a medical technique. These medical techniques are often rejected by conventional medicine's peer review journals before people really get a chance to look at the statistics and whether or not the study was done properly.

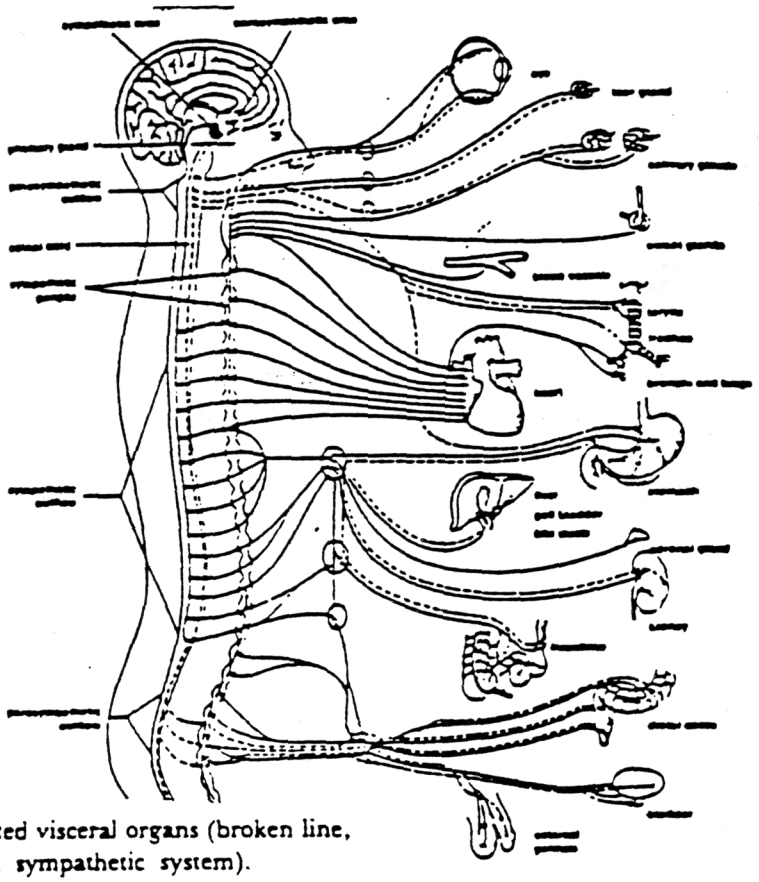
Another severe problem is that these vibrational medicine doctors are often unconventional not only in their beliefs but also in their ability to interact with each other. Ego, self-justification and rationalization fill this industry and prevent these doctors from getting together and sharing ideas.

The alternative societies are filled with companies worried more about profit and short-term finances than in helping patients. In my experience of being in the alternative profession for ten years I have seen that the vast majority of suppliers of devices and compounds are more interested in their money figures than they are in helping patients or in helping a doctor to use legal systems of medicine. To this end it has prevented alternative medicine from really becoming mainstream.

Let us now look at some of the vibrational techniques that are being utilized by practitioners, and briefly review this art. One such system is that of remote viewing, in which the practitioner or psychic is able to enter a different mental state and see things at a distance. In the remote viewing experiments of Targ and Putoff we saw that there was definitely a scientific correlation in their testing. They were able to produce this phenomenon in almost everyone, and certain practitioners were very good at remote viewing. A review should be done at this time on the research and remote viewing of Targ and Putoff.

DIAGRAM OF COLOR ENERGY POINTS (CHAKRAS)





Autonomic nervous system and related visceral organs (broken line, parasympathetic system; solid line, sympathetic system).

Human intuition was also a factor in being able to diagnose medicine by doing remote viewing experiments inside the body. Without the presence of the patient these practitioners were able to go into a trance and diagnose what the conditions were, having only been given the patient's name or an article of their clothing or their being. This is a factor of the indeterminacy principle in their thought forms and their ability to go beyond deterministic physics.

Thus the human body is able to sympathetically pick up these different vibrations in diseases and use these for treatment and diagnosis. The work of Lawrence Lashan quoted in his book, "Mediums, Mystics, and Physicists", as well as well as the work of Dr. Bernard Grad at McGill University, were also able to show that these psychics had abilities in remote viewing. Another issue of medicine that was uncovered by Grad was that of "the healing hands" and the techniques of generating healing forces that had effects on not only biological systems but inanimate systems.

In Dr. Lashan's work he found that he could teach people to actually do remote healings by leaving their bodies in their minds and sending energy through the atmosphere at long distances to heal patients. In one of Lashan's most famous cases that pointed out some intangibility to this, a patient in New York had dramatic cancer. The patient asked Lashan to do a remote healing for him. Lashan, who lived in Seattle, said that he would do so on Sunday night. The doctors were with the patient, diagnosing the cancer. They said that the cancer was inoperable and that the patient had a short time to live. So there was nothing to be lost from remote healing. On Monday the patient awoke and felt great. The doctors found that all cancer was gone, and that total healing had been done. Excited, they called Lashan and said that the results were phenomenal and that they wanted Lashan to write a journal article about this and present it. Lashan said that this was great news, but that he had forgotten to do the healing the night before. This tells us that there are many different dynamics in our testing, and that often placebo response needs to be accounted for.

One of the great systems of medicine that also must be dealt with is *chakra*, the energy fields associated with energy vortexes around the body. This was devised and taught within the system of Hindu and Aravadic medicine, in which it was found that chakra existed. As we point out in Chapter 2, these chakra actually focus consciousness energies that are designed to help resist entropic thermodynamic breakdown in one fashion or another. These chakra were subtle energy spots utilized in medicine by various healers.

NEUROPHYSIOLOGICAL AND ENDOCRINE ASSOCIATIONS OF THE CHAKRAS

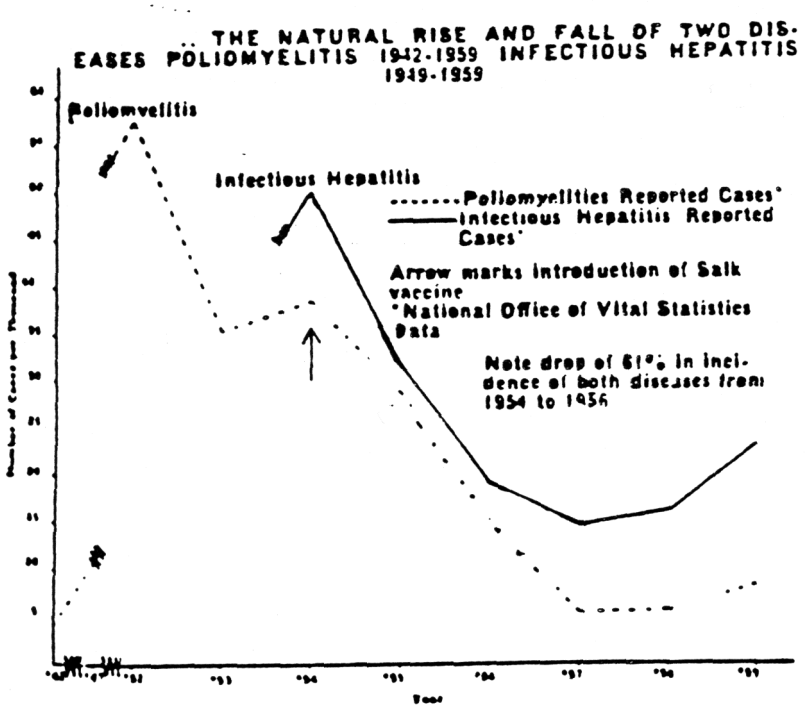
CHAKRA	NERVE PLEXUS	PHYSIOLOGICAL SYSTEM	ENDOCRINE SYSTEM
COCCYGEAL	Sacral-Coccygeal	Reproductive	Gonads
SACRAL	Sacral	Genitourinary	Leydig
SOLAR PLEXUS	Solar	Digestive	Adrenals
HEART	Heart Plexus	Circulatory	Thymus
THROAT	Cervical Ganglia Medulla	Respiratory	Thyroid
THIRD EYE	Hypothalamus Pituitary	Autonomic Nervous System	Pituitary
HEAD	Cerebral Cortex Pineal	CNS Central Control	Pineal

So we can see that there is an implication towards neurological and endocrine associations of the chakra. This art form has been used for over ten thousand years in the fields of medicine. Using our photon receptor, photon multiplier, photon counter equipment, and Kirlian equipment we can document these chakra, as well as the energy circulating through the body.

Some of this work was also done by Hiroshi Motoyama in Japan. In his work he was able to calculate photon release from the human body, and that as the chakra were activated these photons increased.

Another form of medicine subsided from this in the human subtle bodies, which seemed to connect two different chakra.

These graphs of the rise and fall of poliomyelitis and infectious hepatitis show that they were very closely parallel. Were they caused by different viruses? More likely they were products of many of the same FACTORS.



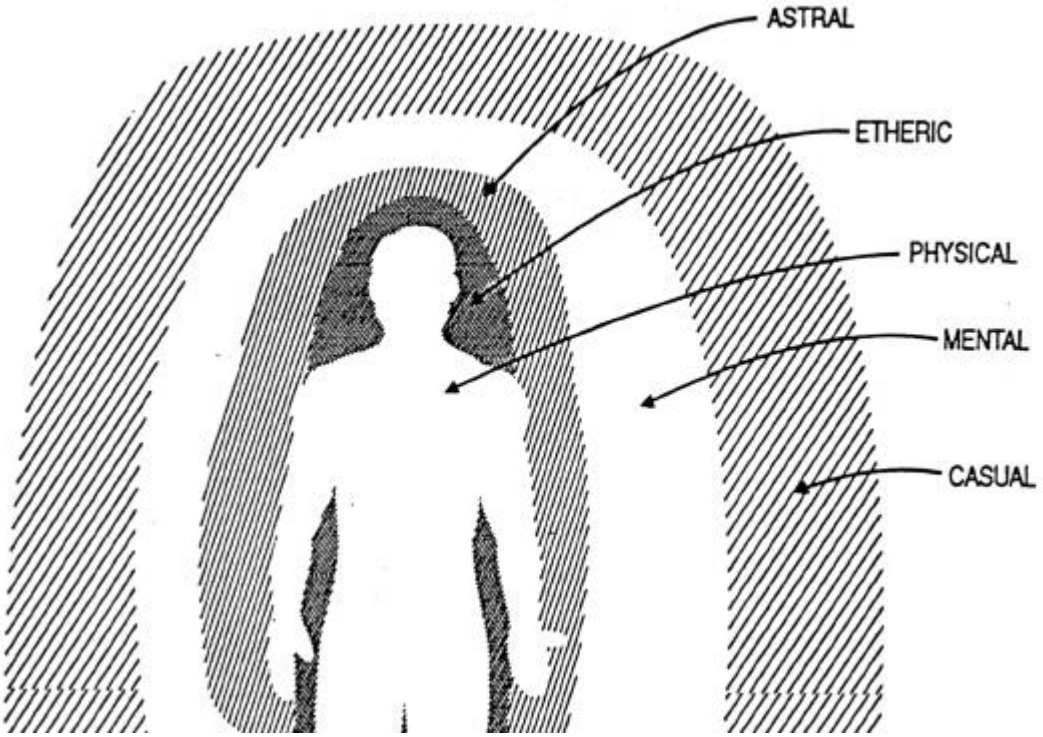
A gradual rise in polio from 1940 to 1952 was followed by a gradual decline from 1952 to 1957. And the introduction of the Salk vaccine (after polio had sharply declined and was slowly rising again) was less coincidental with the fall of polio than with the fall of hepatitis.

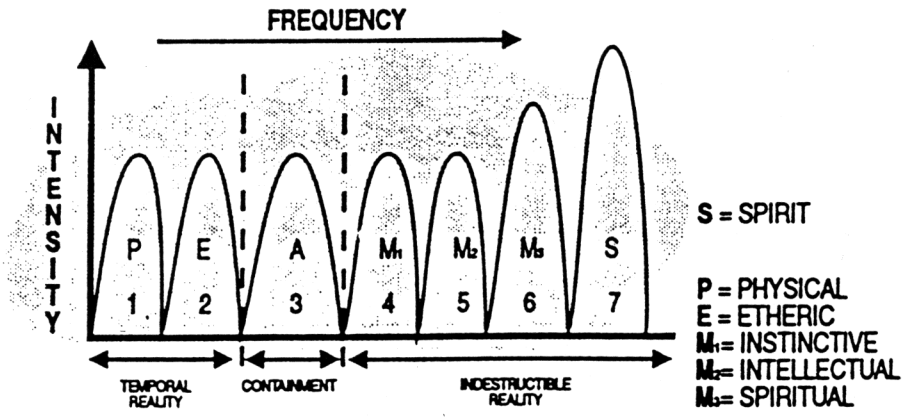
Even though "the doctors" had juggled the names and statistics, we see that particular viruses were not so particular. Shifts in natural patterns were greater than shifts for which Modern Medicine claimed the credit.

With commercial viruses added to epidemics for several generations, our graphs were getting more deceptive — less true to bio-reality.

These subtle bodies seem to harmonize at different vibrations, and often they are thought of as the heart of vibrational medicine techniques. Changes in one of these bodies or dimensions would have repercussing effects on the other because of the “as above, thus below” law. The human energy field is also generated from this understanding.

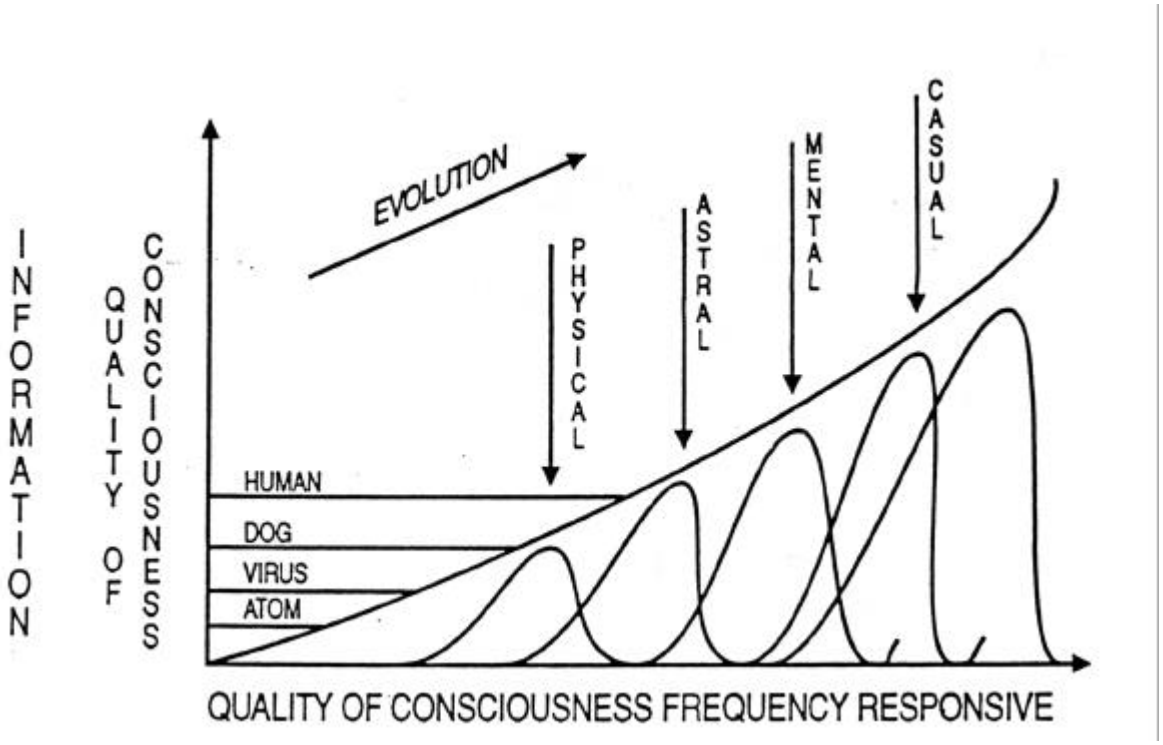
The development of this human energy field is a concentration of the consciousness and its ability to fight against thermodynamics. Thus the chakra focus energies in various ways that assist the organization principle in fighting its erosion to entropy.



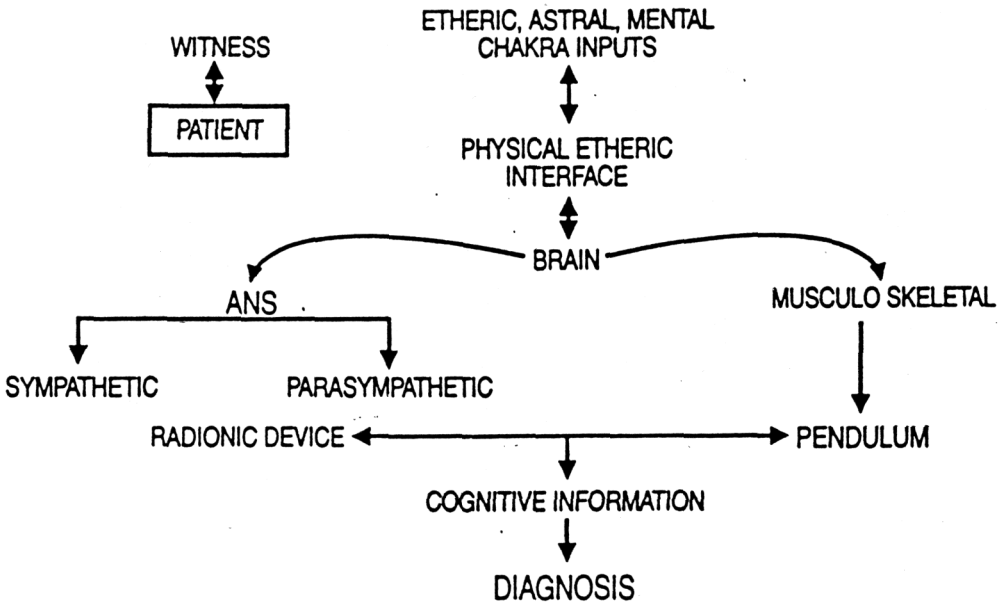


The quantity versus the quality of consciousness was also applied to this system of understanding.

We can see that there is a definite reflection of the cosmic consciousness in the universe that can be distilled and concentrated in certain entities called humans to help resist against the erosion of entropy and thermodynamics. There is a further concentration of these in every chakra system and within every cell, where the organization principle fights against this thermodynamic, random breakdown. This is the basic principle outlined in our *Quantum Biology* book, which we can now expand into the form of a study of consciousness.

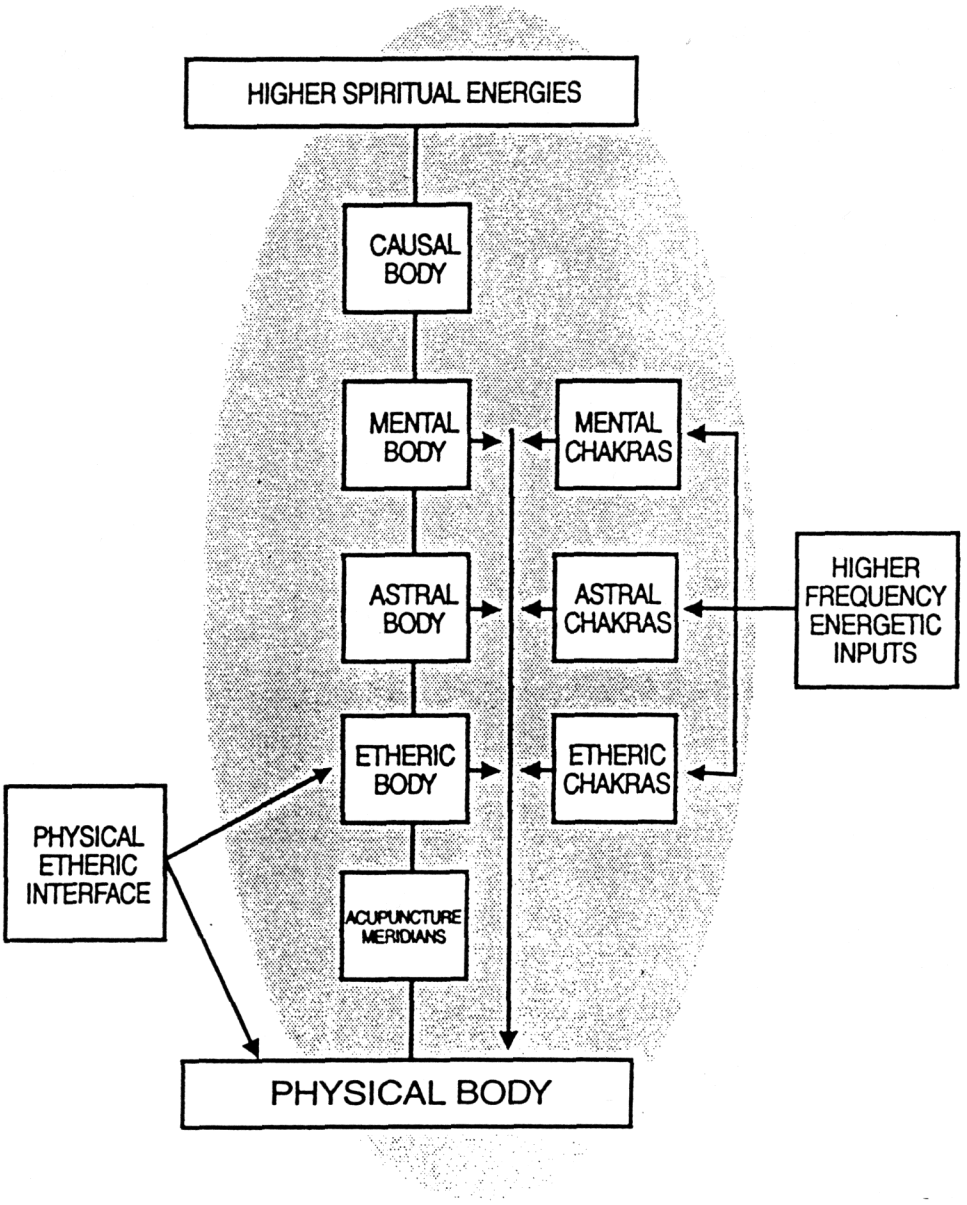


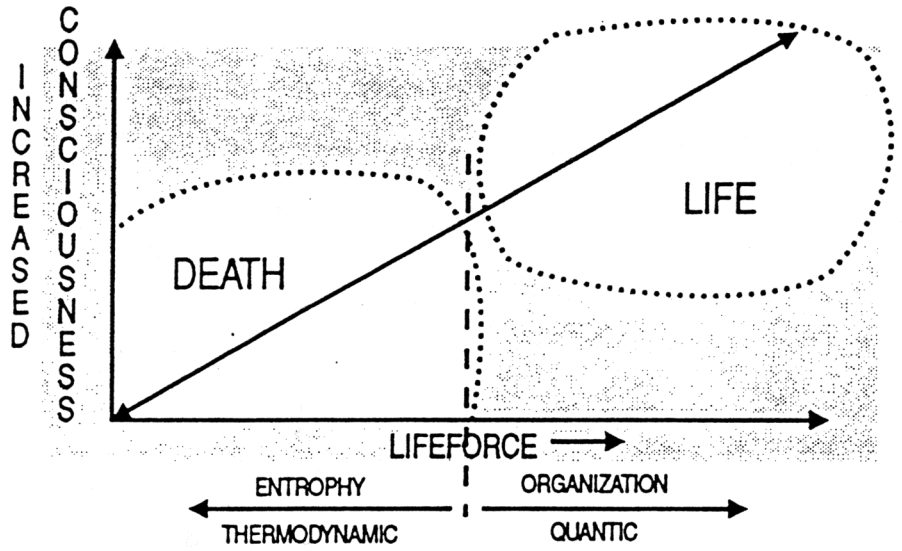
These systems of energy could be diagnosed by radionics, another field of endeavor for which we will have a short review. In radionics a practitioner may produce a subtle variation in his own autonomic nervous system which can produce sweating or no sweating, and thus may interfere with the ability of fingers on a rub plate. Also this may interfere with the development of a pendulum as it moves back and forth because it affects the subtle arm muscles. To understand this Dr. Gerber offers the following diagram:



Here we can see how the radionic device can be interfered with by the autonomic nervous system, which is out of conscious control. This also relates to a multi-dimensional energy system.

Even though conscious control is not out of conscious*ness* control, the consciousness is actually another distillate of the organization principle, allowing us to think in intellectual ways about the universe. This is yet another way for us to resist entropic and thermodynamic breakdown. It is unfortunate that sometimes this very consciousness, which was designed to resist the destructive principles, can sometimes work in their behalf and foster aggression. This can result in the destruction of natural systems that has pervaded this planet.





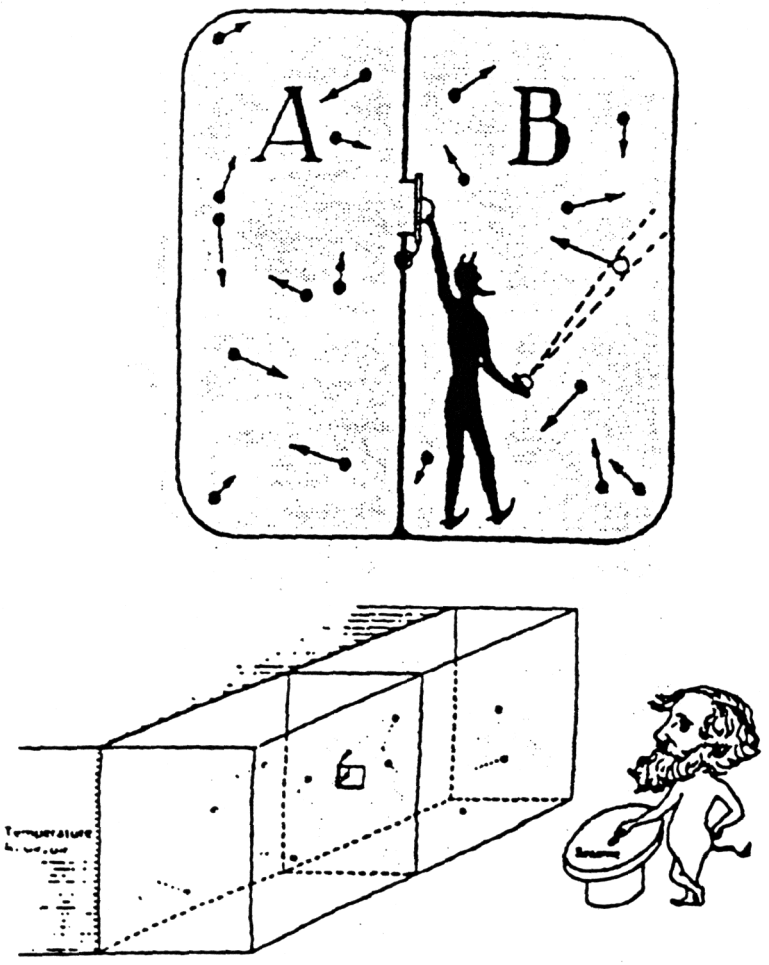
Another field of endeavor is that of using a variety of flower essences and homeopathics that can have subtle effects on these other vibratory beings; mental, causal, or astral bodies. These flower essences and gem elixirs were also charted in their effects.

This led also to an interference of color, and how color might be affected by each of these chakra. This can be related to mitogenic radiation, as discussed in *Quantum Biology*.

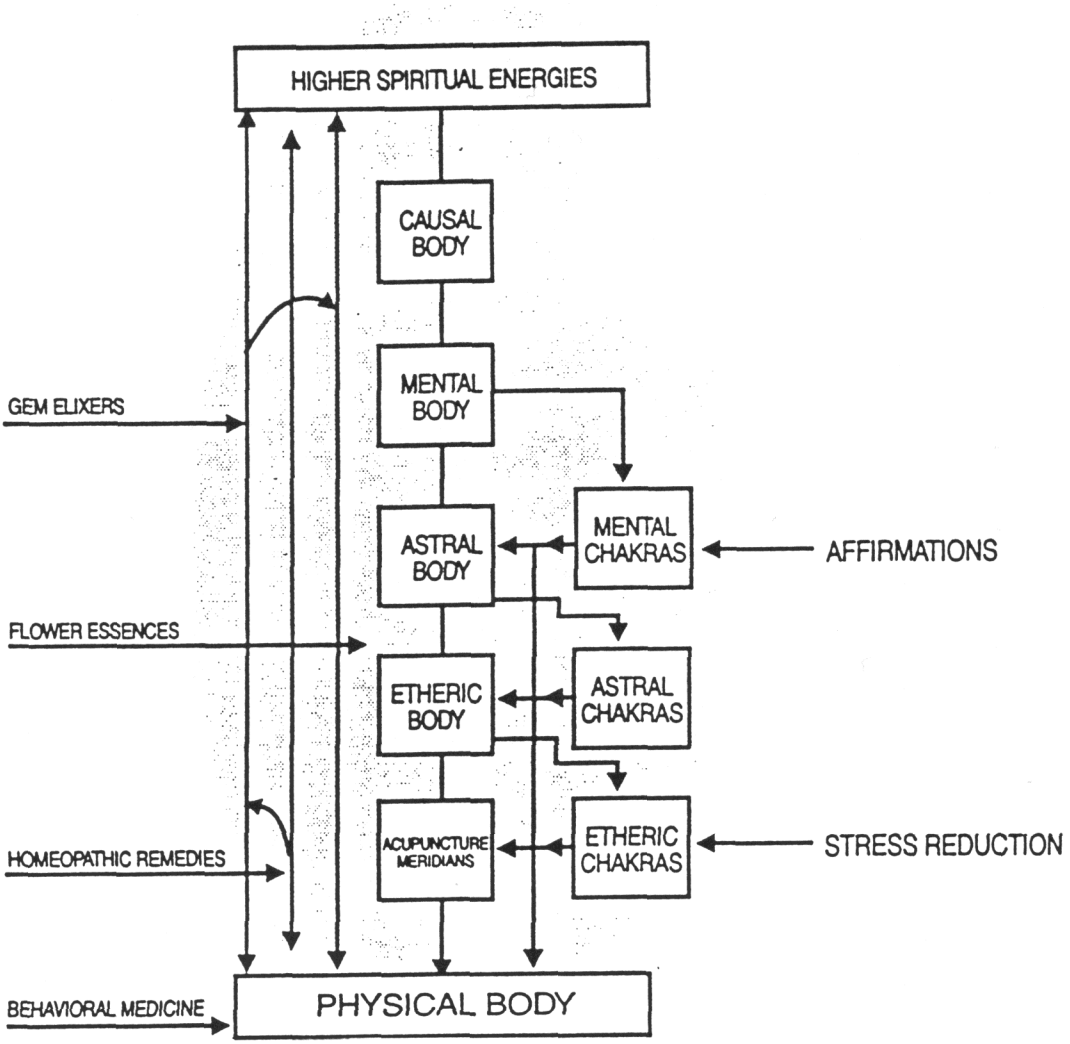
SUBTLE ENERGETIC EFFECTS OF COLOR

COLOR	CHAKRA	ENERGIES	DISEASES AFFECTED
VIOLET	Crown Chakra	Higher Mind	Nervous & Mental Disorders
INDIGO	Third-Eye Chakra	Vision	Disorders of the Eye
BLUE	Throat Chakra	Self-Expression	Thyroid & Laryngeal Diseases
GREEN	Heart Chakra	Inner Harmony	Heart Disease & Hypertension
YELLOW	Solar Plexus Chakra	Intellectual Stimulation	Disorders of Stomach, Pancreas & Liver
ORANGE	Spleen Chakra	Assimilation Circulation	Disorders of Lungs & Kidneys
RED	Root Chakra	Vitality Creativity	Blood Disorders Anemias

BIOLOGYS' QUANTUM COMPONENT ACTS AS MAXWELL'S DEMON



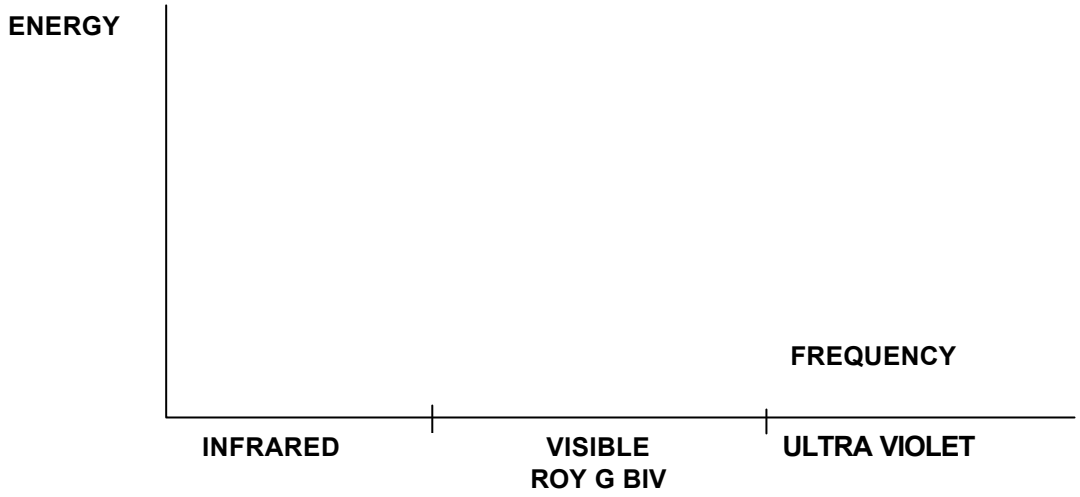
A Maxwll demon controlling a door between two chambers each initially at temperature T_1 and pressure P_1



This allows us to understand some of the effects that color can have on the subtle vibrations of the body.

Other interventions that can be utilized are those of static electricity and magnetic energy, because they have subtle effects on the electromagnetic spectra of the body. The Indumed of Germany has been developed for its magnetic interaction. This magnetic interaction was seen to have inverse relationship effects as to its intensity, meaning that the smaller the magnetic circuit the more it would intervene on the system. Thus a magnetic of 1 gaus would have much more powerful effects than a magnet of 100 gaus.

So the human heart develops a magnetic interaction of .0005 gaus, and the human brain develops an interaction of .000005 gaus. This shows how the human brain and heart can have magnetic healing effects and help to account for the magnetic interaction of the healing parts of the body.



The planet Venus would have .0000000000000001 gaus. This would show how Venus might affect us because of this interaction. Now we might have an ability to understand some of the magnetic astrology principles.

Medical astrology becomes our next system of endeavor as we seek to look at astrological reactions. The coincidence of birth is *not* mere coincidence; it is part of the indeterminacy principle, and nothing is really coincidence. We can see here that perhaps the magnetic interactions at the time of birth might have astrological effects. Every time a statistician has dealt with astrology it has met his criteria and shown that there *is* something in an astrological profile. A medical astrologer would look at this and see how the astrological profile would affect the health of the patient both in diagnosis and treatment. He could suggest certain lifestyle or other changes that would help protect the patient from the risks engendered by his own astrology. Medical astrology is looking for some of the most subtle effects on our vibratory levels, effects that can magnify as time passes.

The organization of the universe and its consciousness can be looked at through medical astrology. This can be used to help understand the intricate systems of the universe. What was apparently indeterminate in the birth pattern is not, and this indeterminacy can also be influenced by the consciousness of the universe, and the consciousness of the system. So medical astrology will become a needed system of analysis. Although it will probably never supply us extremely accurate data, it will give us some information to build on.

Acupuncture also deals with the shifting energy flows of the body. Acupuncture can be seen to have profound vibrational medical effects, and it can be utilized by practitioners to help to connect the physical with the mental, astral, ethereal and causal bodies. Thus acupuncture, which has dramatic medical effects, can also be used in a larger vibrational medical context. For an analysis of acupuncture we suggest some of the other books. In *Quantum Biology* we talk about different acupuncture techniques. In *Homeopathy for Acupuncturists, Chiropractors and Naturopaths* we endeavor to understand the physics behind electroacupuncture in a more dramatic way.

Homeopathy, because of its subtle nature, also can have effects on entities in other parts of the body. Thus homeopathy has profound connective vibrational effects and vibrational medicine effects. For a review of homeopathy and its effects we point the reader to *The Experimental Evidence for Homeopathy*, *Quantum Biology* and *Bio-Quantum Matrix*, where we show mathematical proof for homeopathy.

In charting out a true, full-scale holistic homeopathic utilization, we developed the *Natural Repertory* of Dr. Nelson, which is a catalog of all the various homeopathic products utilized in a true, holistic energetic medicine technique.

Spiritual healing, as we have outlined earlier in this book, must be done under the guidance of a true competent church and God-conscious system of healing. The system of spiritual healing is another endeavor of vibrational medicine that is known to have profound effects. Much research has shown that this effect is more than a super-placebo, and can help patients in dramatic ways.

Counseling and other psychological therapies also have profound effects on various vibrational reactions of the body. Affirmations can help to reduce negativity. In counseling the quality of speech, suggestion, reassurance, bedside manner, etc. are profound in their ability to help. Compassion and sympathy in and of themselves have healing techniques that must be involved in our vibrational medicine model.

Consciousness medicine will also be utilized, as many practitioners and healers will want to find ways to develop their own consciousness, and also to use group consciousness to help affect the systems of their patients.

It is well understood by any competent doctor that most healing is done by a good quality nurse. If the nurse he employs is able to engender warm, compassionate caring and sharing, with a touch of humor and sincerity, this can really help speed the healing process. Any good doctor knows that the vast majority of what he does will be executed by a good, competent nurse. Nursing has generated more of these compassionate arts than those of the doctor.

Another system that we analyzed in our vibrational medicine model is that of sound and other vibrations.

So in developing our vibrational medicine model throughout this book we have tried to account for the scientific engenderment behind it. We have suggested a review of the literature concerning vibrational medicine, and how it shows that there is something to this endeavor. When we use a true, homeopathic full-scale medicine, as well as lifestyle

changes as discussed in the *RWC Book*, we can come upon a true new paradigm in medicine that will help patients, and help to reduce the amount of iatrogenic disease.

Patients will still need surgery and allopathy. We are not trying to do away with either of these technologies. But these technologies today are primary resorts much too frequently. They are resorted to in ninety-five percent of cases presenting to doctors. It would be better that these cases be held off and presented as the last alternatives. Doctors should try to use much safer forms of *subtle* energy systems, and if *they* fail, to then resort to surgery.

In India and Pakistan, where homeopathy is the primary medicine, allopathic antibiotics and synthetic drugs are used only as a last resort, when gentler naturopathy, homeopathy, and lifestyle changes fail. In this extreme case they resort to antibiotics. Many children whose parents come to the United States go to medical doctors who promptly put them on antibiotics, which can cause extreme anxiety in their parents, who say, "Oh my God, my child must be a lot worse than I thought!" They don't realize that the doctor did not know what the more gentle form of homeopathy could do. The doctor does not realize that the more gentle form of homeopathy can be more healing and can work. Modern medicine will soon have to accept homeopathy as a safe and effective regime.

Most doctors in our country are not even aware that these techniques are being used here in America. Many practitioners throughout the United States are using the techniques outlined in this chapter on a day-to-day basis. There are thousands of practitioners helping patients with more natural, safer, and more effective remedies.

Many results are not being manipulated in statistical ways for proof because these practitioners do not have statistical minds. Most of the time they do not like the idea of charting out this type of activity or having to write things down, so they are not getting these results published. The publicity comes in the form of vibrational medicine books, small articles, and the "Quantum Healing" book of Dr. Chopra, where these new speculations come out. It has been the purpose of this book to try to make the next step and supply some of the statistical charges behind this medicine, and to show that these are system which are not only in practice but have every right to be, because they work, and they heal.

We must seek to stop the tyranny over people's minds, and try to help people understand that the modern medical system is trying to *control* their minds and push a synthetic, chemical model on them that propagates the sale of more drugs.

Perhaps if the drug companies could realize the potential for income that could be derived by natural and homeopathic medication sales, then they could help make this shift possible with their large financial forces. If they wish to contact this author concerning any of the work we have done, we would be happy to work with them at any time.

When Norman Cousins went to work with Dr. Schweitzer in Africa, he asked Dr. Schweitzer about the hospital he had built. Dr. Schweitzer took him to the Shaman of an African tribe. He asked the Shaman about what he did with his patients. The Shaman said that there were certain illness for which he needed to use his Shamanistic techniques. He brought out his rattles and mask, jumped around, yelled and screamed, and did energy techniques. This is much like the present-day psychiatrists who use these different sound techniques and talk to the patients. For other patients the Shaman made herbal preparations, taking blends of various plants and animals and making concoctions which he gave to the natives. This was for more of the natural ails in their early stages that could be dealt with by natural pharmacology. Other diseases in some patients were pointed out to Dr. Schweitzer; these people needed hospital care. Some problems were compound fractures, extrauterine pregnancies, and other severe physical systems that needed surgery or other types of hospital care.

Schweitzer then said that it is the little doctor inside that really does the healing, and that the external doctor is just a help to that little doctor. There are some subtle things in the early stages of development that naturopathy, homeopathy, and other systems of gentle natural pharmacology can heal. There are other times when we need surgery and allopathic drugs.

As medicine starts to build we must realize that we have the freedom to choose the types of systems we're discussing here. If we use the model of the extreme, surgery and drugs, we realize that we rob a lot of people of some subtle energy forms that might have healed them. Also we put them at risk for iatrogenic disease from the harsh and demanding systems.

It is said that in energetic medicine a patient dies of the disease and the treatments do little. It is also said that allopathic medicine patients die from the treatment, still having the disease. The combination of both of these techniques are the new development of the future, as thesis plus antithesis yield to develop a new form of medicine.

As we develop these books, it is our hope that we not try to change the law, but to fulfill the law of medicine, and to offer a new type of vibrational medicine that can blend with the old types of conventional techniques.

VIBRATIONAL MEDICINE CORRELATES

Polarity Definitions:

Unlike charges attract

(1) Sun to earth; north seeks south
(2) Positive pole to negative pole

Like-polarity charges repel

(1) Positive repels positive
(2) Negative repels negative

Flow of electron charges

(1) Positive: more electrons flow in a clockwise direction than counter-clockwise
(2) Negative: more electrons flow in a counter-clockwise direction than clockwise.
With pendulum, normal rotation would be counter-clockwise; opposite for positive predominant energy flow pattern.

Flow of electron charges from electromagnetic energy cycles

(1) Negative flows to positive
(2) Electric flows are horizontal
(3) Magnetic flows are vertical with respect to treated object
(4) Circular flow spirals from origin of polarity direction

Flow of electrostatic field

(1) Negative flows to positive between flat metal surfaces and flows in slightly curved paths at all edges.
(2) Electrons flowing at right angles are equipotential lines of force to create any desired patterns.

Flow at magnetic field

(1) Positive (south) to negative (north) with radiating circular fields from north to south
(2) Random when uncharged.

Flow of a conductor

(1) Negative flows to positive
(2) Looking south, flow is counter-clockwise in a circular path series of patterns and is attracted by north pole of a compass.

POLARITY CORRELATES

(1) Polarity is the cause of disease. Control of polarity can eliminate disease, pain and suffering.
(2) Polarity can be changed by means of polarizers that consist of magnets using high-strength magnetic or electro magnetic energy forces.
(3) Polarity can polarize bacteria so that they can't reproduce and expire in about five days.
(4) Polarity stays negative when infection persists. Health is improved with balanced polarity.
(5) Polarity prevents decay and makes food less perishable for longer periods with continued use.
(6) Polarity in food must be changed to positive for better taste, quality, and digestion. All food grown in the soil is neg. ground because the soil is negative. Polarity is normally polarized positive in two minutes.

PROPOSED POLARITIES

In addition to those given above the male reproductive organ is positive while the female is negative. For both male and female the following apply:

Outside right hand -	positive
Inside right hand -	negative
Right knee cap - - -	negative
Left knee cap - - -	positive
Right breast - - - -	negative
Left breast - - - -	positive
Right eye - - - - -	negative
Left eye - - - - - -	positive

Note: The above parts are "looking forward".
Polarity remains the same for both left & right-handed people.

SUMMARY

1. We can see that a quantum analogy of medicine is far more appropriate than a thermodynamic, random understanding.

2. We can see that the history of medicine has included some very avant garde understandings of energy that have been a viable working system of medicine throughout the ages.

3. We can see that there is a neurological connection to these energy patterns that makes distinct sense and is used by millions of health practitioners around the world today. This involves chakra and acupuncture systems and their neurological, psychological and physiological associations.

4. Thus an understanding of vibrations and the subtleties of these other-dimensional vibrations are essential for our understanding of medicine.

5. Vibration has polarity effects. The polarity effects of the body also will be important in our vibrational medicine analysis.

Chapter 2

CONSCIOUSNESS MEDICINE ***(The subspace connection of the universe changes medicine)***

In the books *Quantum Biology* and *Bio-Quantum Matrix* we offered speculative proof that at the beginning of time there was some type of process that all matter went through, and that a set of laws was imposed onto this matter. Every photon, electron, proton, neutron, quark, and other particle seemed to obey a fixed set of consistent rules. These rules seemed to follow the matrices of a plan. Within the pages of this book we account how the same matrices can be applied to the photon and the vibrational qualities of matter. The basis for a matrix for biology and medicine is also postulated.

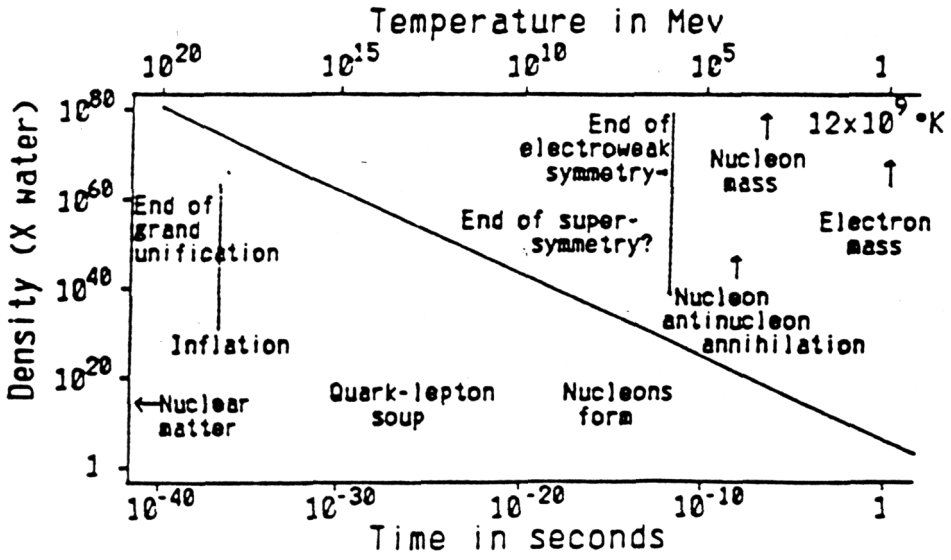
The main body of this text has been utilized to define this set of laws and how they dictate the interaction patterns of the photon, electron, proton, atoms and other constituents of our universe. This set of laws itself now can be viewed as the consciousness contained in every bit of matter. We were also able to show that the universe is a closed material. The combination of matter and energy in the universe produces a joint consciousness of the universe, which is akin to the joint consciousness of all the bees in a hive. Each bee is separate, yet shares some conscious bonding with the other bees, just as all the matter of the universe shares some conscious connection not only in the rules and laws, but beyond them.

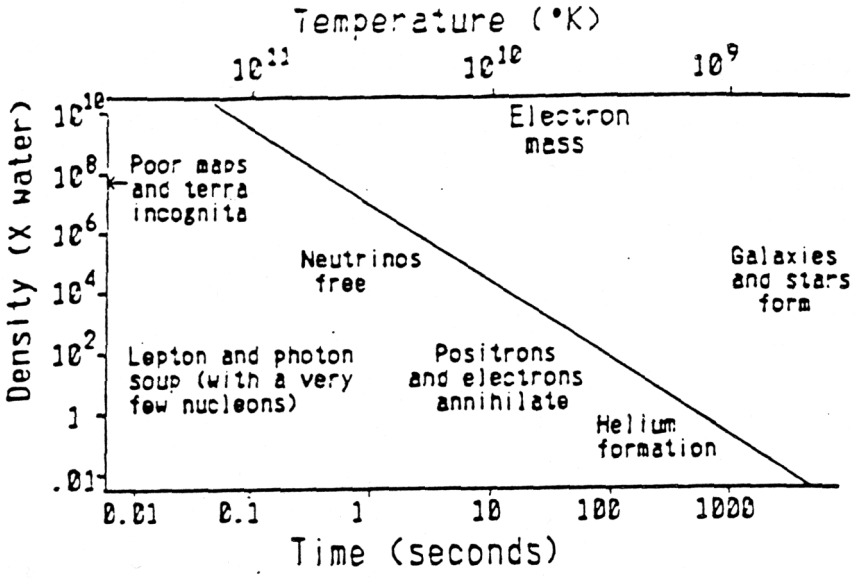
At the printing of this book over 300 quality studies have been done on the efficacy of prayer in medicine. Prayer has been shown to have significant effects on sickness. Larry Dossey reviews this in his book 'Healing Words' by Harpers. The effect is real and medicine and science have to deal with it. There is a God and there is a connecting force of the universe. The existence of other dimensions and a nd a subspace connecting them is a foregone conclusion. There appears to be an ability of consciousness to connect and effect other systems through this subspace.

Now in our text let us try to quantify and understand more fully this consciousness subspace principle by putting it into physics terms.

The indeterminacy principle allows us to quantify this mechanism. As we pointed out in *Quantum Biology section*, the laws of thermodynamics are invalidated in the fractal world even by nonliving systems. In other words, there is an order that raw matter follows, which disobeys the pure laws of entropy.

Approximate density and temperature as a function of time in the very early universe, according to a noninflationary extrapolation.





The approximate variation with time of the temperature and density of the early universe.

The most astonishing hypothesis is how any illtelligent human could over look this magical transcendent consciousness principle, and suppose that all there is is just matter. Some scientists can only see the limits of thier own technology and thus refuse to acknowledge the beauty and grandeur of the universe.

Feigenbaum's work on the fractal theory shows that there is a breakup of matter at a certain bifurcation point, so that matter does not follow a complete entropic gaussian pattern, but breaks down into some type of organization. This type of organization is magnified when the matter organizes into the structure of organic or living tissue. Here we can see the paramount example of resistance to entropy as matter itself tries to resist thermodynamic, entropic breakdown and produce some type of organization. We can see that all matter according to the fractal dynamics and chaos theory resist this breakdown. We will quantify this resistance to breakdown as consciousness.

Thus as an electron or chemical enters an organic body it becomes more resistant to entropy, and thus gains a higher degree of consciousness. This consciousness grows with different organic tissues. The more the organic tissues try to resist thermodynamic breakdown and produce organization the higher the degree of consciousness. The higher degree of consciousness will produce a larger amount of control over indeterminacy. This we labeled as the *Nelson effect* in *Bio-Quantum Matrix section*. The indeterminacy principle inside the interaction of electrons, molecules, protons, etc. may be under some conscious control. The greater the degree of consciousness the more we will be able to control indeterminacy. This is another principle of quantification, allowing us to understand consciousness in scientific terms.

Thus as people learn to control and expand their consciousness, we will see an increase in so-called psychic phenomena, which is literally a control factor over the indeterminacy principle (see *Quantum Biology section*). As a society starts to grow, if it starts to become transcendent, focus on its consciousness and refine its mental abilities, then it also will be able to control these events.

Throughout sports history we have seen certain sports figures who, in the face of all odds, seem to be able to control the ball, puck, or whatever. In other words, there seems to be some subtle effect that the will of these people can produce. This is another example of the consciousness principle, and how the subtle indeterminacies of a hockey or tennis game can be influenced by a strong-willed, highly developed consciousness. Many sports figures talk about that transcendent time when they "become one" with the ball or the game, and have a deep understanding, effect and interaction with the particulars on the playing field.

This control of the indeterminacy principle, which we call consciousness, also can be utilized in many different forms. These different forms culminated the human being, and also can be reflected through the chakra.

The first chakra is a type of consciousness in which the person is trying to survive by getting food and the raw needs of survival. This first raw chakra is an organization state in which the person tries to survive against entropy by getting the food, shelter, and raw constituents of life. This first chakra is also a seed of aggression, as often aggression must be used to survive in a cruel world.

The second chakra is that of a species preservation instinct, or an influence of sex, in which the person tries to preserve the species against entropy and degeneration by copulating and producing offspring. This is a fight against entropy, and a fight to preserve the consciousness of the DNA and the organizational structure itself.

The third, the stomach chakra, is a strong will power center. There are nutritional aspects to this, but it is stronger in its effect on will power in allowing the person to have the will to resist entropy and work towards organization and development of consciousness.

The fourth, the heart chakra, has a social type of influence in which people have the instinct to develop societies, share from their hearts, and unite at the heart level to resist against entropy by developing social networks. We are social beings, and need social networks to function and live healthy lives. This heart chakra is an organization structure that helps to develop the basic instincts against entropy, towards structure and organization, and onward towards development of consciousness.

The fifth chakra is the throat. The throat chakra represents the development of the highly organizational form of speech and speech contact. The power of the word is written about in the Bible. This basic power is another form of consciousness that has echoed throughout the universe since its beginning. This power was then channelled into the production of speech and speech contact in the human being with the help of the organization of this throat chakra or energy vortex. Thus speech is a reflection of the power of the word, which has dramatic effects on our biology and medicine. Dr. Roy Curtain developed the hololinguistic effect, in which he found that the human body had reactions to words that could be demonstrated through subtle energy techniques. This led to the development of the Interro system, which was later improved to a much higher degree in the Quantum Med C.I. system. Thus the power of the word has dramatic effects in enhancing organization in consciousness.

The sixth is the brow chakra, in which the relationship of the biophoton reaches its highest zenith. Here we can see that the photon, which is the communicator of mitogenic radiation, is highly important throughout the universe, and that this light form also resists entropy and yields towards quantum control. This results in a biological photon detector known as the eye; and other electromagnetic detectors, which go to the point of measuring gravity changes, magnetic relationships, capacitance, and other electronic factors. Thus the brow chakra is another form of organization.

The last is the crown chakra, which results in an organizational structural entity that unites all the other energy vortices. This produces the highest degree of resistance to entropy and development of consciousness.

In our development of consciousness we can see that resistance to entropy will allow us to set quantifiable, measurable developments on the consciousness of various entities.

Since there is a measurable entity, and the consciousness can be increased in its effect against entropy and disorganization, we see that two people with focused minds can have a greater effect than one, and that there will be a certain amount of energy evolved from even a group as small as seven thousand, who can get together, refine and focus their consciousness, and have a great effect on the conditions of the world. This is what happened in the transcendental meditation movement, in which the Maharishi trained many people in Iowa of consciousness attainment, and then at periodic times would have them get together in a group, to produce a highly productive conscious state that could influence the indeterminacy of other factors throughout the world. This subtle influence could produce a high degree of organization and control, resulting in some rather profound changes in our society including the fall of the Berlin Wall and many other factors. This could have been influenced by the TM movement people in their development of consciousness.

As we pointed out in *Quantum Biology section*, disease is merely a breakdown in the body's ability to resist entropy and disorganization. Thus consciousness, which resists this type of disease structure, will develop into a new refined form of medicine. Conscious vibrational medicine will also have profound effects in helping patients to overcome a variety of entropic diseases.

Within the concepts of this book we have expounded on how mass, vibration, and all forces of the universe have a constant blend. Biology had the twenty-three chromosomes to produce the full chakra and the high degree of mental ability to intuit and understand this process. Thus biology had the solution for the unified field theory in its twenty-three chromosomes that allowed it to develop the intellectual consciousness to start the understanding process needed to develop this unified field theory.

Consciousness medicine will also have very spiritual ramifications, in that people will need to understand the spirituality of the grand consciousness of the universe, which many cultures call God, in order to focus the consciousness development in themselves. Whenever any one entity or small group thinks that it is God, and tries to control things itself, this is the grand sin, and will produce drastic repercussions.

This is what happens in the chemical companies when they make synthetic pharma-ceuticals; they try to act as if they are God to produce things compatible with the human system. We will see that every natural vitamin, chemical, and herb has its consciousness as well, because it came from an entropy-resistant organism that had a degree of consciousness. Inside the test tube these synthetic chemicals do not have that degree of consciousness; thus they are incompatible with the human body. For some therapist to think that he is God is also a mistake, because the consciousness power of the universe is phenomenally overwhelming in comparison to the consciousness of any one man or small group.

Only through development *with* the consciousness of the universe can we reach the highest degree of development. Only through humility can we truly develop the highest degree of rapport, and focus this in the system.

In this book we have shown that the electromagnetic radiation has six vector components; three that are reflected in the electromagnetic and static dimensions and three that are scalar or virtual, in that they are hidden from our normal perception. These act through other dimensions. There are four dimensions of length, width, height and time, and six other virtual dimensions of time and space, which make up the entire universe.

We would also like to mention in this book the definition of consciousness, the inert ability of matter to ascend away from thermodynamic entropy and breakdown into an organized system. As consciousness develops it resists against thermodynamic breakdown and starts to control indeterminacy. Controlled indeterminacy can be achieved through the development of consciousness.

In developing a consciousness medicine we must look at ways that one conscious human system can affect the subtle electron, photon, proton, ion and other energies of another system; and affect the indeterminate action, thus having subtle ways of improving the health of another human being. It must be pointed out that these techniques are usually not magnificent and grand, but are usually very subtle, hard to measure, and hard to replicate. This is the dimension of the system that we describe in a consciousness medicine.

In *Quantum Biology* we outlined how psychic experiments can be done with indeterminate systems to allow us to measure the degree that any one person might be able to affect an indeterminate system, and help to shape the outcome. This can be used to help in measuring consciousness, in that the higher the degree of consciousness of a person the better his ability to control and affect indeterminacy. This will allow us a way to quantify a consciousness effect, breaking it into mathematical terms. As we have shown in this book, we have used modern physics to account for some of these avant garde forces in biology, and we have used a physics system to analyze these forces and produce ways of controlling them through a scientific process.

As outlined in *Quantum Biology* and *Bio-Quantum Matrix*, sections the Nelson effect is the ability of a human being to use the endorphin receptors and other parts of his being and consciousness to transmit information and control indeterminacy in systems at a distance. The control of indeterminacy in systems can transcend time and space, thus making it other-dimensional in some of its activity.

These types of thoughts that go beyond the limited system of classical physics into a Newtonian system challenge the world and its forms of medicine. Physicians and most scientists have long been rooted in the classical dynamics of a Newtonian thermodynamic analysis, which now must be left by the wayside as medicine expands beyond the limitations of that antiquated system.

Many cultures and religions have developed systems of consciousness which can be useful in guiding a practitioner to a new height of consciousness. In many religions meditation is used to focus the mind internally to maximize consciousness. Meditation systems often use awareness channels by minimizing them and reducing external control, and maximizing them, focusing on external events (such as the walking meditations of Eastern schools).

Some common denominators in these systems involve non-judgmental awareness cultivated through systems of love, compassion, introspection, and art. Often these systems also utilize body exercises such as dance, martial arts and the like to help affect the system towards a higher degree of consciousness.

It is not the purpose of this book to go into intricate detail on developing these systems. That will be left to another book at a later date, when we can go into systems of consciousness building and how they apply in medicine and self-growth.

In quantifying the effect of consciousness medicine we should set a couple of standards for our definitions. Let us assume that the standard of focused consciousness, which we will now refer to as FC, can be achieved by certain human beings after years of training of their minds. This is what has happened to certain meditation masters including certain Buddhists, ECK masters and others. Once at this pinnacle level, let's call this FC standard that someone can achieve the ability of a focused consciousness, regardless of whether one meditation master is better than another. We are concentrating on the ability of this focused consciousness to affect indeterminacy beyond the time and space models of normal physics.

Negative emotions will deter from the focused consciousness. Some of them are anger, greed, delusion, anxiety, worry, jealousy, fear, selfishness, and sadness, among others. These negative emotions (NE) will have an inverse effect on the FC. Thus the ability of this focused consciousness to affect indeterminacy will be FC ÷ NE.

The effect on indeterminacy is still not a direct relationship, in that the effect of the FC can still not totally control the indeterminacy of a situation. The effect is rather the cube root of the FC divided by NE.

$$\text{Percent effect on indeterminacy} = \sqrt{\frac{FC}{NE}}$$

Thus as FC tends towards one hundred percent and NE tends towards 0, we can see that the percentage of effect on indeterminacy will approach about ten percent, which is the maximum one person can achieve in his ability to enhance and affect indeterminacy.

Next we must deal with the number of people. If two people join together with focused consciousness, their effects on indeterminacy can be increased. If we take the total number of people in a situation (Tn) and compare that to the number of focused minds (Fn), we now see the following:

$$100\% - \left(\frac{T_n - F_n}{T_n}\right) \cdot FN\%$$

We can see here that the percentage in a total population of focused minds can be delivered by the total number minus the focused number divided by the total n.

If we substitute the total percentage of focused minds into our original equation, we now come to:

$$\text{Percent of Social Effect On Indeterminacy} = \sqrt{\frac{(F_n\%)}{NE\ (total)}}$$

Here we take the total of the square root of the percent of focused minds divided by the negative emotions to achieve the percentage of social effect on indeterminacy. If just one percent of the total population can become focused, it can have dramatic effects on the ability of society to affect indeterminacy, and thus become a resonant contagious factor that can help to pervade the quality of focused consciousness into the total.

In a cybernetic system, as we pointed out in *Quantum Biology*, it just takes a small effect on indeterminacy to go from entropy into control. Once into control the small effect can challenge the system and resist the entropic thermodynamic breakdown, even at a society level. So we can see the effect that shared consciousness and focused minds can have on the world.

To experimentally challenge this hypothesis we can now look at people with focused minds, as in some of the Targ and Putoff experiments and other psychic phenomena, and see the ability of these people to affect certain indeterminate events, such as the spin of a roulette wheel, the cast of dice and other indeterminate events. The connection through these events is not a direct effect *on* the dice, but rather a shaping of the indeterminate outcome. If we challenge these meditation masters, we will see that the above equation holds out, and that they have the ability to affect the situation within ten percent. This allows them to increase their probability and chance of outcome. We see that they cannot totally *control* the indeterminate events, but they can have an effect on the events through the Nelson effect. Thus we have experimentally validated the above formula.

For a review of statistics we point the reader to a review of psychic research.

We can also see the effect that society has by some collective meditation masters of groups such as the TM movement, and how their efforts are capable of shaping the indeterminate events of society.

This effect is small and measurable; yet it is unreliable for its form of indeterminacy effect. We can also see that negative emotions, even by the researchers, can have derogatory effects on any type of experiment. So if we were to do this experiment in a laboratory in which the researchers did not expect outcomes, or if there were disbelief and negative emotions by others, the experiment might be affected adversely.

SUMMARY

1. We understand that consciousness has profound effects on biology, and thus, medicine.

2. For our understanding of medical intervention we must have a system that allows for the development of a consciousness type of medicine.

3. In this chapter we offer a mathematical formula to calculate the force of consciousness. It must be pointed out that this force of consciousness and its effect on medicine is not a highly-replicable event; it occurs in almost random, fractal or chaotic terms. However, it does definitely have an effect.

4. This consciousness medicine should not be the only intervention used by a practitioner. We still must be concerned with the physical body, nutrition, emotional stability, structural stability, environment, social nature, and all other ramifications. Consciousness will now become part of our medical regime.

Chapter 3

HOMEOPATHY AND VIBRATIONAL MEDICINE

Homeopathy is considered a type of vibrational medicine. This indeed might be correct, in that it does seem to affect more subtle areas of the body than most allopathic drugs. Allopathic drugs are usually concerned with gross, symptom-related conditions, whereas homeopathy tries to prompt certain subtle changes in the body to encourage the body to balance itself. Consequently we must take exception to classifying all homeopathy as vibrational. Homeopathy can be used in many ways to achieve many goals.

Often we use different types of homeopathics in a varicty of ways. As homeopathy starts to receive admission into standard medicine techniques, we must understand that homeopathy involves some pharmacology, and that there are, as we point out in the Natural Repertory of Dr. Nelson, thousands of homeopathics that are utilized for the same types of conditions that they are herbally. As such, if we are using Eyebright in its raw form or Euphrasia in its homeopathic form, we are really trying to accomplish the same goal. Using homeopathics in different dilutions does not mean using so much vibrational medicine as doing imprinting work through polymorphic states (see Natural Repertory).

It is wrong to sec this as totally vibrational. If we want to broaden our definition of vibrational medicine to include anything that exists, we would have to say that allopathic medicine is vibrational. If we want to restrict oursclves and ask just where the definition lies, we might limit or expand ourselves improperly. By the term vibrational medicine we are really trying to say that the charting of vibrations can be utilized by the body.

In homeopathy we have individual potencies of herbals and other constituents. If we were to prepare a remedy one part to ten and succus it, and then dilute one part to ten and succus it again, this would be the series that allows us to do homeopathy on the 10x scale, which in Europe is known. as the decimal scale because of its one-to-ten nature. If we do homeopathy on a one-to one hundred scale, we achieve it on a centesimal scale. The M range is mi, or one to one thousand.

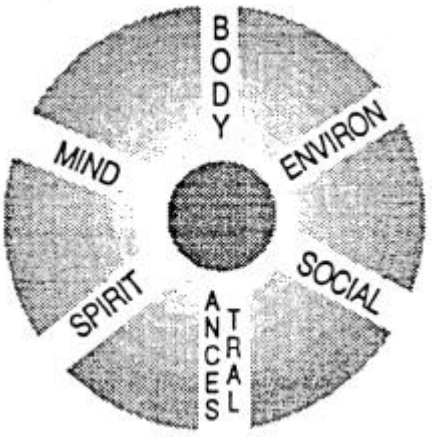
As we dilute these remedies, we see that there are different effects on the curve. The Quantum Biology book points. out how diluting some remedies such as poisons offers a reversal of effect. Also by diluting a non-poison we sometimes potentiate, reverse, or accomplish nothing. A brief review of the Natural Repertory of Dr. Nelson is suggested at this time, along with The Experimental Evidence for Homeopathy and Quantum Biology.

These potencies can be viewed as vibrations, but they can also be viewed as merely different scientific interventions. With increasingly higher potencies we find a greater polymorphic structure or liquid crystal effect, more difference in the variant or Kirlian field effect, and more difference in the electronic structure. The mention of the word “crystal” should not cause people to think that all is vibrational in crystals. Even in crystal therapy there are some entities that arc in the physical domain.

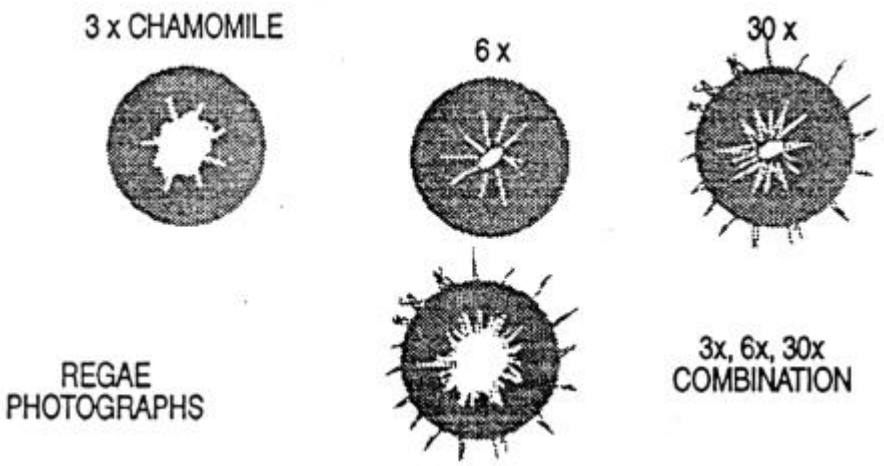
In our field of medicine and biology we must realize that as above, thus below. We need to work fully with the patient to be holistic. If we are going to restrict our activity to just the ethereal plane, we should not call ourselves “holistic”, as we are very much refined and distinctive. .A true holistic practitioner is capable of understanding all parts of the body including the physical and vibrational parts. A vibrational medicine doctor who wants to become a holistic doctor should be trained in all the levels of medicine.

We all know from holistic movement that to treat just one part of the body is to rob ourselves of total understanding. This often brings up a priority issue, where one practitioner will have one favorite type of modality. If this modality is overemphasized, it tends to offset his therapy and make it non-holistic. With the Academy computer system we try to take a more analytical view of the physical and vibrational data. This allows the computer to present probabilities of disease and treatment in a more rational, analytical way.

If we imagine that the human body is like the hub of a wheel with spokes, the outside of the wheel represents interaction with the environment. The spokes are the various entities of our interaction: chemical, psychological, spiritual, etc.



We can see that there are many spokes that can appear on this wheel, and someone invariably come up with another spoke. However, to take any one spoke of the wheel and make it the entire issue. doing all therapy and measurement diagnosis from one spoke, is not holistic. If we make one spoke large or strong, the wheel often becomes unbalanced. To have a balanced wheel we rally need to have equally strong spokes.
So in developing our vibrational medicine technique, we must realize the abilities of homeopathy and vibrational medicine. It is hard to decide just where vibrational medicine starts or stops, and it is wrong for us to think of all spiritual modalities as vibrational medicine, excluding all other diagnostic techniques.
In using various potencies in homeopathy we realize that they can be blended.



We can sec from the Kirlian photography that there was a different field for each potency, and that by blending them ail in the last picture we get a shadow of each one in the. last hole. But the hole is not like any of the others, yet it is somewhat like them. The blended potency becomes a new entity or a new so-called singular. We feel that the body now can pick which type of vibrational level or potency it needs in its state of endeavor.
Thus we have given the practitioner a homeopathic case of choice in which he need only understand homeopathy insofar as what particular product to use. He no longer needs to pursue which potency is needed. A full-range potency can be developed that will allow him to treat at different potencies. A patient may present on Tuesday with a condition that requires Belladonna 6x. By Wednesday he might need a 12x, and by Thursday a 30x. 1f we blend these in a bottle, the body tends to choose what it needs in an uncomplicated way, thus making it easier for the practitioner to direct his activity. If the practitioner does want just a 30x, this can be purchased from LNT*, as they realize that some practitioners have a preference for that. But if the practitioner realizes that he needs a full-range homeopathic for ease: of treatment, which the patient's body can use by choosing which potency it needs, this would to a stronger indication, and easier for the practitioner to use.
Hahnemann interjected that these potencies were not much different from each other in nature. tie observed that when he blended potencies, the lower potency was the dominant one; so dominant that he excluded the blending of potencies from his theory. With our Kirlian photography and other sophisticated equipment we can now see that [his is not the case. The bottom frequency dominates, but the others are shadowed, and can be called upon if needed.
We also find that these individual potencies help to make the remedy safe. Often we find that a 100ox of a homeopathic can be quite dangerous. Our theory is that the over-indulgence of the polymorphic.structure can have a large shape effect on the neural shape receptors of the nasal pharynx, and thus create a disturbance in the limbic system, which is directly innervated to the nasal pharynx. Thus most of the dangers we see in high-potency Homeopathics are in psychological or emotional states. This is due to the transmitting of their effect from the nasal pharynx to the limbic system.
By blending these high-x potencies with low-x potencies we know that the lower-x potency will dominate in the issue. and that the higher-x potency is shadowed. We now make the remedy safe by blending a 1000x with a 100x, 30x, 20x, and 12x. The 12x potency will dominate the issue. and this will make the admission of the 1000x safe. We will not see psychological byproducts from use of this remedy.
Thus combination homeopathy offers us two major benefits for the homeopathic practitioner. One is safety: the safer the remedy the better the utilization by the homeopath. Also it offers him a remedy that is prone to take advantage of the variance of the patient's biological conditions, offering the homochord that the patient needs. Doctors who have not tried these combination remedies arc the ones who probably speak the most negatively about them. However, once they try them they sec that using these remedies is productive. We wish more doctors would try these combinations, rather than continuing to speculate and relying on their background education alone. They should realize from reading different books that homeopathy is about to change, and that the type of education offered about

homeopathy is now obsolete, being two hundred years old.
Homeopathy must now be updated into the bio-quantum world of the future. To this end all the books of Dr. Nelson have been written, and dedicated to the precept of taking energetic medicine, natural medicine, homeopathy and the like into a new world of higher understanding and application.

*Licensed Nelsonian Technologies

The machines, products and patents of Dr. Nelson have all shown to high degrees of efficacy that these theories are indeed applicable. and apropos to a modern culture.
It is our proposition and supposition that the nasal pharynx receptors innervate to the limbic system, and very easily to the hypothalamus and the endorphin receptors of the inner brain. These inner brain spots are very powerful in their transmitting of the information to the ethereal, causal and astral planes.
Thus it is our theory that these endorphin receptors and deep parts of the brain are the link between our other-dimensional bodies. Homeopathy has some profound links to them because it works primarily on those activities.
Homeopathy's primary activity is through the nasal pharynx, which helps to regulate limbic emotional activity as well as hypothalamic regulatory activity. Its link to the endorphin receptors (as pointed out by the Nelson effect in Bio-Quantum Matrix) also can help us to link to other dimensions and through other dimensions to not only our other bodies but to even others as-well, allowing for the existence of the healing forces of the body.
Perhaps there truly is a world of forms as proposed by Plato, and perhaps that is connected to us through these brain receptors. If this is so, homeopathy will he a profound intervention for the medicine of the future. (See The Experimental Evidence for Homeopathy. For scientific proof of homeopathy see Towards a Bio-Quantum Matrix and Quantum Biology. For clinical
recommendations see the, Natural Repertory and Natural Compendium of Dr. Nelson.

SUMMARY

1. HOMEOPATHY IS A PROFOUNDLY LARGE FORM OF MEDICINE. WITH HERBAL MEDICINE, IT IS POSSIBLY THE LARGEST FORM OF MEDICINE ON THE PLANET TODAY.
2. LNT* HAS BEEN ABLE TO QUALITY CONTROL AND PROVE HOMEOPATHY IN MANY WAYS, BEYOD THE 30X STANDARD.
3. WE HAVE INTRODUCED SOME BASIC IDEAS REGARDING KIRLIAN PHOTOGRAPHY AND ITS UTILIZATION IN HOMEOPATHY.

Chapter 4

RHYTHMS

There are many different biological rhythms that must be discussed in our analysis of vibrational medicine. Some rhythms are as long as centuries, if not eons. Some last for years. Some are nanoseconds in length.

An example of a rhythm might be the circadian locust, coming out of its hibernation every seven years to overpopulate the trees. This type of locust extravaganza happens like clockwork on a regular basis. In the South African jungle every twenty years a team of army ants binds together to overpopulate and to eat foliage over a two-mile-wide, fifty-mile-long stretch of jungle. This overpopulation of ants is very devastating, and happens as part of their social rhythm.

Many rhythms happen on a yearly basis, as there are seasonal changes that prompt migration schedules, hibernation or estivation cycles.

An example of a bizarre yearly cycle happens with the Sargaso Atlantic eel. This Atlantic eel will migrate once a year from the center of the Atlantic Ocean, up rivers of France, up into high mountain areas, where it will mate with other eels to preserve its species. The impregnated eels migrate back down the rivers, some rivers being only six inches deep. Often the eels must travel across land to get from one area of the river to another. Often the last five hundred yards are over land as these eels wiggle across the soil to the mountain pools of France. Then they travel back to the center of the Atlantic Ocean, to the Sargaso Sea, where the birthing takes place and the population of eels increases.

There are many examples of bizarre, and often seemingly irrational, events that lead to yearly spawning cycles, such as those of salmon, which fight upstream against long odds. These seemingly irrational events occur in many, many species. Perhaps Darwin's "survival of the fittest" theory would say that if one of these eels or salmon should find a different way to spawn, it would be a wiser choice for the species, and thus it would evolve and propagate in a different direction. There are so many bizarre migration schedules seemingly located in certain geographical areas, such as in the case of the buzzards of Hinckley, Ohio, or the swallows that return to Capastrano. These and thousands of other illogical scenarios do not fit a Darwinian model.

We point out again some indeterminacy in biology. Indeterminacy can extend to even large events, which then become riveted into rhythms.

Thus every animal seems to have yearly and sometimes less frequent rhythms in which it is affected by hormonal and physiological changes that provoke it towards varying behaviors. All animals also have daily rhythms. These are known as *circadian* rhythms, which affect people and animals during the daily course of events.

The pineal gland behind the eyes is a light-receptive organ that helps to dictate the hormonal release and the setting pace of the circadian rhythms of the body. Thus as the human awakes with the light, the pineal gland is stimulated by the excess surge of photons propagated by sunlight. This starts to turn on sex hormones and daily-activity hormones, such as the adrenal glands, which will then prepare the organism for the day. As the light changes during the day the pineal gland also stimulates the organism to shut down for the evening, as it raises and lowers body temperature and sets up different periodic activities. In cases where men have been placed under the ground away from sunlight exposure, their bodies attempted to establish these rhythms. The rhythms thus established were not on a perfect twenty-four-hour cycle, but often a twenty-two- or twenty-three-hour cycle. This shows how the pineal gland attempts to utilize a period less than twenty-four hours in the absence of sunlight.

Many people today have pineal disturbances that disrupt the rhythms of their bodies. This often results from laziness, and "sleeping in" so that they try to extend themselves to sleep a few more minutes because they had been out late the night before. If this conditioning continues, it can rob the pineal of its ability to respond to morning light, and it thus produces a variety of problems in response to the circadian rhythm. Often this has serious hormonal consequences.

One unexplored area of emotional and psychological treatment is that of treating people who oversleep for the resulting upset of their daily rhythms. People should try to sleep a normal seven to eight hours and set their schedules so that they wake up during the hours of 6:00 to 9:00 in the morning. This is the more natural rhythm of the body, and is the most akin to health. Many people have produced unnatural rhythms of the body, trying to stay up late at night and get up late in the day. They justify or rationalize this by stating that this is "right for them". It might be right for them for a short time, but usually it is more harmful in the long term. Many people who work alternative shifts have to reset this rhythm. This produces strain on all the hormones, especially the pineal and adrenal glands, in their attempt to regulate the various body functions. The body can readapt to these unnatural rhythms, and often healthy, productive lives can result. However, many people acquire sicknesses as a result.

Our vibrational medicine doctors will need to be trained in the circadian and seasonal rhythms of the body, to understand the body's response to seasons and light, as well as electromagnetism and other factors. This will help in our understanding of physiology and our treatment of disease and disorder. To this extent let us list some of the known circadian rhythms and how they apply.

Chapter 5

QUALITY CONTROL

In the field of quality control nobody knows more than Walter Deming. Mr. Deming offered the United States a very correct and strict form of quality control, which United States businesses rejected in the 1950s. Once rejected, Deming, out of desperation, took his quality control concepts to Japan. Japan embodied and embellished the Deming concepts of quality control. In the United States the highest award a citizen can receive is the Congressional Medal of Honor, which is usually awarded to soldiers who have killed people. In Japan the highest award that can be presented to a Japanese citizen is the Deming Award, for any citizen that shows the highest degree of quality control in his industry.

Deming said that quality control would be the way to build a business into the future. If a business could adapt quality control as the mainstay of its philosophy, it would last through difficult times, and further increase the profitability of the business in good times. Quality must supersede all other dictates of business. Build for quality first, and profits will follow.

The American companies rejected Deming in the 1950s, saying that they did not need quality control. He remarked that they were in a boom market that in the future might not be able to withstand the same type of inquiries, and that quality control would take them through even the worst times in the market. His predictions were right; the United States has definitely acquired a problem in quality control.

Some U.S. manufacturers recently sent off batches of silicon chips to the Japanese. The Japanese remarked that six percent of the chips were defective; the United States simply remarked that none of their other customers had ever complained. The United States market was completely able to accept a six-percent rejection rate. That is totally intolerable to the Japanese, who strive for the finest degree in quality control. In fact, not even a percent *of* a percent could be tolerated as productive for a business.

In the field of medicine many people have decided to accept medicines for their patients and themselves that are not quite the finest in quality. Synthetic medications are incomplete copies of natural ones. It is known that the natural types of these hormones are often the finest quality, and come with natural control factors that help to stop their overdose effects and other negative side effects. Nature in its infinite wisdom creates an extremely complicated system of intricate cybernetic controls that intertwine to produce the ultimate harmony of life.

Thus the finest quality of pharmaceuticals can be said to be directly made by nature. The books *Quantum Biology* and *Bio-Quantum Matrix* prove this point in mathematical terms. The healing of the planet will come from the leaves of the field.

In light of the electronic duplication studies we have done, we have also shown that electronically-duplicated homeopathics are not real homeopathics, and as such they are definitely inferior in their efficacy. The duplicated homeopathics in the best of tests have been shown as slightly more effective than placebo, which shows that there is something to placebo's usage. However, at the same time these homeopathics fall very short of real homeopathic efficacy. But many practitioners and doctors have allowed themselves to be persuaded into using these homeopathics in light of their efficiency of cost, even though they may recognize that they do not work like the real homeopathics. Cost above quality has become a debilitating factor in the health care system of the United States.

In the manufacture of homeopathics cost above quality is also a problem. For ten years this author has taken quality control techniques to the major manufacturers of homeopathics, asking them to get involved in a dramatic quality control program. This quality control program would analyze the chemistry, the pharmacology, the Kirlian fields, the quantum states, the polymorphic structure, the polymorphic structure, and the energetic dynamics of the homeopathics. This chapter is a review of the procedures we have utilized in making up our quantum quality control procedures for homeopathy. We have trademarked this quantum quality control process as *QQC* (see *Quantum Quality Control* book).

All the manufacturers who were contacted said that they did not want to go with a quality control procedure that was so expensive. Estimated costs of all the research needed to devise this quantum quality control were approximately $150,000, so this author chose to fund this independently by his own means to develop these homeopathic quantum quality control regimes.

It is this author's firm opinion that these electronic duplication machines have caused a dramatic problem in homeopathy in that many people who have tried these inferior homeopathics did not see results, and are resistant to coming back to homeopathy because they feel that it did not work for them. In fact, they never tried homeopathy. These duplicated homeopathics *are not true homeopathics*. They do not fit all of the criteria of the HPUS. They are not made to Hahnemann's specifications. They have no Kirlian field, pharmacology, or polymorphic structure, and they do not fit any of the quantum quality control techniques.

In making sure that we have the finest quality control techniques, let me now outline some of the patents that have been applied for on the quantum quality control procedure, which can now be disclosed.

On many bottles made by this procedure we see a QQC stamp, which denotes that the contained homeopathic meets the QQC procedure. It is the opinion of this author that in medicine we should not take second best; we should insist on the finest quality. Therefore we need to insist on nature, as nature offers us the finest and best in treatment modalities. We must insist on the best in homeopathy, vitamins, minerals, etc. This needs to be quantum quality controlled so that we can understand the energetic nature of our medicines. We must use true homeopathy at its best in order to judge it fairly. It is also the opinion of this author that many doctors who have tried homeopathy did not see results because they used inferior products manufactured by companies who did little to quality control their procedure. To this end LNT* has developed a

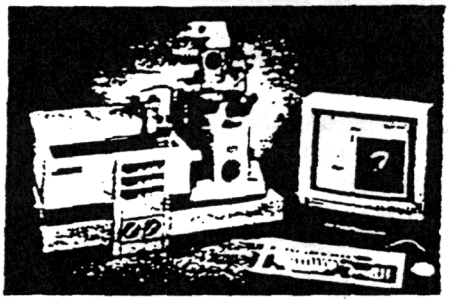
QQC process that is by far the most superior quality control procedure of any pharmaceutical company in the world.

The first step of this quality control is the intake of natural formulas. One critique of natural herbal therapy and the like is that the results are often different from one sample of the product to another. This is not so much a problem in China and Japan, where the herb pickers and manufacturers take fine quality control procedures to heart. They pick their herbs at precise times, knowing that they are pharmacologically active. Once the herbs are picked they are examined for just the right pharmacologically-active substance. In America, however, many suppliers pick herbs at inopportune times when they are not pharmacologically active, just to have an herb without worrying about its quality.

Podophyllum is at its ripest during the first week of July, but often herb pickers in America pick Podophyllum in September, or perhaps even in November when it is totally pharmacologically inactive. It is still Podophyllum to them, and can be sold, but it is not pharmacologically active in the ergot alkaloids that are the recognized pharmacological agent in the Podophyllum treatment.

To this end LNT* developed pharmacologically-active techniques of intaking various compounds, so that the Belladonna, Podophyllum, glandulars, vitamins, minerals, etc. must go through extremely close pharmacological and energetic quality control techniques to be accepted into production before they are made into tinctures or homeopathics. This type of procedure is very important to assure the quality of the homeopathics. The techniques used are chromatography, spectrophotometry, spectro-absorption analysis, energetic techniques and other factors to find the quality pharmacological substances in these compounds. To this end LNT* has also had to choose several herbal suppliers from China and the Orient, where quality control and the adherence to the pharmacopeia is more strict. Even from these strict suppliers rejection rates are often as high as one out of fifteen, whereas from some American suppliers of herbs rejection rates excel to one out of four.

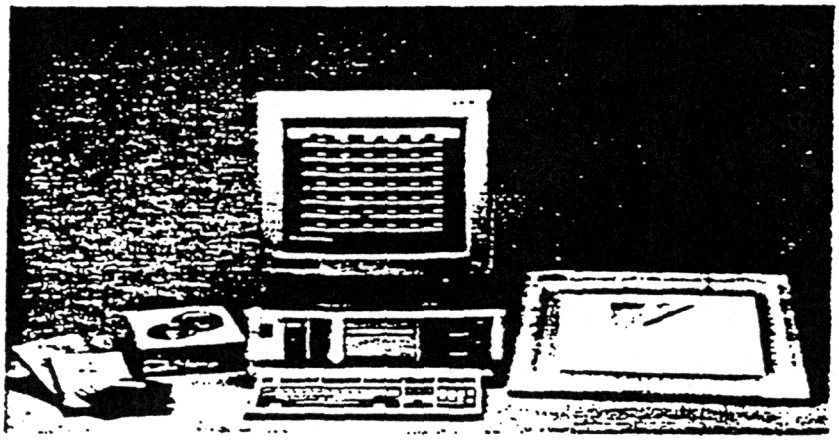
The first step in this quality control procedure is intaking the finest quality items and preserving them for homeopathic manufacturing. The second step in the quality control procedure is pilot studies and experimentation. Often we might have thoughts that this plus this plus this will definitely be powerful, but until we actually blend it into a bottle and give it to a patient population we are still unsure of its true effects. Compounds can potentiate other compounds. They can negate each other, and sometimes they produce variable or changing results different from each of the constituents.



Inverted Confocal Microscope

ASBMB Booth 1814. The MultiProbe™ 2001 inverted confocal laser scanning microscope combines easy access to a sample and an integrated optical accessory plate with imaging of unparalleled clarity and visualization of samples in 3-D. It integrates a very accurate scanning mechanism and a highly sensitive dual detector system with a Silicon Graphics workstation and ImageSpace™ software. A consistent graphical user interface makes it easy to scan, reconstruct, process and analyze confocal images. **Molecular Dynamics,** 880 East Arques Ave., Sunnyvale, CA 94086.

DNA & PROTEIN SEQUENCE ANALYSIS SYSTEM FOR PCs



DNASIS/PROSIS™ System II is a convenient sequence digitizing system for PC-compatible computers. The system is used for comprehensive analysis of DNA and protein sequences. DNASIS/PROSIS System II comprises DNASIS ™ and PROSIS™ software, CD-DATA (GenBank™ EMBL, NBRF-PIR, and SWISS-PROT databases on CD-ROM), an Hitachi CDR-1700S CD-ROM drive, and an Hitachi HDG1717BL backkit digitizer. The PC-compatible computer is not included in System II but can be purchased through Hitachi Software resellers or the customer's own sources

Hitachi Software Engineering America, Ltd., 2000 Sierra Point Parkway MS:580, Brisbane, CA 94005-1819.

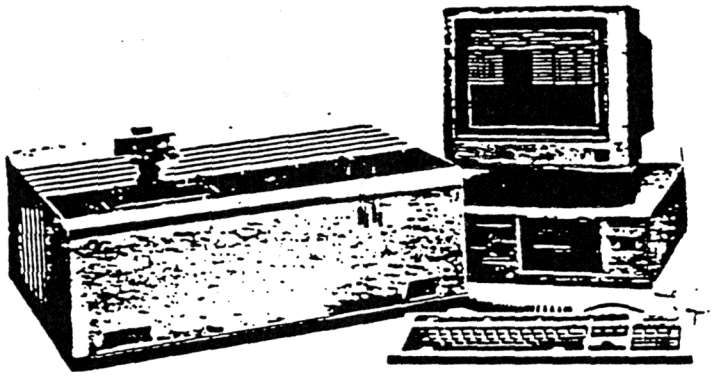
We must realize that Gedanken experiments done just in the head do not always work. Often homeopathics at certain levels and preparations can combine and neutralize each other. Sometimes they might potentiate each other, but often in the wrong direction. Sometimes the result is so different from the singulars that it is quite surprising.

So to make combinations from singular homeopathics we must study the effects in patient populations. A history of such studies is supplied in the books *The Experimental Evidence for Homeopathy I* and *II* by Dr. Nelson. In these books is included a review of all the known literature on homeopathy, as well as some of the major studies. Here we can see that homeopathy can be experimentally evaluated to some degree. It takes a different type of research to evaluate such a subtle medical modality. We offer a new perspective on research that goes beyond some of the statistical dynamics done by pharmaceutical companies. Often the statistics are similar to the American Psychological Association (APA) style. At this time we should review the experimental data offered in *The Experimental Evidence for Homeopathy*.

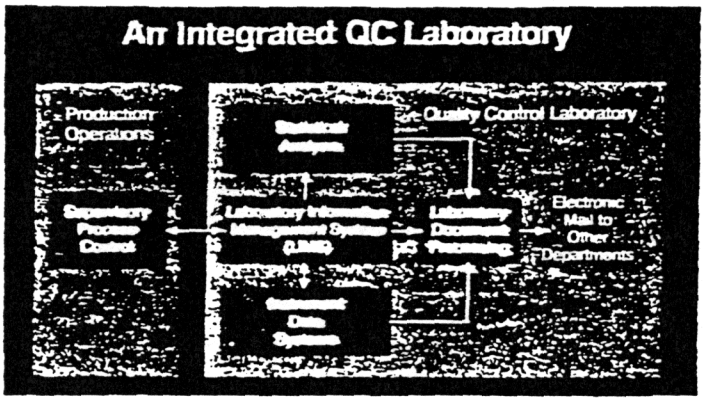
Now let us return to quantum quality control techniques.

QUANTUM QUALITY CONTROL

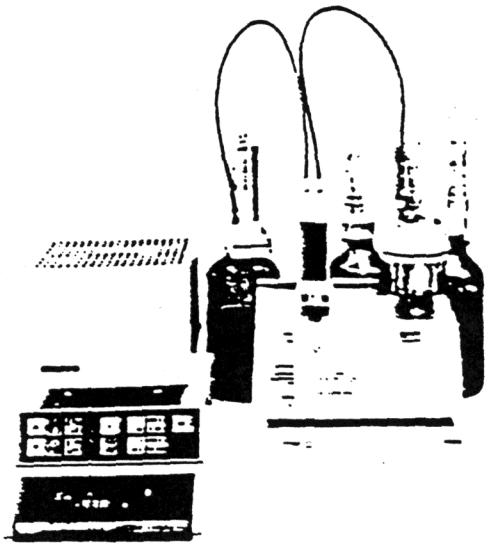
1. Statistical evaluation of clinical results (confirm safety and efficacy)
2. Raw material intake (make sure you begin with the best)
3. Kirlian photography (confirm bio energy field stability)
4. Trivector analysis (confirm polymorphic liquid crystal state)
5. Cryogenic photography (confirm polymorphic liquid crystal state)
6. Spectrophotometry and atomic absorption (confirm biophoton absorption and release)
7. Culture (confirm safety)
8. Chromatography (confirm safety)
9. Pro bono programs (give back to the universe by helping the poor)
10. Educate the doctor and public



TRIVECTOR ANALYSIS

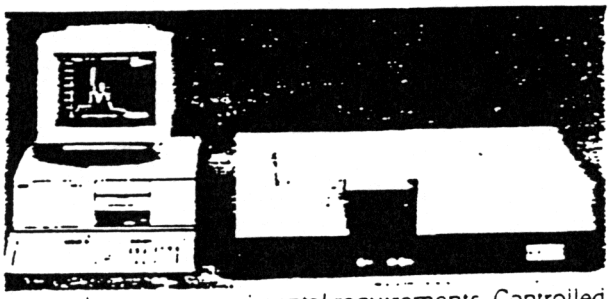


. To eliminate "islands of automation," today's laboratory information system should actively support communication among all laboratory personnel—and with the enterprise.

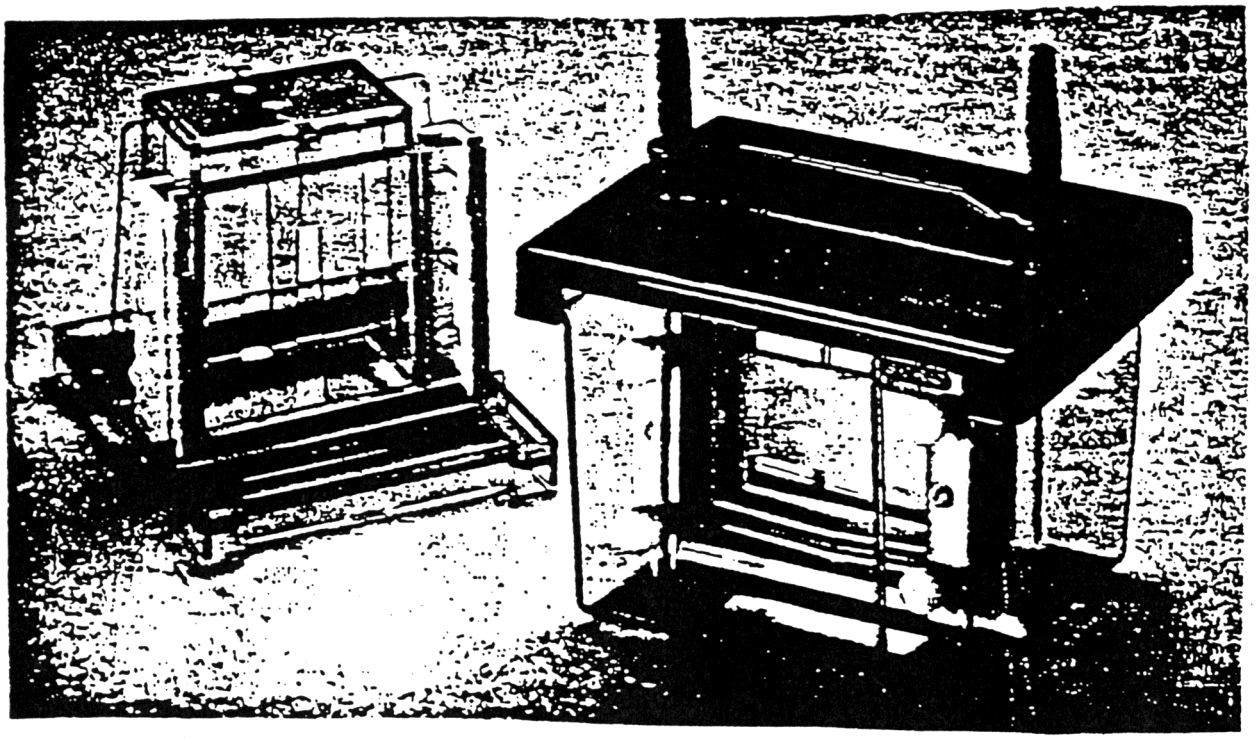


photon counting

The PCI steady state photon counting spectrofluorometer features readily accessible optical components, which makes instrument hardware easily reconfigurable



to match varying experimental requirements. Controlled by personal computer, the unit offers control of monochromators, polarizers, cuvette positioner, shutters, and temperature of the sample. This automation feature, combined with macroprogramming capability, allows set up of complex experimental protocols. The instrument can be used to make intensity measurements at fixed wavelengths, corrected excitation and emission spectra, and synchronous luminescence spectra, as well as polarization measurements.



Another quality control technique is the REGAE (Rare Electron Gas A-Allopathic Evaluation). Here we can see the life force of a homeopathic by exposing it to an electron plasma field and watching the life force fluoresce in a rare electron gas container. Taking a picture of this rare electron gas reaction will allow us to see some of the Kirlian light fields. This reflects the life force field of the item, and is also recognizant of the various electron fields or quantum states of the outer electrons in the homeopathics. As we can see from *Quantum Biology*, information can be stored in these states that can be retrieved by the biological organism in homeopathy. Homeopathy is often a science of information transfer, not just chemistry. It is software, where pharmacology transmits hardware.

Another procedure used in quantum quality control is that of the trivector analysis. By analyzing the conductance spectrum response of a homeopathic, the magnetic inductance response and the static capacitance response, we can get an idea of the three fields that make up the electrical nature of any homeopathic. The electrical nature of a homeopathic can be compared to the electrical nature of a patient, and help to further perfect the utilization of the homeopathic. Three separate patents on these three devices had to be developed and presented in Ireland to help us understand the quality of homeopathics and their electrical or energetic makeup.

Another place where homeopathy had to be investigated was that of the polymorphic structure or the liquid crystal effect of homeopathy. Here we had to develop the cyroliquicrystal microscope to allow us to view the subtle shapes that form in a homeopathic as the shape receptors start to take the shape of a remedy imprinted into their water and alcohol structure. This is yet another way homeopathy works, and a way to investigate it. For an account on the patents involved and their procedures, we must review *Quantum Biology* and *Bio-Quantum Matrix*.

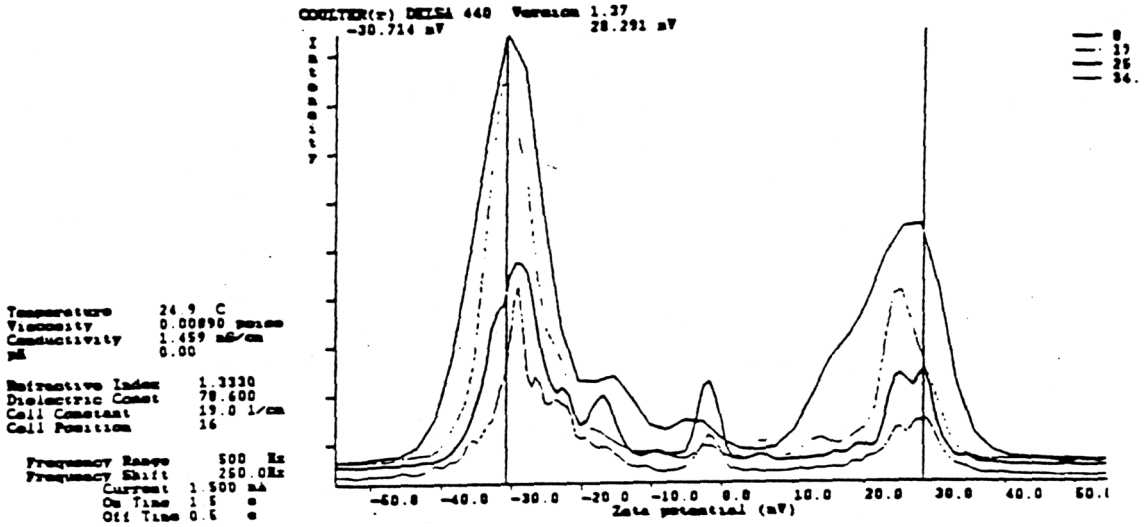
It was found that a new type of homeopathic procedure for manufacturing was also important, so we developed the Nelsonian manufacturing process, which allows us to capture more energy in a homeopathic. As we use more combinations we must look at a new manufacturing procedure for making these combinations more energetic. The Nelsonian manufacturing process is used to allow these singulars to blend into a combination more readily for ease of use, more energetics, and also product honesty on the label.

So quantum quality control is a fine procedure to produce exacting homeopathy, which will allow homeopathy to excel to its new role as a leader in pharmacology. It must be pointed out that the lack of quality in homeopathy, as well as the electronic duplicators that are not homeopathic at all, have led to some of the collapse of homeopathy. Quality breeds consistency. Consistent results build referral networks.

It is the suggestion of this author that we label the use of these electronic duplicators a type of vibrational medicine. In our studies we have observed that there is a difference in these electronically-duplicated formulas versus placebo. However, we now must show that this is not, nor is it as effective as, real homeopathy. This is a different type of medicine that is not prepared by the HPUS method, nor does it fit any of our quality control techniques. In using these formulas we will need to develop a new jargon and a new procedure. This will allow homeopathy not to be viewed negatively when the electronically-duplicated formulas don't work.

In directing patient intervention modalities, true homeopathy must be used whenever possible, and the duplicated vibrational medicine formulas should only be used in extreme cases where time or other criteria might be a factor.

To allow homeopathy, vibrational medicine, energetic medicine, acupuncture and other modalities to become mainstream, it is the suggestion of this author that we go for quality, not quantity or cost. We must go for the quality of service, and direct not for cost savings to our practitioners, but the absolute finest and best in biological treatment to allow people to restore themselves to health. The health of people knows no real cost; it is worth all the gold in the world.


COULTER(r) DELSA 440 Version 1.37
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28.291 mV
Intensity
Temperature 24.9 C
Viscosity 0.00890 poise
Conductivity 1.459 mS/cm
pH 8.00
Refractive Index 1.3330
Dielectric Const 78.600
Cell Constant 19.0 1/cm
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Frequency Range 500 Hz
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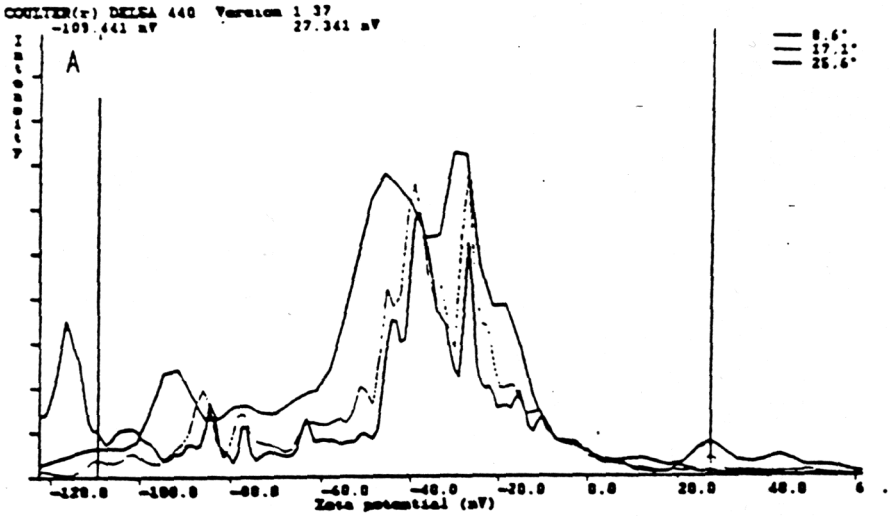
Current 1.500 mA
On Time 1.5 s
Off Time 0.5 s
Zeta potential (mV)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A
Intensity
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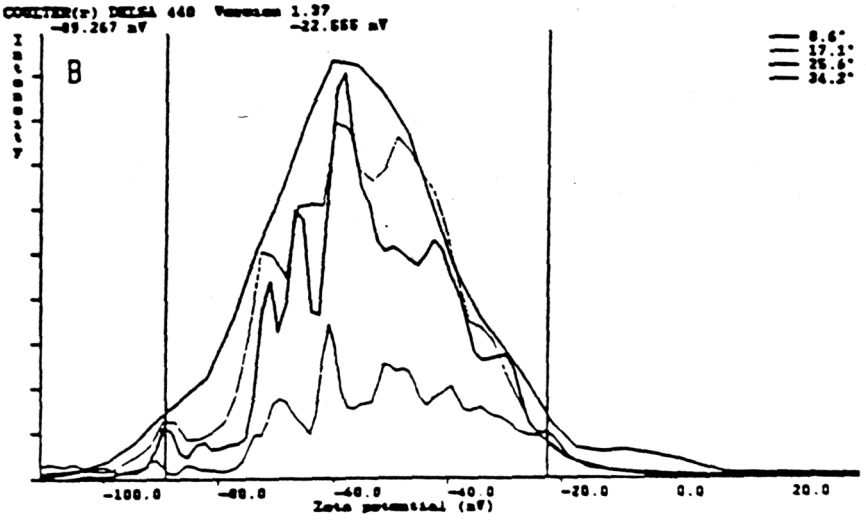
17.1°
25.6°
Zeta potential (mV)


COULTER(r) DELSA 440 Version 1.37
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-22.555 mV
B
Intensity
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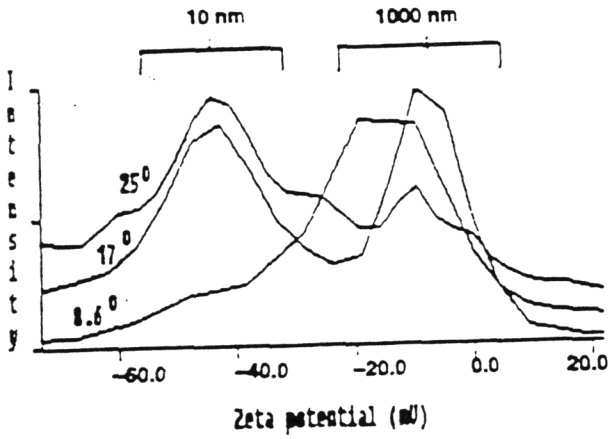
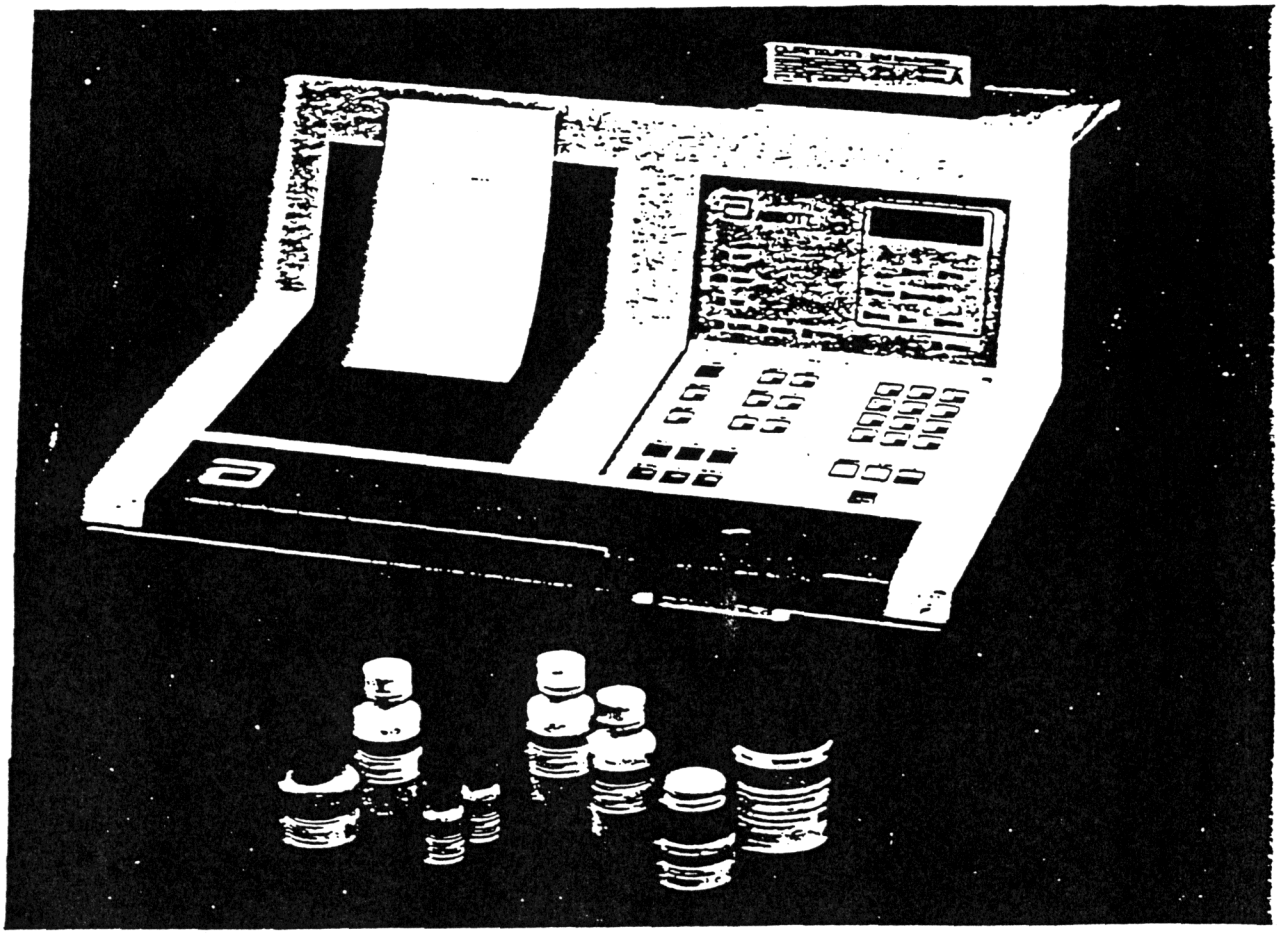
17.1°
25.6°
34.2°
Zeta potential (mV)





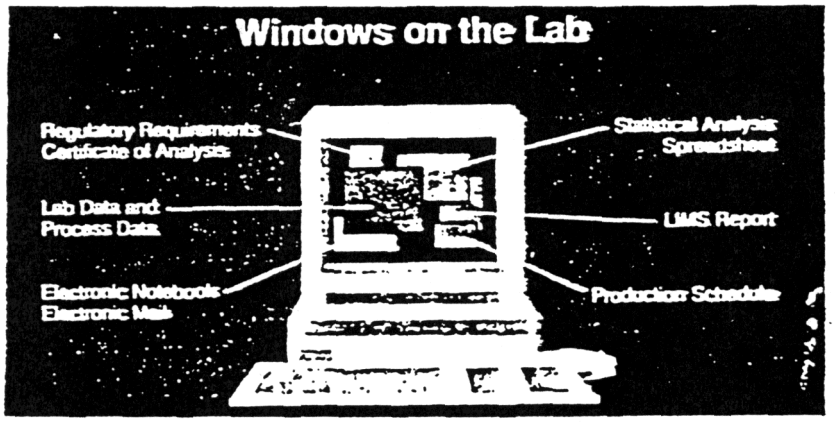
Dual wavelength spectrophotometer with built-in data reduction

We will find that the mechanisms of these energetic, homeopathic and vibrational medicine techniques will allow for inexpensive treatments when compared to surgery, allopathy and other synthetic pharmacological inventions. So we are looking at inexpensive routines. We do not need to look for ways to save pennies and dimes in doing these procedures. It is more important to find ways to make our patients healthier as quickly as possible, and as naturally as possible. The finest in quality control will help.

We hope that the electronically-duplicating practitioners who are utilizing those techniques find ways to develop other modalities, and use true homeopathy. If they do, they will see an increase in their practice, an increase in patient compliance, and an increase in referrals.

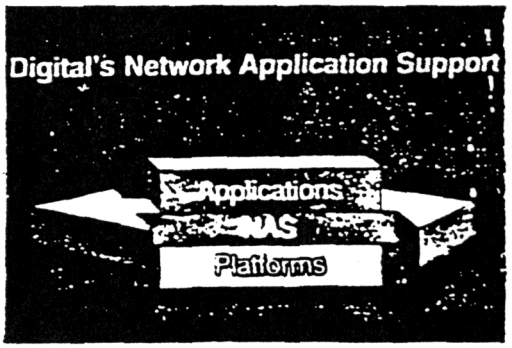
LNT* has developed its quality control techniques and uses the QQC process. Their president is the only one in the world licensed to do so. We develop the finest-quality homeopathics for our patients.

If you as a practitioner care about the true health of your patients more than you care about your own pocketbook, I think that you will want to consider LNT* (please contact this author for information).



Information technology must provide laboratory personnel with timely, predictable access to all the information they need to optimize laboratory operations.

NAS resides between the base platform and the applications, providing a set of standards-based software products that seamlessly integrate all applications running in a distributed, multivendor environment.



SUMMARY

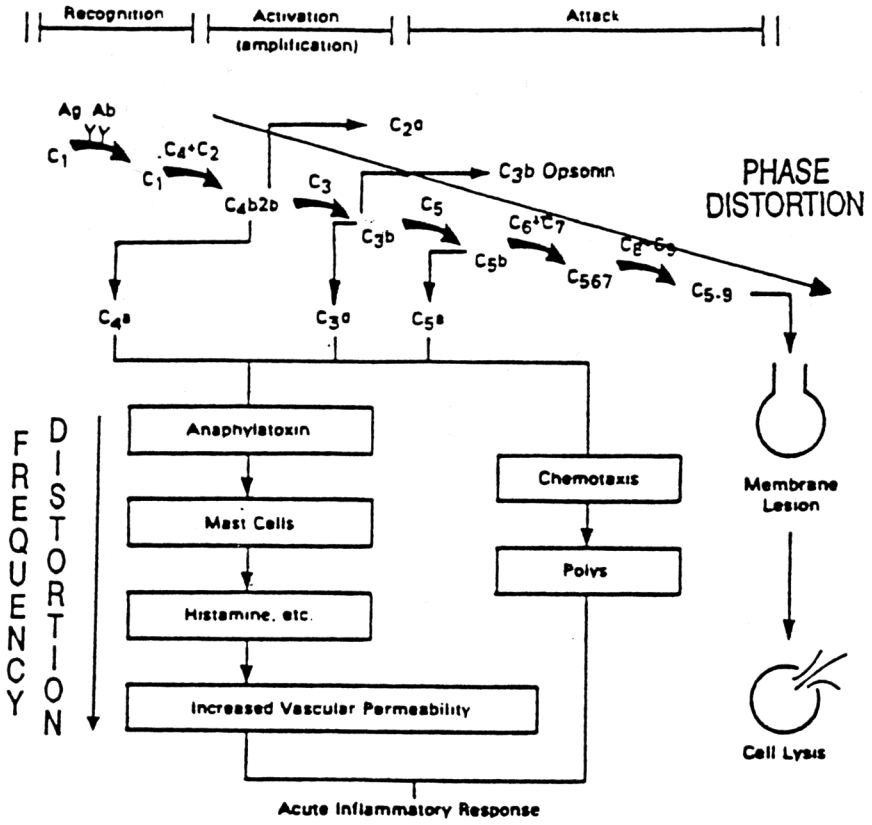
1. We can see that there is a primary need for quality control in developing our quantum vibrational medicine techniques.

2. Homeopathy is in dire need of a dramatic quality control process. This will assure the patient of the highest form of homeopathy, which can then be used to get reliable results which will validate homeopathy to the modern medicine world.

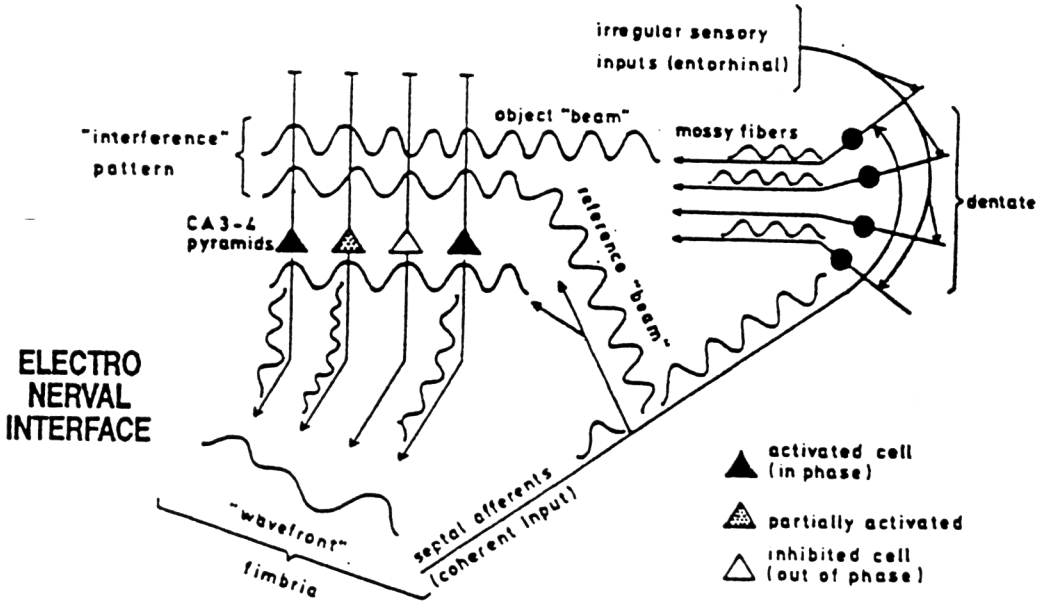
3. We have offered a quantum quality control (QQC) process that will allow us in a highly-refined scientific way to develop and understand the homeopathic quality control process.

4. This QQC process is owned and trademarked by the author and controlled through the Maitreya Corporation of Limerick, Ireland.
   * Licensed Nelsonian Technologies

Complement Activation, Classical Pathway



The classical pathway of activation of complement. Following reaction of antibody with antigen, a cascade of reactions of the components of complement is activated. C_1 functions as a recognition unit for the altered F_c of two IgC or one IgM molecule; C_2 and C_4 function as an activation unit leading to cleavage of C_3. C_3 fragments have a number of biologic activities: C_3a is anaphylatoxin, and C_3b is recognized by receptors on macrophages (opsonin); C_3b also joins with fragments of C_4 and C_2 to form C_3 convertase, which cleaves C_5. C_5 reacts with C_6 through C_9 to form a membrane attack unit that produces a lesion in cell membranes through which intracellular components may escape (lysis).



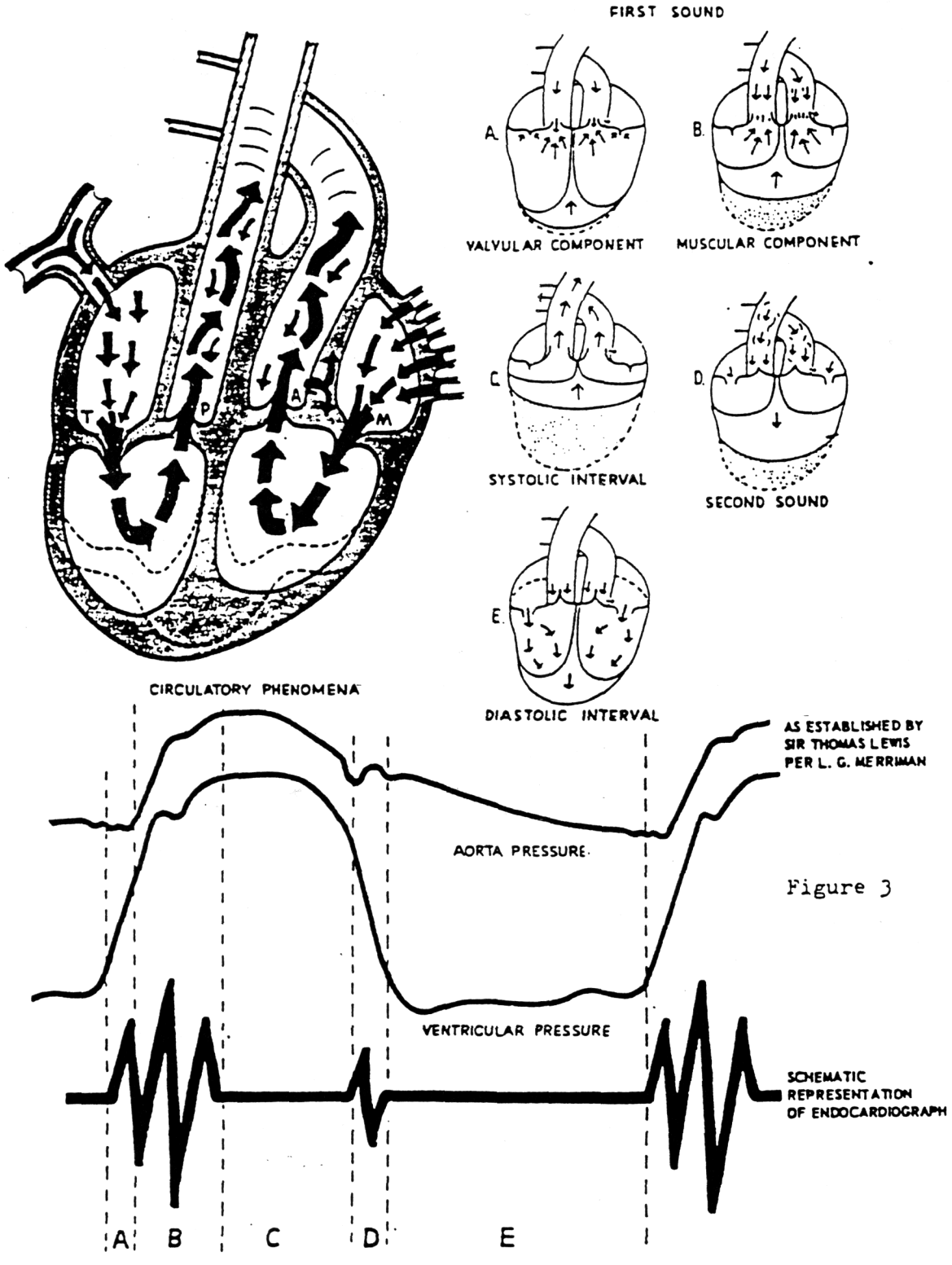
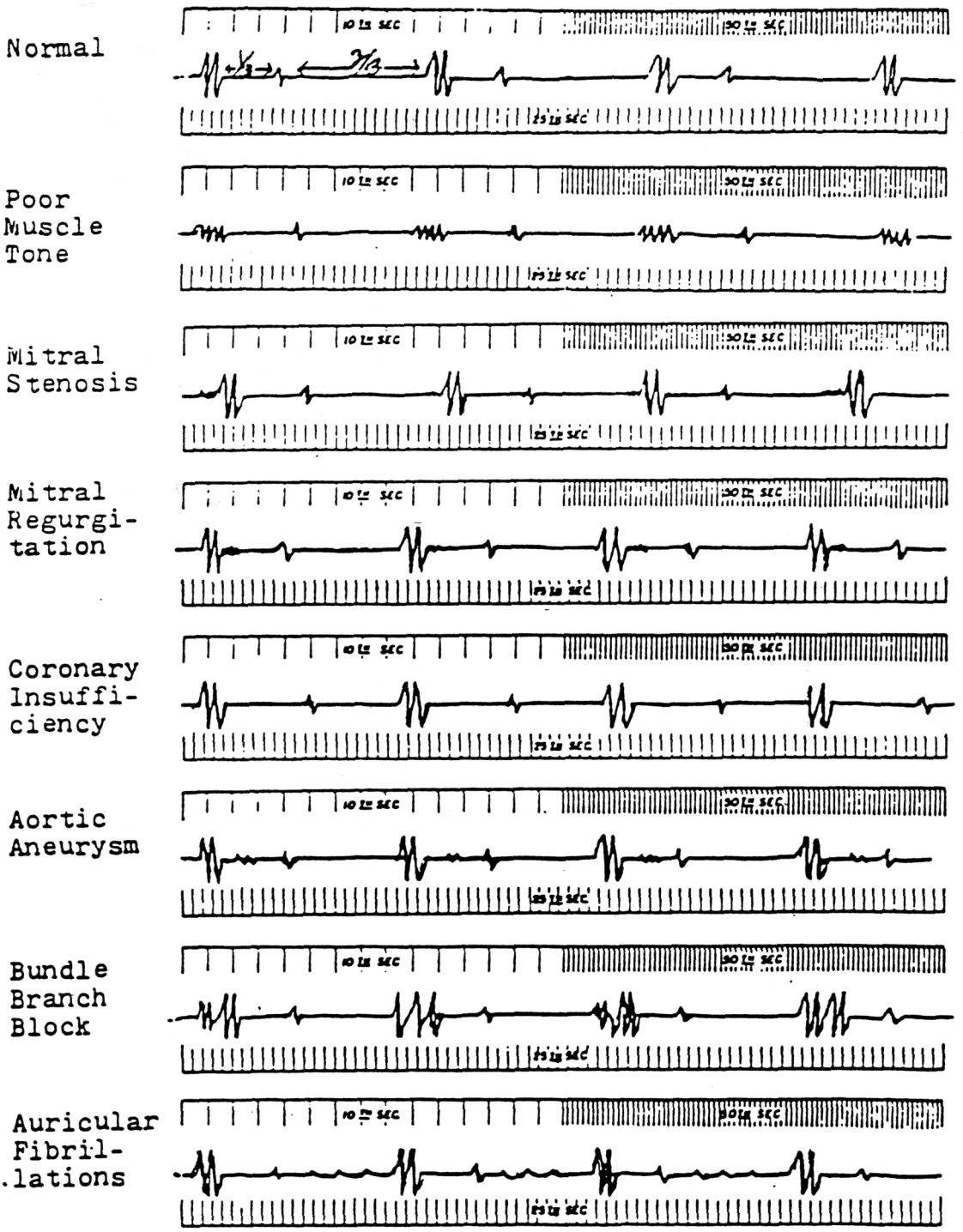
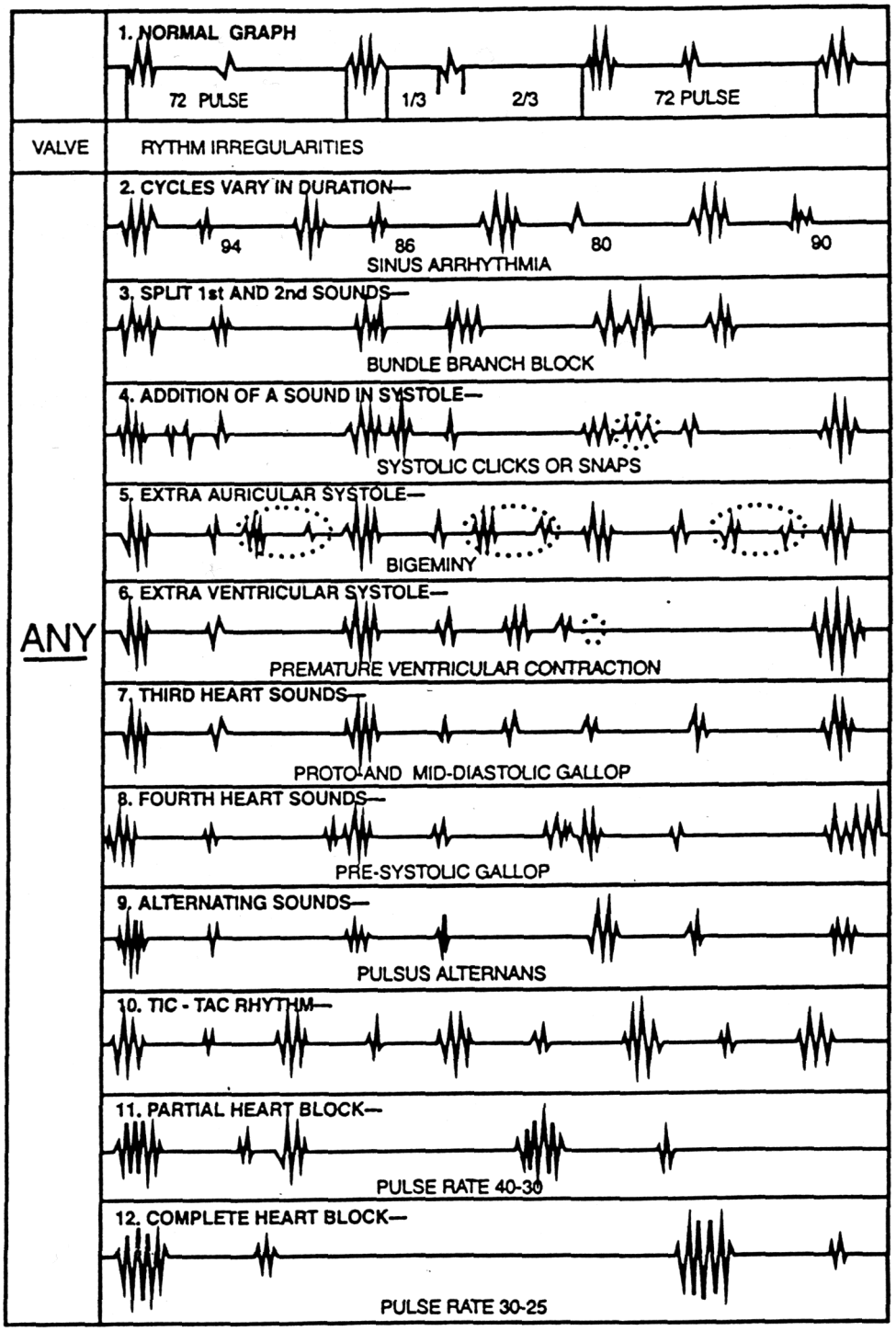


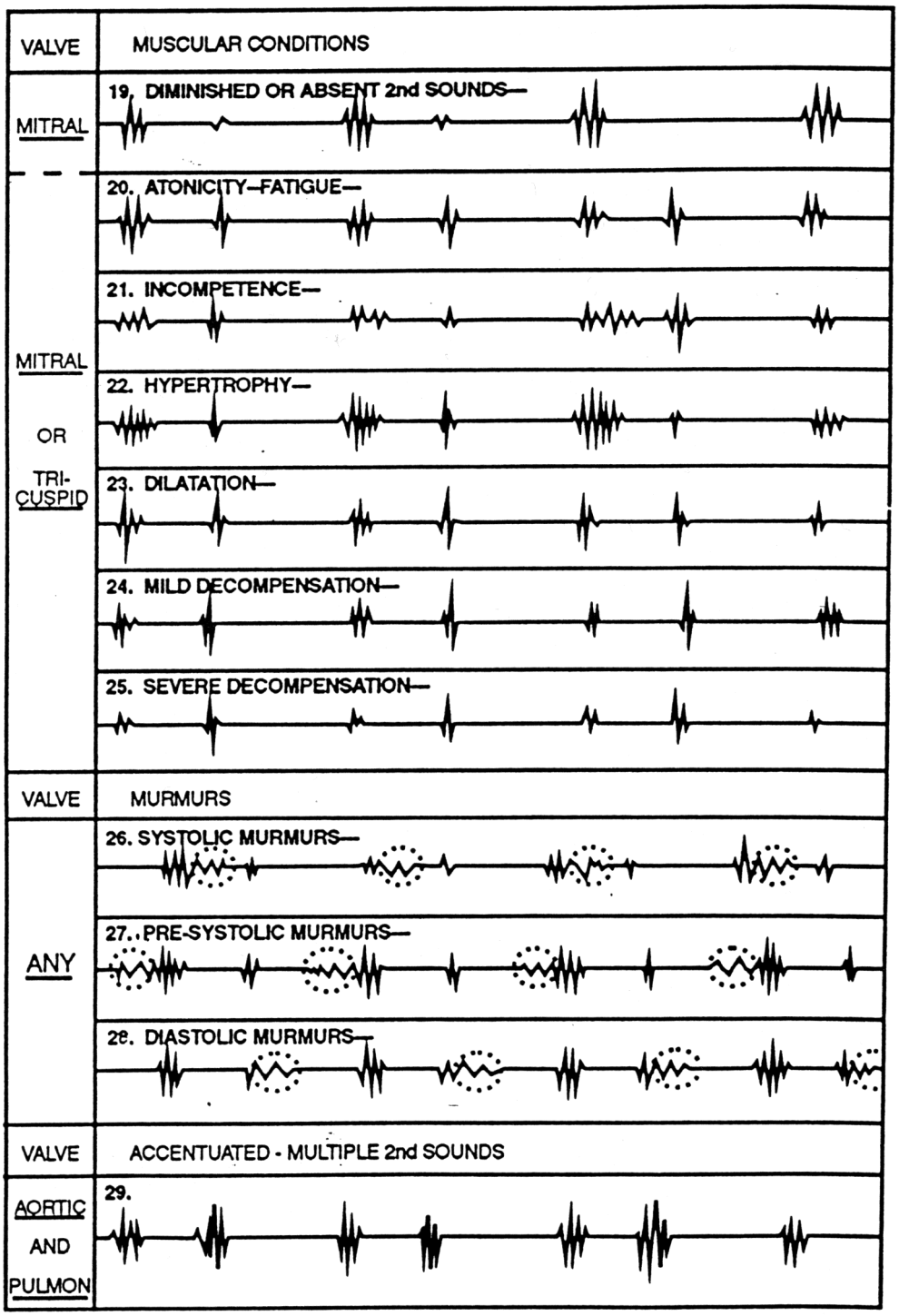
Figure 3

THE HEMODYNAMICS OF HEART SOUNDS

SOME TYPICAL ENDOCARDIOGRAPH INDICATIONS




1. NORMAL GRAPH
72 PULSE
1/3
2/3
72 PULSE
VALVE
RYTHM IRREGULARITIES
ANY
2. CYCLES VARY IN DURATION—
94
86
80
90
SINUS ARRHYTHMIA
3. SPLIT 1st AND 2nd SOUNDS—
BUNDLE BRANCH BLOCK
4. ADDITION OF A SOUND IN SYSTOLE—
SYSTOLIC CLICKS OR SNAPS
5. EXTRA AURICULAR SYSTOLE—
BIGEMINY
6. EXTRA VENTRICULAR SYSTOLE—
PREMATURE VENTRICULAR CONTRACTION
7. THIRD HEART SOUNDS—
PROTO-AND MID-DIASTOLIC GALLOP
8. FOURTH HEART SOUNDS—
PRE-SYSTOLIC GALLOP
9. ALTERNATING SOUNDS—
PULSUS ALTERNANS
10. TIC - TAC RHYTHM—
11. PARTIAL HEART BLOCK—
PULSE RATE 40-30
12. COMPLETE HEART BLOCK—
PULSE RATE 30-25


VALVE
MUSCULAR CONDITIONS
MITRAL
19. DIMINISHED OR ABSENT 2nd SOUNDS—
MITRAL OR TRI-CUSPID
20. ATONICITY—FATIGUE—
21. INCOMPETENCE—
22. HYPERTROPHY—
23. DILATATION—
24. MILD DECOMPENSATION—
25. SEVERE DECOMPENSATION—
VALVE
MURMURS
ANY
26. SYSTOLIC MURMURS—
27. PRE-SYSTOLIC MURMURS—
28. DIASTOLIC MURMURS—
VALVE
ACCENTUATED - MULTIPLE 2nd SOUNDS
AORTIC AND PULMON
29.

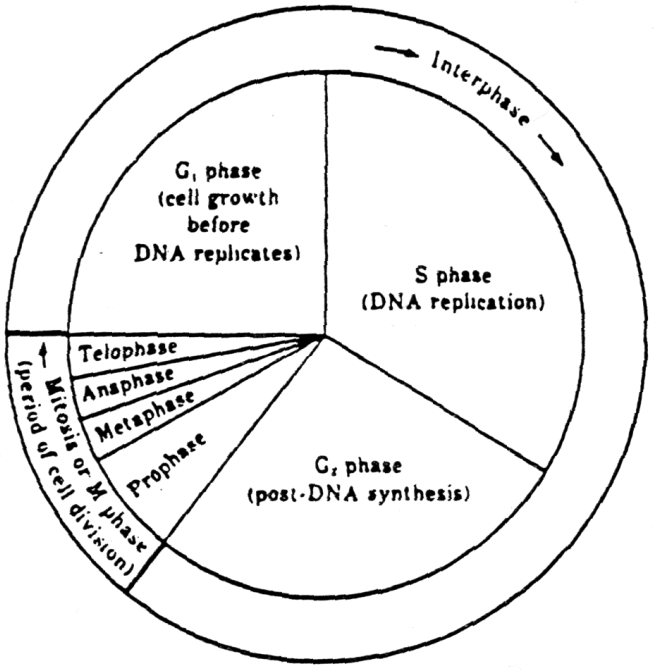
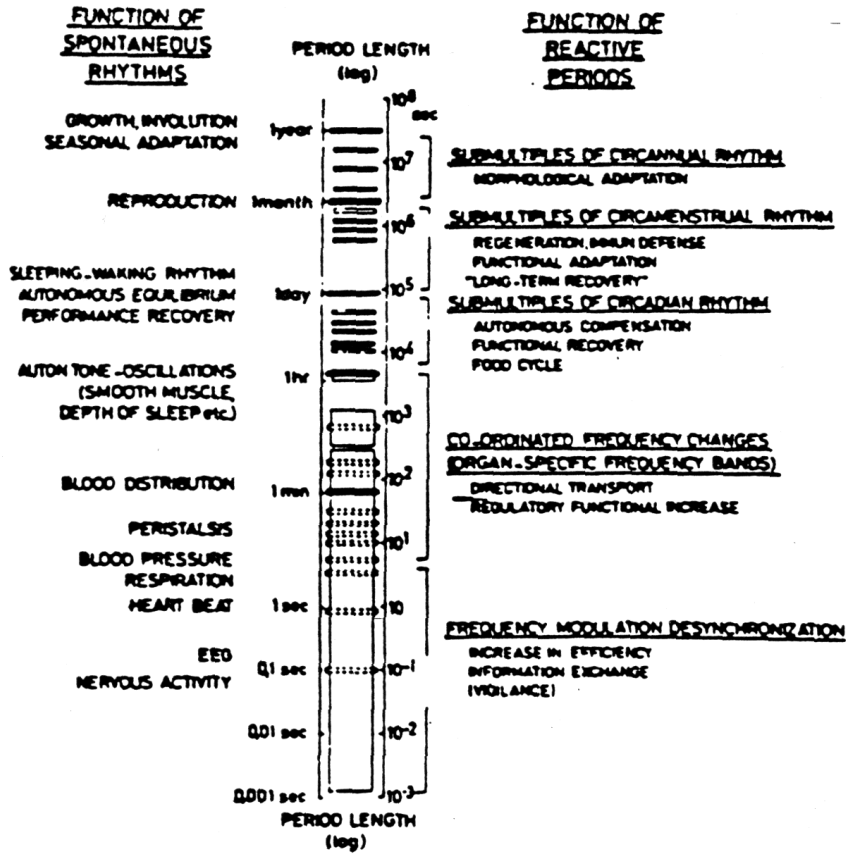


Diagram of a typical cell reproductive cycle. (Idea from Jack A. Ward & Howard R. Hetzel, *Biology: Today and Tomorrow*, p. 71, 1980, West Pub.)



Survey of the preferential period durations (frequency bands) of rhythmical functions in man. The period duration scale is divided logarithmically. The spontaneous rhythmical functions are given on the left; and the reactive processes for the appropriate (bracketed) frequency ranges, on the right (from Hildebrandt [32]).

Season	Condition	Affects
Winter	Cold	Liver
Spring	Brisk Wind	Liver-Kidney
Summer	Heat	Heart
	Dryness	Lung
Fall	Humidity	Spleen

These circadian and seasonal changes allow us to ask questions of the patient to find out if he is irregular in his patterns. If something has upset him at a certain vibrational rate, it can produce a range of effects. If we leave London and fly to New York, we set our compasses and our course very precisely at the beginning of the journey. If we set the course improperly, even by one hundred thousandth of a degree at the start of the journey, we would find amplified effects at the end of our journey.

So as we study vibrational medicine we will often see small changes in some of the slight vibrational rates, such as the mitogenic radiation and/or the ethereal, mental or causal bodies. These changes can produce wide-range effects physically as they are magnified through larger and larger connective chains.

Thus variances in the daily circadian/seasonal rhythms of the body might be one way to help diagnose slight vibrational changes that might be happening at the low vibratory rates. The treatment for these must be considered. If we treat the patient by having him change his irregular rhythm back to normal rhythm, we have done nothing to alleviate the small cause; the shift in the vibrational rhythm in the subtle frequencies of the body. We will need to reestablish the subtle frequencies of the body and put them back into regularity, and then assist the patient in regulating his day-to-day behaviors. To only work at the behavioral level would produce greater shifts and tension on the vibratory chain of events within these rhythm settings.

With homeopathy, energetic medicine and vibrational medicine we can help treat the patients' basic vibratory irregularity, and then assist them in recharting a new behavioral schedule more akin to health. Often in a patient who has his basic vibratory rhythms reestablished, health ensues naturally.

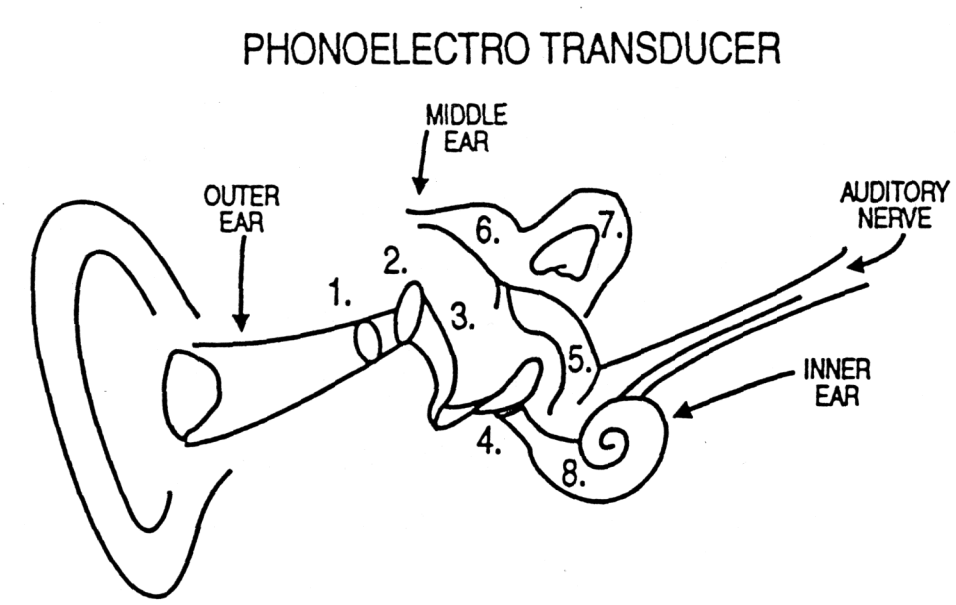
Chapter 13 will help us to understand how some of these effects can be harmonized, and how they have harmonic peaks and valleys, which help us understand the factors of health and disease.

As we discuss our quantum biology, and then observe how the small can affect the large, we now see that vibrational medicine is definitely the medicine of the future. It will help us to understand the vibrations of various factors in health and disease. Also these vibrations, when accumulated with the many different cells of the body, can start to have expounding rhythms. These rhythms echo disturbances in the most subtle quantum levels.

Thus in our quantum biology we see the echoes of the rhythms that produce irregularities in the circadian and ultra-radian rhythms of the body.

The summations of electrons activate eleven major drives in the human body. All MOTIVE STATES, including drives, are conditions in the nervous system (wiring diagram) of the human body that are aroused by occasions that predispose the organism to make certain responses likely to lead to certain goals that are ultimately balanced by the required number of positive or negative electrons:

MAJOR DRIVE	CONDITIONS AROUSING	GOAL
1. Breathing	Concentration of CO_2	CO_2 out
2. Urinating	Bladder extension	Urine out
3. Defecation	Rectum extension	Rectum emptied
4. Sleep	Wake center -"Off"	Vice versa
5. Physical fatigue	Concentration of oxidation ions	Idle muscles
6. Activity	Cortical inhibitory centers "Off"	Fatigue
7. Temp. Regulation	High or low blood temperature	Cool or warm
8. Thirst	Water short in blood	Drink water
9. Hunger	Food short in blood	Eat food
10. Sex drive	Sex hormones in blood	Orgasm
11. Maternal drive	Prolactin hormone in blood	Nurse young

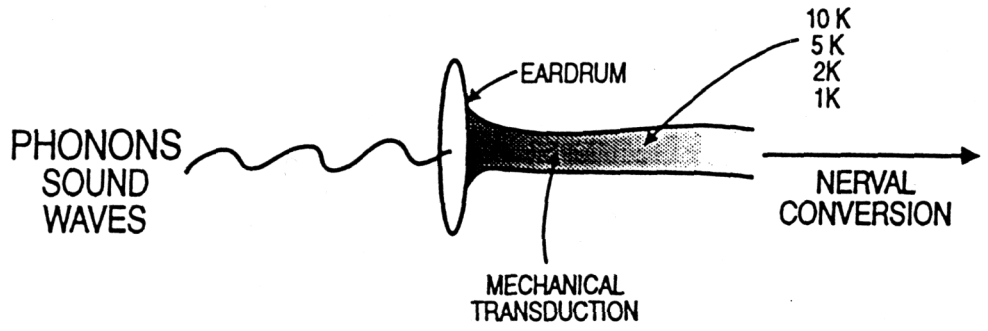


SECTION OF INNER EAR, MIDDLE EAR, AND COCHLEA

1. Tympanic membrane
2. Malleus (hammer)
3. Incus (anvil)
4. Stapes (stirrup)
5. Lateral semicircular canal
6. Posterior semicircular canal
7. Superior semicircular canal
8. Cochlea: spiral shaped inner ear; has cells with hairy projections to pick up electrons excited by internal hydraulic fluid waves.

The impulse is transduced by synapse to the ganglia of 8th cranial nerve. The resolving of complex sounds is by frequency integration devised and discerned from pervious memory excitations of electrons. The ear is commonly called a microphone in electronics.

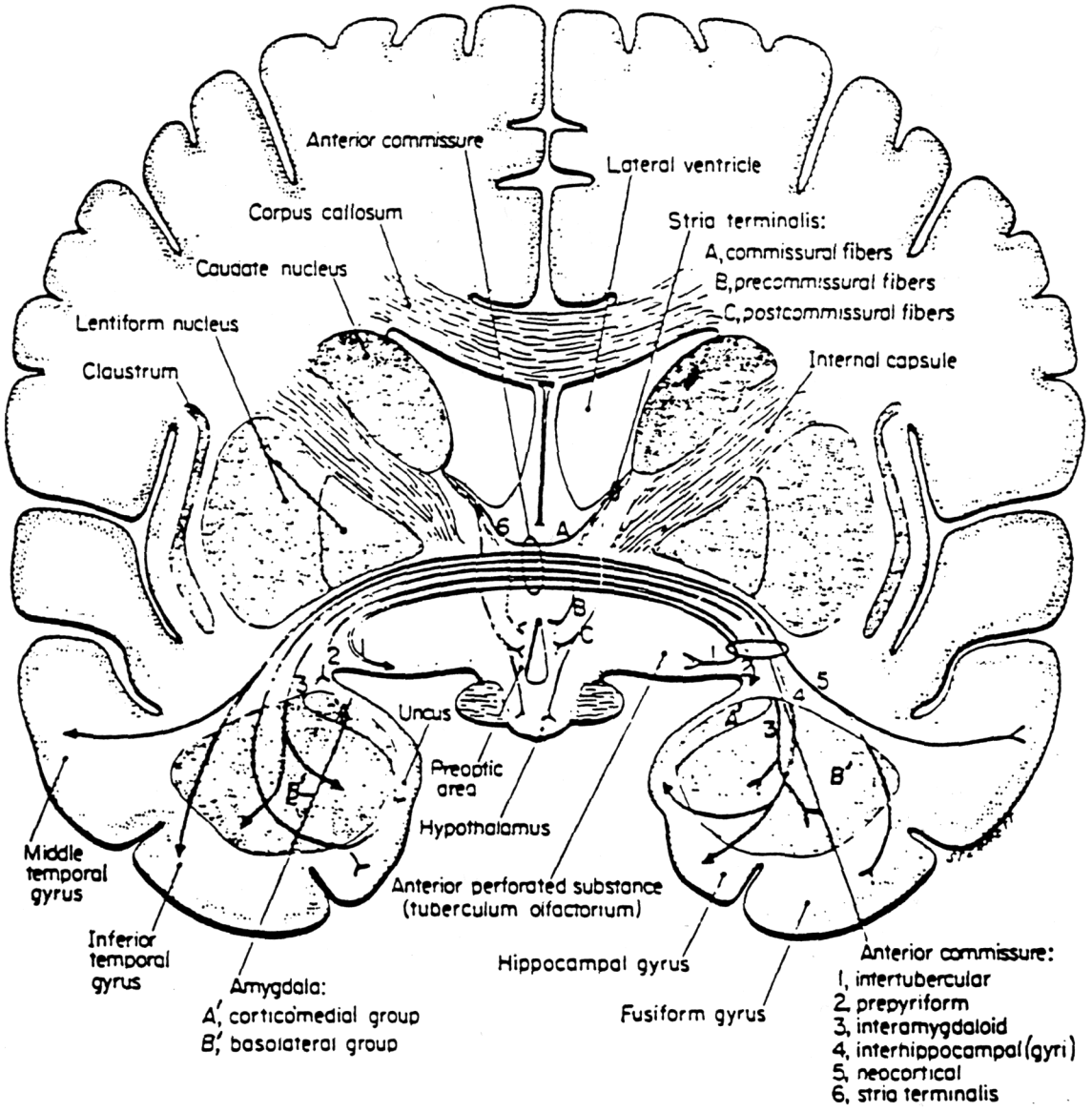
Breathing impulses are excited by electron commands descending down the phrenic nerve to the diaphragm at the rate of 20 to 30 per second, which is increased to from 50 to 80 cycles per second during labored breathing. The velocity of the nerve impulses in the human semiconductor may reach 100 meters per second or less.



ELECTROENCEPHALOGRAMS SHOWING FREQUENCIES OF FOUR ELECTRON WAVE FORMS

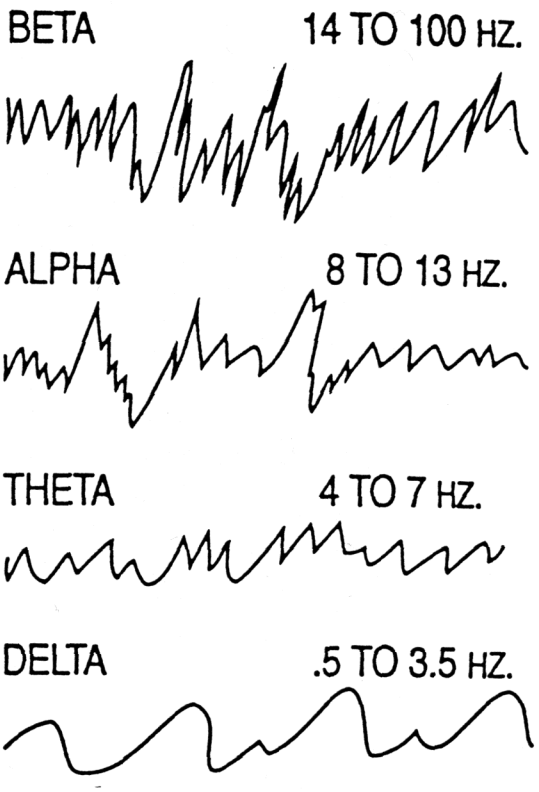
The eyes are photoreceptors of electromagnetic frequencies that range from 380 trillion to 800 trillion cycles per second. By spectrum the colors have been detected in their resonant frequency ranges where: Red is 460 trillion cps, yellow is 520 trillion cps, and blue is 630 trillion cps in the entire range from 380 to 800 trillion cps. Brightness and amplitude received and transduced depends upon retina sensitivity in the eye. Being a photoconductive conductor of electrons the eye detects and receives and excites these light frequencies into electrons in relation to the amplitude imposed upon the retina. These electrons are induced into many conduction bands, where they move freely and carry current to the brain. Two types of conduction are said to be activated: (1) primary conduction is the direct result of radiation and electromagnetic energy penetrating the vision system; (2) secondary conduction effects depending upon the electromagnetic frequency range of the spectrum variables used.

ELECTRO MAGNETIC WHITE MATTER OF THE HEMISPHERE



. *Drawing in a coronal plane through the level of the anterior commissure to show some of the various components of the anterior commissure as projected on the posterior surface of a coronal section. The ending of the stria terminalis fibers in the preoptic and anterior hypothalamic areas is indicated.*
A, commissural component; B, precommissural component; C, postcommissural component.

MAGNETO ELECTRO INTERFACE



EYE TRANSDUCER

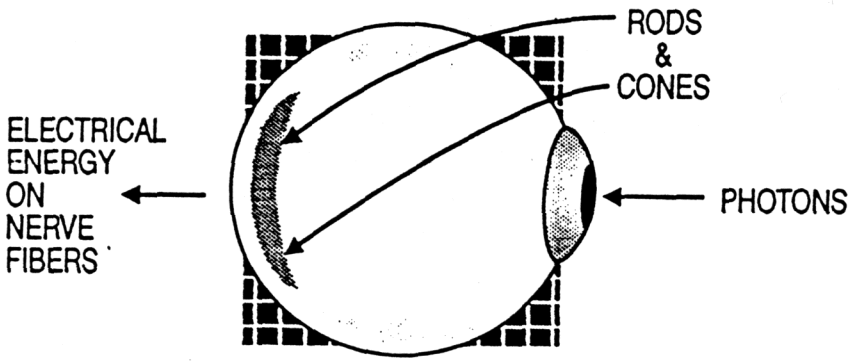
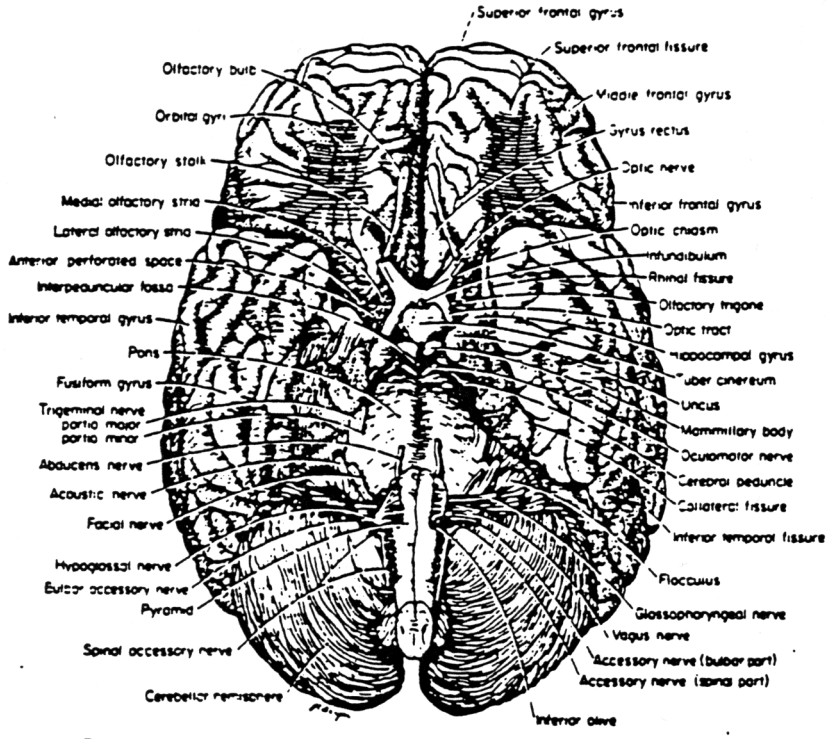
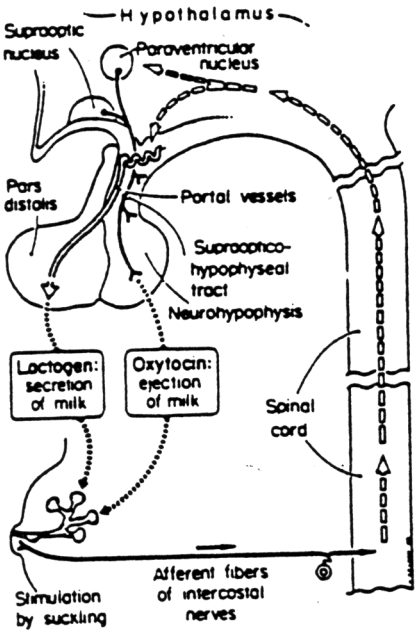


PHOTO ELECTRO REGULATION

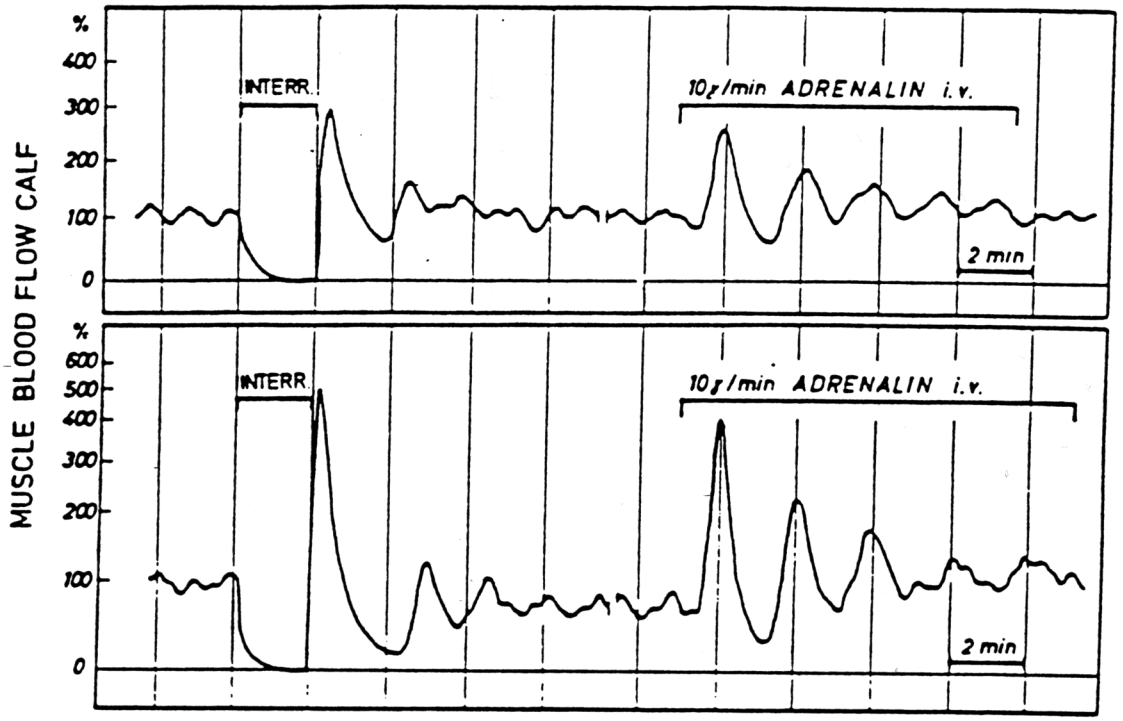
ELECTRO STATIC REGULATION



... Drawing of the ventral surface of the brain to show the convolutions and fissures of the hemispheres and the origins of the cranial nerves.



Probable interrelationship of mammary gland central nervous system, and hypophysis.



.. Two examples of the reactive periodical course of muscular blood flow after arterial interruption and during a continuous infusion of adrenalin. Constant registration of muscular blood flow of healthy subjects by means of a fluvograph by Hensel. Calibration in percentage of average resting blood flow (from Golenhofen in Hildebrandt [32]).

BRAIN FUNCTIONS

1. Sleep is said to be induced in the hypothalamus. It has been concluded that a sleep center discharges inhibitory impulses to cortical cells and waking may occur when alternately excited. This center is more effected by fatigue than the cortex.

2. Eyes, ears, etc. (exteroceptors) send impulses to the cerebrum, which is the integration center and seat of psychic functions, such as: sensation, perception, memory, judgment, volition, and consciousness. In general, frequencies originating from stimulation to the left side of the body are received by the right side cerebral cortex, and vice versa. This is comparable to camera reversal image on a ground glass.

3. Pain is relieved by severing the white matter within the pre-frontal lobes and opening their circuits connecting the cortex with the thalamus and hypothalamus; relieving anxiety, chronic depression, and emotional impulses such as fear, delusion and melancholia. The pituitary gland hormones are also controlled here.

4. Emotional reactions are said to originate in the hypothalamus, which is under the influence of the thalamus and the cerebral cortex, which upon maturity establishes a balance between emotion and reason. Chronic nervous and mental diseases due to malfunction of the area electrons are said to incapacitate more people than any other ailment. Average reaction time for sight is .25 second; for hearing - .17 seconds; for touch - .15 seconds, and may vary by worry, fatigue, alcohol, narcotics, nutrient deficiencies, and lack of oxygen in the blood can cause complete brain damage in four minutes (outside body parts turn blue).

5. Equilibrium, muscle contraction, and voluntary muscle activity is said to be the concern of the cerebellum such as the labyrinthine impressions from the inner ear and the kinesthetic impression from the muscles and tendons. When damaged the patient, with his eyes closed, is unable to maintain an erect position or may stagger or reel in his gait. The flocculondular area seems to be involved in motion sickness. On the other hand reflexes may be jerky and associated with tremors due to spastic contractions where areas in the anterior cerebellar cortex are stimulated at a slow rate by electron resistances increasing. Voluntary muscular coordination is located in this electron network.

6. The vital nerve center for respiration, phonation, vasoconstriction, vasodilation, cardiac inhibition and acceleration, mastication, deglutition, and salivary and gastric secretions are in the medulla oblongata and some nerve fibers merely pass through being bound for other parts of the electronic system in the brain.

7. Twelve pairs of cranial nerves carry function frequencies as command stimuli: pair 1, olfactory; pair 2, optic; pair 3, oculomotor; pair 4, trochlear; pair 5, trigeminal motor and sensory; pair 6, abducent; pair 7, facial; pair 8, acoustic; pair 9, glossopharyngeal; pair 10, vagus; pair 11, spinal accessory; pair 12, hypoglossal.

CONDUCTION RANGE IN THE HUMAN ANATOMY

Using Ohm's law and data given where:
E = 1000 millivolts or .001 volt
R = 350 ohms min.
R = 500,000 ohms max. or 500K

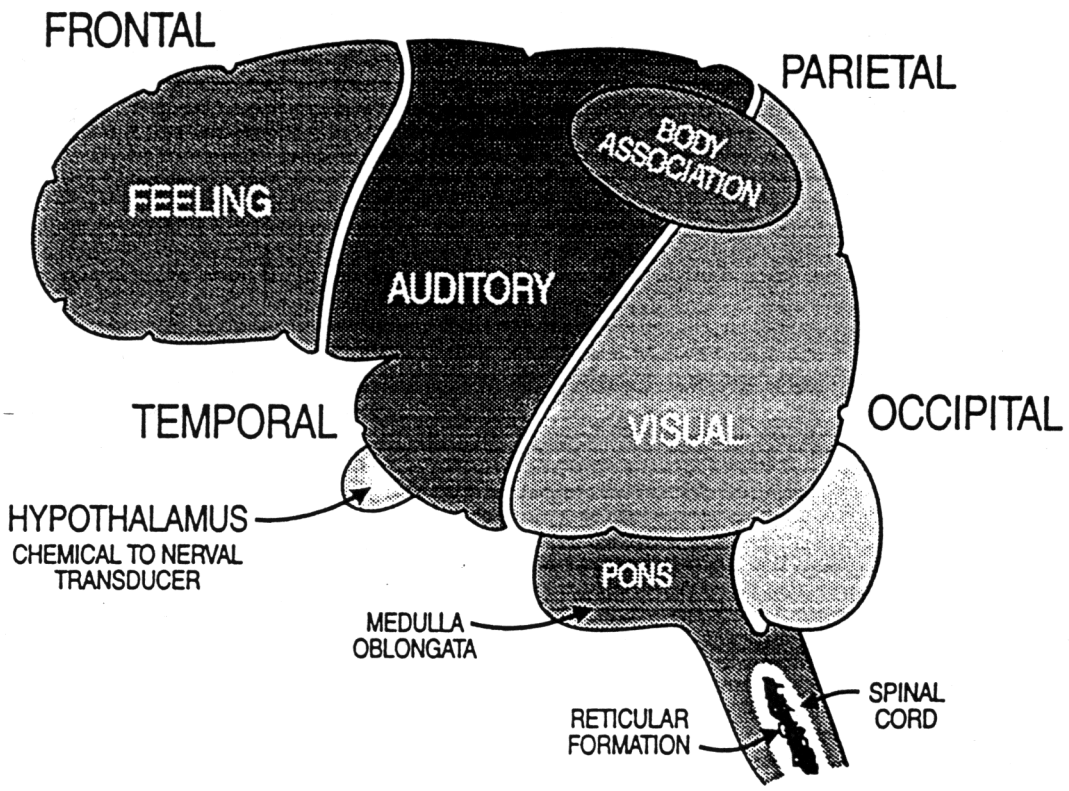
E = IR or I = E/R

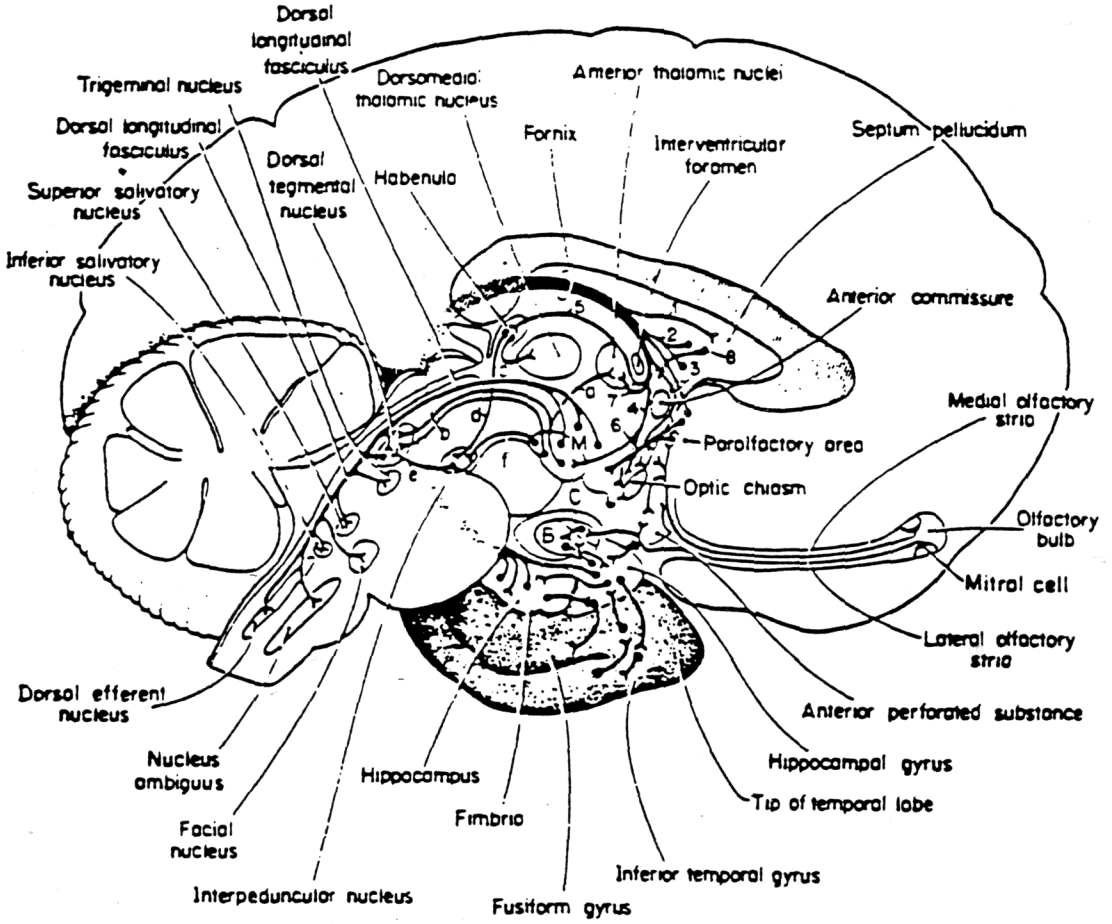
(A) Using R = 350: I = .001/350) = .0000028 amps)
(B) Using R = 500K: I =) Limits
.001/500,000 =) .000000002 amps)

Power measured in watts (P) = Volts times amperes or P = EI

From (A) - above: $P = 2.8 \times 10^{-6} (1 \times 10^{-3}) = 2.8 \times 10^{-9}$ Watts

From (B) - above: $P = 2.0 \times 10^{-9} (1 \times 10^{-3}) = 2.0 \times 10^{-12}$ Watts

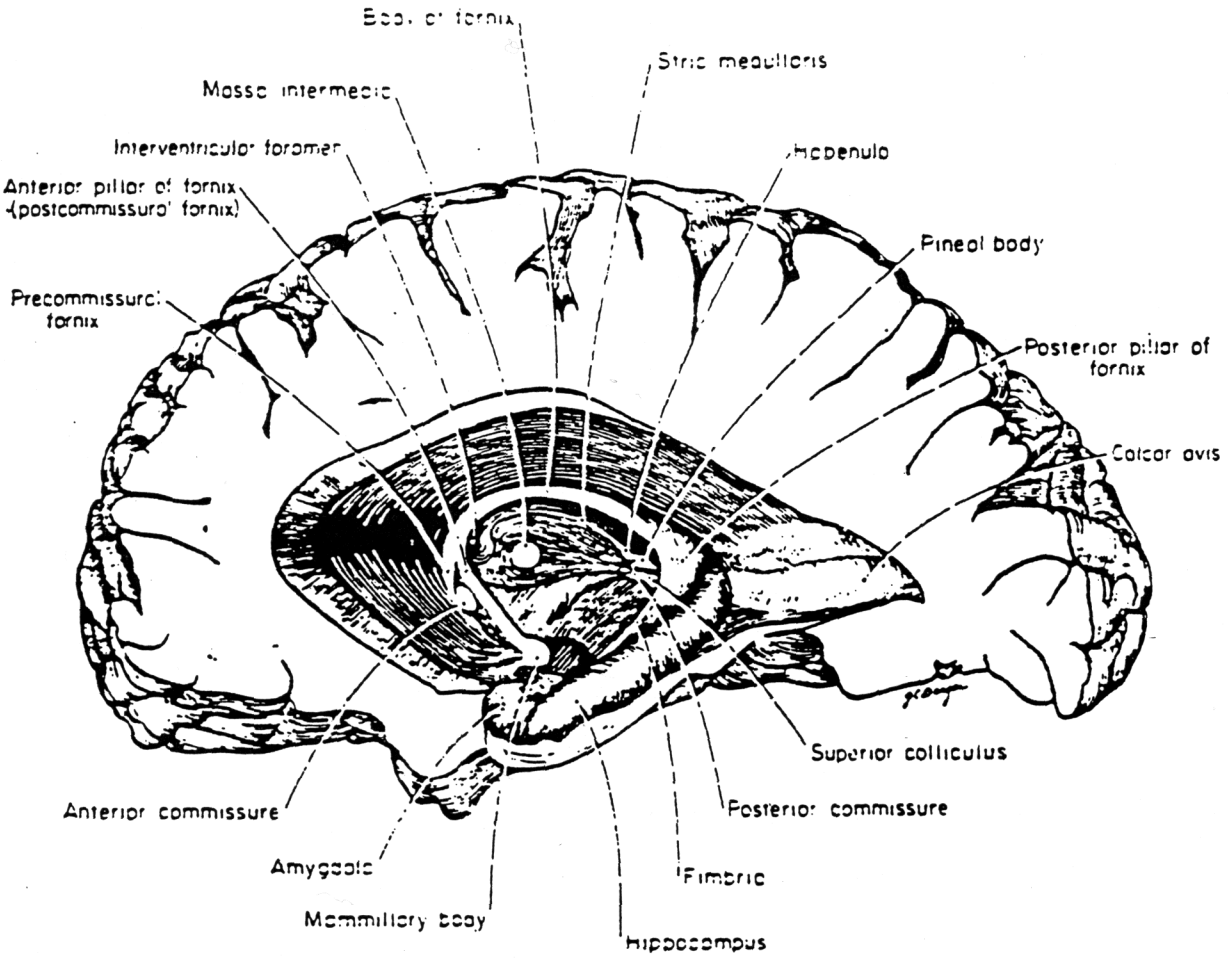




. Diagram to illustrate some of the major connections of the olfactory system. The numbers and letters indicate the unlabeled fiber tracts and nuclear groups. *B*, basolateral amygdaloid nuclear group; *C*, corticomedial amygdaloid nuclear group; *M*, mammillary body; *a*, mammillothalamic tract; *b*, mammillotegmental tract; *c*, habenulodiencephalic tract; *d*, habenulopeduncular tract; *e*, pedunculotegmental tract; *f*, mammillopeduncular (or mammillo-interpeduncular) tract; *1*, hippocamposeptal fibers; *2*, septohippocampal fibers; *3*, precommissural fornix; *4*, postcommissural fornix; *5*, medial corticohabenular fibers; *6*, septopreoptic and septohypothalamic fibers of the medial forebrain bundle; *7*, fibers of the fornix and the septum to the anterior thalamic nucleus; *8*, connections from the septum pellucidum to the thalamus (septothalamic fibers) to the habenula and the postcommissural fornix (septohabenular or olfactohabenular and septohypothalamic or olfactohypothalamic fibers). The medial corticohabenular fibers are in the stria medullaris (*5*).

MORPHIC RECEPTORS TRANSMIT TO EMOTIONAL CONTROL; EXTRA DIMENSIONAL RECIEVER AND TRANSMITTER.

TELENCEPHALON



Drawing of a dissection of the adult human brain to show some of the tracts related to the olfactory system.

ELECTRO CHEMICAL REGULATOR

Discrimination of Relations.

Consider a stimulus S being conditioned to some response R. To each intensity S_i of the stimulus there corresponds a definite number N_i of neuroelements in the nerve centers, which are conditioned to R, so that $N_i > N_k$ if $S_i > S_k$. In this way, we may condition R to a specific absolute intensity S_r of the stimulus, by differential inhibition against stimuli S_i, S_k, etc.

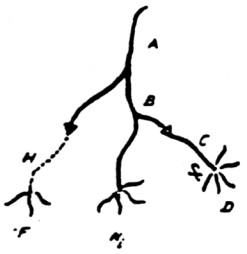


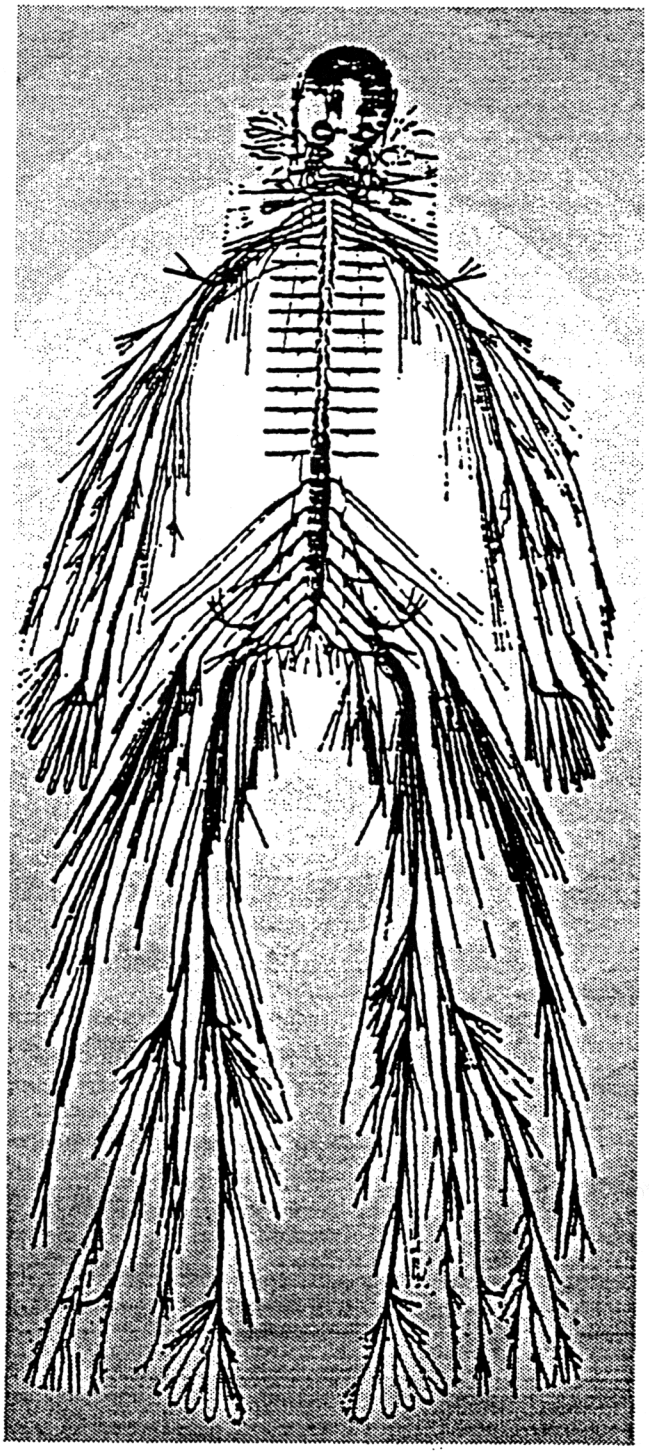
Fig. 1

Let the afferent pathway A (Fig. 1), carrying the excitation due to the stimulus S, excite through a collateral pathway B a fiber C, which is of the intermediate type, with

1) $$B_j < A_j; \quad b_j < a_j; \quad \frac{A_j}{a_j} < \frac{B_j}{b_j}.$$

SINGLE OR MULTIPLE ELECTRON ACTIVATION

1. Impulses carried for sense of smell
2. Relays impulses to occipital lobes and to 3rd, 4th, & 6th
3. Motor nerve for 4 of 6 intrinsic eye muscles and upper eyelid elevator
4. Innervates the superior oblique eyeball muscle
5. Innervates the muscles of mastication
6. Motor nerve for external rectus muscle and of eyeball
7. This is the motor nerve for the muscles of the face, ears, and scalp
8. Auditory nerve - sensory composed of cochlear and vestibular connections
9. Mixed nerve with motor branches controlling the muscles of the pharynx and the base of the tongue and supplies secretory fibers to the parotid (salivary) gland. The sensory fibers are supplied to the tongue and pharynx, and with the 7th cranial nerve constitute the electron path of taste nerves.
10. Called vague or pneumogastric nerve with motor fibers supplied to the muscles of the larynx and of the alimentary tract (extending from the esophagus to the large intestines), and its inhibitory fibers supply the heart. The glands of the stomach and the pancreas are innervated by this nerve conductor. Its sensory fibers end in the heart and in the mucous membranes of the larynx, trachea, lungs, esophagus, stomach, gallbladder and intestines.
11. Motor nerve for sternomastoid and trapezius muscles, and sends many other motor fiber conductors directly into the vague nerve.
12. Arises in the medulla oblongata and is the motor nerve conductor of electrons for the muscles of the tongue and arynx.



NERVES FOR:

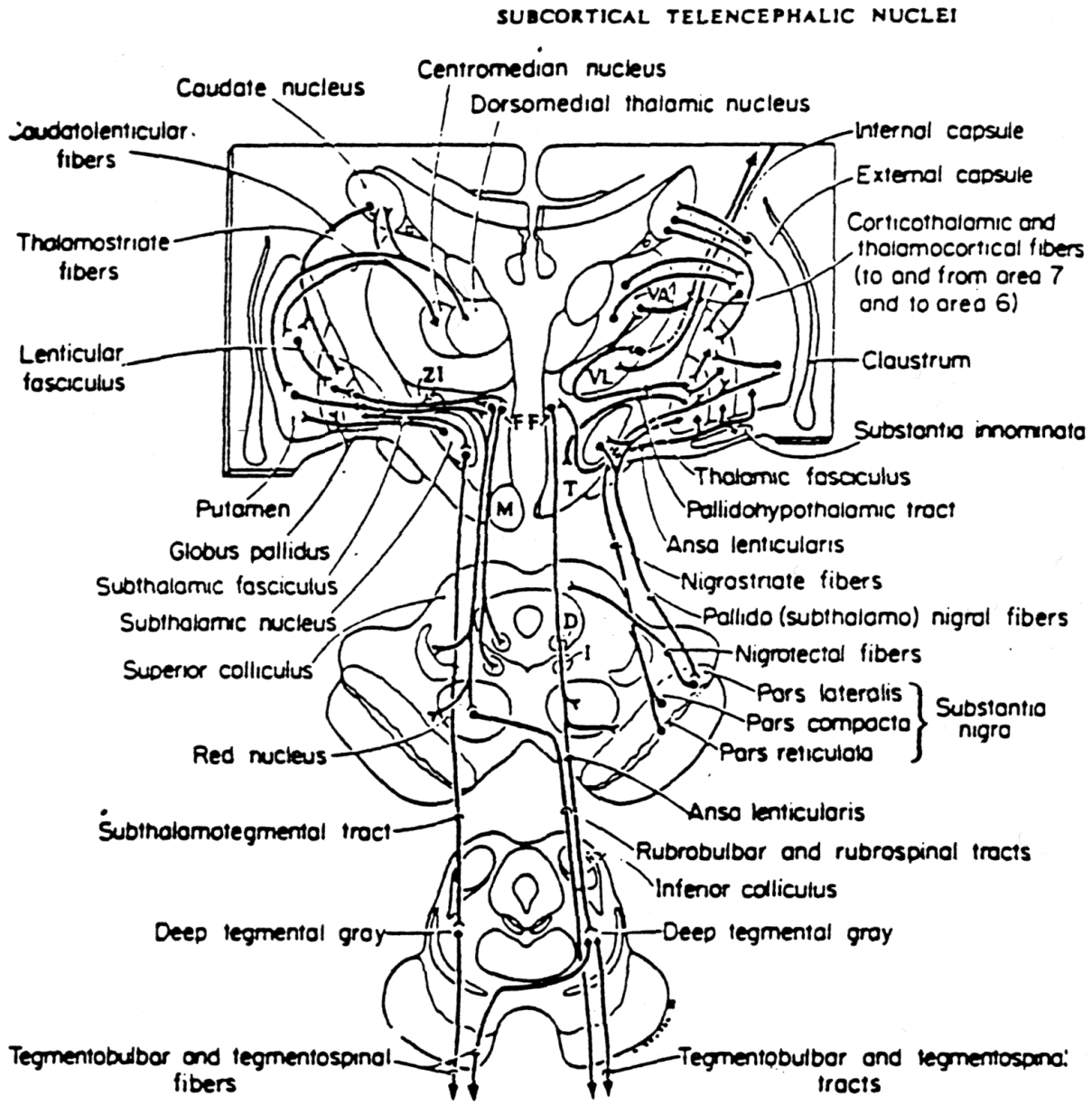
ELECTRON THERAPY

THE WIRING DIAGRAM

OF THE

HUMAN BODY

FROM
CRAIN
RESEARCH



. A diagram of some of the thalamostriate connections and some of the major connections of the caudate and lentiform nuclei. *D*, nucleus of Darkschewitsch; *I*, interstitial nucleus of medial longitudinal fasciculus; *FF*, nucleus of field of Forel; *M*, mammillary body; *T*, tuber cinereum; *VA*, nucleus ventralis anterior; *VL*, nucleus ventralis lateralis; *ZI*, zona incerta. (From Bauer, 1959, *Medizinische Grundlagenforschung*, 2: 101–124. Figure 4 from paper by Crosby, Humphrey, and Showers, "Einige Anordnungen, Verbindungen und Funktionen der supplementären motorischen Rinden," Georg Thieme Verlag.)

ELECTRO NERVAL CONTROL CENTER

SUMMARY

1. There are many rhythms involved in the biological events of all species.

2. These rhythms have their initiation in various biological events, which are under quantum dynamics.

3. For an understanding of the circadian and rhythmic forms of life we must understand our quantum biology, and the ebbs and flows of the electrical pathways inside the body. Thus our vibrational medicine will allow us to understand these various biological rhythms.

4. Electrical rhythmic functions are discussed, such as heartbeat, EEG, reactive periods, reproduction, blood distribution, seasonal events, and countless others.

5. The transducer phenomenon is covered over the ability to transduce one type of signal into another; such as sound into electrical, photons into electrons, magnetic events into electro events, shape receptors into emotional control and electrical events, and chemical into emotional, electrical events.

Chapter 6

RELATIVITY

In our books on *Quantum Biology*, *Bio-Quantum Matrix*, and now *Quantum Vibrational Medicine* we have been discussing mathematical relationships between the laws of physics and the laws of biology. No discussion would be complete without the analysis of the relativity principle. The relativity principle of Einstein has relevance to biology, as we will point out.

Galileo (1564 - 1642) was the first to actually propose the principle of relativity, which he stated as: "All steady motion is relative and cannot be detected without reference to an outside point." Galileo proposed this to mean that if we were moving along within a ship inside a room with closed walls at a constant pace, we would not be able to know that we were moving. We would have to look out a window to know of our motion. The principle of relativity would not allow us to detect movement from within our frame of reference.

Galileo discussed many other revolutionary concepts including the development of the telescope and the proposition that the Earth was not the center of the universe. These scientific ideas so threatened the belief system of people at the time that he was branded a heretic and a warlock, and was persecuted by the scientific and religious authorities. Today the concepts in our books have undergone similar threats by the established scientific system, which operates much as a religious institution itself.

Science gradually started to accept more and more of Galileo's ideas, and by the time of Albert Einstein many of these principles were readily accepted, including the principle of relativity. Einstein started to concern himself about this principle in respect to light and its associated phenomena. Having seen that electromagnetic radiation (proposed by Maxwell, Faraday and many others) was of a certain nature and a drastic speed, Einstein proposed that an item within a system could travel faster and faster, until the item could approach the speed of light.

Einstein contemplated in Newtonian physics that if you had a mirror in front of you and travelled at the speed of light, the light from your face could not reach the mirror and return because of your excess speed. At the speed of light, he wondered, would we be able to see ourselves in a mirror held in front of us in the direction of travel? The answer to his question is yes; we would be able to see ourselves, because of the principle of relativity, which states that if we are travelling at a constant speed we would not be able to detect that speed within our frame of reference. So the light going to the mirror would come back; Newtonian physics must be rethought. We would not be able to detect it; we would have to look outside the room to tell what our speed was. At a constant velocity relativity is in effect.

This is not true of acceleration. As we accelerate our speed we can detect that accel-eration, as one can detect the acceleration of the plane as it takes off. The acceleration of the plane will push the passenger into the seat. As he is pushed into the seat the G forces are detected by the body through the appropriate receptors and through the inner ear. Once the plane attains its speed of 600 miles per hour, a steady speed maintained by a plane in smooth air cannot be ascertained by the passenger without looking out and seeing the ground passing beneath the plane.

Einstein had seen the results of the Michelson-Morley experiment. He found that all attempts to discover any type of ether, or medium of light, seemed to be futile. Perhaps now we can say that this ether is virtual in its existence, and as such will change some dynamics. We will discuss this in more detail later.

Einstein said that the propagation of light suggested the phenomenon of electrodynamics. Since he held that Galileo's principle of relativity would be good for light as well as ordinary motion, he then raised the principle of relativity to a theory. Einstein then raised a contradiction postulate to help reinforce his theory, stating that light is always propagated in empty space with a definite velocity, that of c. This velocity is independent of the state of motion of the emitting body. Thus he proposed that everyone would see light at the same velocity.

The combination of these two postulates allowed for the consistent theory of electrodynamics of moving bodies. This was based on Maxwell's theory of stationary bodies.

Einstein then stated that space would not require special properties to transmit light. Space would need a new interpretation. Space will result as a function of the distance between matter as the universe expands. Before the "Big Suck" (see *Bio-Quantum Matrix*, Chapter 1) all of space was contained in a condensed ball. Nothing else existed. After the implosion, space expanded. Because matter extended out into emptiness, light couldn't extend beyond this barrier of the universe. Gravity would bring it back. Certain conventional ideas about time, length, mass and velocity had to be altered in their concepts of Einstein's theory of relativity. Einstein said, "Light is always propagated in empty space with a definite velocity, which is independent of the state of motion of the emitting or receiving body." Thus everyone sees light in the same way despite their motion.

Maxwell and Hertz showed that these electromagnetic transfers take time, and that every electromagnetic effect must take time to be transmitted. This allowed Einstein to set the speed limit of this time at the speed of light. This is not to say that the speed of light cannot be circumvented in certain cases of negative time-space.

Einstein then made an inference based on the experience of electricity. From the work of Maxwell and Hertz he then proposed that there are no instantaneous interactions at all in nature; that if we have electromagnetic radiation propagating from a certain spot, all other spots will receive this radiation in a different time.

Thus central to Einstein's theory was the theory that there are no instantaneous interactions or simultaneity of activity in the universe. This is extremely important in our development of the vibrational medicine techniques, and will become important as we look into our unified field theory. Since this is the case, there must be a possible maximum speed of interaction that Einstein set at the value of the speed of light.

The speed of any electrical interaction is identical with the speed of light. Since there is no simultaneity, Einstein realized that time was also flexible, and that no one had exactly the same time reference. This flexibility of time and mass allowed for his development of the principles of relativity. Einstein proposed that simultaneous events in one frame of reference would not necessarily be simultaneous when viewed from another frame of reference.

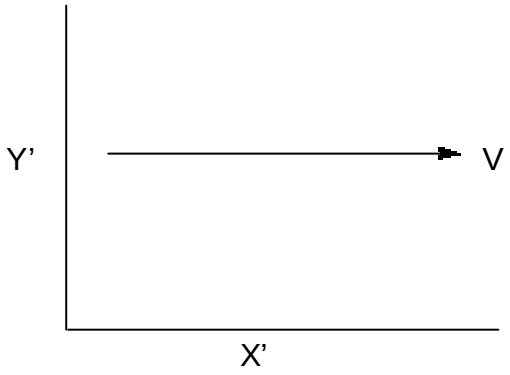
This Einstein called the relativity theory of simultaneity. To prove this he had to resort to geometry and the Lorentz transformation. This differed widely from Newton's analysis. In classical Newtonian mechanics it was assumed that the time interval between events was independent and constant. Thus they believed in simultaneous occurrence of events, so that time was a fixed variable. The space interval or length of a body is also constant because the mass of an item would not change in classical mechanics.

So Newton said that space and time intervals are absolute, and the speed of light is thus relative, or flexible. Albert Einstein came along with Einsteinian dynamics and said that the speed of light is absolute, and that space and time intervals are relative. Thus a new understanding of physics was set, and Newtonian versus Einsteinian physics demarcated. Biology and medicine struggled, and resisted this change for years. Only now, in advent of some nonconforming intellects, are biology and medicine making the transition. In Newtonian biology chemistry and time are fixed with consciousness; a mute, undiscussed term. In our more Einsteinian biology, consciousness is paramount, and chemistry and time are only relative markers. Chemistry is only an after-fact expression of the energetic forces of physics. Consciousness must now be accepted as a viable force in biology and physics.

Let us now return to Einstein.

So if we imagine a car traveling down the railroad, *x*′ is the distance along the car, *y*′ is the distance of the car, and < is the speed of the moving frame.

Now if we expand to a new moving frame, we can show the reference of someone standing on an embankment watching the car.



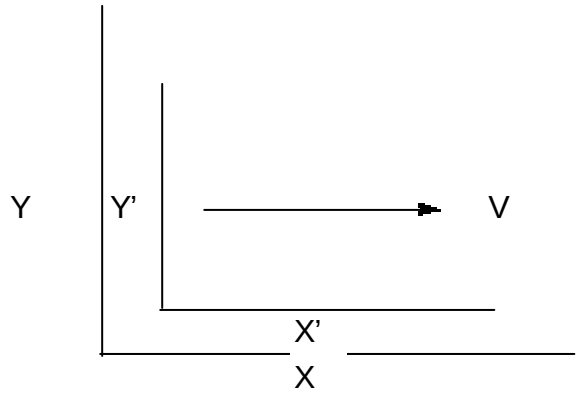
Here *x* is the distance along the embankment, *y* is the distance of the embankment. *t* is the time within the larger axis and *t*′ is the time within the smaller axis. This helps us to develop the following equations.

$$x' = \frac{x - vt}{\sqrt{1 - v^2/c^2}}$$

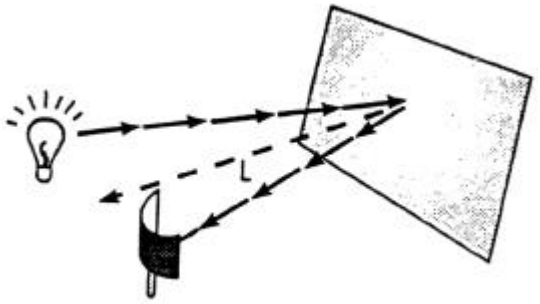
$$y' = y$$

$$t' = \frac{t - v/c^2 x}{\sqrt{1 - v^2/c^2}}$$

A special light clock,



placed into our system,



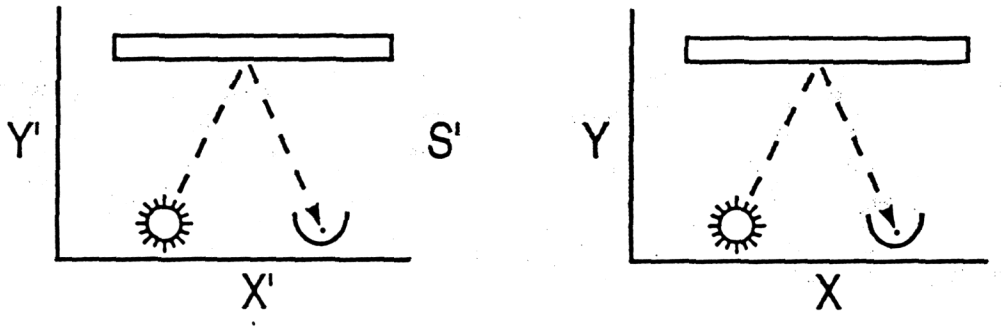
allows us to count and find out about the events regarding light.

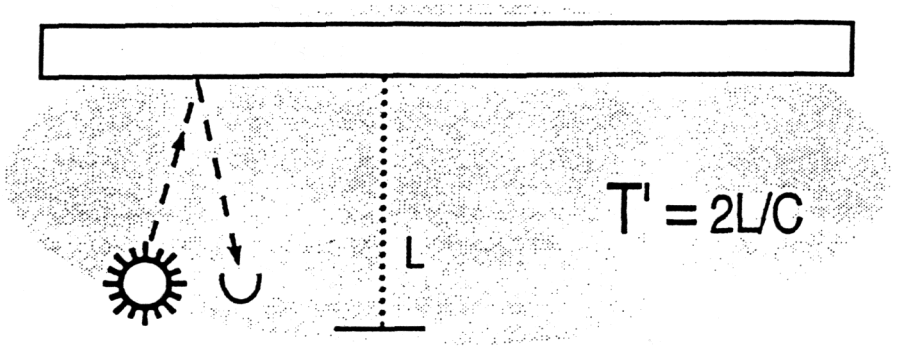
The moving train or frame of reference does not see any difference from a standing-still point. This helps to prove further the principle of relativity. But on the embankment the stationary observer will see something a little different. Since the velocity of light is the same for all observers, the stationary observer hears the elapsed time between the clicks on the moving clock last a little longer than the stationary clock because of the longer path as seen from the stationary point. Einstein said that a moving clock will run slower than a stationary clock. Mathematically this is

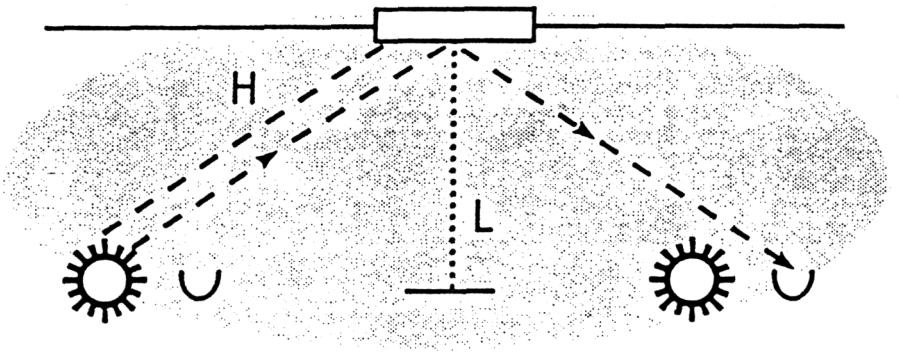
v = the speed of light
t' = the time between clicks in the moving frame
t = the time between clicks in the stationary frame
c = the speed of light

The time, t_M, between clicks in the moving frame is the time the light takes to reach the mirror L/c plus the time it takes to return, again L/c.

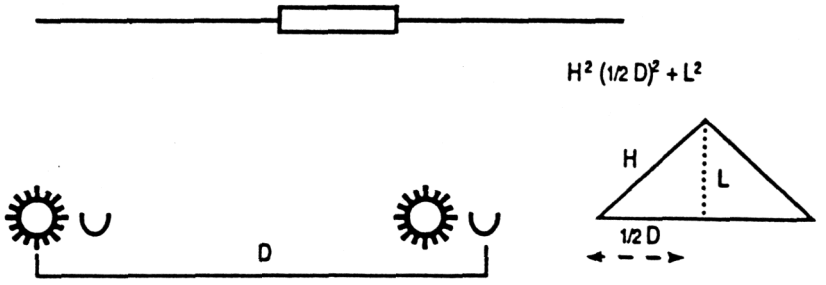
$$\text{so } t' = \frac{2L}{c}$$







$$T = \frac{H}{C} + \frac{H}{C} = \frac{2H}{C}$$



But the time, *t*, between clicks as heard in the stationary frame is the time it takes light to travel the triangular path, *h*.

$$t = \frac{h}{c} + \frac{h}{c} = \frac{2h}{c}$$

Now in the time *t*, the moving frame moves a distance *d*. And *d* = <*t*. And now we can use the 1500-year-old Pythagorean theorem: "The square on the hypotenuse equals the sums of squares on the other two sides."

$$h^2 = \left(\frac{1}{2}d\right)^2 + L^2$$

But we just saw that

$$h \text{ is related to } t: \quad t = \frac{2h}{c} \text{ or } h = \frac{ct}{2}$$

$$d \text{ is related to } t: \quad d = vt \text{ or } \frac{1}{2}d = \frac{1}{2}vt$$

$$L \text{ is related to } t': \quad t' = \frac{2L}{c} \text{ or } L = \frac{ct'}{2}$$

So what we got before ($h^2 = (\frac{1}{2}d)^2 + L^2$) can now be substituted for

$$\left(\frac{ct}{2}\right)^2 = \left(\frac{1}{2}vt\right)^2 + \left(\frac{ct}{2}\right)^2$$

Finally we achieve the formula

$$t = \frac{t'}{\sqrt{1 - v^2/c^2}}$$

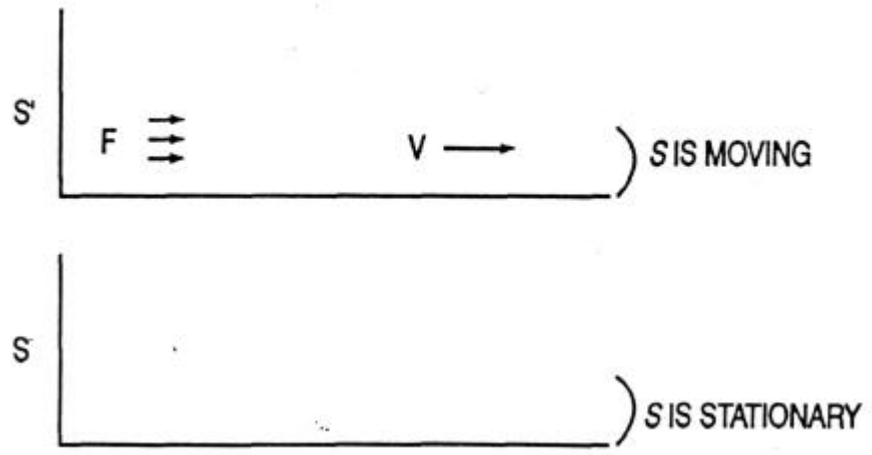
So our velocity produces a shift in time.

In this next formula

$$u = \frac{v + \omega}{1 + v\omega/c^2}$$

we can look at two different velocities in a system. The velocity T is equal to the speed of light. If we want to know the speed of a light beam on our train, we can see that if we substitute *c* for the velocity of the train with respect to T (the velocity of light being *c*), we can see that it will reduce to *c*, so that the velocity of light is always the same. So the formula allows us to show the constant of the speed of light, and to look at the variability of time.

Next, Albert Einstein tried to show how much force it would take to bring an object to the speed of light. Force is the amount of energy it takes to push something. Isaac Newton said that force equals mass times acceleration, or that acceleration equals force divided by mass. Mass here is another name for the inertia of an object. The bigger the force the faster it picks up speed. The higher the inertia or mass the harder it is to get it moving.



If we draw a diagram that shows us how we can push an electron to greater and greater velocities, we will also need to put in a Lorentz transformation to describe the physics of the system. The electron will go faster because of the force, but in the frame where the electron is at rest, the time over which the force acts gets smaller and smaller compared to the stationary frame. As we have shown there is a change in time in regard to speed or velocity.

Thus Einstein had to change Newton's formula regarding force, mass and acceleration.

$$a = \frac{F}{M}\left(1 - \frac{v^2}{c^2}\right)^{3/2}$$

So we can see that since there are no instantaneous interactions in nature, nothing can go faster than the speed of light in Einstein's formula.

Next, Einstein wanted to relate this mass to energy. Newton proposed that when a force acts on a body of mass *m* for distance *d*, work has been done. The work can be calculated as Work = Force x Distance. If Force = Mass x Acceleration, we can show that work is defined by Work = Force x Distance, which is exactly equal to one half Mass x Velocity squared. So one half Mass x Velocity squared is the term given to kinetic energy. The more work you put into pushing a body the more kinetic energy it gets.

Thus Einstein developed a new formula with his relativity concept.

$$F = \frac{ma}{(1 - v^2/c^2)^{3/2}}$$

Thus now we can see the formulas of Einstein physics versus Newtonian physics.

EINSTEINIAN **NEWTONIAN**

$$\omega = \frac{mc^2}{(1 - v^2/c^2)^{1/2}} - mc^2 \quad vs \quad \omega = \frac{1}{2}mv^2$$

Now we can make a dramatic intellectual jump for society to show that energy and mass have a degree of interchangeability.

So Einstein was able to show that energy has a mass component through the following conclusions.

1. Einstein has shown that the work equals $\frac{mc^2}{(1 - v^2/c^2)^{1/2}}$
2. So Einstein says let's call the quantity $\frac{mc^2}{(1 - v^2/c^2)^{1/2}}$ the energy E of the electron.
3. Then, with the definition of energy, Einstein's formula reads $E = W + mc^2$

So even when the work is 0, we can see that energy equals mass times the speed of light squared ($E = mc^2$), the simple shortcut that allowed us to understand some of Einstein's most intriguing work. Our understanding of all science was thus changed dramatically.

Also we must keep in mind that mass is a flexible item that changes in respect to velocity. Thus the equation $E = mc^2$ must be modified to a different equation.

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

Einstein was awarded the Nobel Prize in 1921 for his work regarding these concepts. He interacted with Niels Bohr, a famous quantum physicist who developed some basic ideas of quantum mechanics. Albert Einstein could not accept the quantum theory. He said that he didn't think God would play dice with the universe. This was the implication of quantum theory to Einstein. As we have shown in *Quantum Biology*, this is just not true. In fact, the indeterminacy within a biological or quantic system can be controlled by an outside source. It is our precept that this indeterminacy is actually affected by biological or quantic interactions. This force, known as the *Nelson effect*, allows biology to affect, and thus control, indeterminacy.

Thus God does not play dice with the universe; in fact, God might be indeterminacy. In other words, the universe may not be indeterminate at all; it may just be God's wisdom, only appearing indeterminate to our meager human minds. We as humans can also affect indeterminacy through the power of our minds and beings. This may be because we are made in His image. This is a grand power and ability which many people mastered at one time. Our society has lost this power, but we are now regaining this power. It must always be tempered with caution and reverence for the grand scheme of God's universe. If Nelson could only have met Heisenberg, Einstein and Bohr, the quatrain could have made the most dramatic change.

We should not try to second-guess God's eternal wisdom. I think that Albert Einstein would like our concept, and would realize that indeterminacy is a factor of physics, though it does not mean that things are out of control. Biology is the control factor, and is an expression of God's control. Truly God created man in His own image.

In the last years of his life Einstein worked to develop the theory of an equation between gravity and electromagnetism. Let us now expand on this set of theories using some of Einstein's work.

SUMMARY

1. Here we go over an in-depth analysis of Dr. Einstein's relativity theory, and how he used mathematical analysis to disprove Newtonian dynamics.

2. These Newtonian dynamics are compared to the Einstein generation, and thus we come up with an Einsteinian version of biology that must meet the relativity theory and all other aspects of Einstein's theories.

3. We offer some biological correlates to this application of Einstein's theory to biology.

Chapter 7

TOWARDS A BIOLOGICAL UNIFIED FIELD THEORY
(consciousness of the Universe as connection of subspace)

In the theory of relativity Einstein showed a reinforcement of Galileo's precept that if we are travelling at a consistent speed, we will not be able to notice that speed within the realm. However, if we are accelerating or decelerating, we would be able to notice. Acceleration is defined as a change in our velocity, which means that going faster produces acceleration. If we are riding in our airplane at 600 miles per hour, according to the theory of relativity we would be unable to know our speed. However, if there were choppy air, then we would notice our speed, as it would reflect in a change of acceleration, in going up and down.

Einstein showed that acceleration is very similar to gravity. In his concept he showed how the forces of nature were relative if at a constant velocity; but at a changing velocity, they appeared to be very similar to gravitation. Acceleration, as we defined, is a change in velocity, meaning that we have now gone beyond the system of relativity. Thus change in acceleration appears to be very similar to gravity.

Our unified field theory must look at the forces of gravity and acceleration as we blend them together to develop a consistent theory for the universe, with biology and consciousness as its center.

Einstein was unable to finish his precepts due to an early death. The next equation offers a formula for gravitation.

$$Gravity = \left(\frac{M_1 \cdot M_2}{D^2} \right) G$$

Here we can see that the force of gravity equals mass sub 1 plus mass sub 2 divided by the distance squared. This is the *inverse square law*. We can see that the gravitational force between two masses is dependent on the size of the mass, as well as the distance between them, which becomes the inverse square law. This was all multiplied by the gravitational constant, *G*.

$$G = 6.67 \times 10^{-11} \text{ Newton } M^2/KG \text{ in MKS units}$$

or

$$G = 6.67 \times 10^{-8} \text{ Dyne - } CM^2/\text{Gram}^2 \text{ in CGS units}$$

We can tell from Einstein's relativity equation that

$$E = \frac{mc^2}{\sqrt{1-v^2/c^2}}, \quad \text{which converts to} \quad m = \frac{E\sqrt{1-v^2/c^2}}{c^2}$$

Having converted the formula so that we now see what mass is, we now substitute into our gravitational equation for mass, writing the equation in terms of energy, not mass.

$$Gravity = \frac{(E_1\sqrt{1-v^2/c^2} \cdot E_2\sqrt{1-v^2/c^2})\,G}{D^2\,C^2}$$

If the relative velocities between the units is the same, then we can reduce this equation to

$$\text{Gravity} \cdot \frac{[E_1 \cdot E_2(\sqrt{1-v^2/c^2})]G}{D^2 C^2} \text{ or } \frac{(E_1 \cdot E_2)G}{D^2 C^2}$$

Since we know that the speed of light is 3 x 1010 cm per second, or 3 x 108 meters per second, we also know that distance here is in meters. Substituting for *G*, as in the previous equation, we can now substitute for *G*, *D* and *C*, and we arrive at

$$\text{Gravity} \cdot \frac{(E_1 \cdot E_2)\,6.67 \times 10^{-11}\ \text{Newton}\ M^2/KG^2}{(\text{meters})^2\ 9 \times 10^{16}\ (\text{meters})^2/\text{sec}^2}$$

$$\text{Gravity} \cdot \frac{(E_1 \cdot E_2)\ .74 \times 10^{-27}}{KG\ \text{meters}/\text{sec}}$$

or

$$\text{Gravity} \cdot \frac{(E_1 \cdot E_2)\ (.74 \times 10^{-27})}{\text{joules}}$$

We also know that the energy of a photon is equal to 6.63 x 10^{-27} ergs per second x the frequency. This comes from our Planck's constant knowledge of photons. Also Planck's constant is 6.63 x 10^{-34} joule second. So if we substitute the energy of a photon, we can see

$$\text{Gravity} \cdot \frac{N(6.63 \times 10^{-34}\ \text{joule sec}) \times (\text{beats}/\text{sec})\ (.74 \times 10^{-27}}{\text{joules}}$$

$$\text{Force of Energy Produced by Energetic Photon} \cdot \frac{7.22 \times 10^{-61}\ \text{beat})N}{\text{cancels out}} \cdot 7.22 \times 10^{-61}\ \text{quantum number beats}$$

$N \cdot \text{Quantum Number}$

So a quantum number beat or vibration has a gravity expression. Thus vibration has gravity, but 10-61 is very, very small.

This allows us to see that there is a gravitational force applied by the vibration of the photon, but everything in the equation cancels out, with the exception of the amplitude of the frequency.

As we can see from our equation, everything cancels out, leaving vibrations with the force of gravity (7.22 x 10^{-61} force). This tells us that even our massless virtual photon will have gravity, and that everything that has vibration (and everything does) has an extra bit of gravity in it, because of its vibrational quantity.

So the force of gravity holding the universe together now has a vibrational component. We can see that vibration also helps to hold together the universe, leading towards our unified field theory.

Now let's look at the force involved with the electron. If we substitute the energy of the electron electromagnetically, we can see that there are gravitational forces there as well.

In our electrical setting the energy in joules equals the watts times seconds. Watts equals voltage times amperage. We can now express this as

Energy joule = watts x sec

If we substitute this into the equation for gravity, substituting for energy, we arrive at the following. We find that the gravity is in

$$Gravity = \frac{watts \times sec\ 7.22 \times 10^{-27}}{joule}$$

Keeping in mind that watts are volts times amperes, we now must find out the gravitational force in energy terms of the electron. We must substitute in for the gross terminology of watts to break into the gravitational force of an electron.

We can define an electron volt as the energy gained by a particle carrying one elementary electric charge. This could be an electron or a singly-charged positive or negative ion. When this electrically charged particle is accelerated through an electric field with the potential difference of 1 volt, this is known as an electronvolt (eV).

The elementary charge of electron, proton, or any singly-charged ion is 1.602×10^{-19} coulombs. A volt is 1 joule per coulomb.

$$1\ eV = 1.602 \times 10^{-19} \times 1 = 1.602 \times 10^{-19}\ joule = 1.602 \times 10^{-12}\ erg$$

Assuming that we have 1 volt of potential we can now insert into the gravitational equation the value for the charge of the electron. This will produce

$$Gravity = \frac{1.602 \times 10^{-19}\ joule\ sec \times 7.22 \times 10^{-27}\ volt}{joules}$$

$$\text{Force of Gravity of 1 Energetic Electron} = \frac{11.57 \times 10^{-46}\ volt\ sec}{(cancels\ out)}\ 11.57 \times 10^{-46}\ volt\ sec.$$

Now if we look at the magnetic force, we can see that the force of a magnetic field is equal to

$$Force\ in\ Newtons = \frac{Coulombs \times meters \times Webers}{sec \times (meter)^2}$$

Since energy is force through distance, multiplying this force by another meter we can now substitute this back into our energy equation for gravity, yielding

$$\text{Force of Gravity Produced By Magnetic Field Quanton} = \frac{1.602 \times 10^{-19} \times joules \times meters \times Weber\ Met\ 7.22 \times 10^{-27}}{joule\ sec\ Met^2}$$

or

$$Gravity = \frac{11.566 \times 10\text{-}46\ Webers}{sec} = 11.566 \times 10^{-42}\ gaus$$

So from our conversion we have shown a relationship of gravity to magnetism, and fulfilled Einstein's wish. This type of conversion, when taken into an other-dimensional concept, allows us to understand how the photons and magnetic phenomena react to gravity. In the words of Einstein, gravity was a result of the curvature of space. This curvature of space can be interpreted from our multi-dimensional model offered in our other books. The curvature allows for virtual photons to emerge and exist.

But our unified field theory cannot be complete unless we can make the connection between the Nelson effect and the ability of the endorphin receptors to transcend through these other dimensions and past various materials. This will allow us to understand and generate a unified field theory that is contingent on biology.

To set our unified field theory into the modality of consciousness, we must first return to the equation given for gravity and energy.

$$\text{Gravity} \cdot \frac{(\text{Energy})\,G}{D^2\,C^2}$$

We have also said that the energy of the system in its ability to affect indeterminacy is

$$\text{Energetic Effect On Indeterminacy} \cdot \sqrt{\frac{\text{Focus on Consciousness}}{\text{Negative Emotions}}}$$

$$E \cdot \sqrt{\frac{FC}{NE}}$$

If we substitute this into the first equation (above), we now have

$$\text{Gravity} \cdot \frac{FC/NE\ 6.67 \times 10^{-11}\ \text{Newtons}\ m^2/kg^2}{(\text{meters})^2\ 9 \times 10^{16}\ \text{met}^2/\text{sec}^2}$$

$$\text{Gravity} \cdot \frac{\sqrt{FC/NE}\ 6.67 \times 10^{-11}\ \text{Newtons}\ m^2/kg^2}{(\text{meters})^2\ 9 \times 10^{16}\ \text{met}^2/\text{sec}^2}$$

$$\text{Force of Gravity Exerted By Consciousness} \cdot \frac{\sqrt{FC/NE}\ (.74 \times 10^{-27}}{\text{joules}}$$

With a little bit of substitution and reduction we arrive at so that there is a small amount of force, .74 x 10^{-27} per joule of the effect of consciousness on gravity.

It is wrong for us to think of the force of consciousness and its effect on indeterminacy as a true force, in that it does not affect mass or energy as the other forces we have calculated. It is more the allowance of an effect on indeterminacy through the other-dimensional effects of the Nelson equation.

Next we must catalog the energy affected through gravitation that is exerted by the small and large forces of the nucleus.The weak and strong forces of the nucleus and their effect on gravity also must be explained in our theory, and the existence of a unified field theory.

Vector bosons, known as W+ or W-, show the effects of the weak interaction transitions inside a nucleus. The electric charge of a proton is exactly the same size as an electron. As we consider the hadron decay of a neutron and proton as a usual constituent of the nuclei, we want to consider that the weak interactions dealt equally with the electron/proton system, the electron/neutrino system and the meuon neutrino system.

Here we can see that the vector boson is a compilation of the effect of understanding the weak interactions inside the nucleus. Transition from the pair of particles at the corner of the triangle to the pair of particles at any other corner proceed at equal strengths. These transitions take place through an intermediate particle, and a coupling to that particle is the weak charge. The particle known as W mediating the weak interaction will decay freely to any pairs at the corners of the triangle. Thus W is called the *intermediate vector boson*, and helps us to understand some of the weak interactive forces.

Fermi developed the universal Fermi interaction, saying that the weak charge is universal. He developed a description of beta decay. Using weak and strong forces we can inspect the quarks and understand more of the vector relationship inside the nucleus.

Our descriptive abilities of the weak and strong interactive forces of the nucleus will lead us into the treatise of understanding the subatomic particles that make up the larger particles known as electrons, protons and neutrons. Now we must look into quarks of the charmed, up, down and other kinds; leptons, meuons, bosons, fermions, and other particles that make up these forms. Our inward search sometimes seems endless, and as we proceed into this search we will find that these entities do not really exist in typical matter forms, but in vibrational forms.

In order to cut our treatise for this document into some degree of size for readability, we will hold off on our pursuit of these extremely small entities, and go back to our vibrational concept, to bring out a unified field theory of some simplistic terms. These simplistic terms allow us to see that gravity and vibration are the entities, and thus we have a field theory that can explain any or all phenomena. As we look into this, we will see that the vibrations congealing to form the quarks, leptons, etc. are extremely complicated beyond our present-day understanding. It is not beyond our present-day ability to speculate, but man cannot truly ever know.

As we look at the universe and observe the Heisenberg uncertainty principle, we run into the extreme complexity nature presents. To challenge nature through allopathic arrogance is completely ludicrous. Only through naturopathy, homeopathy and gentle stimulation of the body's healing mechanism can healing truly occur.

Let us now return to our simplistic unified field theory.

$$\underset{\text{MAGNETIC}}{\text{Quantum of Gravity}} \cdot 11.566 \times 10^{-42}\ \text{Gaus} \cdot \underset{\text{ELECTRO}}{11.566 \times 10^{-46}\ \text{volt sec.}} \cdot 7.22 \times 10^{-61}\ \underset{\text{VIBRATION}}{\text{Quanton Hz.}}$$

$$\text{Quantum of Gravity} \cdot \underset{\text{CONSCIOUSNESS}}{\frac{(FC/NE) \times (7.4 \times 10^{-26})}{\text{joules}}}.$$

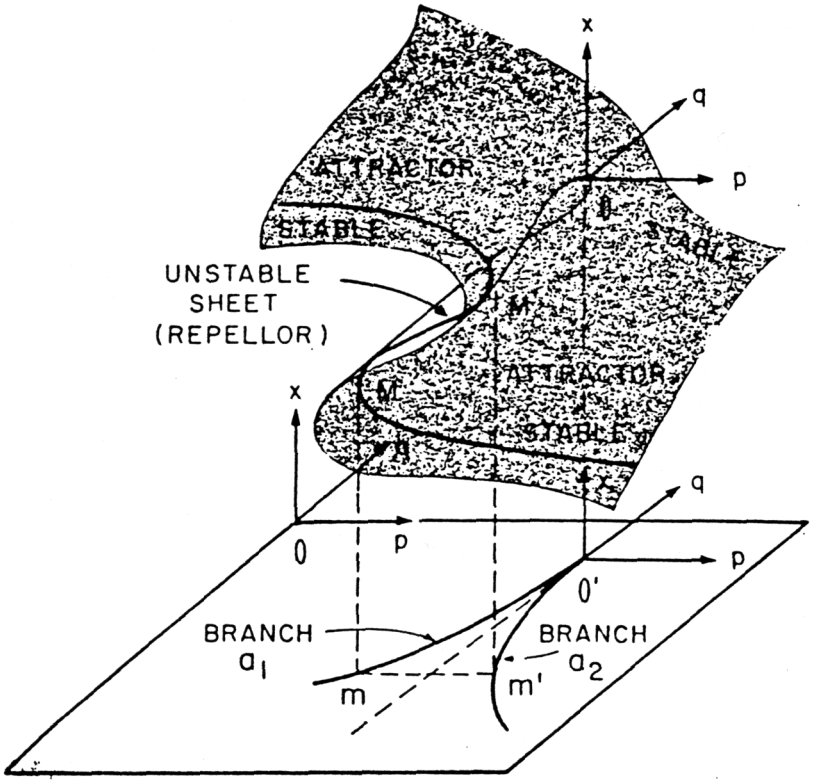
From our formula we show that vibration is a unified force in the universe, and that there is also a unified force of consciousness. The force of consciousness is contained in all entities in the universe. But it congeals with the development of mass as the development of the quantum interaction increases. We can see an expression of this consciousness in the fractal and chaotic theory of how nonliving matter organizes itself. We can see a further development of this consciousness and an expression of its modalities in living tissue as it organizes itself into a form that has biophoton organization.

Something happens at 1023 chromosomes where we now have the quantic ability to develop a cranium, and a technology through society that will allow the development of an understanding of the connectedness of the universe.

Thus the Nelson effect and its control on indeterminacy is an expression in the quantic system. As the quantic system develops to its highest degree we will see an understanding of the biophoton and the body, culminating in an understanding of the universe. Thus vibration and consciousness will allow us to develop the unified field theory and explain the unification of the forces in the universe.

. This table (from Grotz and Klapdor (1985b, 1986) shows calculated half-lives for $\beta^-\beta^-$ isotopes. Columns 4 and 5 contain the results of an RPA calculation for $2\nu\ \beta\beta$ decay (Grotz and Klapdor 1985b). ϵ is the nuclear structure quantity defined in the text. The quantity δ (column 3) is the nuclear deformation parameter used in the RPA calculation. The half-lives $T^{2\nu *}_{1/2}$ in column 6 and $T^{0\nu *}_{1/2}$ in column 7 are the result of a large-scale calculation which also considered the effect of quadrupole phonons (Klapdor and Grotz (1984), Grotz and Klapdor (1986), see Subsection 3.6.1.3). Finally the last column shows estimates for $0\nu\ \beta\beta$ decay, assuming massive Majorana neutrinos. Since the half-life $T^{0\nu}_{1/2}$ depends on the neutrino mass $\langle m_\nu \rangle$, we give the independently calculable product $T^{0\nu}_{1/2}\langle m_\nu \rangle^2$ (for $\langle m_\nu \rangle$ = 1eV the values correspond to half-lives in years).

			QRPA			
	T_0 (MeV)	δ	ϵ (MeV^{-2})	$T^{2\nu}_{1/2}$ (years)	$T^{2\nu *}_{1/2}$ (years)	$T^{0\nu}_{1/2}\cdot\langle m_\nu \rangle^2$ (years $\cdot$ eV^2)
^{70}Zn	1.00	0	0.720	$1.9\cdot10^{22}$		$7.6\cdot10^{23}$
^{76}Ge	2.04	0.2	0.278	$1.1\cdot10^{20}$	$2.2\cdot10^{20}$	$2.6\cdot10^{23*}$
^{80}Se	0.136	0.2	0.273	$9.0\cdot10^{26}$		$6.7\cdot10^{25}$
^{82}Se	3.01	0.2	0.200	$4.5\cdot10^{18}$	$1.5\cdot10^{19}$	$9.5\cdot10^{22*}$
^{86}Kr	1.25	0	0.039	$3.5\cdot10^{22}$		$5.0\cdot10^{24}$
^{94}Zr	1.15	−0.1	0.450	$4.1\cdot10^{21}$		$6.2\cdot10^{23}$
^{96}Zr	3.35	−0.12	0.490	$5.2\cdot10^{17}$		$1.6\cdot10^{22}$
^{98}Mo	0.11	−0.19	0.308	$1.6\cdot10^{20}$		$7.3\cdot10^{24}$
^{100}Mo	3.03	−0.24	0.258	$1.8\cdot10^{18}$		$3.3\cdot10^{22}$
^{104}Ru	1.30	−0.26	0.258	$1.8\cdot10^{21}$		$5.0\cdot10^{23}$
^{110}Pd	2.01	−0.23	0.219	$5.0\cdot10^{19}$		$1.3\cdot10^{23}$
^{114}Cd	0.54	0.14	0.111	$2.7\cdot10^{24}$		$1.7\cdot10^{25}$
^{116}Cd	2.81	0	0.065	$8.3\cdot10^{18}$		$1.7\cdot10^{23}$
^{122}Sn	0.36	0	0.036	$1.4\cdot10^{26}$		$3.6\cdot10^{25}$
^{124}Sn	2.28	0	0.030	$9.3\cdot10^{19}$		$3.1\cdot10^{23}$
^{128}Te	0.87	0.15	0.044	$1.2\cdot10^{23}$	$5.7\cdot10^{23}$	$9.8\cdot10^{23*}$
^{130}Te	2.53	0.10	0.050	$1.9\cdot10^{19}$	$1.2\cdot10^{20}$	$4.6\cdot10^{23*}$
^{134}Xe	0.84	0	0.110	$5.1\cdot10^{22}$	$2.5\cdot10^{23}$	$8.7\cdot10^{23*}$
^{136}Xe	2.48	0	0.019	$6.0\cdot10^{19}$	$3.3\cdot10^{19}$	$3.0\cdot10^{23*}$
^{142}Ce	1.41	0	0.024	$2.8\cdot10^{21}$	$4.1\cdot10^{20}$	$4.7\cdot10^{23*}$
^{146}Nd	0.06	0	0.193	$2.9\cdot10^{30}$		$5.6\cdot10^{25}$
^{148}Nd	1.93	0.18	0.192	$2.5\cdot10^{19}$		$1.1\cdot10^{23}$
^{150}Nd	3.37	0.24	0.082	$4.8\cdot10^{17}$		$2.4\cdot10^{22}$
^{154}Sm	1.25	0.28	0.127	$9.5\cdot10^{20}$		$2.4\cdot10^{23}$
^{160}Gd	1.73	0.29	0.170	$4.4\cdot10^{19}$		$6.4\cdot10^{22}$
^{170}Er	0.66	0.27	0.139	$6.6\cdot10^{22}$		$9.1\cdot10^{23}$
^{176}Yb	1.08	0.26	0.161	$1.1\cdot10^{21}$		$2.5\cdot10^{23}$
^{186}W	0.49	0.20	0.131	$3.2\cdot10^{23}$		$1.2\cdot10^{24}$
^{192}Os	0.41	−0.15	0.076	$1.7\cdot10^{24}$		$1.6\cdot10^{24}$
^{198}Pt	1.04	−0.10	0.008	$1.2\cdot10^{22}$		$1.6\cdot10^{24}$
^{204}Hg	0.41	0	0.002	$4.6\cdot10^{25}$		$2.6\cdot10^{25}$
^{232}Th	0.85	0.23	0.311	$1.6\cdot10^{20}$		$3.8\cdot10^{22}$
^{238}U	1.15	0.24	0.245	$2.2\cdot10^{19}$		$2.4\cdot10^{22}$



Nonunivocity, discontinuity, hysteresis, and divergence on a cusp-type catastrophe

We must look at the similarities of some of these forces. One is the symmetry between the force fields and the de Broglie matter fields. We can look at the character of global and local symmetries using a model, and look at contour fields as if they were a map of the topographical gradients on an island. If we look on the map at the scalar field, we can compare this to the gradient map, which will divine the vector field. Thus both maps will show us the contour of our island, and reveal an implication of altitude above sea level. We can see the dramatic symmetries in this model.

Thus on the contour map the field is defined by a number that reflects the altitude above sea level. On the gradient map two numbers are required, which define the field of the two-dimensional manifold. The vector gradient can be determined by the proportional number comparison of the slope, and a number giving the direction of the maximum slope, or numbers proportional to the magnitude of the force lying on an abject that is at rest. The angle of direction of this force will be revealed by the contour and the magnitude of the force of the ball in the *x* and *y* directions.

The relationship between these scalar and vector fields is that the force on the ball at any point on the map is in the direction of the steepest slope, and it is perpendicular to the direction of the contour proceeding through the positioning point where the object is. This is proportional in magnitude to the slope, and is inversely proportional to the spacing of the contour lines in the direction of the steepest slope. (We point the reader to "The Great Design", by Robert K. Adair, published by Oxford University Press, 1987. This reveals a deeper understanding of the vector and scalar fields.)

We can show the equivalence of gravity, magnetic, electromagnetic, vibration, consciousness, and weak and strong forces; but the appearance of these is that they interact variably as we increase one or another. Thus the relationship is not always *directly* proportional, but has more of a logarithmic variance that occurs as one force is increased.

Thus the conductivity of the universe is through its abilities to affect indeterminacy. This happens across a virtual dimension. The virtual photon dimension has a dynamic effect on the universe, and is part of the unification principle of our theory. The culmination of the biophoton effect has developed with the human being and his ability to psychically affect atoms through biophotons, virtual electrons and other components of reality.

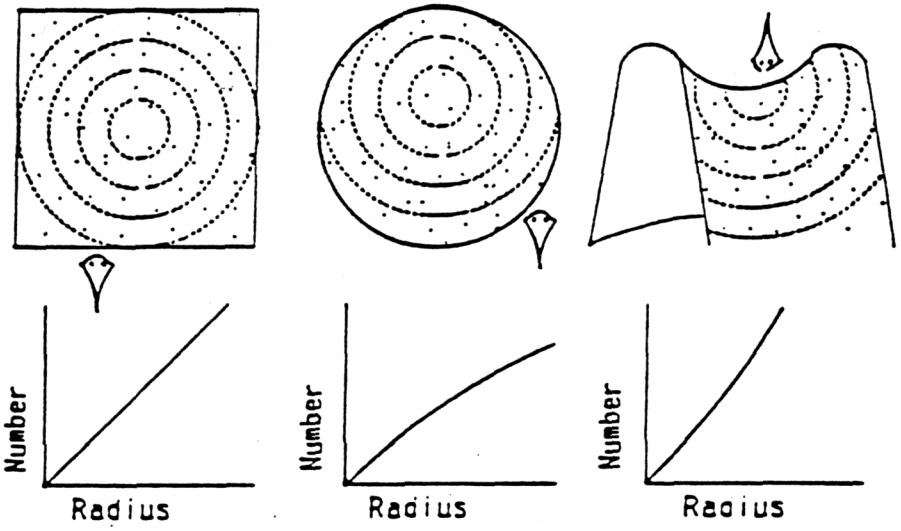
So not only does the human being through his twenty-three chromosomes generate the ability to understand this phenomenon; he also generates the ability to *produce* this phenomenon, which we have labelled the Nelson effect. Thus we have shown how the indeterminacy of the universe can be affected in fractals, consciousness, and human behavior.

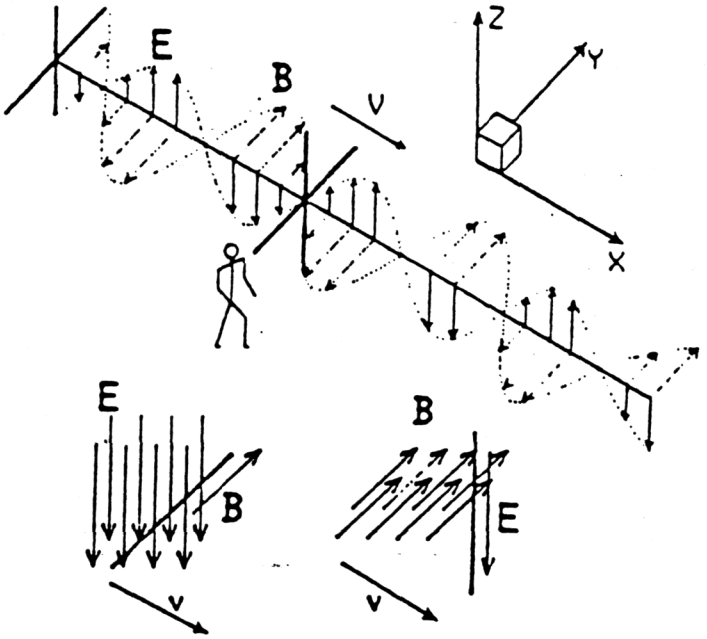
So our understanding of the real universe and the virtual universe can now come together towards a unification field theory that will allow us to understand the phenomena of the universe. In this treatise we wish only to provide an intellectual hypothesis, upon which we will expand at another time, in another book. The challenge has been rendered for us to expand and explain each step in developing this mathematical hypothesis. This book has just started this hypothesis by proposing this unified field theory.

In Dr. Richard Gerber's book "Vibrational Medicine", he offers a Tiller-Einstein proposition, which requires discussion at this time. In the Tiller-Einstein model the Einstein variation is given into the Einstein-Lorentz transformation. Tiller proposes that this leads to a relationship of energy and velocity.

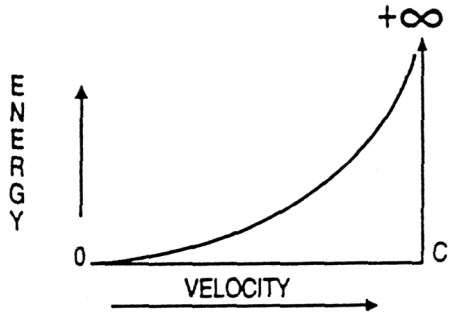
Tiller proposes this to be what he deems *positive physical space*. He then proposes that with the intervention of *i* (the square root of -1), perhaps certain things might exceed the speed of light, and lead to what he deems as *negative physical space*.

. . . Above, the flatworm determines the curvature of his universe by measuring the number of inkspot galaxies per unit distance from a center. Below are the graphs he constructs.



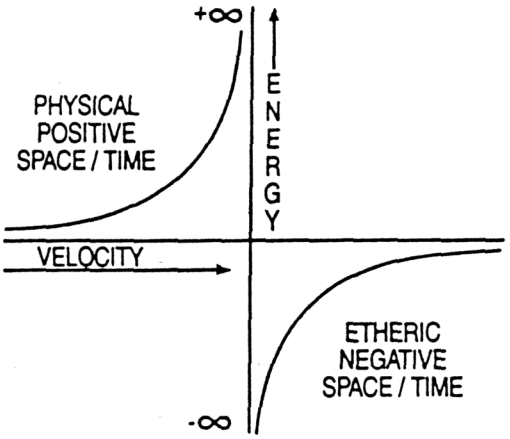


. . . . The variation with distance of the electric and magnetic fields of a polarized electromagnetic wave, together with elements used to deduce the velocity of the waves.



$$E = \frac{mc^2}{\sqrt{(1-v^2/c^2}}$$

$AS_v \rightarrow c$, *then* $E \rightarrow \infty$

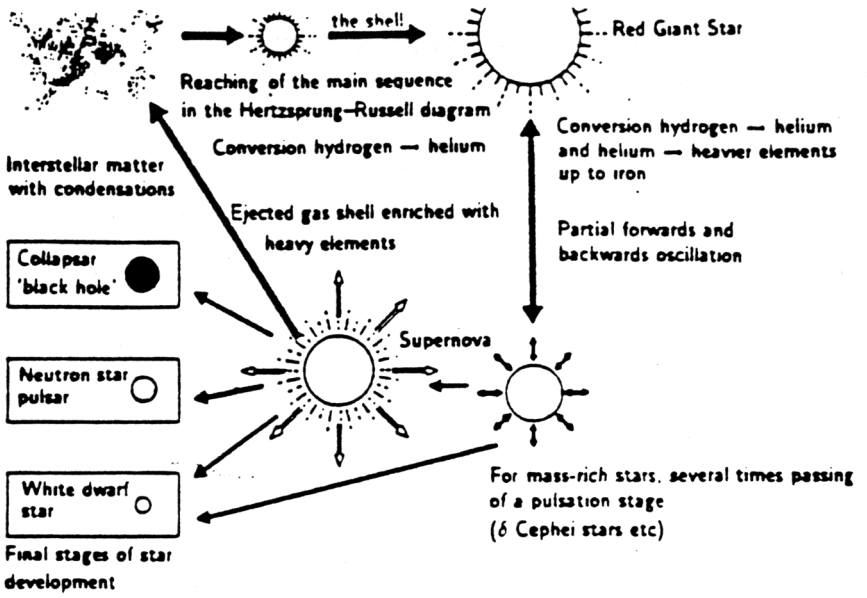


Here this negative space-time would be *magneto-electric*, he proposes, not *electromagnetic*. Dr. Gerber alludes to its possible existence in the ethereal body. The ethereal body, he proposes, would thus have factors exceeding the limits proposed by Einstein.

This type of imaginary system would be virtual, and could be an explanation of some other dimensional factors that we have alluded to in our previous works. But there are several flaws in this proposed square root of -1 concept that would be very difficult to validate through experimental endeavors. It is the purpose of our book to show that the vibrational medicine concepts we deal with are acting within the *real* frame, and thus can be added to medicine now. It is our purpose to try to show statistical and scientific data to help validate our work within the laws of physics accepted by physicists.

In our discussion of the biology of this system we must realize that the electron is travelling at 600 miles per second, roughly twenty percent the speed of light, which we must put into our relativity format in charting out electrical dynamics. Also we must look at the speed factors of human thought, as well as neuronal or nerval interaction, and understand these with our Lorentz transformation. Within our Lorentz transformation, since we have dictated that the photon is so highly involved in biology, we will also need to see its factors with the speed of light, and analyze it for biology. Our vibrational medicine will have much to do with this realm.

As we go through the laws of physics and understand photons, relativity, mass, velocity, momentum, viscosity, and interchanges, the vibrational medicine outlined in this book will allow us to develop systems that will work within the physics modality, and thus generate systems for modern medicine. It must be brought up that in the alternative fare, or the marketplace of unconventional medicine, many practitioners can get off into deifying people who generate ideas that are attacked by the standard system.



Development of stars and their final states (schematic) (after Herrmann (1980)).

Final states of star development.

Initial mass (in $M_\odot$)	Final stage Type	Final stage Mass (in $M_\odot$)
$0.01 - (6 \pm 2)$	White dwarf (degenerate electron star)	< 1.4
$\approx 8 - \approx 100$	Neutron star or strange star, or black hole	$0.1 - 2^*$ > 2 Schwarzschild radius at $2M_\odot$: 6 km

* Theoretical; in general $\gtrsim 0.5M_\odot$ if developed from core of massive star

One case is Rife, another is Tesla; there are many others. People who have come up with ideas regarding physics and biology, who are unable to persuade conventional scientists in medicine of the validity of their ideas, are attacked by legal systems. Alternative practitioners usually assumed that the legal systems were at fault, and often the researcher was wrongfully persecuted. It could very well be that their human flaws did not allow them to understand.

In the case of Rife, he was given four million dollars to develop a technology which, by all the standards of physics, could not work. Could it be that he failed, and that after his failure, a rumor pervaded that he was shut down by the system? Or did the system shut him down appropriately? Could it not be that the psychological rejection of conformity which really pervades some people's thought provokes their acceptance? Is it possible for someone to work within the system and change it, and to succeed by giving modern medicine a true new physics and new dynamics? We think so. It is to this end that these books have been written. It is our goal to provide good scientific theories of energetic medicine, legal products and devices for use, and statistical evidence for our claims.

As we pursue vibrational medicine, we also want to make sure people understand that this does not mean that we just use flower essences or vibrational techniques. We also must deal with other causes of disease including poor nutrition, lack of exercise, and many other simple lifestyle changes. These are covered in depth in our *RWC (Registered Wellness Consultant) Book*. We suggest that our readers who wish to practice medicine read this book as an introductory session, and listen to the tapes regarding it.

Just because the conventional system rejects something does not make it worth rejection. We must go through our science, do our double-blinds, propose our theories, and look at the interventions to understand totally. To this end statistical analysis is needed. We will see the statistical side of what we do in our books on *The Experimental Evidence for Homeopathy* and *Quantum Vibrational Medicine*, as well as *New Biology*, on the concepts of electrodynamics in medicine.

SUMMARY

1. Here we show the association of gravity to the photons, electrons, and magnetic, capacitance and inductance effects; proposing a unified field theory of a form that brings together the various forces of physics.

2. This brief discussion of the unified field theory shows that mere vibration has gravitational effect. Vibration in and of itself has gravity, and associates it with the forces that hold together the universe.

3. We also propose that biology is the simple solution to this event, and that the twenty-three chromosomes of man are not a fluke; they allow for our ability to understand this phenomenon.

Chapter 8

OPTICS

As we have described in previous books, light is a quantum electrodynamic condition, and light consists of electromagnetic waves. The phenomenon of electromagnetic waves is very interesting in its various components. Electromagnetic radiation can be thought of as mutually coupled vector waves. One is the electric field wave and the other a magnetic field wave, both making up electromagnetic radiation. As we have described before, electric and magnetic exist together in motion. Vibrational biology is dependent on photons, and thus our study of biology will require in-depth knowledge of light.

To understand vibrational medicine we must thoroughly review photons, electrons, sound, and all vibration before jumping into medical applications. If uninterested in the scientific principles discussed in this chapter, the untrained reader may skip to the medical chapters.

It is possible to describe optical phenomena with a *scalar wave theory*. Here we describe light as a single scalar wavefunction. Scalar wave optics are also known as *wave optics*.

In history scientists have analyzed light. The first theory of light was that of *ray optics*. Here light is described as rays that travel in various optical media. These follow different geometrical rules. Ray optics has also been termed *geometrical optics*.

Throughout history it has been found that this has much validity in daily experiences. But as it looked deeper and deeper, science found that there were other phenomena requiring explanation. The second phenomenon was wave optics. The wave theory of light encompasses the ray theory of light, but it simply expands from there.

Since ray optics was found to be limited in that some wavelengths were very, very short, a new type of theory was developed. In wave theory light is described by a scalar function, called the *wavefunction*. This obeys the wave equations. Much of this was developed by Schrödinger. The precise meaning of wavefunction is not always specifically stated, but it has components of the electric and magnetic fields. Thus optical power density and wavefunction, with the postulates of scalar wave light, developed into the theory of wave optics.

Wave optics also had drawbacks. Wave optics could not demonstrate a complete picture of reflection and refraction at the boundaries between dielectric materials. Wave optics was also incapable of demonstrating optical phenomena that required a vector formulation. An example of this is polarization.

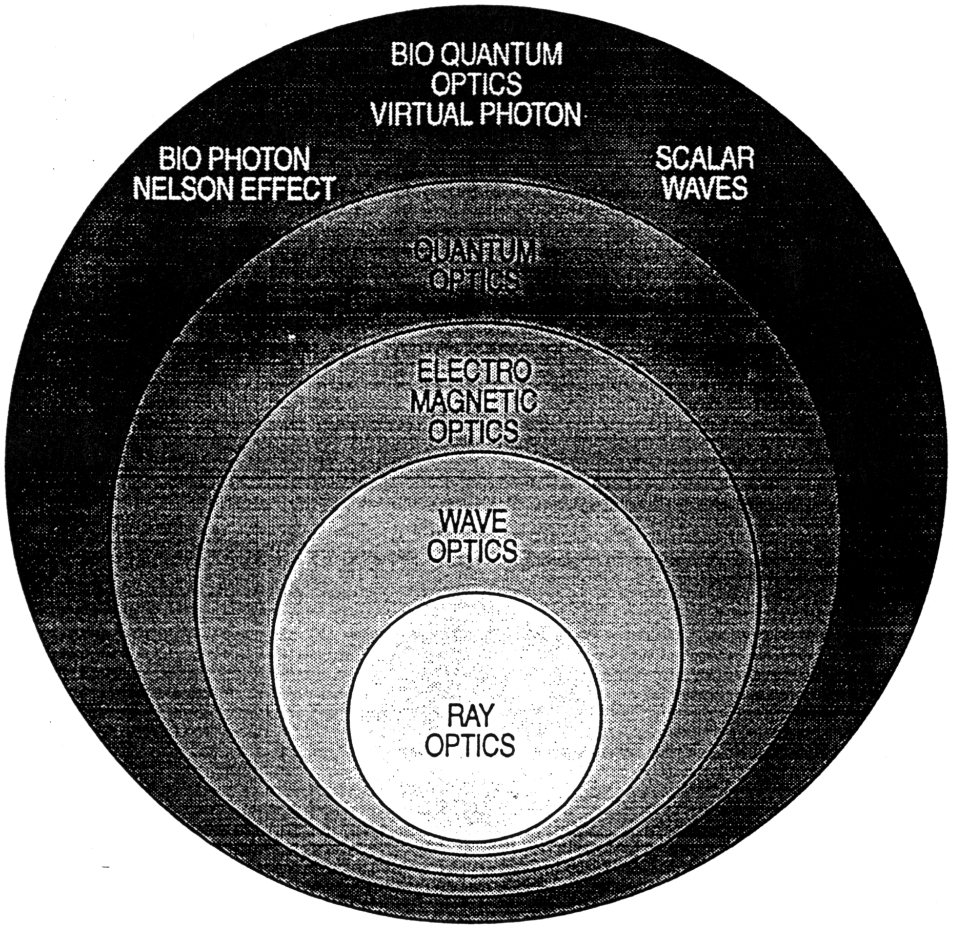
So historically a new system was developed; that of *electromagnetic* optics, which contained the theories of wave optics, yet went beyond. Visible light was contained within the electromagnetic radiation spectrum, and had a relatively short wavelength between 10 nm and 1 mm.

Most of the previous work done in history involved visible light, because that's what could be detected by the eye. However, electromagnetic radiation had to go beyond this to cover the entire electromagnetic spectrum.

Electromagnetic radiation propagates in two different vectors: the *electric field wave* and the *magnetic field wave*. Wave optics theory described light as a single scalar function of position in time. This was known as the *wave function*. This was adequate for certain conditions but fell short in describing others. Maxwell's equations allowed us to understand some interesting effects of light that we will expound on in this chapter.

Now electromagnetics allows us to understand dielectric media, optical transmission, and many other electrical and magnetic theories that were not covered by the wave and ray theories. To understand biology we at least need an electromagnetic theory.

EACH THEORY OF OPTICS
EXPANDS AND CONTAINS THE
THEORIES OF THE PREVIOUS THEORY



Yet even the electromagnetic theory was not complete. History had to go on to another theory that encompassed all of the above theories, but went a little further. The theory is known as the *quantum theory of light*. Now biology can relate to the biophoton.

The quantum theory of light allowed us to understand thermal light and develop lasers, and to understand the interactions of crystals, collision broadening, line broadening, stimulated emissions, and many other factors that brought much more to science. Now with the arrival of the new science of quantum biology we must add a new dimension to light. That is *bio-quantum optics*, which allows us to take all the various rules and developments contained in all the others one step beyond into understanding the interaction of the bio-quantum photon. This would show that light and the photon are highly important to biology. Also with our bio-quantum optics we will develop some treatises that will allow us to propose a unified field theory (see Chapter 7). Here biology is the solution contained within the twenty-three chromosomes that allowed man to have the mental and mathematical capacity to comprehend a unified field theory.

As we develop the proposition of the unified field theory, we will encounter some interesting speculations. Meanwhile, as we develop the laws of the factors of life, we will encounter many medical implications that will have direct statistical and clinical effectiveness to medicine and biology. Thus as we explain and propose some speculative action in this book, we also will define some actual clinical modalities of vibrational medicine that can be used now. We will attempt to tell the reader when we are speculating versus when a medical technique is actually in practice.

Let us return to our study of optics. Let us develop some postulates, laws, guidelines, and definitions for optics. We will refer to this in a historical perspective by reviewing all the various aspects of light and photons.

Ray Optics.

We will find that ray optics is concerned with the direction and location of the photon beams known as rays. This makes it very useful for image formation and also the ability to understand the flow of optical energy.

Optical components can revolve around an optical axis. The rays will travel about this axis as small inclinations. These rays are known as *paraxial* rays. This is the foundation of *paraxial optics*. If we look at the changing position of a paraxial ray moving through an optical system, it can be described with matrix algebra. This is known as *matrix optics*.

The development of ray optics and matrix optics came through the visible and infrared light spectra. This was significant in development because the biological systems of human beings could observe them, because their receptive instruments known as eyes and their heat sensors were able to detect, and thus set up some understandings. It is very interesting that the biological system also could be used for the mitogenic radiation, which is also in this spectrum. Thus matrix algebra can be used to calculate and plot our mitogenic radiation. This is the same matrix that we used in the *Bio-Quantum Matrix* book, and this allows us to chart out a flow of the mitogenic radiation.

Postulate #1:

Light travels in rays. These rays are released by a light source, and can be observed as they affect an optical detector.

Postulate #2:

Optical media can be characterized by their refractive index. The refractive index is the ratio of the speed of light in free space (c_0) to the speed of the light in a medium (c). We calculate the time that light travels a distance known as d, where $d \div c = n \cdot d \div c_0$. This proportion to the product nd is known as the *optical path length*, and allows us to calculate the refractive index for the medium and the material that we wish to analyze. The refractive index of water is extremely important in our biological systems as are many other dielectric materials. However, water helps to focus the mitogenic radiation to do its work inside the cell.

Postulate #3:

In a non-like medium the refractive index is the function of the position $r = (x, y, z)$. The optical path length along the path between point A and B is therefore optical path length = $\int_A^B n(r)ds$. *ds* is the differential element of length along the path. Thus the optical path length as it increases will increase the time light travels from A to B.

Postulate #4:

In Fermat's principle optical rays travelling between two points A and B will follow the minimum amount of time between the two points.

Postulate #5:

In Hero's principle the refractive index is the same everywhere as is the speed of light within a like medium. The path of minimum time dictated by Fermat's principle also applies to minimum distance. Thus the path of minimum distance and the path of least time equate Hero's principle with Fermat's principle, and thus light rays must travel in straight lines in a homogeneous medium.

Postulate #6:

If we study reflection, we will see that the angle of incident equals the angle of reflection. As a light ray comes into a mirror or another reflective surface, the law of reflection states that the angle at which it approaches the mirror will be equal to the angle by which it is reflected out. This is the dictate of reflection. Refraction tells us how a light ray when it enters a new medium can be twisted or bent; just as when we look at the reflection of a stick put into the water, the stick appears to be bent, although it is not. This is known as *refraction*, and has to do with the speed of light as it changes from one medium to another. The refractive index of the many capacities of biology will make our job difficult, yet will be able to explain some photon phenomena throughout the body.

In *planar* boundaries there is a direct relationship between the angles of refraction and incidence when there are two media of refractive index n_1 and n_2. This is governed by *Snell's law*, which is a variation of the angle of incidence = angle of reflection. External refraction, thus, is when $n_1 < n_2$. Here a ray is incident from the medium of smaller refractive index and a refracted ray bends away from the boundary. If we have internal refraction, where $n_1 > n_2$ and the incident ray is in a medium of higher refractive index, a refractive ray will bend towards the boundary. If the angles are extremely small and the rays are paraxial, the relationship is approximately linear. This helps explain why at certain times an object might hide within a medium and not be visible because of the angle of refraction. Here we can see that just as a stone might not be visible in water because of the refraction, certain items inside the body might not be visible.

In the book *Quantum Biology* we outlined how the white blood cell had photon receptors through which the blood cell was able to hunt down and see its prey. If this was the case, perhaps cancerous tissue because of its size is able to develop a refractive index and hide its RNA and DNA so that the white blood cells would not see its photon release, and thus would ignore it. Many people have tried to understand exactly what it is about cancer that at certain times will be able to fool white blood cells. Perhaps it is that the cancer has some type of refractive ability that can bend the light so that white blood cells cannot see the photons properly. Just as certain light can be trapped in a medium of a high refractive index, so the refractive index of the cancer cell, plus its size, might be able to trap the photons within, thus preventing the white blood cell from seeing what it searches for.

Using Fermat's principle we can determine the trajectory of light rays in a medium of known refractive index.

$$\delta \int_B^B n(\tau)\, ds = 0$$

Here *ds* is the differential length along the ray trajectory between points that we will call A and B. The functions of $x(s)$, $y(s)$, $z(s)$ is the trajectory at which *s* is the length of each trajectory. Using calculus of variations we can be shown that these three are partially differential equations.

$$\frac{d}{ds}\left(n\frac{dx}{ds}\right) = \frac{\partial n}{\partial x}, \quad \frac{d}{ds}\left(n\frac{dy}{ds}\right) = \frac{\partial n}{\partial y}, \quad \frac{d}{ds}\left(n\frac{dz}{ds}\right) = \frac{\partial n}{ds}$$

If we analyze the vector of $r(s)$ whose components are $x(s)$, $y(s)$, and $z(s)$, we can convert this to a compact vector form.

$$\frac{d}{ds}\, n\frac{d\tau}{ds} = \nabla n \qquad \textit{Ray Equation}$$

Here L*n* is a vector of cartesian components. *n* is the gradient.

Thus these vector components follow the right-hand rule, in which electro, magnetic, and static components are at right angles to each other. There are three other echo or virtual dimensions to these three. These are scalar in type, and defy most detection techniques. More on this will be discussed later.

Adapting the Ray equation to paraxial waves, we now arrive at

$$\frac{d}{dz}\left(n\frac{dx}{dz}\right) = \frac{\partial n}{\partial x}, \quad \frac{d}{dz}\left(n\frac{dy}{dz}\right) = \frac{\partial n}{\partial y}. \qquad \textit{Paraxial Ray Equations}$$

The trajectories of these rays are determined by the surface from which they originate. If $S(r)$ is a scalar function of equal-level surfaces, then $S(r)$ is a constant. If $S(r)$ is known, the ray trajectory can readily be constructed using normal to equal-level surfaces at a position r in the direction of the gradient vector.

The function $S(r)$ is now known as an *eikonal*. An eikonal is akin to the potential function in electrostatics. This allows us to see the role of the optical rays in an electric field where
$E = -MV$. If we satisfy Fermat's principle (which is the main postulate of ray optics), this eikonal $S(r)$ must satisfy a partial differential equation. This is known as the eikonal equation.

$$\left(\frac{\partial S}{\partial x}\right)^2 + \left(\frac{\partial S}{\partial y}\right)^2 + \left(\frac{\partial S}{\partial z}\right)^2 = n^2$$

Converted to vector form we now have

$$|\partial S|^2 = n^2$$

These equations will be of value later when we make the jump into biology, and make use of this for medicine. In this chapter we wish to continue in the *theoretical* aspects of the laws of optics, and how they apply.

Matrix optics is used to plot paraxial rays. These rays are assumed to travel within a single plane in our ray mechanics. As we proceed into more quantum dynamics we will see that they can travel in other planes. Thus the matrix optics can be expanded from the two-by-two matrix of ray dynamics into the ten-by-ten matrix of quantum dynamics.

In setting up our matrix we can look at a periodic system of a cascade of identical unit systems, which we will call stages. Each of these will have its own ray transfer matrix A, B, C and D. As the ray goes into a system with the initial position y_0, 2_0 we can determine the position and slope of the ray at the exit of the mth stage. Here we can apply the ABCD matrix m times.

$$\begin{bmatrix} y_m \\ \theta_m \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix}^m \begin{bmatrix} y_0 \\ \theta_0 \end{bmatrix}$$

We also can see that the following relations apply.

We can now derive an equation that governs the dynamics of the position ym, where m = 0, 1, 2, ... This is irrespective of the angle 2m. This formula can be achieved by eliminating 2_m to yield

$$y_{m+1} = Ay_m + B\theta_m$$
$$\theta_{m+1} = Cy_m + D\theta_m$$

$$\theta_m = \frac{y_{m+1} - Ay_m}{B}$$

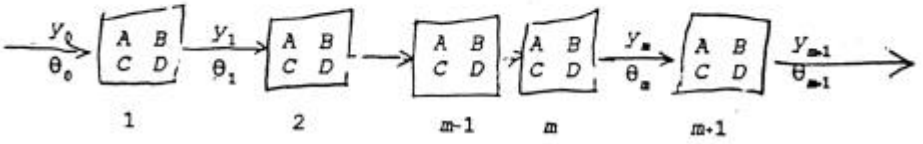
If we replace m with $m + 1$, we get

$$\theta_{m+1} = \frac{y_{m+2} - Ay_{m+1}}{B}$$

If we use all these equations together, we can get a recurrence relation for the ray position presented by

$$y_{m+2} = 2by_{m+1} - F^2 y_m$$

Recurrence Relation For Ray Position

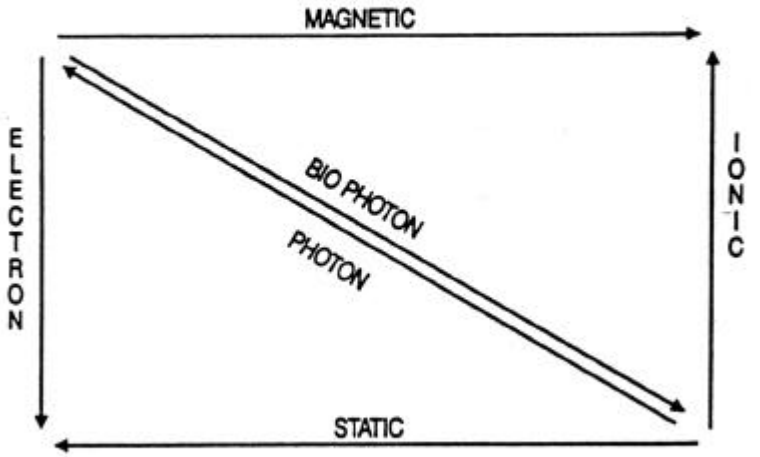


The diagram below presents a cascade of identical optical components, where

$$b = \frac{A + D}{2}$$

$$F^2 = AD - BC = \det [M]$$

In the above equation the determinant of **M** = det (**M**).



MATRIX REGULATION OF BIOLOGICAL PROCESS

E1(0), E2(0), E3(0), E4(0), E5(0), E6(0), E7(0), E8(0), E9(0), E10(0), E11(0), E12(0)

E1(1), E2(1), E3(1), E4(1), E5(1), E6(1), E7(1), E8(1), E9(1), E10(1), E11(1), E12(1)

E1(2), E2(2), E3(2), E4(2), E5(2), E6(2), E7(2), E8(2), E9(2), E10(2), E11(2), E12(2)

E1(3), E2(3), E3(3), E4(3), E5(3), E6(3), E7(3), E8(3), E9(3), E10(3), E11(3), E12(3)

E1(4), E2(4), E3(4), E4(4), E5(4), E6(4), E7(4), E8(4), E9(4), E10(4), E11(4), E12(4)

E1(5), E2(5), E3(5), E4(5), E5(5), E6(5), E7(5), E8(5), E9(5), E10(5), E11(5), E12(5)

E1(6), E2(6), E3(6), E4(6), E5(6), E6(6), E7(6), E8(6), E9(6), E10(6), E11(6), E12(6)

E1(7), E2(7), E3(7), E4(7), E5(7), E6(7), E7(7), E8(7), E9(7), E10(7), E11(7), E12(7)

E1(8), E2(8), E3(8), E4(8), E5(8), E6(8), E7(8), E8(8), E9(8), E10(8), E11(8), E12(8)

E1(9), E2(9), E3(9), E4(9), E5(9), E6(9), E7(9), E8(9), E9(9), E10(9), E11(9), E12(9)

E1(10), E2(10), E3(10), E4(10), E5(10), E6(10), E7(10), E8(10), E9(10), E10(10), E11(10), E12(10)

E1(11), E2(11), E3(11), E4(11), E5(11), E6(11), E7(11), E8(11), E9(11), E10(11), E11(11), E12(11)

E1(12), E2(12), E3(12), E4(12), E5(12), E6(12), E7(12), E8(12), E9(12), E10(12), E11(12), E12(12)

Biology will use this cascadance to communicate, regulate and respond to environmental changes. Since biology is so photon-oriented, it is necessary to use these constructs in our medical or biological models.

The recurrence relation for the ray position is a linear difference equation governing the ray position of *y*m. This usually takes extensive computer work to solve. We also can find another expression for *y*m by solving the different equations of our recurrent relationship.

Linear differential equations present solutions that satisfy the initial conditions. It is therefore allowable to make a guess for the solution of our recurrent relationship using a geometric form.

$$y_n = y_0 h^n$$

h here is a constant. If we substitute our geometric form into this solution, we will find that *h* will present a quadratic, giving us

$$h^2 - 2bh + F^2 = 0$$

From the above equation we can now see that

$$h = b \pm j(F^2 - b^2)^{1/2}$$

The results can be presented in more compact form by defining the variable

$$\varphi = \cos^{-1} \frac{b}{F}$$

This allows us to present a solution of positive/negative signs of linear combination so that the exponential functions can be written as a harmonic circular function, so that

$$y_n = y_{max} F^n \sin(m\varphi + \varphi_0)$$

In most applications *n*1 equals *n*2, and the determinant of *n* also equals 1, and *F* equals 1. Here we will find that the solution for the ray position is

$$y_n = y_{max} \sin(m\varphi + \varphi_0) \qquad \textit{Ray Position in A Peridic System}$$

To look at the solution for y_m as a harmonic instead of a hyperbolic function there must be a real value to the wavelength. This requires

$$|b| \le 1 \quad \text{or} \quad \frac{|A + D|}{2} \le 1 \qquad \textit{Condition for a Stable Solution}$$

The above equation is known as the condition for a stable solution. This will come into effect as we try to find harmonic solutions in biology for treatment modalities. Indeed our development and refinement of Rife technology will depend on these equations.

So we can see that a paraxial ray travels through a series of identical unit optical systems, and that each of these systems possesses a ray transfer matrix of the nature ABCD, such that AD - BC = 1. Thus the paraxial ray will follow a harmonic trajectory. The harmonic trajectory will be bounded if the condition *(A + D)/2* # 1. This is called the *stability condition*, and satisfies the harmonic bounded trajectory. The position at the *m*th stage is then

$y_m = y_{max}$ x sin(*m*n + n0), *m* = 0,1,2,... Thus n = cos-1[(A + D)/2]. The constants *y*max and n0 can be derived from the initial positions *y*0 and *y*1. *y*1 = Ay_0 + B2_0. Here 2_0 is the initial ray inclination. The ray angles are connected to the positions by 2m = (y_{m+1} - Ay_m)/B. Then a harmonic function 2m + 2_{max}sin(*m*n + n1) and we can now see that for a paraxial approximation to be valid it must have a value of 2max « 1. Now we know that the ray trajectory is periodic with period *s* if n/2B is a rational number *q*/*s*. This is important in our medical technology of vibrational medicine.

Wave Optics.

Moving into wave optics we need to present the *wave equation*. We know that light's photons travel as waves. In free space these light waves will have a constant speed *c*0, the speed of light. The refractive index tells us the speed of light in a homogeneous transparent medium. This gives us

$$c = \frac{c_0}{n}$$

n = *Refractive Index*
c_0 = *Speed of Light In a Medium*

The wavefunction of the optical wave will satisfy the wave equation.

$$\nabla^2 u - \frac{1}{c^2}\frac{\partial^2 u}{\partial t^2} = 0 \qquad \textit{The Wave Equation}$$

We can see here that L^2 is a Laplacian operator, such that the electro, magnetic and static vectors are

$$\nabla^2 = \partial^2/(\partial x)^2 + \partial^2/(\partial y)^2 + \partial^2/(\partial z)^2$$

In our wave optical system the wave equation is linear, and the *principle of superposition* applies. The boundary operator allows us to understand how the wavefunction changes when it proceeds from one medium to another. This is dependent on the refractive index of the two items. The wave equation is approximately applicable to media where the position-dependent refractive indices are known.

Optical intensity must be described here; the optical power per unit of area.

Thus it is expressed in units of watts/cm^2.

$$I(r,t) = 2\langle u^2(r,t)\rangle \qquad \textit{Optical Intensity}$$

This follows the inverse square law, so that the further we move distance-wise the less optical intensity there is. The optical power flowing into an area normal to the propagation of light is known as the *intensity*.

$$P(t) = \int_A I(r,t)\,dA$$

The optical energy in units of joules that can be collected in a defined interval is a time integral of the optical power over the time interval.

A monochromatic wave also can be represented by a wavefunction that has harmonic time dependence.

$$u(r,t) = a(r)\cos[2\pi\nu t + \varphi(r)]$$

$a(r)$ = *amplitude*
$\varphi(r)$ = *phase*
ν = *frequency (cycles/s or Hz)*
$\omega = 2\pi\nu$ = *angular frequency (radians/s)*

The amplitude and phase are position-dependent, but the wavefunction is a harmonic function of time with frequency. The frequency of an optical wave will lie between 3 x 1011 to 3 x 1016 Hz. It is interesting that this should also be the same set of boundaries that we observed in the "Mitogenic Radiation" chapter of *Quantum Biology*. This range of activity allows for the existence of transfer of mitogenic radiation energy. This allows us to understand monochromatic waves.

To represent a *complex wavefunction*

$$U(\tau, t) = a(\tau) \exp[j\varphi(\tau)] \exp[j2\pi\nu t),$$

$$u(\tau, t) = Re\{U(\tau, t)\} = \tfrac{1}{2}[U(\tau, t) + U^*(\tau, t)]$$

Our complex wavefunction will allow us to see that a wave with wavefunction can be simplified somewhat. Here we have the wave equation

$$\nabla^2 U = \frac{1}{c^2}\frac{\partial^2 u}{\partial t^2} = 0 \qquad \textit{The Wave Equation}$$

Substituting the function *U* into the wave equation will result in

$$(\partial^2 + k^2) U(\tau) = 0 \qquad \textit{Helmholtz Equation}$$

This also can be expressed by

$$k = \frac{2\pi\nu}{c} = \frac{\omega}{c} \qquad \textit{Wavenumber}$$

To determine optical intensity we use

$$2u^2(\tau, t) = 2a^2(\tau)\cos^2[2\pi\nu t + \varphi(\tau)] + |U(\tau)|^2\{1 + \cos(2[2\pi\nu t + \varphi(\tau)])\}$$

If this is averaged over an optical period, the second term will vanish, so that we can now describe optical intensity simply with

$$I(\tau) = |U(\tau)|^2 \qquad \textit{Optical Intensity}$$

We can see that the optical intensity of a monochromatic wave is the absolute square of its complex amplitude. The intensity of a monochromatic wave does not vary with time.

- A monochromatic wave of frequency < is described by a *complex wavefunction* $U(r,t) = U(r)\exp(j2B<t)$, which satisfies the wave equation.
- The *complex amplitude* $U(r)$ satisfies the Helmholtz equation; its magnitude $*U(r)*$ and argument $\arg\{U(r)\}$ are the *amplitude* and *phase* of the wave, respectively. The optical *intensity* is $I(r) = *U(r)*^2$. The *wavefronts* are the surfaces of constant phase, $n(r) = \arg\{U(r)\} = 2Bq$ (q = integer).
- The *wavefunction* $u(r,t)$ is the real part of the complex wavefunction, $u(r,t) = Re\{U(r,t)\}$. The wave function also satisfies the wave equation.

To understand the wavelength we must use

$$\lambda = \frac{c}{\nu} \qquad \nu = \textit{Frequency}$$

$$\textit{Wavelength}$$

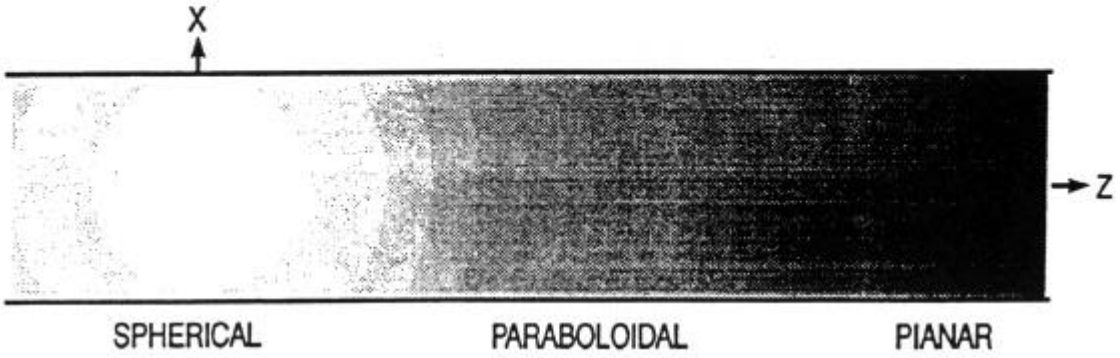
This allows us to calculate wavelength from the speed of light and its frequency.

Knowing that a wavefunction is periodic in time with period 1/Hz and periodic in space with period 2B/*k*, we now can calculate the wavelength, using the wavelength equation.

Since the phase of the complex wavelength will vary with time, and position depends on the variable, we know that *c* is called the phase velocity of the wave. It can be deduced that a monochromatic wave propagating through a medium of different refractive indices can remain the same in frequency, but its velocity, wavelength and wavenumber are altered through

$$c = \frac{c_0}{n}, \quad \lambda = \frac{\lambda_0}{n}, \quad k = nk_0$$

If we have a spherical wave that starts at an *xy* axis,



we can see that as the spherical wave proceeds it will become paraboid-like, and then it will later become planar.

As we have discussed, a paraxial wave is one in which the wavefronts consist of paraxial rays. For an example of a paraxial wave we would start with a plane wave, regarded as a carrier wave, and modulate its complex envelope. Thus it will carry a varying function of position in a complex amplitude of the modulated wave. This becomes

$$U(\tau) = A(\tau) \exp(-jkz)$$

By substituting into the Helmholtz equation we can arrive at

$$\nabla_T^2 A - j2k \frac{\partial A}{\partial z} = 0 \qquad \textit{Paraxial Helmholtz Equation}$$

This equation is an example of a slowly varying envelope approximation of the Helmholtz equation. We will call it the *paraxial Helmholtz equation*. It resembles the Schrödinger equation of quantum physics. We will use this later in our medical systems.

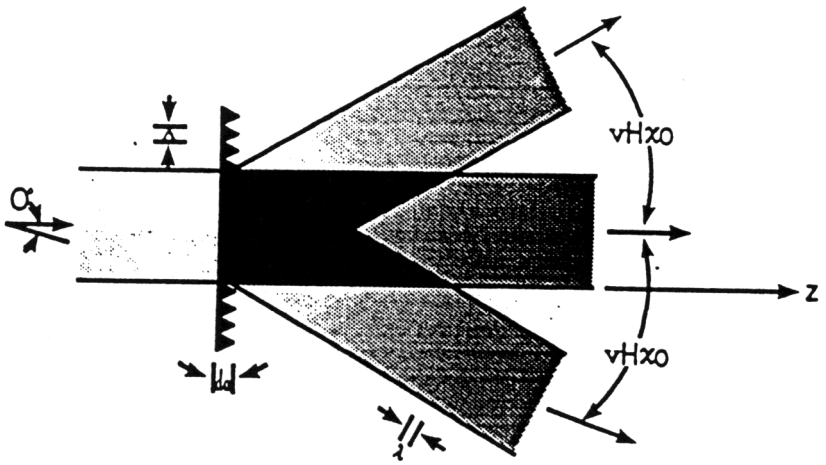
Diffraction Gratings.

Since we mentioned diffraction gratings in the book *Quantum Biology*, let us now briefly expand on diffraction gratings as an initial explanation for interference patterns.

A diffraction grating allows us to send light through two or more holes, in which the amplitude of two different waves can either be at additive and increasing or negative and actually canceling each other out. This is shown as

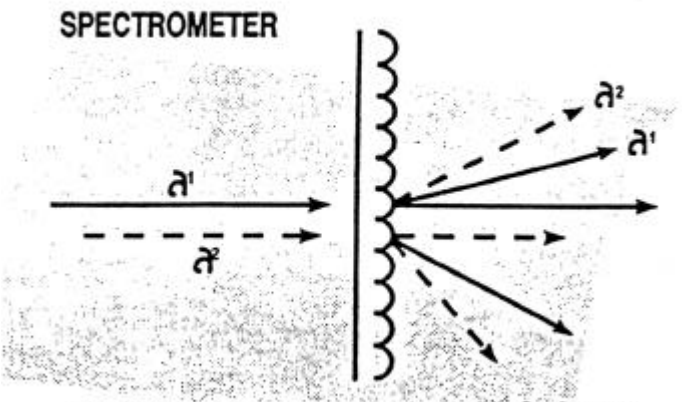
$$\theta_q \cdot \theta_i \cdot q\frac{\lambda}{\Lambda} \qquad \textit{Grating Equation}$$

(When a wave is canceled out, so to speak, it generates a surge in the electromagnetic static virtual side. This shifts these waves from virtual to real with dramatic effects on quantum and biological systems).



A diffraction grating can also serve as a spectrometer in comparing two different waves of different wavelengths. This is shown as

$$\sin\theta_q \cdot \sin\theta_i \cdot q\frac{\lambda}{\Lambda}$$



DIFFRATION GRATINGS DIRECT 2 WAVES λ^1, λ^2 INTO 2 DIRECTIONS. CAN SERVE AS A SPECTRUM ANALYSER.

When multiple optical waves are together in the same region of space and time, the total wavefunction is the sum of all of the individual wave functions. Thus as these waves cross through space and time, their collective force can make them more potent. Or they can wipe each other out if one is negative and one is positive and their added force equals 0. This is known as *superposition*.

The principle of superposition tells us that the linearity is derived from the linearity of the wave equation. This deals with amplitude, not intensity. The superposition principle will not be applicable to optical intensity. If we superimpose two waves, we will not always get the sum of their intensities. Ray optics cannot explain interference, but our wave phenomenon can.

Let us now look at the interference two waves may have on each other. When monochromatic waves of varying amplitudes are superimposed, we get a result of

$$U(\tau) = U_1(\tau) + U_2(\tau)$$

Here we can see that the intensity of individual waves is shown as

$$I = |U|^2 = |U_1 + U_2|^2 = |U_1|^2 + |U_2|^2 + U_1^* U_2 + U_1 U_2^*$$

The explicit dependence on r was omitted for convenience. Thus substituting will show

$$U_1 = I_1^{1/2} \exp(j\varphi_1) \text{ and } U_2 = I_1^{1/2} \exp(j\varphi_2)$$

Now we can see that the phase of the two waves can produce the interference equation.

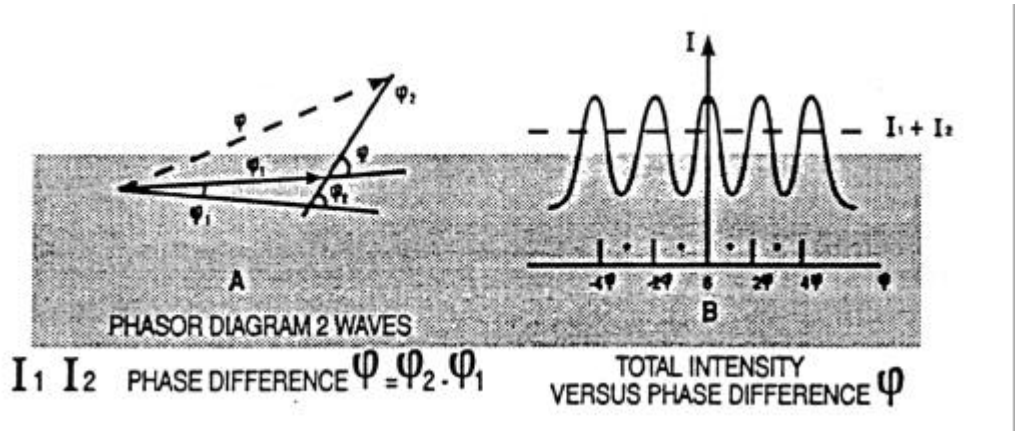
$$I = I_1 + I_2 + 2(I_1 I_2)^{1/2} \cos\varphi \qquad \textit{Interference Equation}$$

Infrared (heat) is the byproduct of this interference. Because the scalar waves that result are in the mitogenic radiation realm, the result is heat or visible light. This resulting interference is felt by living systems and has effects on bio-quantum systems.

The effect can be reduced to

$$\varphi = \varphi_2 - \varphi_1$$

Now we know the interference equation, which tells us about the geometry that can be calculated in a phasor diagram.



An *interferometer* is an optical instrument that is capable of splitting a wave into two waves using a beam splitter. It produces a delay of unequal distances and redirects them using mirrors and partial mirrors. There are many types of interferometers on the market. In our medical chapter we will discuss how we can produce interferons with some disease-causing wavefunctions in the body, and how we can possibly run interference to wipe out these disease-causing frequencies while amplifying healthy frequencies. This produces the mitogenic-like radiation which feels like heat. The scalar effects are a bio-quantum-effecting energy.

We first need to understand interference with complex amplitudes. We first lay out

$$U_m = I_0^{1/2} \exp[j(m-1)\varphi], \quad m = 1, 2, \ldots, M$$

Where these waves have equal intensities, the phase difference between the successive waves is n. To derive the equation for the intensity and to find out the amplitude, the superposition of the wave is then

$$U = I_0^{1/2}(1 + h + h^2 + \cdots + h^{M-1}) = I_0^{1/2} \frac{1 - h^M}{1 - h}$$

$$= I_0^{1/2} \frac{1 - \exp(jM\varphi)}{1 - \exp(j\varphi)}$$

The corresponding intensity, thus, is

$$I = |U|^2 = I_0 \left| \frac{\exp(-jM\varphi/2) - \exp(jM\varphi/2)}{\exp(-j\varphi/2) - \exp(j\varphi/2)} \right|^2$$

resulting in the interference of *M* waves.

$$I = I_0 \frac{\sin^2(M\varphi/2)}{\sin^2(\varphi/2)}$$

If we deal with waves of progressively smaller amplitude, such as a lifetime broadening effect, we can see that there are equal phase differences.

$$U_1 = I_0^{1/2}, \quad U_2 = hU_1, \quad U_3 = hU_2 = h^2U_1, \ \ldots$$

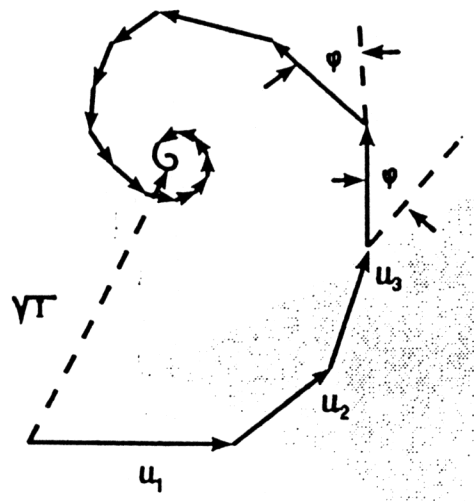
This superposition has a complex amplitude of

$$U = U_1 + U_2 + U_3 + \ldots$$
$$= I_0^{1/2}(1 + h + h^2 + \ldots$$

$$= \frac{I_0^{1/2}}{1 - h} = \frac{I_0^{1/2}}{1 - re^{j\varphi}}$$

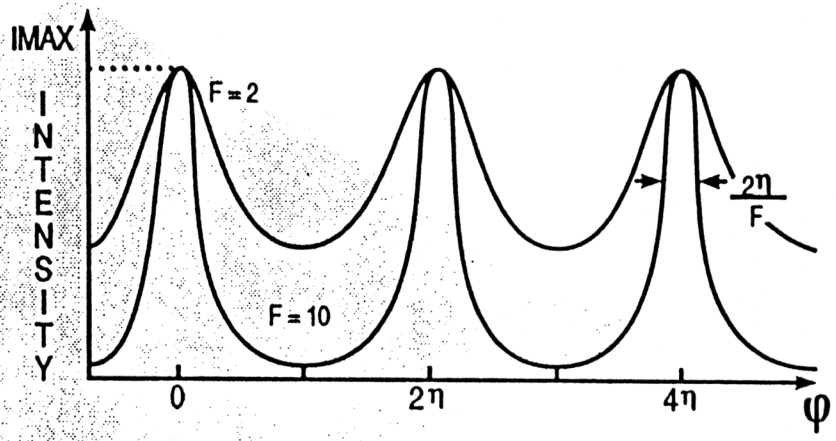
The intensity will be

$$I = \frac{I_0}{(1 - r)^2 + 4_r \sin^2(\varphi/2)}$$



A

SUM OF AN INFINITE NUMBER OF PHASORS WITH MAGNITUDES THAT SUCCESSIVELY REDUCE AT A GEOMETRIC RATE



B

DEPENDENCE OF THE INTENSITY ON THE PHASE DIFFERENCE φ

PEAKS AT $\varphi = 2\pi Q$
WIDTH (FWHM) $= 2\pi/\mathcal{F}$
WHEN $\mathcal{F} \rightarrow 1$

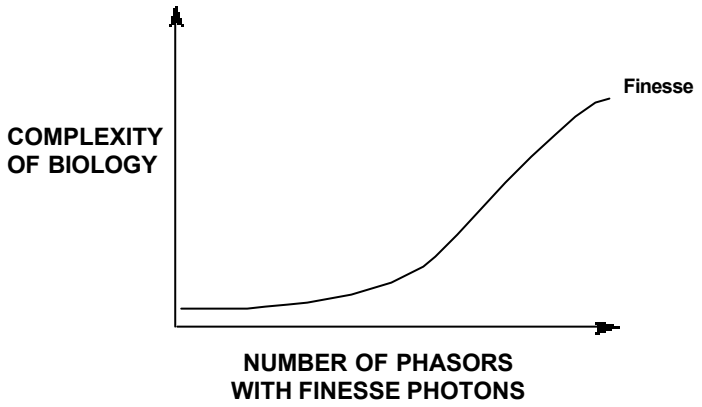
It is convenient to write this equation in the form that will tell us the intensity of the infinite number of waves, yielding

$$I = \frac{I_{max}}{1 + (2\mathcal{F}/\pi)^2 \sin^2(\varphi/2)}$$ *Intensity of an Infinite Number of Waves*

where $$I_{max} = \frac{I_0}{(1 - r)^2}$$

which finally results in the finesse parameter.

$$\mathcal{F} = \frac{\pi r^{1/2}}{1 - r}$$ *Finesse*



Finally, we can calculate the width of the interference pattern.

$$\Delta\varphi = \frac{2\pi}{\mathcal{F}}$$ *Width of Interference Pattern*

As we address complex waveforms we must move into a Fourier analysis, which allows us to understand how complex waveforms can be combined and decombined out of their utilization. Later in this discourse we will review electronic devices that can perform these functions for biology and medicine.

Monochromatic light has a wavefunction that is generally harmonic in space and time. Often reality does not live up to this perfect harmonic representation. A *polychromatic wave* can contain many monochromatic waves, and can be broken up from the Fourier transform.

$$u(r,t) = \int_{-\infty}^{\infty} U_\nu(r) \exp(j2\pi\nu t)\, d\nu$$

Developing the transform further we find

$$U_\nu(r) = \int_{-\infty}^{\infty} u(r,t) \exp(-j2\pi\nu t)\, dt$$

Since there are real amplitude measures, they are symmetrical in wavelength. We can simplify the equation to

$$\int_{-\infty}^{0} U_\nu(r) \exp(j2\pi\nu t)\, d\nu = \int_{0}^{\infty} U_{-\nu}(r) \exp(-j2\pi\nu t)\, d\nu = \int_{0}^{\infty} U_n^*(r) \exp(-j2\pi\nu t)\, d\nu$$

The sum of its complex functions in its conjugate is

$$u(r,t) = \int_{0}^{\infty} [U_\nu(r) \exp(j2\pi\nu t) + U_\nu^*(r) \exp(-j2\pi\nu t)]\, d\nu$$

in monochromatic light the complex equation is twice the first term,

$$U(r,t) = \int_{0}^{\infty} [U_\nu(r) \exp(j2\pi\nu t)\, d\nu$$

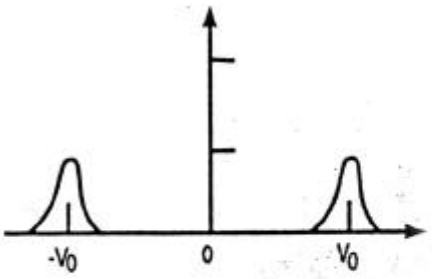
resulting in the wavefunction

$$u(r,t) = Re\{U(r,t)\} = \tfrac{1}{2}[U(r,t) + U^*(r,t)]$$

This is known as the *complex analytical signal*, which is obtained in the wavefunction using three steps:

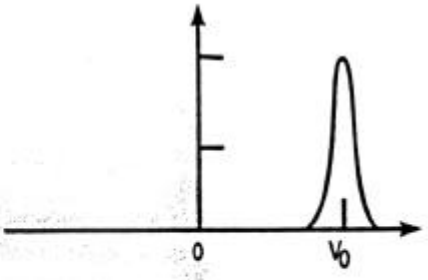
a) determine the Fourier transfer
b) eliminate negative frequencies multiplied by 2
c) determine the inverse Fourier transforms.

Each Fourier transform satisfies the wavefunction. So we know that the complex wavefunction itself satisfies the wave equation. The magnitude of the Fourier transform of the complex wavefunction of a quasi-chromatic wave is illustrated below.



A

MAGNITUDE OF THE FOURIER TRANSFORM OF THE WAVEFUNCTION



B

MAGNITUDE OF THE FOURIER TRANSFORM OF THE CORRESPONDING COMPLEX WAVEFORM BIO PHOTON

To calculate the intensity of the wavefunction

$$I(r,t) = 2\langle u^2(r,t)\rangle$$
$$= 2\langle \{\tfrac{1}{2}[U(r,t) + U^*(r,t)]\}^2\rangle$$
$$= \tfrac{1}{4}\langle U^2(r,t)\rangle + \tfrac{1}{4}\langle U^{*2}(r,t)\rangle + \langle U(r,t)U^*(r,t)\rangle$$

In calculating the optical intensity of the quasi-monochromatic light we find

$$I(r,t) = |U(r,t)|^2$$ *Optical Intensity of Quasi-Monochromatic Light*

This will allow us to analyze, understand and discern some of the medical implications of our wavefunction for biology in medicine.

Electromagnetic Optics.

Light as an electromagnetic wave complies with all of the same theoretical principles that govern electromagnetic radiation.

Electromagnetic radiation, as we described before, is a coupled vector of an electric field wave and a magnetic field wave. Both occur simultaneously if there is movement. The wave optic theory describes light as a single scalar wave in a function of position in time. However, the wavefunction theory does not hold for the entire electromagnetic spectrum. Electromagnetic optics allows us to broaden our scientific understanding over the wave optic theory.

Both electric and magnetic vectors are functions of position in time. In the *electromagnetic optic* theory we need six scalar functions of position in time to thoroughly describe light in free space. Three of these are real electro, magnetic, and static. Each of these has a virtual counterpart. These virtual components have profound effects on biology. This points out the subtle ability of biology to use virtual photons. The cadeusesus coil uses an interference system to cancel out the electromagnetic and static components, to leave the virtual or imaginary components. These can produce influence on cells and living tissue.

Maxwell defined some of the first equations to mathematically outline the relationships.

The first Maxwell equations of free space are outlined here.

$$\nabla \times \quad = \varepsilon_0 \frac{\partial \mathcal{E}}{\partial t}$$
$$\nabla \times \mathcal{E} = -\mu_0 \frac{\partial}{\partial t}$$
$$\nabla \cdot \mathcal{E} = 0$$
$$\nabla \cdot \quad = 0$$ *Maxwell's Equations (Free Space)*

The constant $\varepsilon_0 = (1/36\pi) \times 10^{-9}$ and $\mu_0 = 4\pi \times 10^{-7}$ (MKS units). Here ε_0 equals electric permittivity and μ_0 describes magnetic permeability of free space. $\nabla\cdot$ and $\nabla\times$ are the divergence and curl operations.

Some of the conditions needed to describe the magnetic and electric fields to satisfy Maxwell's equations come from the wave equation.

$$\nabla^2 u - \frac{1}{c_0^2}\frac{\partial^2 u}{\partial t^2} = 0$$ *The Wave Equation*

On further expounding we can find the speed of light in free space, which is 3×10^8 meters per second.

$$c_0 = \frac{1}{(\varepsilon_0\mu_0)^{1/2}} = 3 \times 10^8 \text{ m/s}$$ *Speed of Light (Free Space)*

There are three scalar components of the electric field and three scalar component field, each in *x*, *y*, *z*. Since Maxwell's equations and the wave equation are linear, we will find that the principle of superposition fits. That is to say that if two sets of electric and magnetic fields are solutions to these equations, their sum is also a solution. This allows us to understand the potentiation of certain fields and to know the negation of certain fields.

In a medium in which there are no free electric charges or currents two more vector fields also need to be analyzed and discussed for our understanding. These are the *electric flux density* (sometimes called the *electric displacement*) and the *magnetic flux density*.

$$\nabla \times \quad = \frac{\partial}{\partial t}$$

$$\nabla \times \mathcal{E} = -\frac{\partial}{\partial t}$$

$$\nabla \cdot \quad = 0$$

$$\nabla \cdot \quad = 0$$

Maxwell 's Equation
(Source -Free Medium

This leads us to two other needed components:

$$= \varepsilon_0 \mathcal{E} +$$

$$= \mu_0 \quad + \mu_0$$

where is the polarization density, is the magnetization density. Where there is a dielectric medium the polarization density is the macroscopic sum of the electric dipole moments that the electric field induces. The magnetization density from the dielectric medium is a result of the magnetic field. In free space = = 0, since there is a nonmagnetic medium. This happens so that
= ,oõ and = µo

The flow of electromagnetic power is governed by the vector

$$= \mathcal{E} \times$$

which is also known as the *Poynting vector*. The optical intensity *I* (the power flow across the unit area normal to the vector) is the magnitude of the time-averaged Poynting vector.

Now let us describe the dielectric medium.

The dielectric medium is exhibited in relationship to the polarization density in the electric field. This is called the *medium equation*. This is created as an electric field that attempts to cross a medium.

We still must note that the electric field and the polarization density are functions of position and time.

Definitions

- A dielectric medium is said to be *linear* if the vector field (r,*t*) is related linearly to the vector field õ(r,*t*) The principle of superposition then applies.
- The medium is said to be *nondispersive* if its response is instantaneous; i.e., at time *t* is determined by õ at the same time *t* and not by prior values of õ. Nondispersiveness is clearly an idealization since any physical system, however fast it may be, has a finite response time.
- The medium is said to be *homogeneous* if the relation between and õ is independent of the position r.

- The medium is called *isotropic* if the relation between the vectors and õ is independent of the direc tion of the vector õ, so that the medium looks the same from all directions. The vectors and õ must then be parallel.
- The medium is said to be *spatially nondispersive* if the relation between and õ is local; i.e., at each position *r* is influenced only by õ at the same position. In this chapter the medium is always assumed to be spatially nondispersive.

The electric susceptibility can be determined by the value of P in

$$= e_0 \chi$$

Substituting, we can follow

$$= e$$

$$e = e_0(1 + \chi)$$

Now we will find that the scalar constant of the electric permittivity of the medium allows us to calculate a dielectric constant of a ratio.

Now we can outline Maxwell's equations of linear, homogeneous, isotropic, and nondispersive source-free media.

$$\nabla \times = e \frac{\partial}{\partial t}$$

$$\nabla \times = -\mu_0 \frac{\partial}{\partial t}$$

$$\nabla \cdot = 0$$

$$\nabla \cdot = 0$$

Maxwell 's Equations (Linear , Homogeneous , Isotropic , Nondispersive , Source -Free Medium)

As we have shown before,

$$\nabla^2 u = \frac{1}{c^2} \frac{\partial^2 u}{\partial t^2}$$ *Wave Equation*

Recounting our speed of light in a medium formula

$$c = \frac{c_0}{n}$$ *Speed of Light (In a Medium)*

and our refractive index formula

$$n = \left(\frac{e}{e_0}\right)^{1/2} = (1 + \chi)^{1/2}$$ *Refractive Index*

slightly varied, we can now calculate

$$c_0 = \frac{1}{(e_0 \mu_0)^{1/2}}$$

and show that the constant *n* is the ratio of the speed of light in free space to that in the medium. Therefore we can conclude that the refractive index of the medium is related to the dielectric constant. In fact, the refractive index is the square root of the dielectric constant. This confirms the static connection to the photon.

Now if we consider an inhomogeneous medium that is nonisotropic, we can see that a new wave equation is needed.

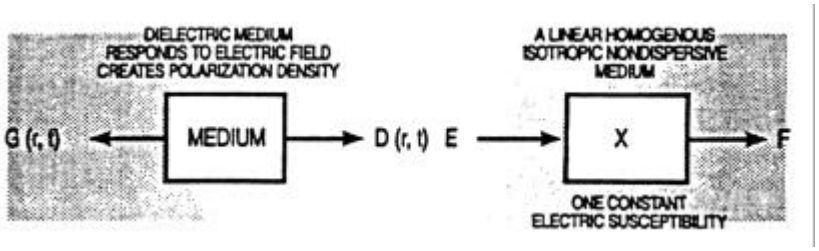
$$\nabla^2 \mathcal{E} - \frac{1}{c^2}(r)\ \frac{\partial^2 \mathcal{E}}{\partial t^2} = 0$$

Wave Equation (Inhomogeneous Medium)

We vary Maxwell's equation to conclude

$$\nabla \times (\nabla \times \mathcal{E}) = \nabla(\nabla \cdot \mathcal{E}) - \mu_0 \frac{\partial^2}{\partial t^2}$$

We graph this relationship out below.



We can now find values of the electric field that allow us to describe the equation

$$\nabla^2 \mathcal{E} - \frac{1}{c^2(r)}\ \frac{\partial^2 \mathcal{E}}{\partial t^2} + \nabla\left(\frac{1}{c}\nabla e \cdot \mathcal{E}\right) = 0$$

If the medium for which we are measuring the dielectric is not isotropic, the relationship of the vectors and õ would depend on the direction of the vector õ.

$$= \sum_j e_0 X_{1j} \mathcal{E}_j$$

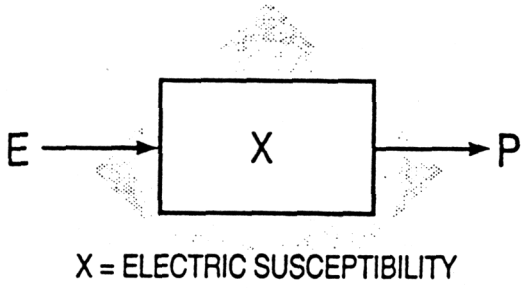
The dielectric properties of the medium we described would display a constant known as the *susceptibility tensor*.

$$= \sum_j e_{1j} \mathcal{E}_j$$

The elements of $,_{ij}$ are known as the *electric permittivity tensor.*

The electric susceptibility can be determined by the value of $_X$ in

$$= \epsilon_0 \chi \mathcal{E}$$



X = ELECTRIC SUSCEPTIBILITY

From this diagram we can see that our matrix is expanded to a more complex format that catalogs the *x*, *y*, *z* capacities of the various factors. We can further expand this to include the scalar components x_S, y_S, z_S.

If we deal with monochromatic light, the electric and magnetic field components will be harmonic functions of time of the same frequency.

$$\mathcal{E}(r,t) = Re\{E(r)\exp(j\omega t)\}$$
$$(r,t) = Re\{H(r)\exp(j\omega t)\}$$

Here T is the angular frequency, < is the frequency, and the amplitudes of , , and are real functions. Substituting in for the boundary layer in Maxwell's equation we will see

$$\nabla \times H = j\omega D$$
$$\nabla \times E = -j\omega B$$
$$\nabla \cdot D = 0$$
$$\nabla \cdot B = 0$$

Maxwell 's Equations (Source -Free Medium ; Monochromatic Light)

Countering this to Maxwell's equations for monochromatic light in linear, homogeneous, isotropic, nondispersive source-free media

$$\nabla \times H = j\omega\epsilon E$$
$$\nabla \times E = -j\omega\mu_0 H$$
$$\nabla \times E = 0$$
$$\nabla \times H = 0$$

Maxwell 's Equations (Monochromatic Light ; Linear , Homogeneous , Isotropic , Nondispersive , Source -Free Medium

In a nonhomogeneous medium Maxwell's equations remain applicable. But there will be a position dependence. In a dispersive medium the electric field and the polarization density will be connected by a dynamic relation. The result is

$$P = \omega_0 \chi(\nu) E$$

where

The above formula shows a Fourier transform that allows us to understand some of the complexities. The relationship between D and E is very similar.

$$\chi(\nu) = \int_{-\infty}^{\infty} x(t)\exp(-j2\pi\nu t)\,dt$$

The relationship between electric flux density and the electric field can also be shown

$$E = \epsilon(\nu) E$$

where

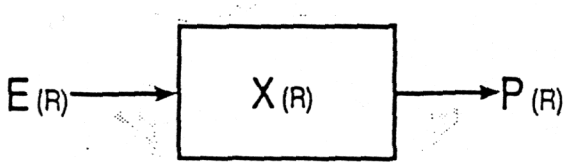
$$\epsilon(\nu) = \epsilon_0[1 + \chi(\nu)]$$

Our concept of biology must be able to deal with absorption, since few of the factors in the body are totally transparent. These dielectric materials will absorb light, and often are represented phenomenologically by a very complex susceptibility.

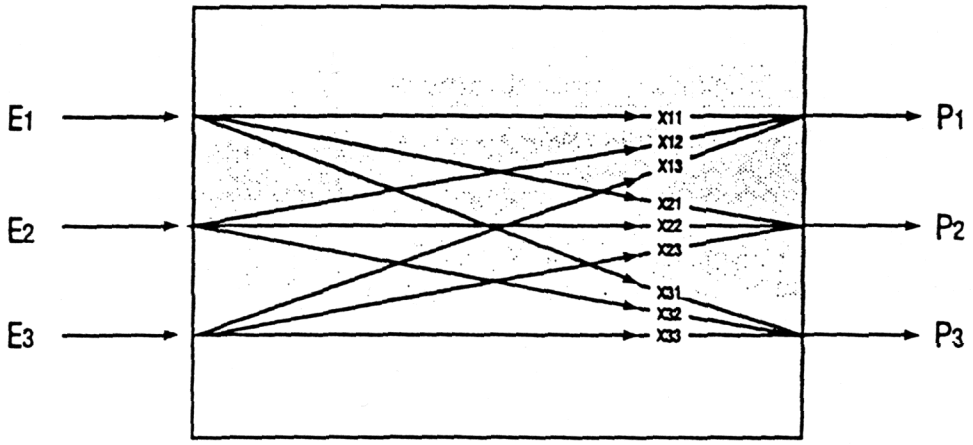
The below formula shows us some of this complexity.

$$\chi = \chi' + j\chi''$$

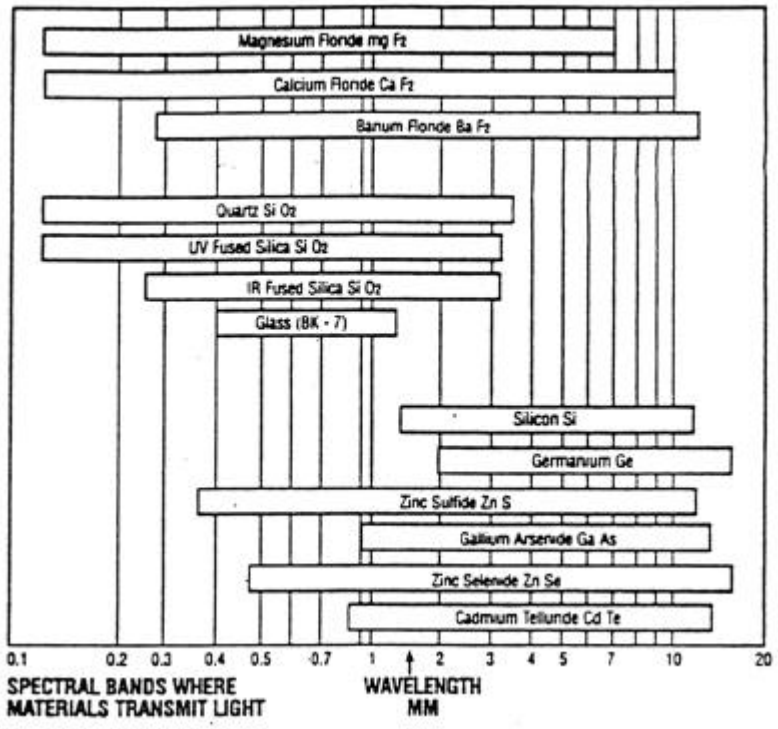
If we look at some of the factors of absorption and dispersion,



IN HOMOGENOUS, LINEAR, NONDISPERSIVE, ISOTROPIC MEDIUM CHARACTERIZED BY A POSITION DEPENDENT SUSCEPTIBILITY X (R)



IN AN ANISOTROPIC, LINEAR, HOMOGENOUS, AND NON DISPERSIVE MEDIUM IS CHARACTERIZED BY NINE CONSTANTS (ELEMENTS OF SUSCEPTIBILITY TENSOR) EACH *P* HAS 3 SUPERPOSITIONS OF *E*



A variation of the Helmholtz equation along with this complexity allows us to see

$$k = \omega(\omega\mu_0)^{1/2} = (1 + \chi)^{1/2}k_0 = (1 + \chi' + j\chi'')^{1/2}k_0$$

The plane wave traveling in a medium in a *z*-direction is described by a complex amplitude. Since *k* is complex, both the magnitude and phase of μ vary with *z*. It is useful to write *k* in terms of its real and imaginary parts. Here we can obtain

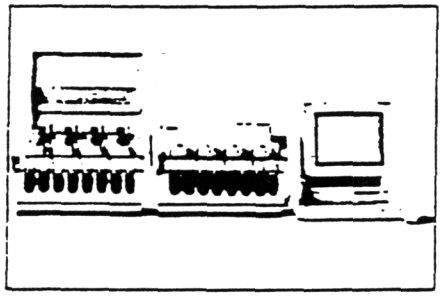
$$\beta - j\tfrac{1}{2}\alpha = k_0(1 + \chi' + j\chi'')^{1/2}$$

The *absorption coefficient* = the *attenuation coefficient* = the *extinction coefficient*. This is very important in our development, and also will be important in our study of mitogenic radiation.

Here we can see that absorption is wave-linked, and thus frequency-dependent. Our absorption coefficient and refractive index formula help to point this out.

$$n - j\frac{\alpha}{2k_0} = (1 + \chi' + j\chi'')^{1/2}$$

Absorption Coefficient and Refractive Index



Microphysiometer

ASBMB Booth 1345. The Cytosensor™ Microphysiometer allows non-invasive detection and characterization of the biological response of living cells to chemical and biological agents. A patented light-addressable potentiometric sensor, or LAPS, detects and measures subtle fluctuations in the metabolic rate of living cells in response to various synthetic or natural molecules. The instrument finds numerous applications in bioanalytical testing. Immediate cellular response can be studied, as well as cellular response over time. The physiological effects of receptor binding can be studied. Measurements are quantitative and reproducible. **Molecular Devices Corp.,** 4700 Bohannon Dr., Menlo Park, CA 94025.

CHEMILUMINESCENT BLOTTING KIT
detect nucleic acids

The PolarPlex™ blotting kit, a new member of the Plex Kit family for chemiluminescent detection of nucleic acids, eliminates radioactivity from Southern and Northern blotting procedures. The Kit detects DNA through an enzyme catalyzed light reaction. Alkaline phosphatase is attached to the target DNA/RNA and breaks the dioxetane bonds on the Lumigen-PPD substrate, which then decomposes and emits light. In standard blots, 0.1 pg of homologous DNA can be detected. Single copy genes can be identified from as little as 1 µg of human genomic DNA in Southerns. The entire detection process takes only 40 minutes, including typical exposure times of 10 minutes. The signal is long lasting and, therefore, multiple exposures can be taken to optimize signal intensity. Different sets of fragments can also be detected by stripping the membrane and rehybridizing with a different probe.
Millipore Corp., 80 Ashby Rd., Bedford, MA 01730.

Certain media are very weakly absorbing, and provide a different type of formula.

$$n \approx 1 + \tfrac{1}{2}\chi'$$

$$\alpha \approx -k_0\chi'' \qquad \textit{Weakly Absorbative Medium}$$

The refractive index is related in a linear fashion to the real part of the susceptibility. The absorption coefficient, however, is proportional to the imaginary part. In an absorptive medium[RTF annotation: #33] P" is negative and " is positive. For an amplifying medium P" is positive and " is negative.

Absorption is very close to dispersion. These are similar factors of slightly different phenomena. A dispersive material, having a wavelength-appended refractive index, must also be absorptive. The absorption coefficient will be dependent on the wavelength.

This relationship between absorption and refractive index will have an underlying connection between the real and imaginary parts of the susceptibility. This develops in

$$\chi'(\nu) = \frac{2}{\pi}\int_0^\infty \frac{s\chi''(s)}{s^2 - \nu^2}\,ds$$

$$\chi''(\nu) = \frac{2}{\pi}\int_0^\infty \frac{\nu\chi'(s)}{\nu^2 - s^2} \qquad \textit{Kramers-Kronig Relations}$$

This allows us to understand the real and imaginary components of the susceptibility.

As we study the resonant medium we can find a dielectric medium for which a dynamic relationship between the polarization density and the electric field can be described by the linear second-order differential equation.

$$\frac{d^2}{dt^2} + \sigma\frac{d}{dt} + \omega_0^2 + \omega_0^2 + \omega_0^2 e_0 \chi_0 \mathcal{E}$$

Resonant Dielectric Medium

Since the refractive index is the square root of the dielectric constant, we can see the definite relation of the static component of electromagnetic radiation. This will result in an electromagnetic static matrix with three virtual or scalar components. This can then be expanded to a 12-by-12 matrix, as in biology (see *Bio-Quantum Matrix*). This relation arises in the motion of the bound charge of the medium.

$$\frac{d^2x}{dt^2} + \sigma\frac{dx}{dt} + \omega_0^2 x + \frac{\mathcal{F}}{m}$$

m is the mass of the bound charge, T0 is its resonant angular frequency, 6 is the elastic constant, and F is the damping coefficient. The force is ö = *e*õ and the polarization density is [RTF annotation: script P] = N*ex* where *e* is the electron charge and *N* is the number of charges per unit volume. [RTF annotation: script P] and õ are proportional to *x* and ö.

In the harmonic monochromatic field the dielectric medium allows us to present

$$(-\omega^2 + j\sigma\omega + \omega_0^2)\,P + \omega_0^2\omega_0\chi_0 E$$

This allows us to then develop an expression for the frequency-dependent susceptibility.

$$\chi(\nu) + \chi_0\frac{\nu_0^2}{\nu_0^2 - \nu^2 + j\nu\Delta\nu}$$

Susceptibility of a Resonant Medium

Finally in calculating the real and imaginary or virtual parts, we come to

$$\chi'(\nu) + \chi_0\frac{\nu_0^2(\nu_0^2 - \nu^2)}{(\nu_0^2 - \nu^2)^2 + (\nu\Delta\nu)^2}$$

$$\chi''(\nu) + -\chi_0\frac{\nu_0^2\nu\Delta\nu}{(\nu_0^2 - \nu^2)^2 + \nu\Delta\nu)^2}$$

Finally our imaginary or virtual part obtains

$$\chi(\nu) + \chi_0\frac{\nu_0/2}{(\nu_0 - \nu) + j\Delta\nu/2}$$

and allows us to conclude

$$\chi''(\nu) + -\chi_0\frac{\nu_0\Delta\nu}{4}\;\frac{1}{(\nu_0 - \nu)^2 + (\Delta\nu/2)^2}$$

$$\chi'(\nu) + 2\frac{\nu - \nu_0}{\Delta\nu}\chi''(\nu)$$

Susceptibility Near Resonance

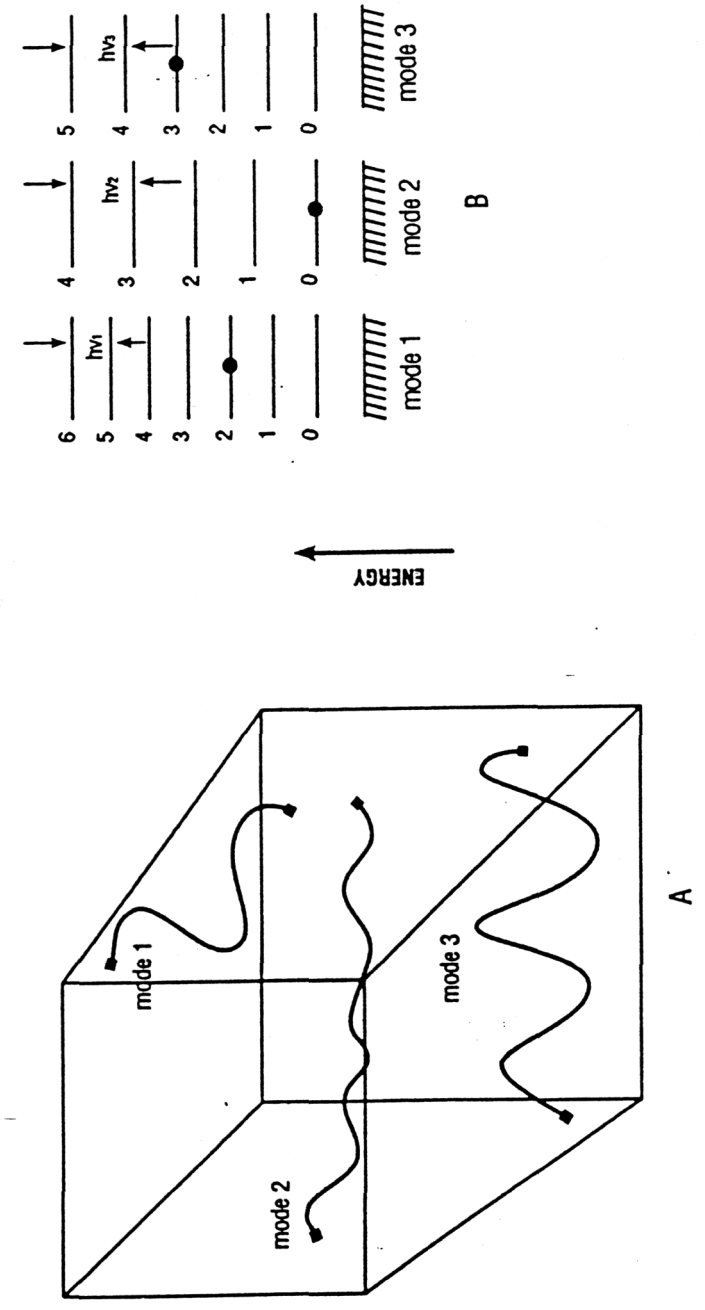
Thus our maneuvering has allowed us to uncover some of the relations of an electromagnetic optic system. These six dimensions of light, three real and three virtual, have profound effects on biology. This leads to the concept of light in medicine for diagnosis or treatment.

Quantum Optics.

Now let us look at *quantum optics*, involving the quantum elements of the photon.

For years, there were still phenomena that could not be explained by electromagnetic optics, until quantum optics offered some possible explanations. The development of the theory of *quantum electrodynamics* allowed for the existence of this quantum optics. *Quanta* meant quantity, and Max Planck proposed that there was a packet of energy known as the *photon*, one quanta.

We outlined some of the information necessary to understand quantum theory in *Quantum Biology* and in *Bio-Quantum Matrix*. Today quantum electrodynamics (QED) is accepted as a useful theory to explain almost all optical phenomena.



3 MODES OF DIFFERENT FREQUENCES AND DIRECTIONS IN A CUBIC RESONATOR

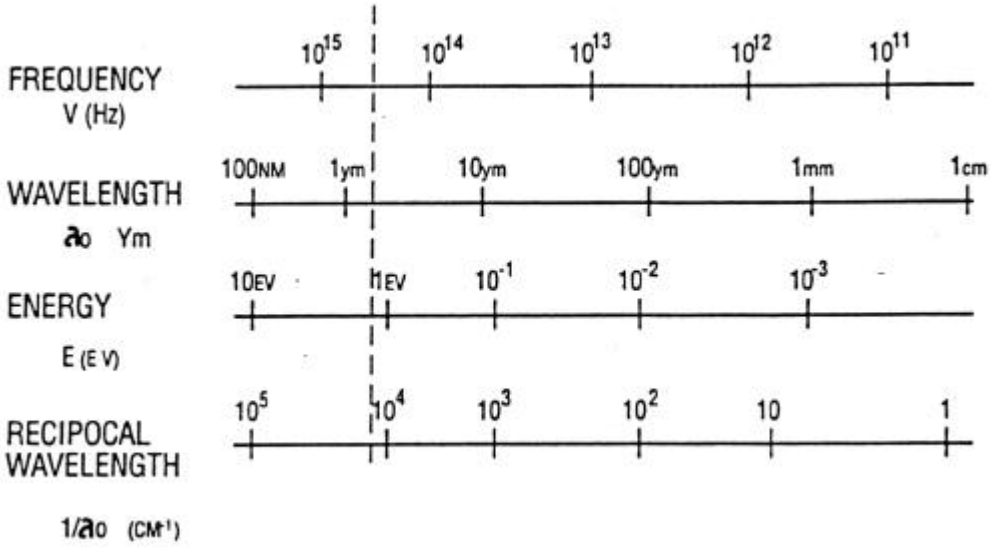
In our QED electric and magnetic fields are operators in a vector space. The photon is a particle that participates in a wave; apparently having zero mass, electromagnetic components, angular momentum, linear momentum, and other quantum dynamics.

In trying to understand black-body radiation Max Planck proposed the idea of quantum theory, and named this packet the *photon*. One principle of quantum dynamics is that we are not sure of all the values of position, time, energy, or momentum; nor can we be absolutely sure of the number of photons in a stream.

Light in a resonator is comprised of a set of modes containing several identical photons. Characteristics of the mode such as its frequency, spatial distribution, direction of propagation, and polarization can be assigned to the photon. The energy of the photon can be displayed as a function of frequency.

$$E = h\nu = \hbar\omega$$

S (Planck's constant) is 6.63 x 10^{-34}, and helps us to relate our idea of the quantum packet.

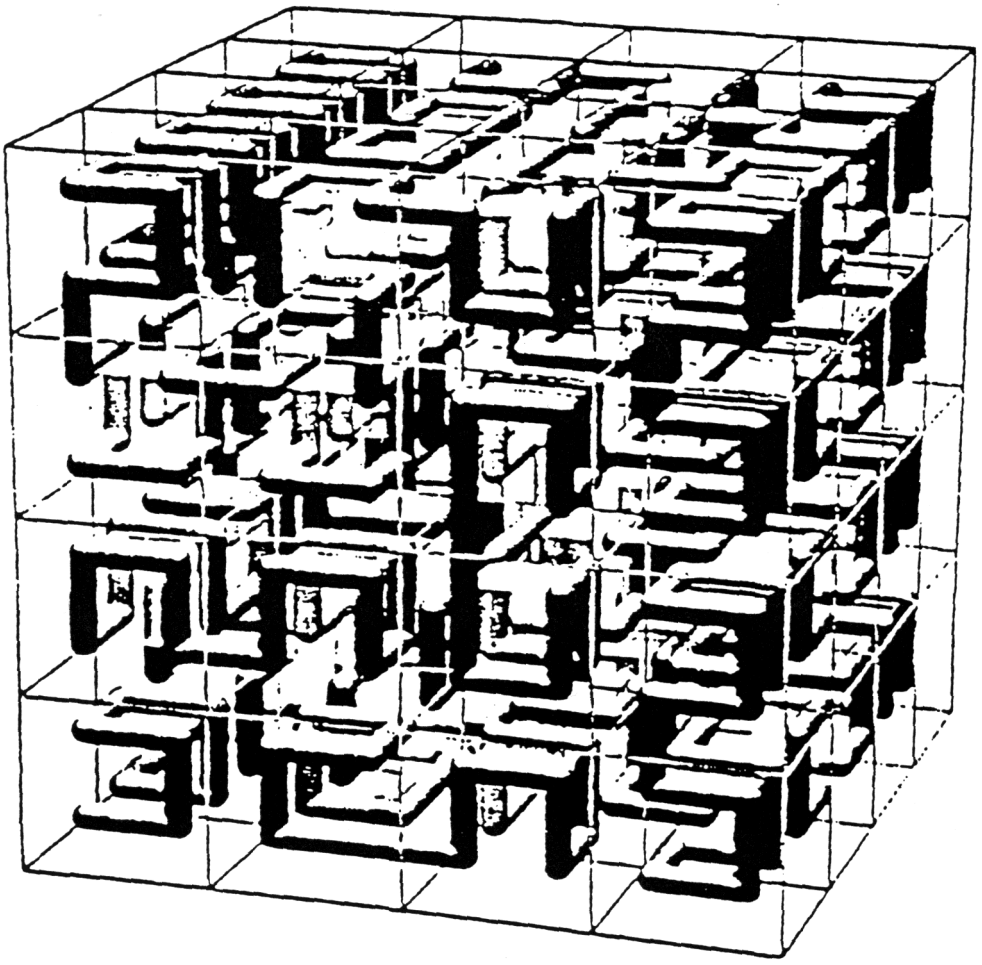


The higher the frequency the more energy carried by the photon. Here the particle nature of the theory helps to tell us about the energy. In our quantum theory we are not sure whether the light is a wave or a particle, or both at any given point in time. The probability of our observing a photon or knowing exactly where it is has to be stated as just that; probability determinations.

The probability *p*(r) *d*A of observing a photon at a point r within an incremental area *d*A, at any time, is proportional to the local optical intensity *I*(r) " *U(r)*2,

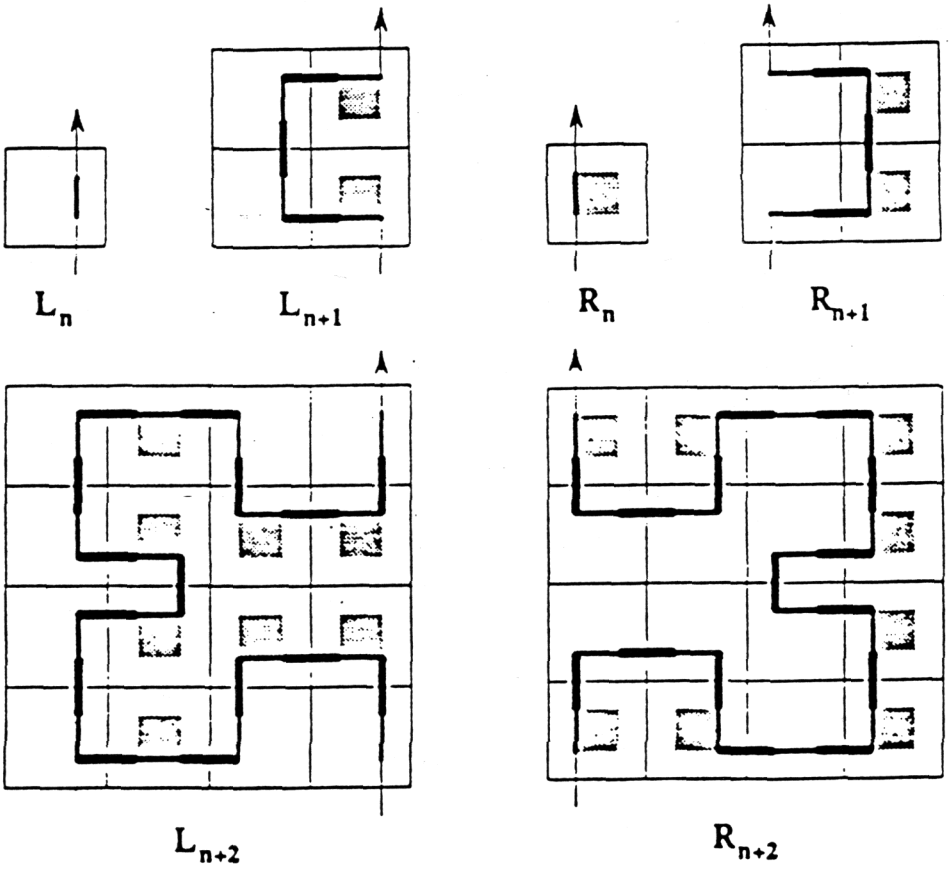
$$p(r)dA \propto I(r)dA \qquad \textit{Photon Position}$$

A photon's momentum is tied to the wavevector of its associated wavefunction by the following rule.



n=2, δ=90°
A
A → B-F+CFC+F-D&F∧D-F+&&CFC+F+B//
B → A&F∧CFB∧F∧D∧∧-F-D∧|F∧B|FC∧F∧A//
C → |D∧|F∧B-F+C∧F∧A&&FA&F∧C+F+B∧F∧D//
D → |CFB-F+B|FA&F∧A&&FB-F+B|FC//

A three-dimensional extension of the Hilbert curve [139]. Colors represent three-dimensional "frames" associated with symbols A (red), B (blue), C (green) and D (yellow).



Recursive construction of the Hilbert curve in terms of node replacement

A photon in a mode described by the plane wave

$$E(r,t) = A\exp(-jk \cdot r)\exp(j2\pi\nu t)\hat{e}$$

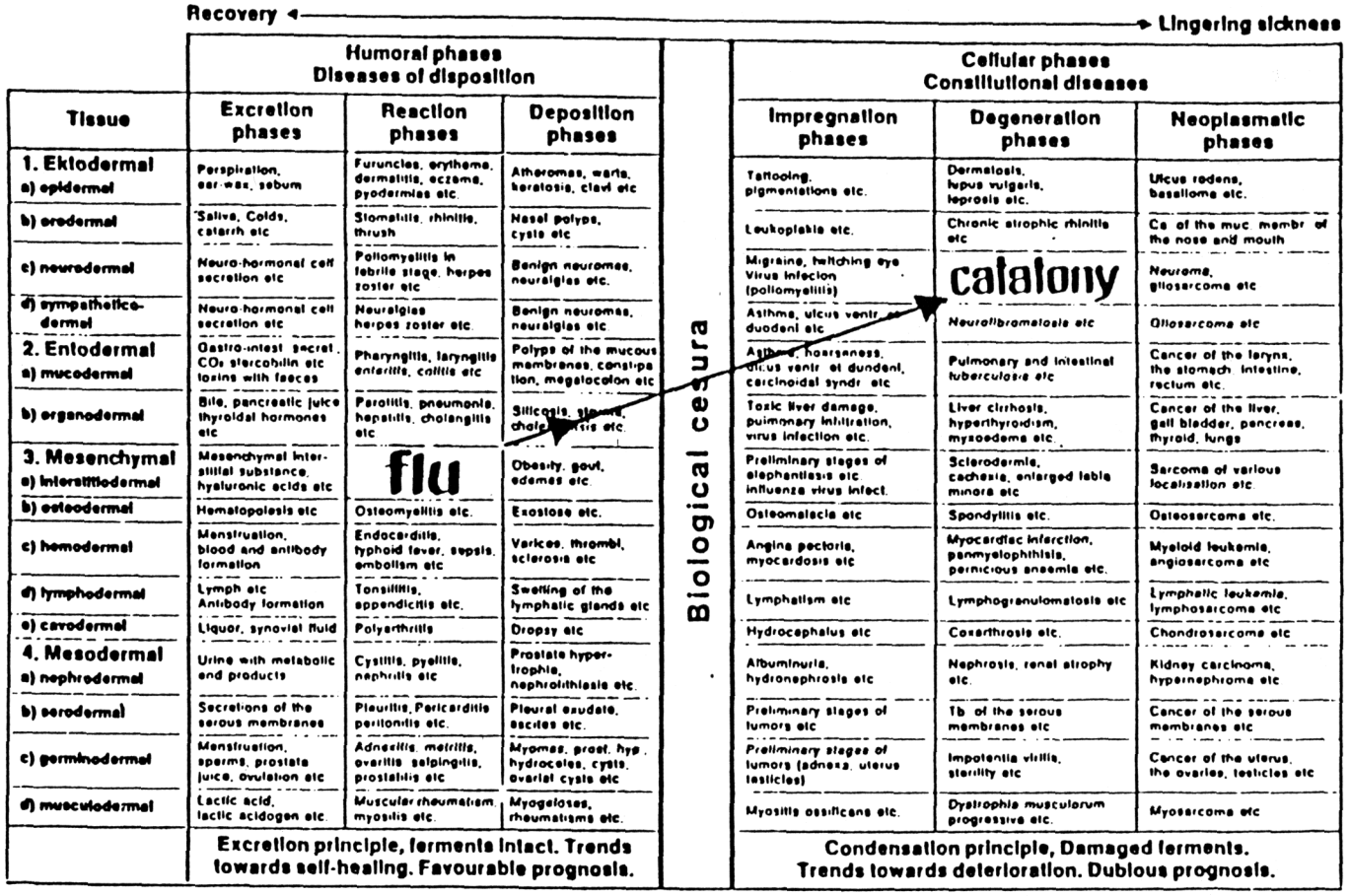
has a momentum vector

$$p = \hbar k$$

The photon travels in the direction of the wavevector and the magnitude of the momentum is $p = S = S2B/8$, i.e.,

$$p = \frac{h}{\lambda}$$

In our study of electromagnetic optics we found the same energy momentum energy relationship for a plane wave, where *p* was the momentum content of the unit of a cell. Of course, the concept of the photon did not exist thoroughly in the electromagnetic optics, since we were dealing with waveforms. Here we are able to deepen our understanding by finding the factors of the Planck's constant in our photon optics.



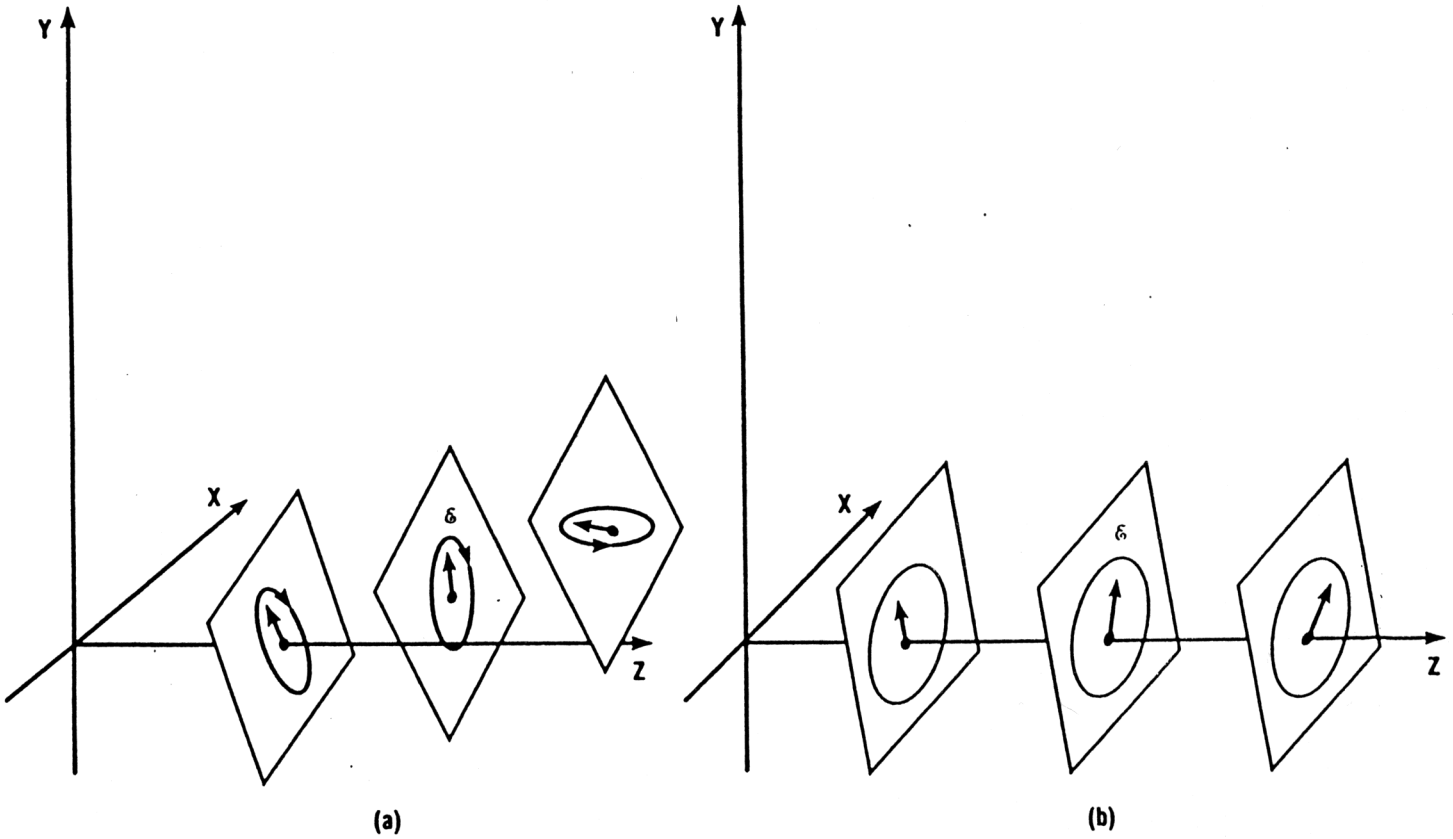
. Catatony, much improved after and during biological homeopathic treatment, deteriorated severely after allopathic treatment of intercurrent flu fever with pyrazdones and salizylates

Recovery ◄ ——— ► Lingering sickness

Tissue	Humoral phases — Diseases of disposition: Excretion phases	Reaction phases	Deposition phases	Biological cesura	Cellular phases — Constitutional diseases: Impregnation phases	Degeneration phases	Neoplasmatic phases
1. Ektodermal							
a) epidermal	Perspiration, ear wax, sebum	Furuncles, erythema, dermatitis, eczema, pyodermias etc	Atheromas, warts, keratosis, clavi etc.		Tattooing, pigmentations etc.	Dermatosis, lupus vulgaris, leprosis etc.	Ulcus rodens, basalioma etc.
b) orodermal	Saliva, Colds, catarrh etc	Stomatitis, rhinitis, thrush	Nasal polyps, cysts etc		Leukoplakia etc.	Chronic atrophic rhinitis etc	Ca. of the muc. membr. of the nose and mouth
c) neurodermal	Neuro-hormonal cell secretion etc	Poliomyelitis in febrile stage, herpes zoster etc	Benign neuromas, neuralgias etc		Migraine, twitching eye Virus infection (poliomyelitis)	Paresis, sclerosis, atrophy of optical nerve, syringom etc.	Neuroma, gliosarcoma etc.
d) sympathetico-dermal	Neuro-hormonal cell secretion etc	Neuralgias, herpes zoster etc	Benign neuromas, neuralgias etc.		Asthma, ulcus ventr et duodeni etc	Neurofibromatosis etc	Gliosarcoma etc.
2. Entodermal							
a) mucodermal	Gastro-intest secret., CO_2 stercobilin etc toxins with faeces	Pharyngitis, laryngitis enteritis, colitis etc	Polyps of the mucous membranes, constipation, megalocolon etc		Asthma, hoarseness, ulcus ventr et duodeni, carcinoidal syndr etc	Pulmonary and intestinal tuberculosis etc	Cancer of the larynx, the stomach, intestine, rectum etc.
b) organodermal	Bile, pancreatic juice thyroidal hormones etc.	Parotitis pneumonia hepatitis, cholangitis etc	Silicosis, struma, cholelithiasis etc.		Toxic liver damage, pulmonary infiltration, virus infection etc.	Liver cirrhosis, hyperthyroidism, myxoedema etc.	Cancer of the liver, gall bladder, pancreas, thyroid, lungs
3. Mesenchymal							
a) interstitiodermal	Mesenchymal interstitial substance, hyaluronic acids etc	Abscess, phlegmone, carbuncles etc	Obesity, gout, edemas etc		Preliminary stages of elephantiasis etc influenza virus infect	Sclerodermia, cachexia, enlarged labia minora etc	Sarcoma of various localisation etc.
b) osteodermal	Hemetopoiesis etc	Osteomyelitis etc	Exostose etc		Osteomalacia etc.	Spondylitis etc.	Osteosarcoma etc.
c) hemodermal	Menstruation, blood and antibody formation	phlebilis	Varices, thrombi, [illegible] etc.		Angina pectoris, myocardosis etc.	Myocardiac infarction, panmyelophthisis, pernicious anaemia etc	Myeloid leukemia, angiosarcoma etc
d) lymphodermal	Lymph etc Antibody formation	Tonsilitis, appendicitis etc.	Swelling of the lymphatic glands etc		Lymphatism etc.	Lymphogranulomatosis etc	Lymphatic leukemia, lymphosarcoma etc.
e) cavodermal	Liquor, synovial fluid	Polyarthritis	Dropsy etc.		Hydrocephalus etc	Coxarthrosis etc.	Chondrosarcoma etc.
4. Mesodermal							
a) nephrodermal	Urine with metabolic end products	Cystitis, pyelitis, nephritis etc	Prostate hypertrophia, nephrolithiasis etc.		Albuminuria, hydronephrosis etc.	Nephrosis, renal atrophy etc	Kidney carcinoma, hypernephroma etc.
b) serodermal	Secretions of the serous membranes	Pleuritis, Pericarditis, peritonitis etc	Pleural exudate, ascites etc.		Preliminary stages of tumors etc.	Tb. of the serous membranes etc.	Cancer of the serous membranes etc.
c) germinodermal	Menstruation, sperms, prostate juice, ovulation etc.	Adnexitis, metritis, ovaritis, salpingitis, prostatitis etc.	Myomas, prost. hyp., hydroceles, cysts, ovarial cysts etc.		Preliminary stages of tumors (adnexa, uterus testicles)	Impotentia virilis, sterility etc.	Ca. uteri
d) musculodermal	Lactic acid, lactic acidogen etc	Muscular rheumatism, myositis etc	Myogeloses, rheumatisms etc.		Myositis ossificans etc	Dystrophia musculorum progressiva etc.	Myosarcoma etc.
	Excretion principle, ferments intact. Trends towards self-healing. Favourable prognosis.				Condensation principle, Damaged ferments. Trends towards deterioration. Dubious prognosis.		

Plebitis like simultaneous compensation phase of cancer uteri

TIME COURSE OF THE ELECTRO FIELD VECTOR AT SEVERAL POSITIONS

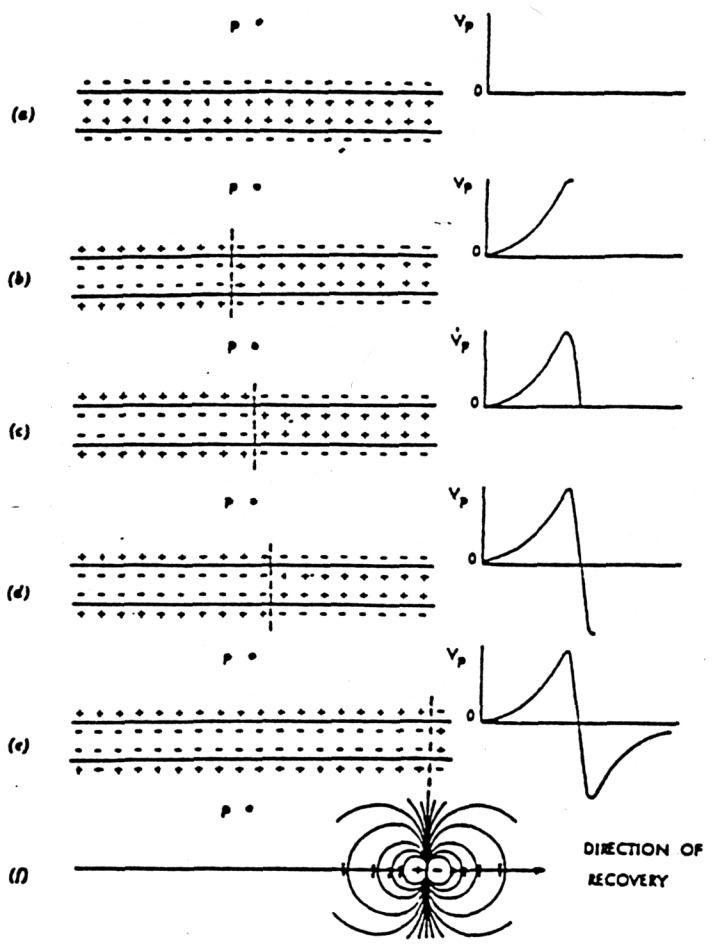


(a)

ARBITRARY WAVE

(b)

PARAXIAL WAVE
PLANE WAVE TRAVELING IN *Z* VECTOR



In calculating the momentum of the localized wave we can use some of the following data.

The momentum of a photon described by an arbitrary complex wavefunction $AU(r)\exp(j2B<t)$ is uncertain. It has the value

$$p = \hbar k,$$

with probability proportional to $*A(k)*^2$, where $A(k)$ is the amplitude of the plane-wave Fourier component of $U(r)$ with wavevector k.

Photons also possess angular momentum, known as *spin*. The magnitude of photon spin can be revealed in

$$S = \pm\hbar \qquad \textit{Photon Spin}$$

There is right- or left-handedness of the polarized photon, as we analyze their spin and momentum vectors.

6 PHOTON SPIN VECTORS

	REAL	VIRTUAL
ELECTRO	**X AXIS**	**Xi AXIS**
MAGNETIC	**Y AXIS**	**Yi AXIS**
STATIC	**Y AXIS**	**Zi AXIS**

The probability of observing a photon at a certain time also comes into our equation.

The probability of observing a photon at a point r within the incremental area *d*A, and during the incremental time interval *dt* following time *t*, is proportional to the intensity of the mode at r and *t*, i.e.,

$$P(r,t)\,dA\,dt \propto I(r,t)\,dA\,dt \propto |U(r,t)|^2\,dA\,dt$$

Photon Position and Time

Time and energy are also related in an uncertainty position. The time during which a photon in a one-color mode of frequency may be detected is uncertain, whereas the frequency is absolutely certain. Thus if we know the energy, we cannot know the time. If we know the time, we cannot know the energy. These are part of the limitations of our quantic system; not being able to understand completely or know any dynamics.

The bound photon time in this way engenders an uncertainty of the photon's frequency. This can result in a Fourier transform, allowing us to calculate the frequent uncertainty in the Fourier expansion of its harmonic components.

$$U(t) = \int_{-\infty}^{\infty} V(\nu) \exp(j2\pi\nu t)\,d\nu$$

If the energy and time are uncertain, then we can get to the time and energy uncertainty proposition.

$$\sigma_E \sigma_t \geq \frac{\hbar}{2}$$

Time-Energy Uncertainty

Electromagnetic radiation may be described as a sum of modes, e.g., monochromatic uniform plane waves of the form

$$E(r,t) = \sum_q A_q \exp(jk_q \cdot r) \exp(j2\pi\nu_q t)\,\hat{e}_q$$

Each plane wave has two orthogonal polarization states (e.g., vertical/horizontal-linearly polarized, right/left-circularly polarized, etc.) represented by the vectors q. When the energy of a mode is measured, the result is an integer (in general, random) number of energy quanta (photons). Each photon associated with the mode q has the following properties:

- Energy E = h_q.
- Momentum p = Sk.
- Spin *S* = ± S, if it is circularly polarized.
- The photon is equally likely to be found anywhere in space, and at any time, since the wavefunction of the mode is a monochromatic plane wave.

The choice of modes is not unique. A modal expansion in terms of nonmonochromatic (quasimonochromatic), nonplanar waves,

$$E(r,t) = \sum_q A_q U_q(r,t)\,\hat{e}_q$$

is also possible. The photons associated with the mode q then have the following properties:

- Photon position and time are governed by the complex wavefunction *U*q(r,*t*). The probability of detecting a photon in the incremental time between *t* and *t* + *dt*, in an incremental area *d*A at position r, is proportional to $*U$q(r,*t*)$*^2 d$A *dt*.
- If *U*q(r,*t*) has a finite time duration Ft, i.e., if the photon is localized in time, then the photon energy *h*<q has an uncertainty *h*F< $ *h*/4BF$_t$.

- If $U_q(r,t)$ has a finite spatial extent in the transverse ($z = 0$) plane, i.e., if the photon is localized in the x direction, for example, then the direction of photon momentum is uncertain. The spread in photon momentum can be determined by analyzing $U_q(r,t)$ as a sum of plane waves, the wave with wavevector k corresponding to photon momentum $\hbar k$. Localization of the photon in the transverse plane results in a spread of the uncertainty of the photon-momentum direction.

In the real world we deal mostly with photon streams. This allows us to deal with a large number of photons. Our photon detector allows us to see when photons hit, on the oscilloscope. The spatial patterns of these photons is manifested by using the detector, which integrates over a fixed exposure time. A list of some of the mean photon flux densities is given.

Mean Photon-Flux Density for Several Light Sources

Source	Mean Photon Flux Density (photons/s-cm^2)
Starlight	10^6
Moonlight	10^8
Twilight	10^{10}
Indoor light	10^{12}
Sunlight	10^{14}
Laser light (10-mW He-Ne laser beam at λ_0 = 633 nm focused to a 20-μm-diameter spot)	10^{22}
Strong mitogenic radiation	10^3
Weak mitogenic radiation	10^1
W. B. C. chemiluminescence	10^4

In a monochromatic light of frequency and intensity we can calculate the photon-flux density with

$$\phi(r) = \frac{I(r)}{h\nu} \qquad \text{Mean Photon-Flux Density}$$

In classical terms we have

$$\phi(r) = \frac{I(r)}{h\bar{\nu}}$$

To calculate the mean photon-flux over a specific area we can use

$$\Phi = \int_A \phi(r)\,dA = \frac{P}{h\bar{\nu}} \qquad \text{Mean Photon Flux}$$

The average energy of the photon is

$$P = \int_A I(r)\,dA$$

The mean number of photons over an area A and time interval *T* is

$$\bar{n} = \Phi T = \frac{T}{h\bar{\nu}}$$

In this formula $E = PT$ is the optical energy, listed in joules.

Classical		Quantum
Optical intensity	*I*(r)	Photon-flux density $N(r) = \frac{I(r)}{h\bar{V}}$
Optical power	P	$h\bar{V}$
Optical energy	E	Photon flux $M = \frac{P}{h\bar{V}}$
		Photon number $= \frac{E}{h\bar{V}}$ $\bar{n}$

Thus we can see from the above formulas some variant ways to calculate the quantum dynamics of our photon. In polychromatic light we can see that there are some quantum counterparts as well.

Classical	Quantum
$I_<$(W/cm2-Hz)	$N_< = \frac{I_<}{h_<}$ (photons/s-cm^2-Hz)
$P_<$(W/Hz)	$M_< = \frac{P_<}{h_<}$ (photons/s—Hz)
$E_<$(J/Hz)	$\bar{n}_< = \frac{E_<}{h_<}$ (photons/Hz))

Bio-Quantum Optics.

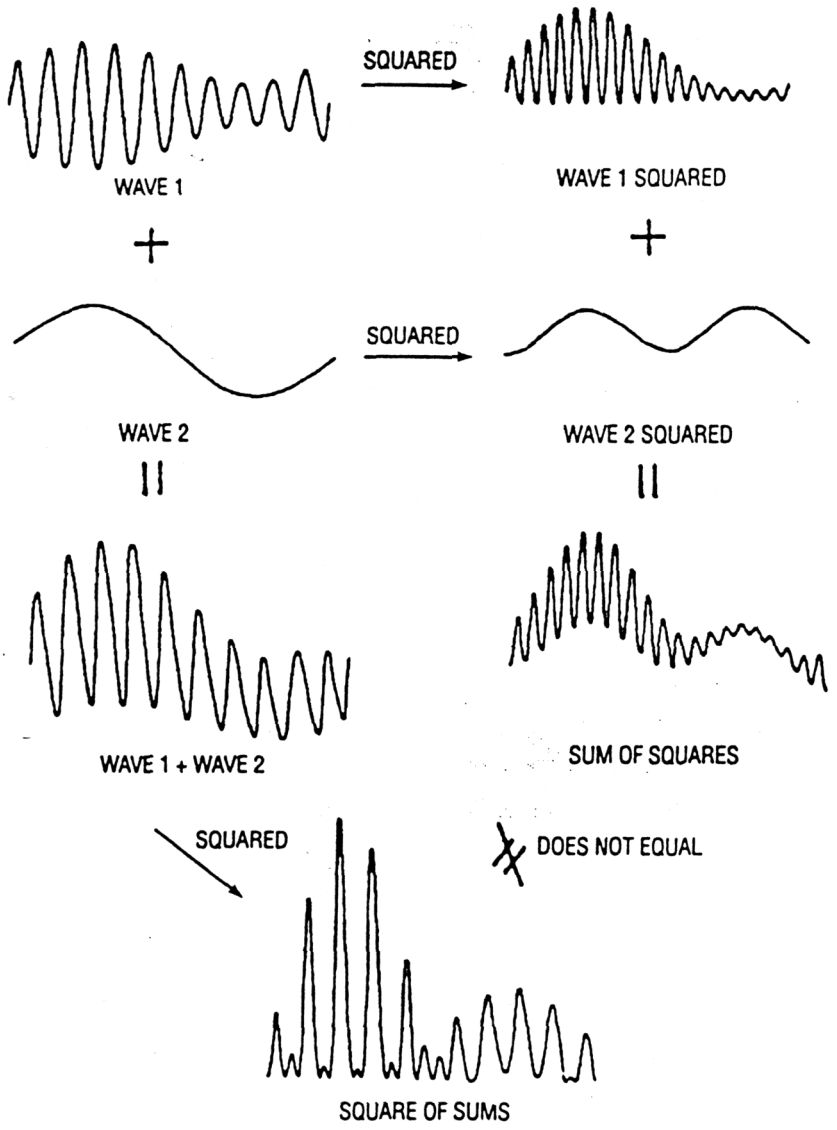
In order to fulfill our definition of optical systems, we now must go beyond even the quantum system into a bio-quantum system, where we can see that the biophoton generates from virtual dimensions, subspace and thus must have a new system of understanding. First, in our analysis of bio-quantum optics, we must look at the signal-to-noise ration that can be generated by a living system. In our study of mitogenic radiation in *Quantum Biology* we can see definite proof of the bio-quantum dramatic effect in biology.

There are aberrant waveforms from room temperature or from any type of system above 0E K. This type of thermal photon must be counteracted, as the biological system must take information from the mitogenic photon, sort it out from the thermal background noise, and thus utilize the information contained on this ray optical system. The first part of our analysis will deal with signal-to-noise ratio.

TABLE OF ELEMENTS BY SINGLE COLOR PREDOMINANCE

RED			
Cadmium	Hydrogen	Krypton	Neon
ORANGE			
Aluminum	Antimony	Arsenic	Boron
Calcium	Copper	Helium	Selenium
Silicon	Xenon		
YELLOW			
Beryllium	Carbon	Iridium	Magnesium
Molybdenum	Osmium	Palladium	Platinum
Rhenium	Rhodium	Ruthenium	Sodium
Tin	Tungsten		
LEMON			
Cerium	Germanium	Gold	Hafnium
Iodine	Iron	Lanthanum	Neodymium
Phosphorus	Praseodymium	Protactinium	Samarium
Scandium	Silver	Sulphur	Thorium
Titanium	Uranium	Vanadium	Yttrium
Zirconium			
GREEN			
Barium	Chlorine	Nitrogen	Radium
Tellurium	Thallium		
TURQUOISE			
Chromium	Fluorine	Mercury	Nickel
Niobium	Tantalum	Zinc	
BLUE			
Cesium	Indium	Oxygen	
INDIGO			
Bismuth	Ionium	Lead	Polonium
VIOLET			
Actinium	Cobalt	Gallium	Radon
PURPLE			
Bromine	Europium	Gadolinium	Terbium
MAGENTA			
Lithium	Potassium	Rubidium	Strontium
SCARLET			
Argon	Dysprosium	Erbium	Holmium
Lutecium	Manganese	Thulium	Ytterbium

* * * * *



In classical physics to find the probability for two independent events one simply adds the probability for each event. But according to the quantum theory and the superposition principle, one must first add the wave amplitudes for independent events— like an electron going through different holes— and then take the square to obtain the total probability. As this illustration shows, the result is quite different from what one expects from classical physics. The square of the sum is not equal to the sum of the squares. This is why quantum particles do not obey the usual, classical laws of physics and instead exhibit quantum weirdness.

$$\phi(r,t) = \frac{I(r,t)}{h\bar{\nu}}$$

The optical power and photon flux are also functions of time.

$$\Phi(t) = \int_A \phi(r,t)\,dA = \frac{P(t)}{h\bar{\nu}}$$

$$P(t) = \int_A I(r,t)\,dA$$

The mean number of photons can be calculated by

$$\bar{E} = \int_0^T \Phi(t)\,dt = \frac{E}{h\bar{\nu}}$$

where

$$E = \int_0^T P(t)\,dt = \int_0^T \int_A I(r,t)\,dA\,dt$$

The above formula tells us the optical energy integrated over time and area.

So as we can see the randomness in the number of photons, we can now intuit that this is a fundamental source of noise. We can calculate signal to noise by calculating the ratio of control to entropy. This gives us

$$SNR = \frac{(\text{mean})^2}{\text{variance}} = \frac{\bar{n}^2}{\sigma_n^2}$$

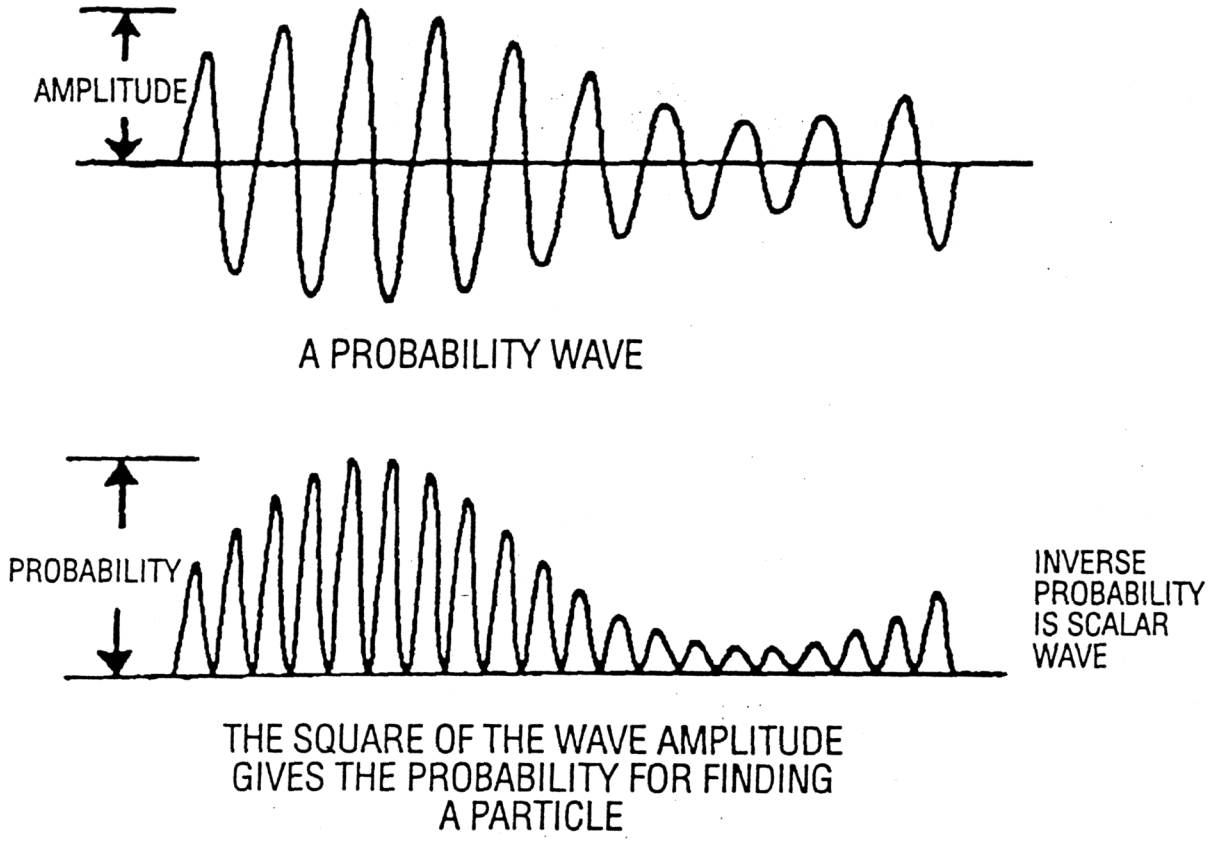
and the Poisson distribution gives us

$$SNR = \bar{n} \qquad \begin{matrix} \textit{Poisson Photon Number} \\ \textit{Signal-to-Noise Ratio} \end{matrix}$$

Now as we proceed into *thermal light*, into the infrared category, we can see an optical resonator whose walls are maintained at temperature T of a certain temperature Kelvin, so that the photons are emitted into the modes of the resonator. This obeys the standards of the Stefan-Boltzmann law discussed in the *Bio-Quantum Matrix* book, and relates the Boltzmann distribution.

$$P(E_n) \propto \exp\left(-\frac{E_n}{k_B T}\right)$$

Here k_B is the Boltzmann constant, 1.38 x 10^{-23} J/K.



According to Max Born's statistical interpretation of the de Broglie-Schrödinger wave, the height or amplitude of the wave when squared gives the probability for finding the particle at that position. All quantum theory could do was to predict the wave shape and hence the probability that a quantum particle would have certain properties; it could not predict with certainty the outcome of single measurements of those properties, as did the old classical physics.

Biological systems exceed this formula because of the bio-quantum optic system. Biology needs information transfer to fight for survival in a random, thermodynamic world. This fight against entropy would not be possible without biophoton-carrying information.

The probability of finding n number of photons in a single mode of a resonator in thermal equilibrium is given by

$$p(n) \propto \exp\left(-\frac{nh\nu}{k_B T}\right) \cdot \left[\exp\left(-\frac{h\nu}{k_B T}\right)\right]^n, \qquad n = 0, 1, 2, \ldots$$

Finally, we can find an expression for *n* in

$$p(n) = \frac{1}{\bar{n} + 1}\left(\frac{\bar{n}}{\bar{n} + 1}\right)^n \qquad \textit{Bose-Einstein Distribution}$$

This leads to the conclusion

$$\bar{n} = \frac{1}{\exp(h\nu/k_B T) - 1}$$

Using the photon number variance, we achieve

$$\sigma_n^2 = \bar{n} + \bar{n}^2 \qquad \textit{Bose-Einstein Variance}$$

and a signal-to-noise ratio in the Bose-Einstein distribution, which is

$$SNR = \frac{\bar{n}}{\bar{n} + 1}$$

Another calculation of the signal-to-noise ratio can be used in *coherent light* versus *thermal light*, which is probably a better detection system for our mitogenic radiation. This is shown in

$$\mathcal{F}_n \qquad \textit{Coherent light}$$

$$SNR = \frac{\mathcal{F}_n}{\mathcal{F}_n + 1} \qquad \textit{Thermal light}$$

In our quantum system of light we see that position, momentum, number of photons and electromagnetic mode are often random quantities. In our quantum system through indeterminacy we can find that in certain biological systems, what appears to be random might not be random at all.

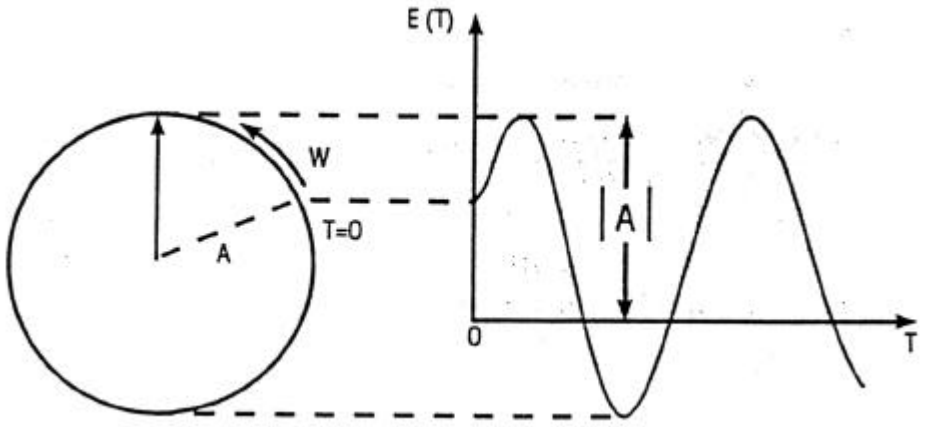
If we look at the plane wave monochromatic electromagnetic mode in a volume *V*, we can see that the electric field tells us that

$$E(r, t) = A \exp(-jk \cdot r) \exp(j2\pi\nu t)\,\epsilon$$

In classical electromagnetic optics the energy of the mode is fixed. But here the electric field may be written as

$$E(r, t) = \left(\frac{2h\nu}{\epsilon V}\right)^{1/2} a \exp(-jk \cdot r) \exp(j2\pi\nu t)\,\epsilon$$

Now let's analyze the quantum theory of our harmonic oscillator. A particle of mass *m*, position *x*, momentum *p* and potential energy *V*(*x*) = ½6*x*2, where 6 is the elastic constant, is a harmonic oscillator of total energy ½*p*2/*m* + ½6*x*2.



The real and imaginary parts of the variable N exp (*j*2B<*t*), which governs the complex amplitude of a classical electromagnetic field of frequency. Angular frequency = *w* = 2B<.

The Schrödinger equation

$$-\frac{\hbar^2}{2m}\frac{d^2\psi}{dx^2} + V(x)\psi(x) = E\psi(x)$$

can now tell us more about this harmonic oscillator. *E* is the particle energy. For the harmonic oscillator the solutions of the Schrödinger equation will produce discrete values given by

$$E_n = (n + \tfrac{1}{2})h\nu, \quad n = 0, 1, 2, \ldots$$

We can see that the energy states of the quantum energy are reflected by Planck's constant, and are normalized in the Hermite-Gaussian function.

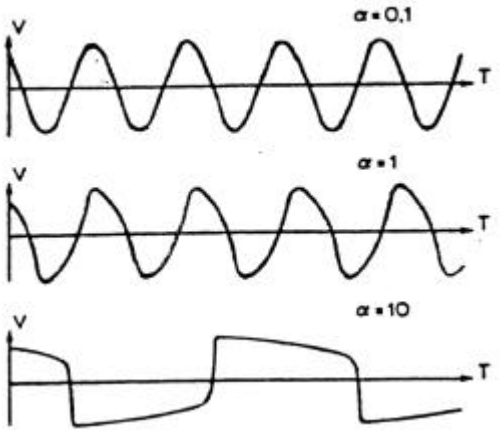
$$\psi_n(x) = (2^n n!)^{-1/2}\left(\frac{2m\omega}{h}\right)^{1/2} H_n\left[\left(\frac{m\omega}{\hbar}\right)^{1/2} x\right]\exp\left(-\frac{m\omega x^2}{2\hbar}\right)$$

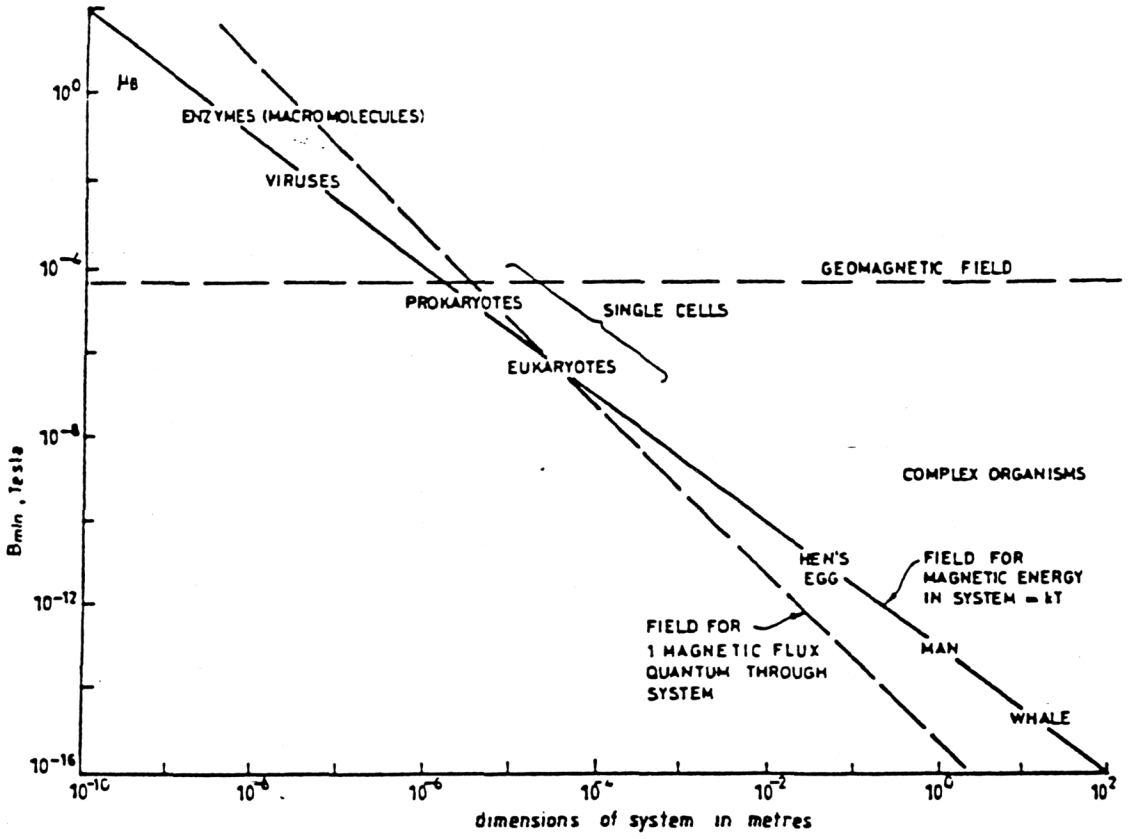
Here *H*n(*x*) is the Hermite polynomial of the order *n*.

Physical measurements on mitogenetic radiation and ultraweak photon emission

Year	Method/Equipment	Background [cps]	Sensitivity [counts/photon]
1930	counter tube, Ka	0.1	$1.4 \cdot 10^{-4}$
1931	counter tube, Cd	0.3-0.6	10^{-3}
1931	counter tube, Al	–	$5 \cdot 10^{-4}$
1932	photoelectric eff.	–	–
1934	counter tube, Zn	0.5	$4 \cdot 10^{-3}$
1935	counter tube, Cd	0.2	$1.4 \cdot 10^{-4}$
1935	photoelectric eff.	–	–
1935	photoelectric eff.	–	–
1937	counter tube, Cd	0.5	10^{-2}
1937	photoelectric eff.	–	–
1937	photoelectric eff.	–	–
1938	counter tube, Al	0.5-1.0	10^{-6}
1954	PM, EMI 6260 RCA 5819	20	0.17
1955	PM, EMI 6260 RCA 5819	130	–
1957	counter tube, Au	0.2-0.3	–
1963	PM, FEU 18	0.7-0.8	–
1964	PM, analogue signal	–	–
1965	PM, FEU 42	25-30	–
1965	PM, FEU 42	23	–
1966	PM, FEU 18A	0.4-0.8	$2 \cdot 10^{-3}$
1966	PM, FEU 42	17	–
1967	PM, FEU R3	0.4-1.0	–
1968	PM, analogue signal	–	–
1968	PM, FEU 42	4.5	–
1969	PM, FEU 42	30	–
1969	PM, FEU 42B	–	–
1969	PM	–	$6 \cdot 10^{-3}$
1972	PM, FEU 18A	0.3-0.6	$8.5 \cdot 10^{-3}$
1976	PM, EMI 9558QB	40	0.15

Limit of Detection [photons/s · cm²]	Biological Object	Intensity [photons/s · cm² or cps]	Wavelength [nm]	Significance percent	Reference	Comment
1800	yeast	< 120	–	no proof	35	–
12	onion roots, carcinoma	13-130	UV	99.9	31	–
–	frog heart, frog muscle	400-2000	220	–	14	–
–	allium cepa	< 10	230-340	no proof	38	–
–	yeast	< 300	–	no proof	22	–
13	onion roots, blood	–	–	no proof	44	–
–	excited nerve	10^3-10^4	230-240	–	6	–
–	discoglossus eggs	10^2-10^3	200-250	–	24	–
–	roots and germs of helianthus, peas and beans	3-10	240-270	99.9	15	filters
–	bacteria	< 500	≈ 230	no proof	20	–
–	tumors	10-100	190-230	–	26	–
12-1200	frog nerve	10^3-10^4	230-240	99.9	5	–
	frog spawn	10^3-10^5	200-250		11	
–	wheat seedlings	55 cps	450-650	–		–
	lentil seedlings	110 cps			12	
	corn seedlings	170 cps				
–	wheat seedlings	680 cps	390-600	–		filters
	lentil seedlings	370 cps			8	
	beans seedlings	630 cps				
10	culture of fibroblasts	0.05 cps	195-210	99.9		–
–	barley roots	1.5-2.5 cps	500	–	46	filters
10^3	yeast	–	–	no proof	42	–
–	wheat seedlings	60 cps	–	–	2	–
–	grain seedlings	15-20 cps	–	–	1	–
–	yeast	0.5 cps	250-380	99.9	21	filters
–	earthworm	2.5 cps	–	99	27	–
–	frog nerve	3-5 cps	–	99.9	4	–
–	frog muscle	effect present	–	–	40	–
–	frog muscle	1 cps	red	–	10	–
–	bean seedlings	100 cps	–	–	48	–
–	maize seedlings	10-20 cps	–	–	13	–
–	over 90 species	0-2000	370-650	> 95	25	–
–	mouse liver	0.1-0.2 cps	–	99.9	39	–
2	different species	6000	400-700	99.9	33	filters





Magnetic field B_{min} giving a magnetic energy equal to the thermal energy kT within a volume corresponding to that of a system having the dimensions shown on the abscissa.

In the arbitrary wavefunction expanded in the orthonormal eigenfunction we can find out that the behavior of the particle may be determined as follows:

- The probability $p(n)$ that the harmonic oscillator carries n quanta of energy is given by the coefficient $*cn*^2$.
- The probability density of finding the particle at the position x is given by $*R(x)*^2$.
- The probability density that the momentum of the particle is p is given by $*N(p)*^2$, where $N(p)$ is proportional to the inverse Fourier transform of $R(x)$ evaluated at the frequency p/h,

$$\phi(p) = \frac{1}{\sqrt{h}} \int_{-\infty}^{\infty} \psi(x) \exp\left(j2\pi \frac{p}{h} x \right) dx$$

If we Fourier transform the relationship, we can get an implication of the Heisenberg position-momentum uncertainty relation.

$$\frac{\sigma_x \sigma_p}{h} \geq \frac{1}{4\pi} \quad or \quad \sigma_x \sigma_p \geq \frac{h}{2}$$

As an analogue between the optical mode and the harmonic oscillator, we know that the energy of the electromagnetic mode can relate

$$x = (2h\nu)^{-1/2} \omega x \quad and \quad p = (2h\nu)^{-1/2} p$$

An electromagnetic mode of frequency < is described by a complex wavefunction $R(x)$ that governs the uncertainties of the quadrature components x and p and the statistics of the number of photons in the mode.

- The probability $p(n)$ that the mode contains n photons is given by $*cn*^2$, where the cn are coefficients of the expansion of R(x) in terms of the eigenfunctions $R_n(x)$,

$$\psi(x) = \sum_n c_n \psi_n(x)$$

- The probability densities of the quadrature components x and p are given by the function $*R(x)*^2$ and $*N(p)*^2$, where R(▯) and N(▯) are related by

$$\phi(p) = \frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} \psi(x) \exp(j2px) dx$$

- If R(x) is known, then N(p) may be calculated and the probability densities of x and p determined. The complex wavefunction R(x) therefore determines the uncertainties of the quadrature components of the complex amplitude.
- Uncertainty can be affected by biological systems via the Nelson effect. This accounts for bio-photon enhancement in apparently unconnected systems. The effect over uncertainty is related to consciousness. The effect is:

$$Nelson\ effect = effect\ on\ uncertainty = \sqrt{\frac{Consciousness}{Negative\ emotions}}$$

- Biological systems emit biophotons of an organized information field.
- Biological systems intake these biophotons as information for fighting against entropy and death.
- Emission rates of biophotons are directly proportional to intake sensitivity.
- All bio systems eventually lose to entropy, and die.

Voluntary control of bleeding. Jack Schwarz (a) is "wired" for psychophysiological recording in preparation for driving an unsterilized knitting needle through his biceps (b). The needle was buried about one half inch deep in the muscle (c). The first wounds released about one half cubic centimeter of blood when the needle was withdrawn from the arm (d). The blood, which was continuously being wiped up, appeared to stop in about one second when Jack said

it would cease (e). When asked if he would repeat the demonstration, now that bleeding control had been established, Jack obliged by driving the needle through the biceps again (f and g). No bleeding occurred this time, and no blood could be squeezed from the arm (h). Jack reported feeling mechanical pressure but no pain, and showed no particular signs of pain in heart rate, respiration, galvanic skin response, hand temperature, and brain-wave records.

. Room arrangements for the psychokinetic demonstration with Swami Rama.

Nobel Prize ceremony. King of Sweden with Heisenberg and Schrödinger.

In our quadrature uncertainty formula

$$\sigma_x \sigma_p \geq \tfrac{1}{2} \qquad \textit{Quadrature Uncertainty}$$

we see the that real and imaginary components of an electric field cannot be determined simultaneously with arbitrary precision.

The imaginary components can also be seen as virtual. As we have shown in our Feynman diagrams in *Quantum Biology*, virtual photons are coming off all systems. If the system is immersed in a thermal system of photons, such as in room temperature (see *Quantum Biology*), then these virtual photons can escape and be treated as real photons in their system. This virtual exchange allows the biological system to develop photons of a certain informational quality. We see that there is a heightened form of information that can be utilized in many states. For clinical analyses of these photons we direct the reader to *Quantum Biology*, where we see the inception of the biophoton and its generation point.

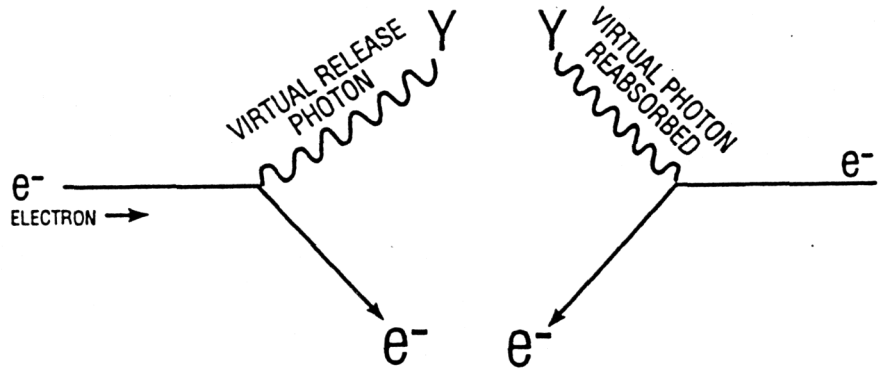
The mitogenic focused radiation carries information from one cell to another through the electromagnetic spectrum. In our analysis of this we found that the transmitted radiation falls between 10^{12} Hz. and 10^{16} Hz., which includes infrared, visible light, and a touch of the UV spectrum.

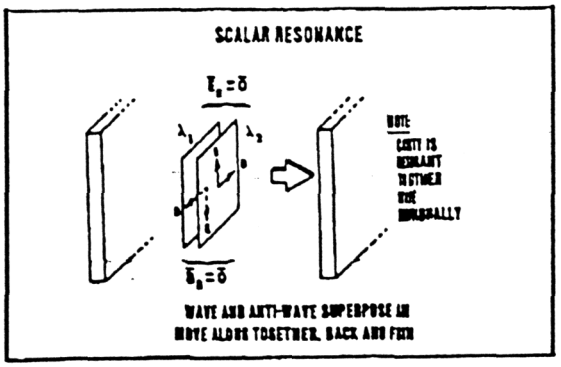
REAL PARTICLE

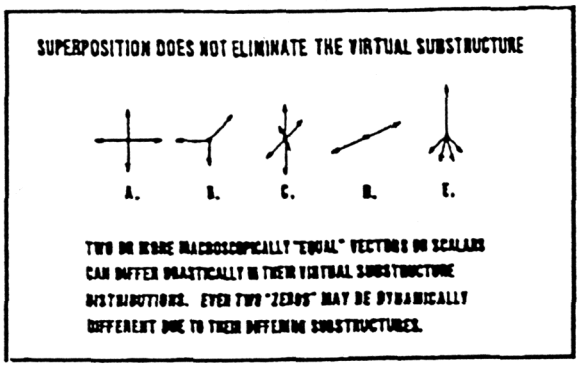
$$E = + \sqrt{(MASS)^2 (C)^4 + (MOMENTUM)^2 + (C)^2}$$

VIRTUAL

$$E \neq + \sqrt{(MASS)^2 (C)^4 + (MOMENTUM)^2 (C)^2}$$







For our vibrational medicine model we can use the generation of this part of the spectrum in our development of various electronic devices that will treat the body. Our bio-quantum optics system will analyze not only the virtual transference system but also the information in the transfer of these biophotons. The information generated within these biophotons will also allow these subatomic particles to interact with biology in a specific manner. The specific fashion of interaction was set at the beginning of the universe in all matter, which now is culminated with the highest degree of information; those of biological systems. These biological systems are indeed profound in their ability to transfer information and achieve biological stability.

The bio-quantum optical system is profound in its ability to transfer and utilize various systems. Needed in this system are lenses that can focus. This is one of the needs for water in biology. Water, with its particular refractive index, can act as a lens and help to focus this mitogenic radiation. Bio-quantum mechanics will be a new, challenging field for medicine and biology, as our medical systems move into the next century.

The bio-quantum photon system also brings indeterminacy into its analysis, and how indeterminacy can be shaped by biological systems. This was accounted in the *Bio-Quantum Matrix* book as the Nelson effect of a biological system to have an effect on an indeterminate system. The shaping of an indeterminate system is another factor of the bio-quantum optic effect. The shaping of this indeterminacy has thus been covered in the development of our three books.

So the bio-quantum optic system goes beyond the optic system in that there is an enhancement of three parts:

1. The virtual or imaginary transition into real

2. The generation of an informational system versus background noise, which biology needs to transfer in order to maintain its fight against the entropic, thermodynamic, random world

3. A system of shaped indeterminacy through the biological enhancement of an indeterminate system to allow biology to shape the photon, and thereby affect the informational system

Real Particle

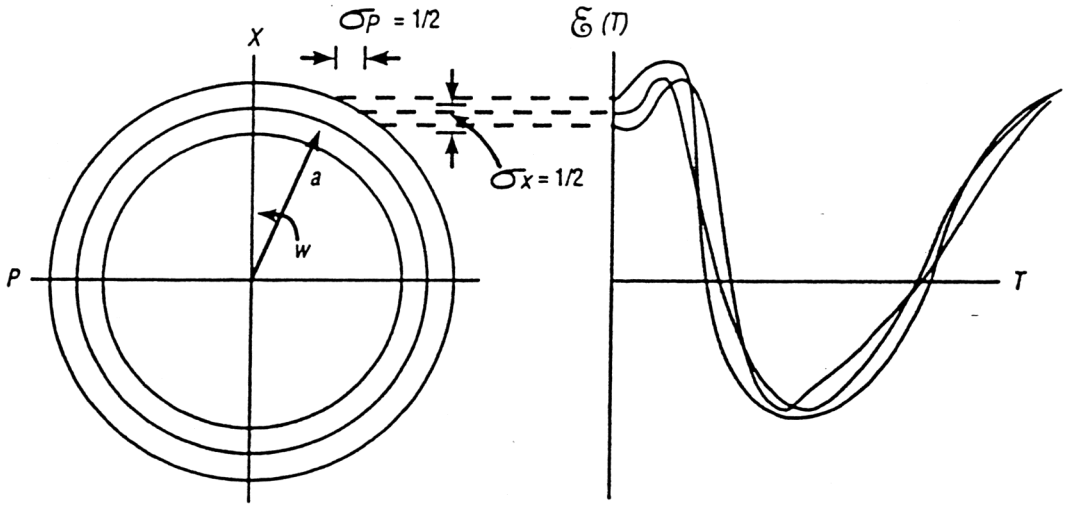
$$E = + \sqrt{(Mass)^2 (c)^4 + (Momentum)^2 (c)^2}$$

Virtual

$$E = + \sqrt{(Mass)^2 (c)^4 + (Momentum)^2 (c)^2}$$

$X \qquad \sigma_p = \frac{1}{2} \qquad \mathcal{E}(T)$

$\sigma_x = \frac{1}{2}$



UNCERTAINTIES FOR THE COHERENT STATE

Thus our brief summary of quantum and bio-quantum optics shows some things that we have learned technologically by passing up electromagnetic optics. With this background in physics we can now provide a more scientific and productive system of medicine.

As we have developed our idea of waveforms, we have now come to the biophoton wave, which seems to have the ability to be influenced by other quantic, uncertain systems at a distance. This, as we have discussed in our other books, accounts for the Nelson effect, and is partially a type of tunnelling. This type of influence on indeterminacy at a distance by a quantic or biological system can best be described as happening through the phenomenon of subspace. On the TV series *Star Trek* we've often seen that subspace is a type of space that is occupied beneath the normal matrix we see, hear and feel. This subspace seems to have been bent, or *can* be bent, through many different dimensions.

It is quite apparent that our phenomenon of the biophoton influence of uncertainty, or the Nelson effect, is a phenomenon that happens through subspace. Thus in the development of our treatise, as we learn more and more about this phenomenon, we might be able to conquer the various technological achievements that we now see only in science fiction: the achievements of transferring influence and information over great distances, the ability to scan objects at great distances through the particles that flow through subspace, and possibly even the idea of pushing matter through subspace, as well.

Thus the subspace dimension has its first real analytical proposition in the biophoton applications. This is what all of the *Quantum Biology* series books are centered around. For the first time we are introducing the relationship of this with a subspace phenomenon that will become less a part of our future and more a part of our present as time, science and medicine march on.

Biology and medicine have been so rooted in chemical and classical physics that they have not developed an energetic, photonic or quantum perspective. This form of analysis is very subtle and is complicated because the infrared radiation coming off the body has always been viewed as a useless byproduct of metabolism. Perhaps now that can be changed.

SUMMARY

1. In this chapter we show all the various histories and developments of optic theory, all the way up to the new bio-quantum optics associating the biophoton, the Nelson effect, with the virtual photon and scalar wave theories. Thus the development of optical analysis is key in our understanding of vibrational medicine.

2. In going through the understanding of ray optics, wave optics, electromagnetic optics, quantum optics and bio-quantum optics, we can propose an understanding of the various optical-phenomena. This will lay the groundwork for the development of our vibrational medicine.

3. We show the association of frequency, wavelength, energy, and the reciprocal wavelength, and how they have biological ramifications.

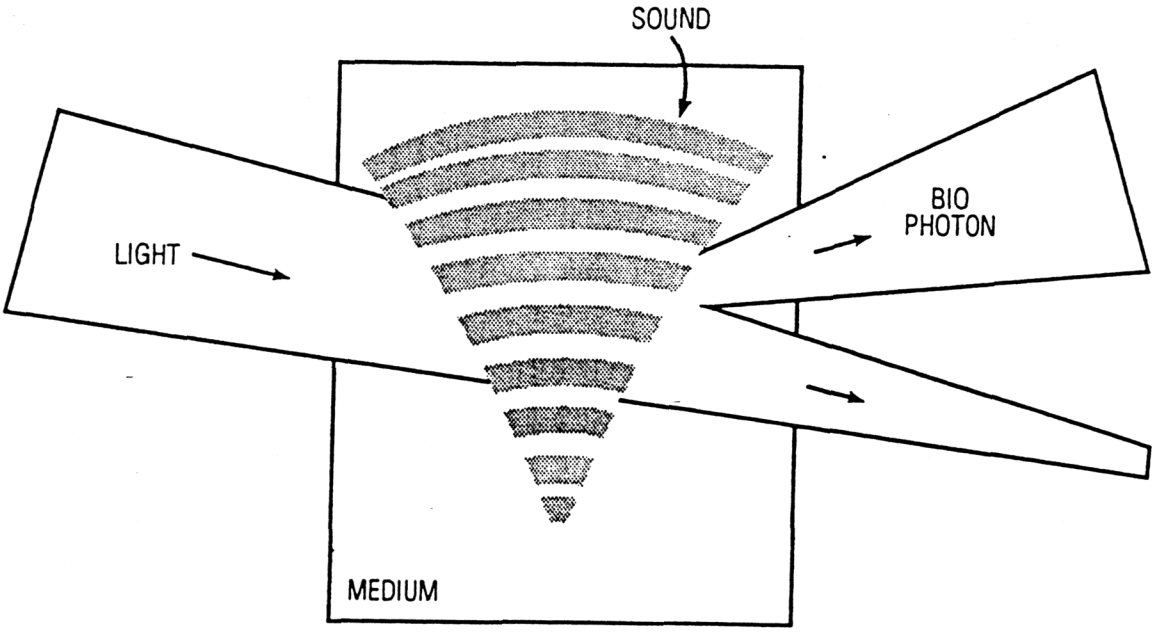
4. We show that the Isaacs understanding of a matrix also allows us to understand the bio-photon, because the bio-photon has a matrix of its own.

5. We show how the bio-photon can be a pinnacle in the development of a biological theory.

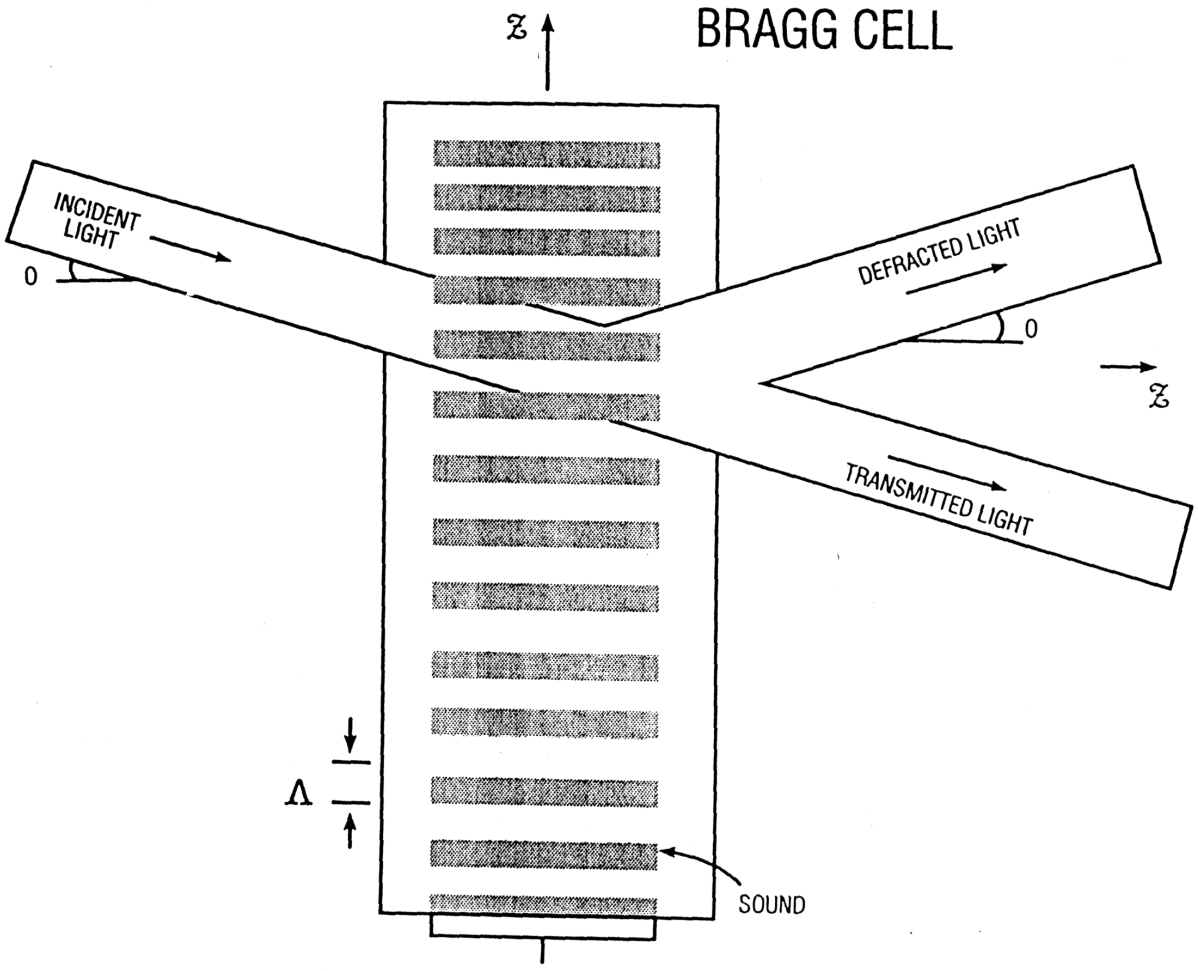
Chapter 9

SOUND AND OPTICS

Since we know that the refractive index of an optical medium is altered by the presence of sound, sound can have a powerful effect on light. Sound can control light. This is often known as the *field of acousto optics*.



DEFLECTION OF LIGHT (PHOTONS) BY SOUND

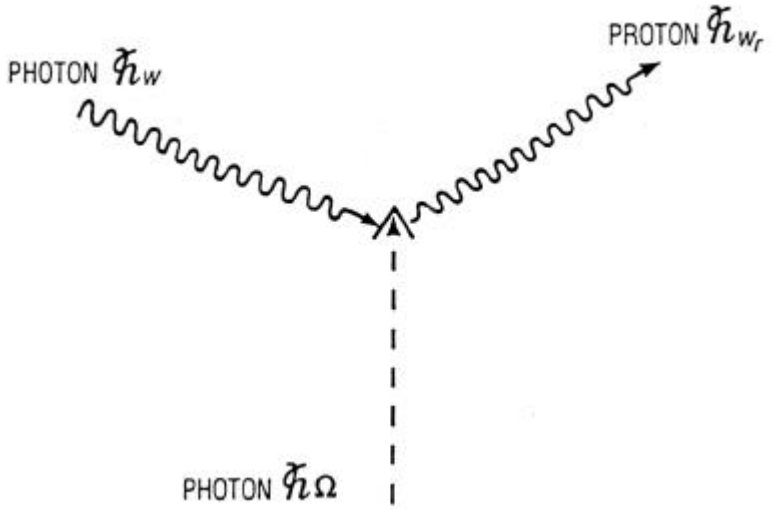

BRAGG CELL
z
INCIDENT LIGHT
θ
DEFRACTED LIGHT
θ
z
TRANSMITTED LIGHT
Λ
SOUND

This makes optical modulators, filters, isolators, deflectors, spectro-analyzers and many other devices possible. Sound has a dynamic shift on molecular vibration that affects waves which travel through these vibrations. The medium of sound produces rarefaction and compression. This constitutes a sound wave. By changing the medium through rarefaction and compression sound affects the refractive index of the medium.

We later discuss how light transfers in an inhomogeneous medium. Sir William Henry Bragg and Sir William Lawrence Bragg (a father and son team) were awarded the Nobel Prize in 1915 for their studies in the refraction of light from periodic structures. Part of what they studied was the effect of sound on light.

$$\sin \cos \cdot \frac{\lambda}{2\Lambda} \qquad \textit{Bragg Condition}$$

Here the wavelength of light in the medium is known, and the form of the light-sound interaction is known as the *Bragg diffraction*. The device that affects it is known as a *Bragg reflector*, a *Bragg deflector*, or a *Bragg cell*.



We take an acoustic plane wave traveling in a direction *x* through a medium of velocity Ls, frequency *f*, and wavelength 7 = <s/*f*. The strain (relative displacement) at position *x* and time *t* is

$$s(x,t) \cdot S_0 \cos(\Omega t - qx)$$

Here S_0 is the amplitude, S = 2B*f* is the angular frequency, and *q* = 2B/7 is the wavenumber. Acoustic intensity is

$$I_{\cdot} \cdot \tfrac{1}{2} \rho u_{\cdot}^3 s_0^2$$

The medium is assumed to be optically transparent. The refractive index in the absence of sound is *n*. This leads us to

$$\Delta n(x,t) \cdot -\tfrac{1}{2} \; n^3 s(x,t)$$

The photoelastic constant tells us about a reduction and shift in refractive index. This leads us to

$$n(x,t) \cdot n' - \Delta n_0 \cos(\Omega t - qx)$$

with amplitude

$$\Delta n_0 = \tfrac{1}{2} n^3 S_0$$

This is proportional to the square root of the acoustic intensity

$$\Delta n_0 = (\tfrac{1}{2} I_s)^{1/2}$$

where

$$= \frac{2_n 6}{\rho U_s^3}$$

Thus the effectiveness of sound in altering refractive index allows us to calculate the strength of the acousto optic effect.

The amplitude reflectance is yielded by

$$r = \tfrac{1}{2} jr' L \, sinc \left[(q - 2k \sin\theta) \frac{L}{2\pi} \right] d^{j\Omega t}$$

Amplitude Reflectance
(Upshifted Case)

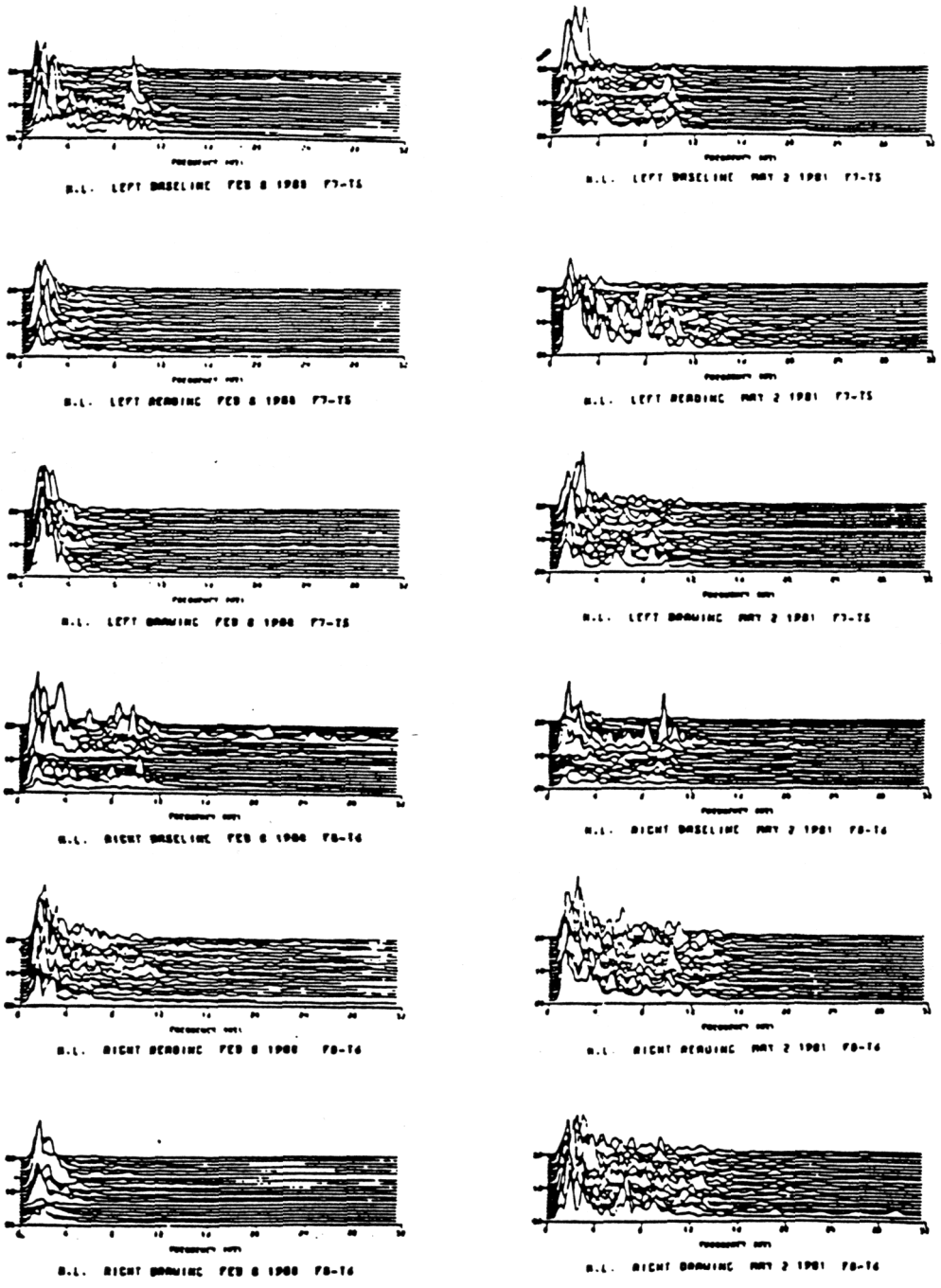
The Bragg angle from the Bragg condition is

$$\sin \theta_B = \frac{\lambda}{2\Lambda}$$

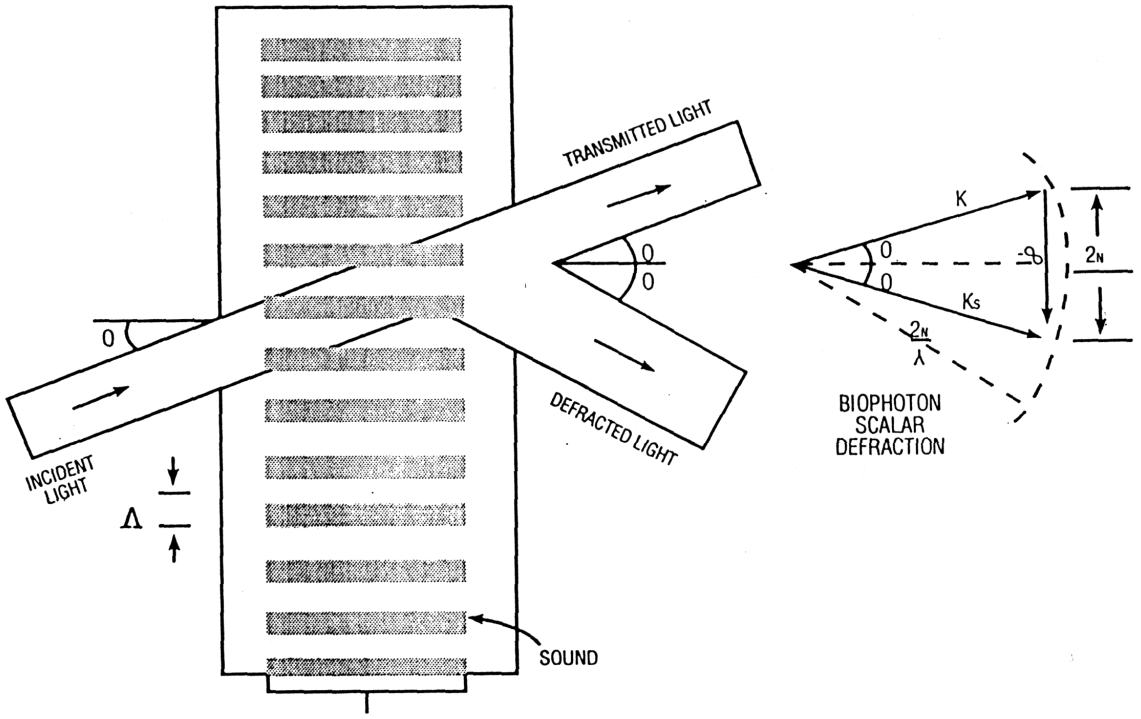
If we approach our quantum theory of light, the optical wave has an angular frequency and a wavevector, and can be seen as a stream of photons, each of which has an energy relating to Planck's constant and a momentum.

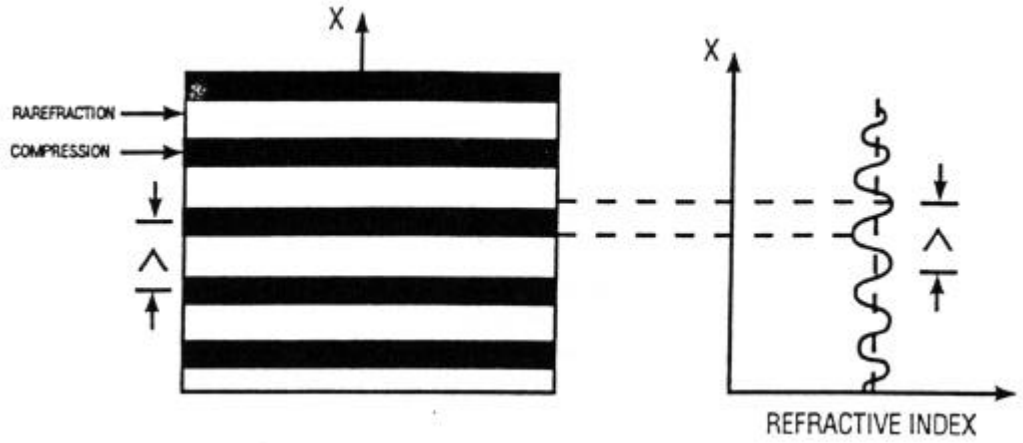
The acoustic wave, the angular frequency and the wavevector are similarly regarded as a stream of acoustic quanta. These are called *phonons*, each of energy SS and momentum *Sq*.

A blend of light and sound occurs when a photon combines with a phonon to generate a new photon of the sum energy and momentum. The incident photon of a frequency in the wavevector can interact with the phonon of frequency S and wavevector q. This allows the generation of a new photon of frequency T and wavevector k, as illustrated below.



Changes in the power spectral analysis before and after biofeedback training for increasing SMR or beta activity and suppressing theta activity between 4 and 8 Hz for an 11-year-old learning disabled male.


TRANSMITTED LIGHT
θ
θ
θ
INCIDENT LIGHT
Λ
DEFRACTED LIGHT
SOUND
K
θ
θ
Ks
2N
λ
2N
BIOPHOTON
SCALAR
DEFRACTION



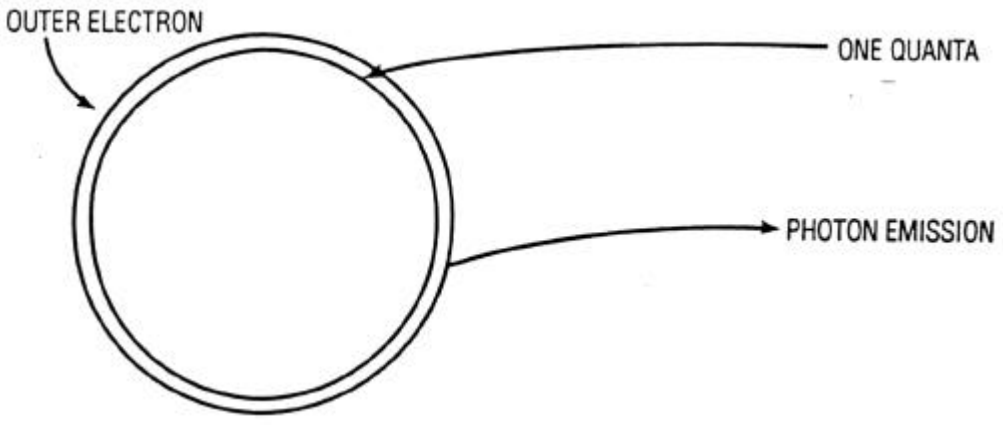
Conservation of energy and momentum will dictate that the change in momentum and the change in position will be stable, from which the Doppler-shift formula and the Bragg condition can be recovered. The Super Learning machine we developed uses this sound-light interaction. It also uses electromagnetic and static interaction to produce a profound relaxation effect and the suggestibility needed for enhanced learning.

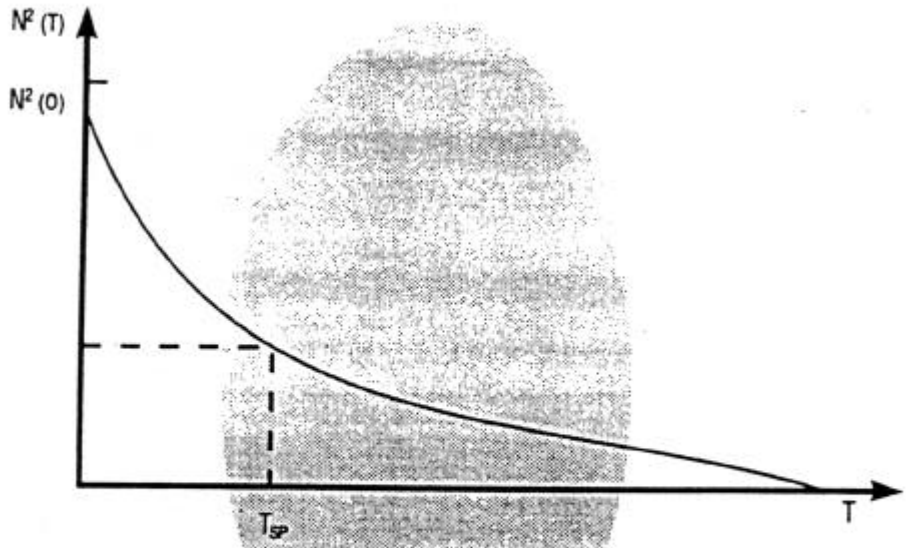
Thermal Light.

When the atoms and molecules of an item are under thermal equilibrium condition in the absence of other external energy sources and light is emitted, this is known as *thermal light*.

We can see thermal light's properties by looking at the action of the photons with the atoms in equilibrium. If we have a place with a unit volume whose walls have a large number of atoms, and these atoms are at two energy levels denoted as 1 and 2, they can be separated by an energy difference. This energy difference can be calculated by a variation of Planck's constant times the wavelength. The place must support broad-band radiation.

If $N_2(t)$ and $N_1(t)$ represent the number of atoms per unit volume occupying energy levels 1 and 2 at time t, then spontaneous emission will be released from the place if the atoms in level 2 are at an external finite temperature, meaning that they are not 0E K. The radiation absorbed in stimulated emissions can be calculated. The three processes coexisting in a steady-state equilibrium will be reached. We assume that the average of photons occupies each of the radiation modes whose frequencies lie within the atomic line width.





DECAY OF THE UPPER LEVEL POPULATION CAUSED BY SPONTANEOUS EMISSION

If we look at the spontaneous emission, we will see that there is a probability that a single atom in the upper level undergoes spontaneous emission into any of the modes within the increment of time. We will set this increment of time from *t* to *t* +)*t*, which is *P*sp)*t* =)*t*/*t*sp. There are N2(*t*) such atoms. The average number of emitted photons within)*t* is therefore N2(*t*))*t*/*t*sp. There also are several atoms that will leave level 2 during the)*t* time frame.

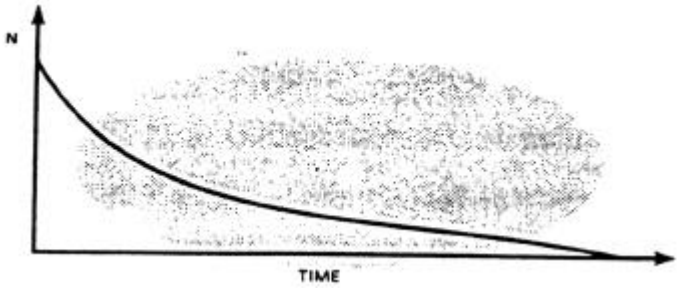
Therefore the rate of spontaneous emission is given by

$$\frac{dN_2}{dt} = -\frac{N_2}{t_{sp}}$$

whose solution is

$$\frac{dN_2}{dt} = N_1 W_1 = \frac{N_1 \bar{n}}{t_{sp}}$$

This will be an exponentially decaying function of time.



But there can be other types of radiation. As the spontaneous emissions occur there will be absorption and stimulation, which will cause other emissions, or stimulated emissions, in both populations. If we look at absorption first, we will see that in our first group the atoms are capable of absorbing. The rate of increase of population of the atoms in the upper energy levels is

$$\frac{dN_2}{dt} = N_1 W_1 = \frac{N_1 \bar{n}}{t_{sp}}$$

Stimulated emission would cause an increase in atoms in the upper state, given by

$$\frac{dN_2}{dt} = -\frac{N_2 \bar{n}}{t_{sp}}$$

The ability to stimulate and absorb these various emissions will be proportional to the number of photons. If we combine the above three equations, we now get

$$\frac{dN_2}{dt} = -\frac{N_2}{t_{sp}} + \frac{\bar{n} N_1}{t_{sp}} - \frac{\bar{n} N_2}{t_{sp}} \qquad \textit{Rate Equation}$$

This equation does not include the transitions out of level 2 rising from interaction effects with other energy levels and other sources of external excitement. Thus a steady state can be achieved and calculated with

$$\frac{N_2}{N_1} = \frac{\bar{n}}{1 + \bar{n}}$$

With the Boltzmann distribution we arrive at

$$\frac{N_2}{N_1} = \exp\left(-\frac{E_2 - E_1}{k_B T}\right) = \exp\left(-\frac{h\nu}{k_B T}\right)$$

Substituting the last formula into the one before it we now have

$$\bar{n} = \frac{1}{\exp\left(h\nu / k_B T\right) - 1}$$

which tells us about the average number of photons in the mode of the frequency <.

Photons interacting with atoms of thermal equilibrium of temperature *T* are themselves in thermal equilibrium, at the same temperature. But they are still sharing photons back and forth.

This is the basic precept of the photon bath concept proposed by this author in *Quantum Biology*. This photon bath concept maintains that there is a bath of large numbers of photons circling any item. Since these items are not at 0E K, these photons can interact with each other and produce effects that will allow for substitution of the real photons created with some of the virtual photons. Thus every item has a signature bath around it, known as the *photon bath*. This allows for medication testing; in that every substance, such as milk, coffee, sugar, pharmaceuticals, homeopathics, vitamins, and people themselves will have a particular signature bath created by the types of photons that are released from around them. This is the phenomenon of medication testing, and one of the hallmarks of energetic medicine. Here for one of the first times we can explain it in scientific notation.

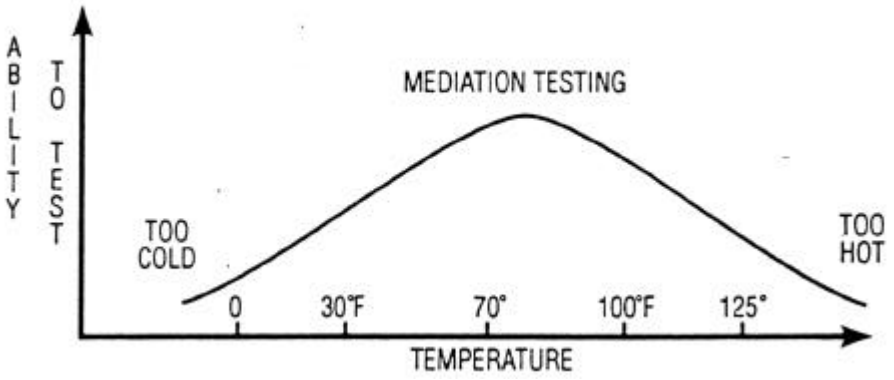
The average energy for radiation mode can be stated in

$$\bar{E} = \frac{h\nu}{\exp\left(h\nu / k_B T\right) - 1} \qquad \textit{Average Energy of a Mode of Thermal Equilibrium}$$

Here we see that is dependent on <.

These are some equations used to calculate the black-body radiation spectrum, which is known to tail off at normal room temperatures, because the energy of the photons is significantly small. Here we will find that at these temperatures virtual radiation fields will peak, because there is not enough thermal energy to be destructive to these virtual photon fields, and there is yet enough kinetic energy in the photon to peak our medication testing virtual field phenomenon. If we go to temperatures of 0E C or below, we will start to notice that medication testing phenomena tails off drastically. At temperatures of 0E F medication testing phenomena do not work well at all, and at temperatures below -10E F medication testing does not seem to work at all.

Thus there seems to be a particular level between 0E C and 100E C, where medication testing in the virtual photon field are done best. At room temperature values from 20E C to
30E C medication testing seems to work best.



If there is an external source of energy, be it chemical or whatever, it can cause an atomic molecular system to undergo transition to higher energy levels. The course of decaying to lower energy levels as a backlash system may emit optical radiation. This type of light can be classified as *luminescent light*, and when it happens in biological systems, it can be known as *bioluminescence*. These nonthermal radiators are often called luminescent because they usually work in nonradical thermal conditions.

There are several categories of luminescence:

1. *Cathodoluminescence* is caused by accelerated electrons that collide with the atoms of a target. An example is the cathode ray tube in which electrons deliver their energy to a phosphor. The term *betaluminescence* is used when the fast electrons are the product of nuclear beta decay rather than an electron gun, as in the cathode-ray tube.

2. *Photoluminescence* is caused by energetic optical photons. An example is the glow emitted by some crystals after irradiation by ultraviolet light. The term *radioluminescence* is applied when the energy source is x-ray or gamma-ray photons, or other ionizating radiation. Indeed, such high-energy radiation is often detected by using luminescent (scintillation) materials such as NaI, special plastics, or PbCO3 with optical detectors.

3. Chemiluminescence provides energy through a chemical reaction. An example is the glow of phosphorus as it oxidizes in air. *Bioluminescence*, which characterized the light given off by living organisms (e.g., fireflies and glowworms), provides another example of chemiluminescence.

4. Electroluminescence results from energy provided by an applied electric field. An important example is *injection electroluminescence*, which occurs when electric current is injected into a forward-biased semiconductor junction diode. As injected electrons drop from the conduction band to the valence band, they emit photons. An example is the light-emitting diode (LED).

5. *Sonoluminescence* is caused by energy acquired from a sound wave. The light emitted by water under irradiation by a strong ultrasonic beam is an example.

6. *Mitogenic radiation*, outlined in *Quantum Biology*, is the radiation supplied by the cell, supposedly from the DNA; which allows for information transfer from one system to another.

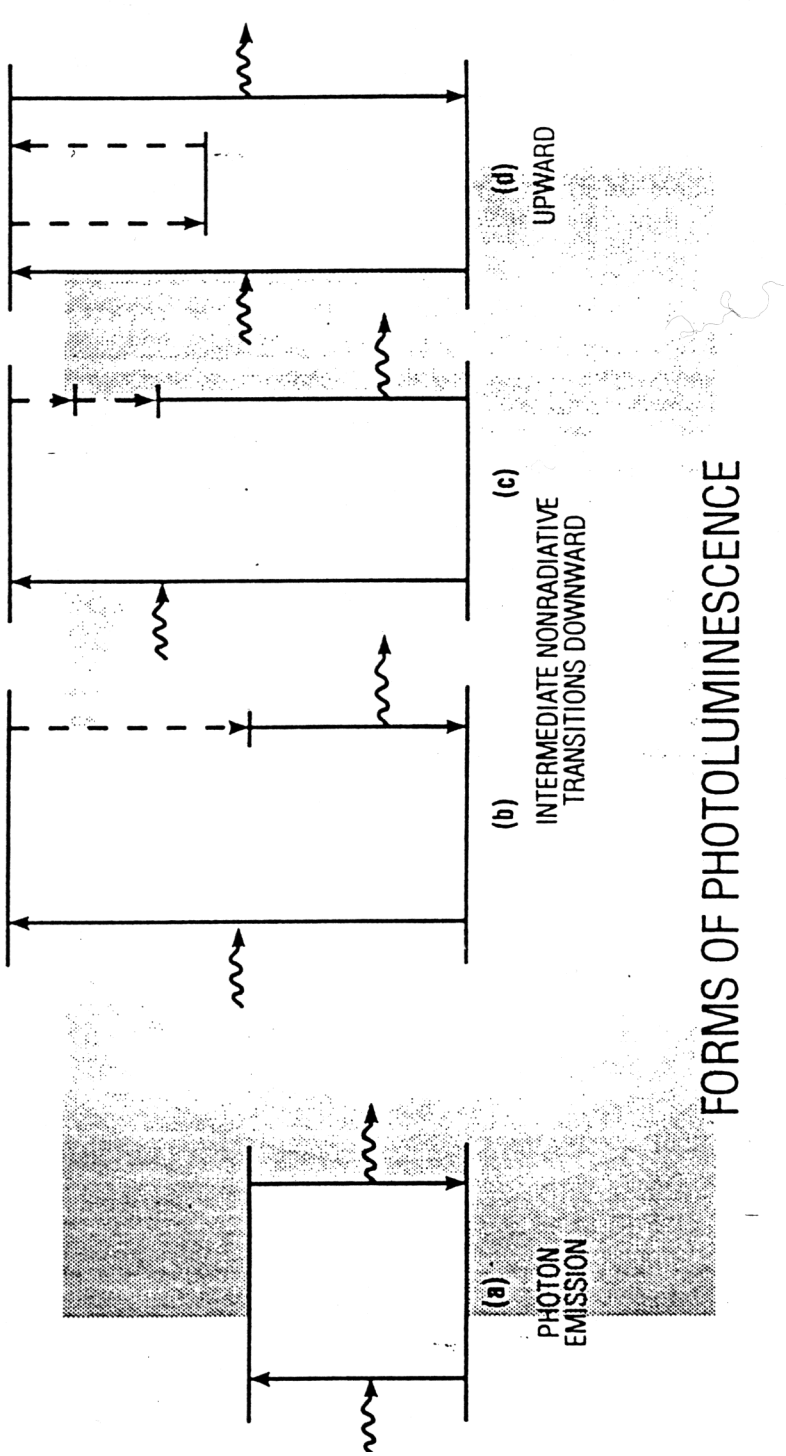
We will find that this photoluminescence can occur when a system is excited to a higher level in the process of absorbing a photon and then spontaneously decaying to a lower level, emitting the photon in the process. The conservation of energy of the emitted photon cannot have more energy than the excited photon, unless two or more excitation photons act together.

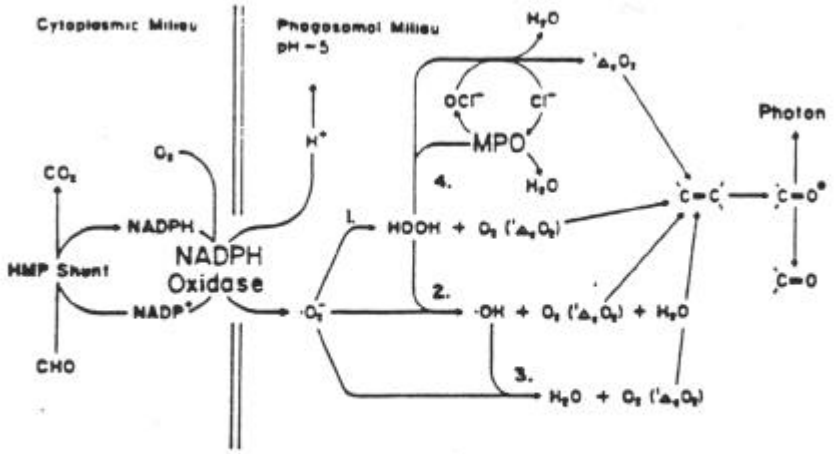
As we see in our diagram, the intermediate nonradiative downward transitions are possible, as shown by the dashed lines. Electrons can be stored in the intermediate state for a long time. This is a type of electron trap, which can result in a delayed luminescence, such as that of the lightning bug. Ultraviolet light cannot be converted to visible light by this mechanism, however. Intermediate downward radiation transitions will be followed by upward nonradiative transitions in certain examples, as shown in our above diagram.

If these radiative transitions are spin-related, or if they take place between two states of equal multiplicity, then the luminescence process is called *fluorescence*. In contrast, luminescence from spin-forbidden transitions is called *phosphorescence*.

Fluorescence lifetimes are usually short (.1 to 10 ne), so that the luminescence photon is promptly emitted after excitation. This type of fluorescence can be seen when we expose ultraviolet light to certain biological conditions, the most prominent of which is candida. All the candida family will fluoresce under ultraviolet light during the emission. The emission will stop almost immediately after the light stops because of the short duration of the effect.

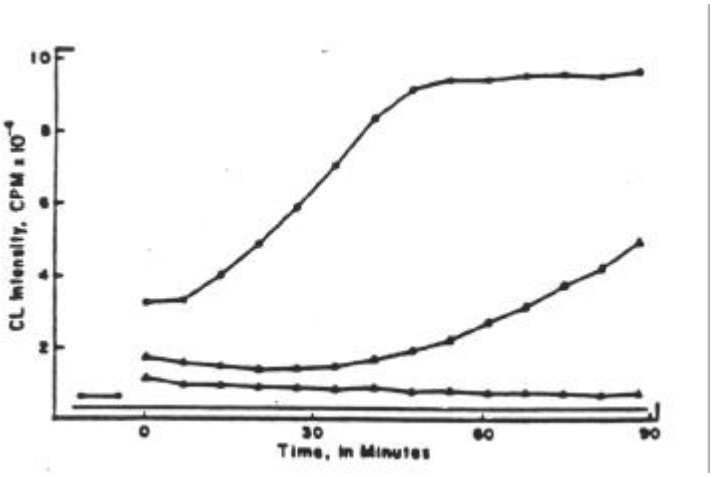
Phosphorescence, however, because the transitions are forbidden, involves longer lifetimes of 1 ms to 10 seconds; thereby substantial decay between excitation and emission. This is the type of light that can be seen stored in phosphorescent conditions, and it happens in biology in certain phosphorous compounds.





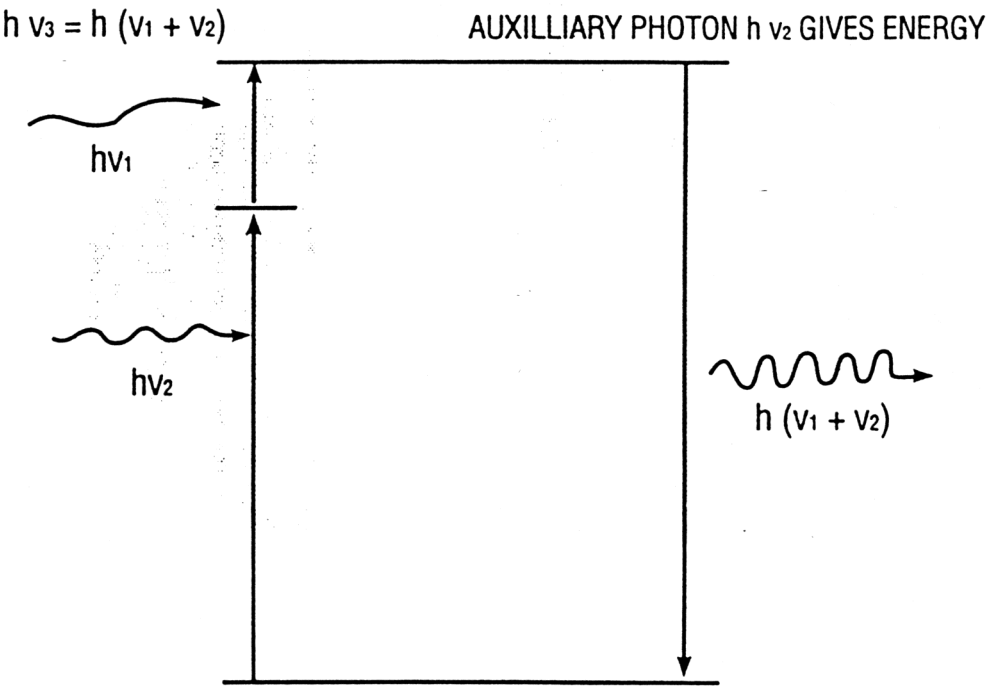
Postulated energy transductions involved in microbicidal action. Four mechanisms for the generation of $^1\Delta_g O_2$ are shown. The C=C represents a hypothetical target molecule on the phagocytized microbe.

Photoluminescence occurs in many materials including inorganic molecules, the noble gases and the inorganic crystals. This photoluminescence effect allows for the REGAE device that we will describe later, as we see how the noble gases are capable of various luminescence patterns, and thereby change color and activity in the presence of biological fields activated by an electron plasma field. (This will be covered in Chapter 5).

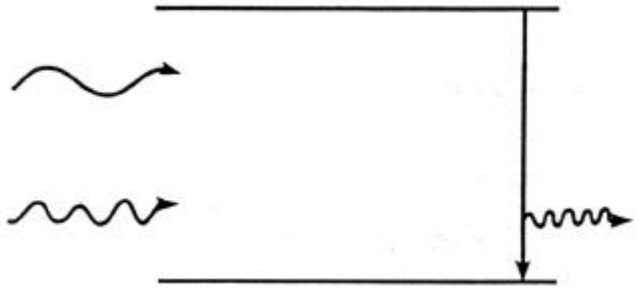


Certain aromatic molecules and certain inorganic crystals such as diamond, ruby, zinc, sulphide and others can also display photoluminescent effects. A semiconductor can also act as a photoluminescence material. This involves an electron hole generation induced by photon absorption. This is followed very rapidly by a nonradiative relaxation to a lower energy level of the conduction band, and finally by photon emission accompanying band-to-band electron hole recombination. The intra-band relaxation is very fast in comparison with band-to-band recombination. This allows for some photon transfer effects, and why we need these various materials (see *Bio-Quantum Matrix*).

DETECTION OF A LONG WAVELENGTH PHOTON *h v1* BY CONVERSION TO A SHORT WAVELENGTH PHOTON



If we have absorption of two or more photons, this might result in the emission of one photon of shorter wavelength. This is illustrated below.



This can occur when there are traps of materials that can store the electron elevated by one photon for a long enough time so that another photon can come along and excite the electron even further. Such materials behaving in this can be used for the detection of infrared radiation. Thus this is how we make various phosphorous donor traps and rare earth ions, such as Yb3+ and Er3+, which can contain certain traps and charge up in minutes by daylight and fluorescent light. Infrared signals then release the electrons from the trap, causing a visible luminescence to be emitted.

Useful devices can take the form of small cards containing this upconverting powder laminating between plastic sheets. They can be dispersed on three-dimensional polymers for three-dimensional viewing. The spatial distribution of the infrared beams, such as those produced by an infrared laser, can be visibly displayed by this means. The conversion efficiency is, however, substantially less than one percent.

It is little understood just why certain musical notes sound good with other musical notes. This does form a mathematical relation, however. When we amplify speech or music with a nonlinear amplifier, the sum in difference frequencies in the output make the speech or music sound radically different. This is known as *inner modulation distortion*, and is the change in the spectrum caused by the sum in difference frequencies.

Middle C has a fundamental frequency of 256 Hz. The next higher C is an octave higher, and has a fundamental frequency of 512 Hz, exactly double that of middle C. Two notes an octave apart sound pleasant. Chords can also sound very pleasant. The C chord, made up of C, E and G, sounds very pleasant. There is something interesting in the mathematical properties of C, E and G. This is shown below.

C	E	G	Notes in Chord
256	320	384	Fundamental frequency, Hz
1	1¼	1½	Ratio to middle C

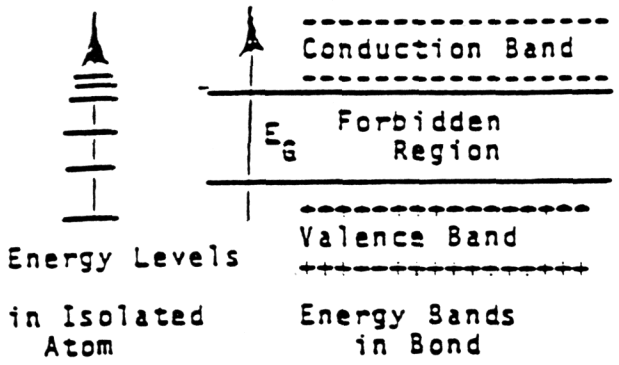
The ratios presented show that the chord sounds good when the fundamentals are a quarter-multiple of the lowest frequency.

Aside from the fundamental frequencies the C chord contains harmonics to around 10 kHz. The amplitude of these harmonics give the chord its distinctive sound. As we see in our figure there are fundamental frequencies of 256, 320 and 384. Second harmonics are at 512, 640 and 768. Third harmonics and fourth harmonics can also be calculated. The relative amplitudes of these harmonics remain the same with respect to the fundamentals.

ENERGY BANDS

What is allowed in energy values that an electron can take in such a bond? The answer follows in the quantum theory: The electrons surrounding a free bond atom occupy definite energy levels that are associated with particular orbits. Any change in the energy of an electron can be accomplished only by a jump or transition from one energy level and orbit to another. Such an energy change is accompanied by the emission or absorption of one unit (quantum) of radiation. The relation between this energy change $E_m - E_n = hc/\text{frequency} = hv$. Where: v = velocity, c = wavelength, h = Planck's constant. This process and equation are the basis of spectroscopy, which infers the system of energy levels from the nature of the radiation emitted or absorbed by them or by their atoms

When a large number of bond atoms, each with its energy level scheme, are brought together to form a bond, an interesting change occurs. Atoms that are closer together interact with each other. This interaction causes valence bonds to be set up. Some energy levels broaden out into bands and others disappear altogether. The result is to produce an energy diagram for illustration purposes:



What are the allowed energies in a bond? The quantum theory says simply that some whole bands of energies are allowed and other bands completely forbidden. The valence band has all the bonds occupied; above this band there is the forbidden region where no electrons are found; above this there is an empty conduction band. The value of E_G is highly characteristic of the particular material, and is the most important single parameter of that bonded material. The significance of E_G is apparent. It is the minimum energy needed by an electron in the valence band to enable it to reach the empty band above. When such an electron is provided with this energy, it is said to suffer from one of the valence electrons in the bond scheme. An electron in the upper band can have its energy released further by absorbing some energy from an externally applied electron field. That is to say, the liberated valence electron may now move freely at will throughout the lattice. It can, in fact, move from one end of a bond to another or to the other. Since it bears a negative charge (-g), it may thus take part in the conduction. The upper, partly empty band, is therefore called the conduction band (at low temperatures).

"Potential" and "voltage" are interchangeable terms. Potential has a dimension work-per-unit charge, is measured in volts, and is the force that overcomes limiting resistance, which impairs the flow of electrons to selected levels of conduction from or to an arbitrary ground point of reference.

The random velocity of electrons in a conductor is of the order of 400 miles per second, while in a semiconductor the velocity is reduced because it has fewer loosely-held electrons to the speed approaching that in insulators where there are very few loosely-held electrons.

When a field is superimposed on the electrons in a conductor, the resultant drift velocity is 1 cm/sec., which is relatively slow, and less in semiconductors.

When current flows through a resistance, heat is produced.

Human body current is measured by milli and micro voltmeters and by voltmeters capable of measuring milli and micro volts: values are converted to milli and micro amperes and to milli and micro watts.

Since the charge on electrons is negative, they tend to move from points of lower potential to points of higher potential.

Because each electron carries a charge of e coulombs, where $e = 16 \times 10^{-20}$, the current density or charge in coulombs crossing an area one meter squared or i equals: pve; where p = number of electrons in a cubic meter, v = drift velocity of electrons in meters per second. A coulomb per second is, by definition, an ampere.

The resistance of any material depends on its length, cross-section, and temperature.

The flow of electrons is by Ohm's law, where E = I x R: E being the voltage applied from point to point, I being the current of electrons calculated, and R being the resistance of the substance or material through which the flow of electrons must pass in conduction.

Conductance is the reciprocal of resistance and its unit is mho, which is merely the word "ohm" spelled backwards and is measured in micro-mobs generally and obtained from the formula:

$$G = r\left(\frac{A}{1}\right)$$

Where: A = cross-section of conductor
1 = length of conductor
r = 1/p = conductivity of material.
p = charge density or resistivity

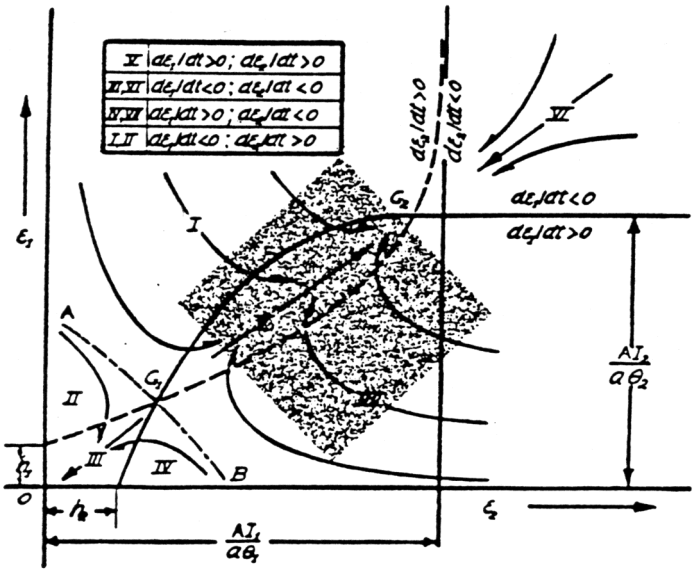
When a current of I amperes flows through a resistance of R ohms for T seconds, the amount of heat developed is: $H = R(I)^2(T)$.

The amount of heat generated in one second is expressed by RI^2 joules; a joule per second is called a watt and is the unit that expresses the rate at which heat is produced: thus, Watts = H/T = $W = RI^2$; W is commonly referred to as the I^2R loss, which represents energy wasted and/or an increase in temperature in conduction. Because a conductor heats when carrying a current, it is important that it does not overheat or cause unsafe conditions. Excessive resistance in the human anatomy is known as "fever".

Ohm's law states: the voltage drop across a resistor is equal to the resistance times the current through the resistor or I = IR where E is the electromotive force voltage.

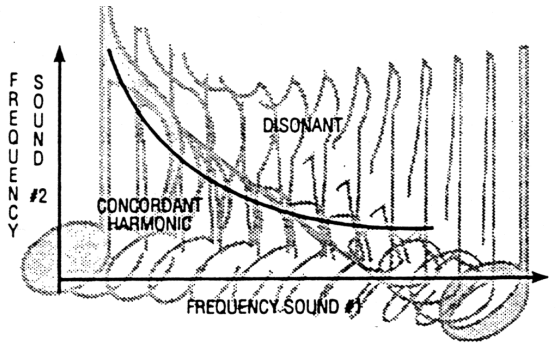
If conduction voltage is increased and resistance remains constant, current will increase, and vice versa.

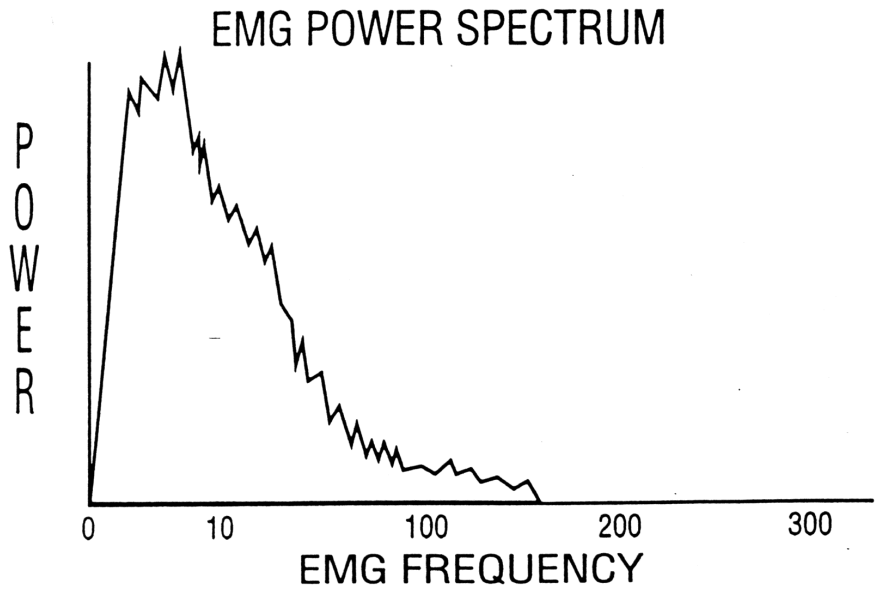
If resistance is decreased and voltage is kept constant, current will increase, and vice versa; thus the cause for the generation of heat is represented by electrons.



If we want to retain the exact sound, the spectrum drives a linear amplifier in which each spectral component receives the same gain. This will assume that all components are in the midband of the amplifier. As we can see in the superposition theorem, the output is the sum of each amplified spectral component.

If we use the spectrum of the C chord (C-E-G) to drive a nonlinear amplifier, the output spectrum will contain all the input spectral lines as well as the sums and differences of every possible combination of the components. This will sound dissonant and disruptive to the ear. The ear will detect the sum of the different frequencies because these frequencies will sound like musical mistakes. This is known as *discordant music*.



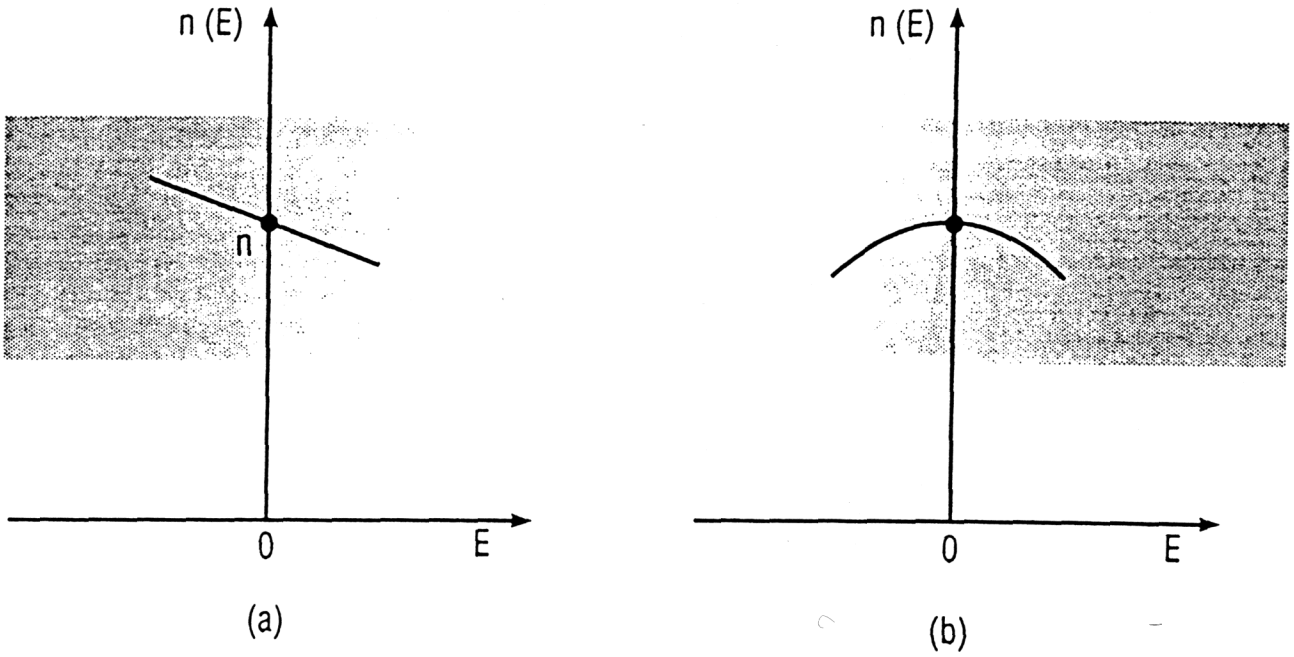


As an example, the first two spectral lines in the top figure above have frequencies of 256 and 320 Hz. These components will produce a different frequency of 64 Hz, one minus the other, and the sum frequency of 576 where they have been added together. The 64-Hz component corresponds to the C note two octaves below middle C. This extra C note is not unpleasant, because it is harmonically related to the first C. However, it does represent a new component not in the original sound. This can be worse if there is a subfrequency of 576, which corresponds to the D note one octave above middle C. The D note does not belong in the C chord, and thus sounds discordant. This sounds as if the pianist has made a mistake.

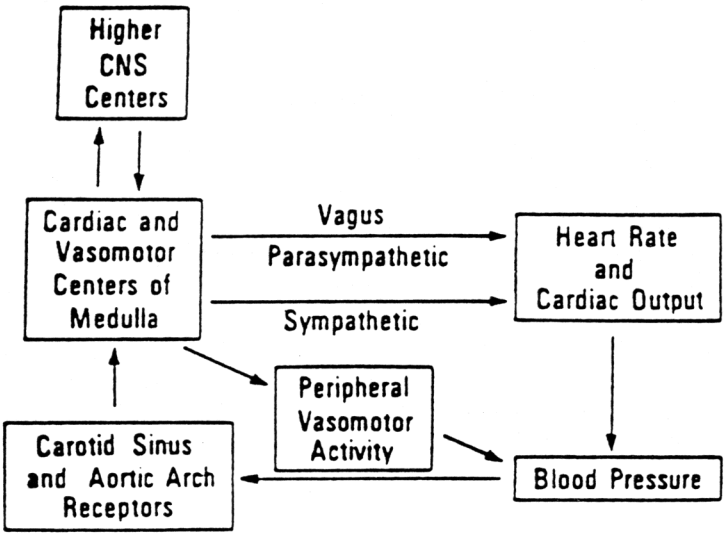
Nonlinear amplification can produce many discordant notes because of the sums and differences produced by the combinations. Nonlinear distortion causes harmonic and intermodulation distortion. Devices or circuits with a nonlinear input-output relation can result in nonlinear distortion of a signal. In time domain this means that the shape of the periodic signal can change as it transits through the nonlinear circuit.

If we look at this in a frequency domain technique, the result is a change in the spectrum of the signal. If only one input sine wave is present, only harmonic distortion can occur. if two or more sine waves are involved, both harmonic and intermodulation distortion can occur.

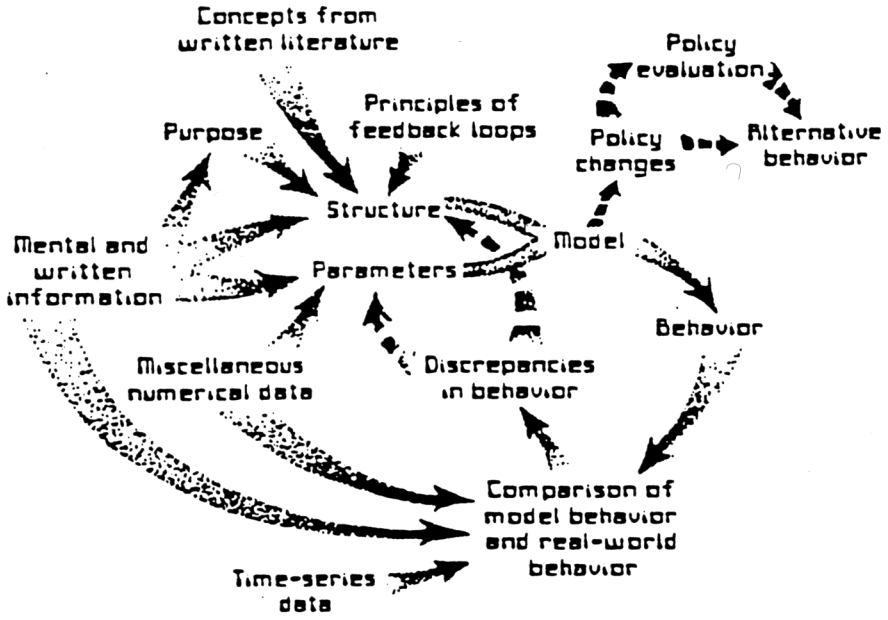
Frequency mixers can be used in our electronic systems to help produce less distortion and assist us in our treatment of the human body with sound.



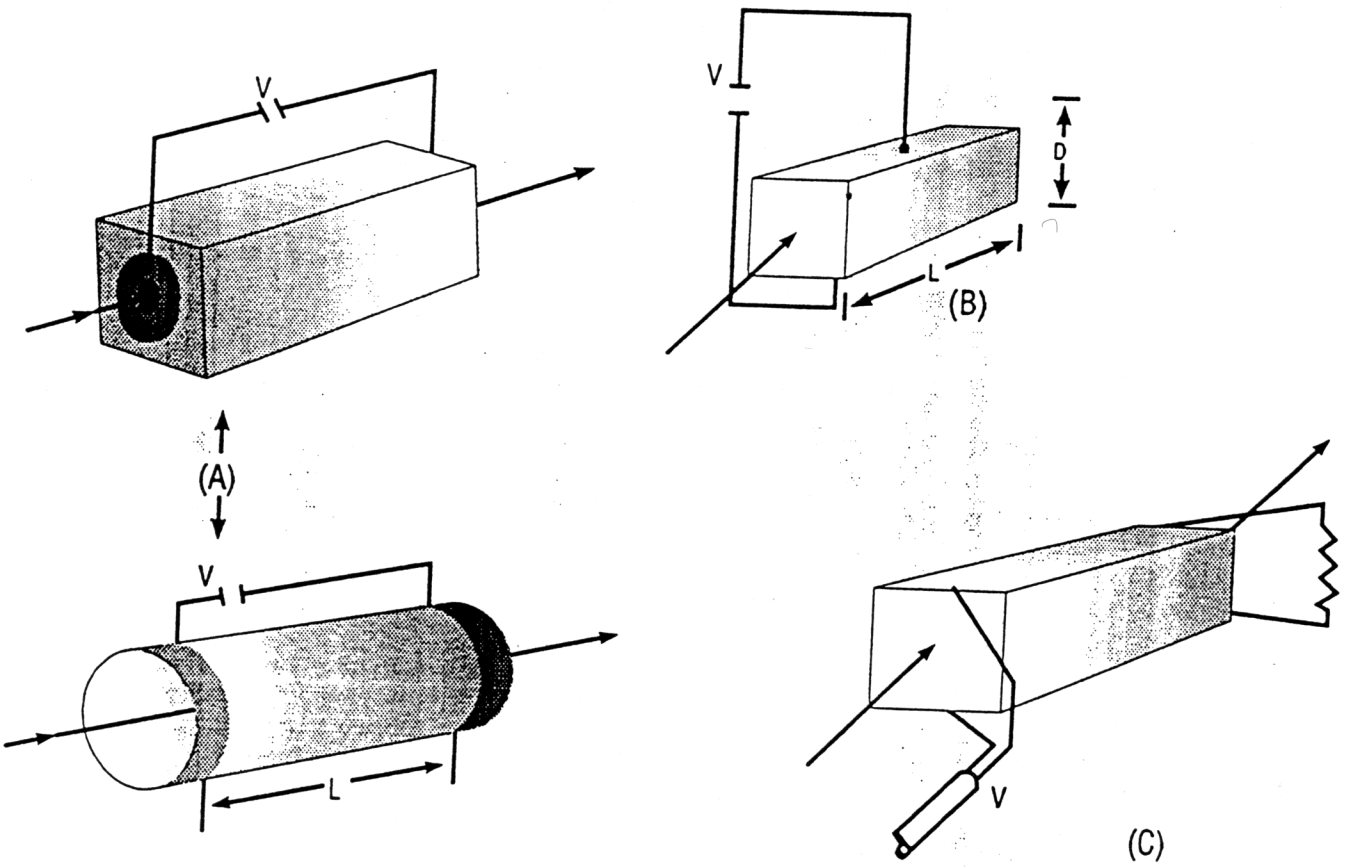
The above figure will show the basics of our frequency mixer. The two input sine waves drive a nonlinear circuit. So the harmonics and intermodulation components result from this circuit. A bandpass filter then passes one of the intermodulation components, usually the difference frequency of *fx* - *fy*. The final output of the typical mixer is the sine wave with frequency *fx* - *fy*. The frequency mixer is a circuit that produces an output spectrum with a single line at *fx* and *fy* when the input spectrum is a pair of lines at *fx* and *fy*. Sometimes a low-pass filter can be substituted for a bandpass filter, so that *fx* - *fy* < *fx or fy*. But only with the bandpass filter can we pass only the difference frequency.



Servo-control system for heart rate and blood pressure regulation.

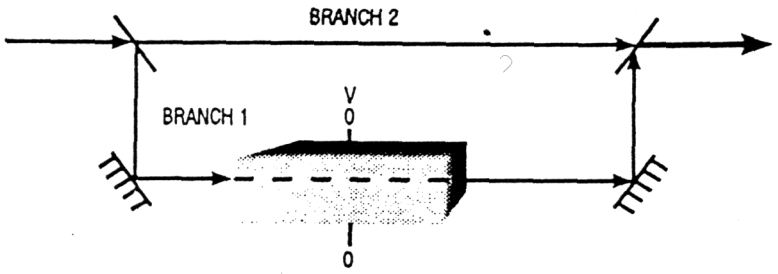


A picture of the process of making a nonlinear feedback model is itself a nonlinear feedback process.


V
V
D
L
(B)
(A)
V
L
V
(C)

Normal inputs to our mixer will be a large signal adequate to produce medium or large signal operation of the mixer, or a small signal that by itself can produce only a small-signal operation.

An example of the transistor mixer is shown below.



PHASE MODULATOR OF A MACH-ZEHNDER INTERFEROMETER

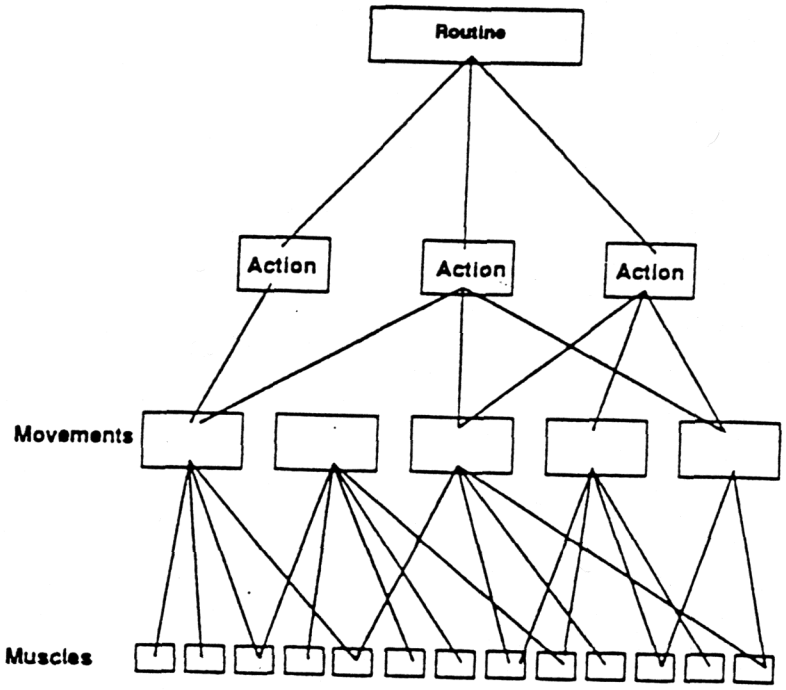
One signal drives the base, and the other signal drives the emitter. The resulting current will contain harmonics and intermodulation components.

Heterodyne is another word for mixing of circuits, and *beat frequency* is synonymous with certain frequencies. In our above circuit we are mixing, or heterodyning, two input signals, which gives us a beat frequency of *fx* - *fy*. Some circuits can be utilized by using diodes in a nonlinear device.

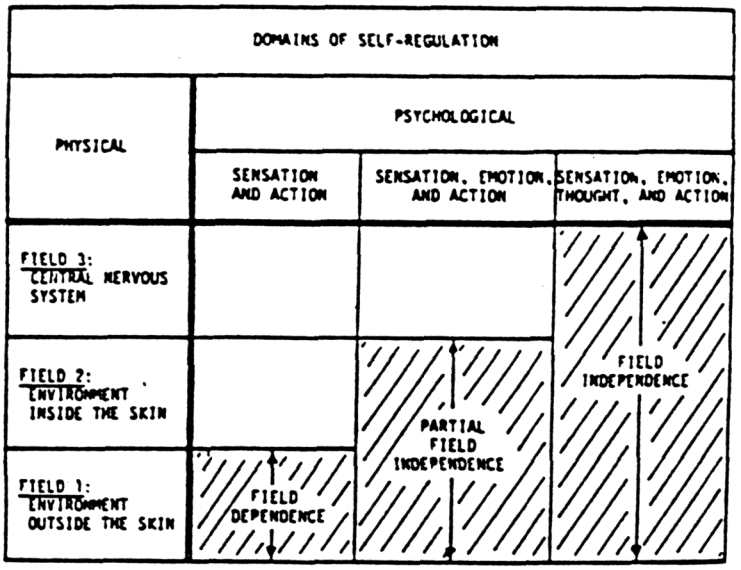
Conversion gain refers to the power gain of the mixer, where conversion gain is equivalent to the ratio of $power_{out}/power_{in}$. *Conversion voltage gain* is the ratio of $voltage_{out}/voltage_{in}$.

Noise can contain sinusoidal components at all frequencies. Some of these noise components will mix with the signal and produce various frequencies at the output of the mixer. So the remainder of the system amplifies the desired signal and the unwanted noise. This noise that is unwanted is not derived from the original input. This noise is a result of a wide range of signals produced by entropy in the system.

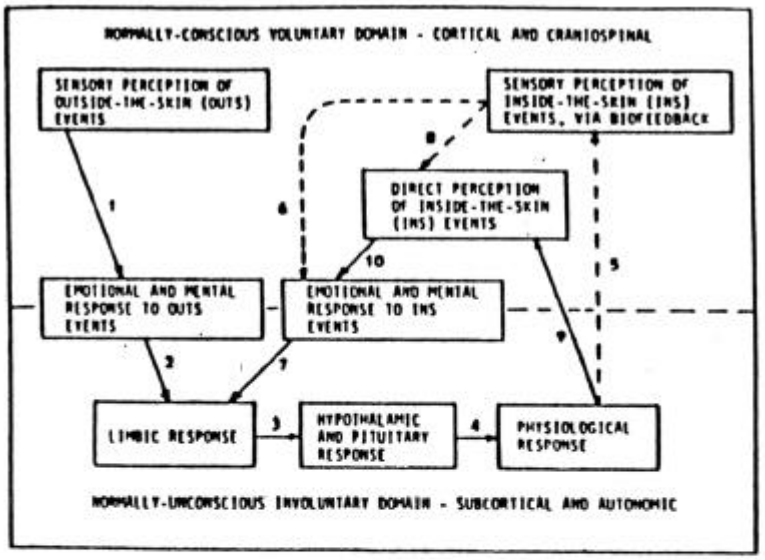
Thermal noise can be a result of the effects of resistors from conduction-band electrons. Since these electrons are loosely held by the atoms, they tend to move in random conditions, and can result from the thermal energy and surrounding air and the higher ambient temperatures to produce more electron activity.



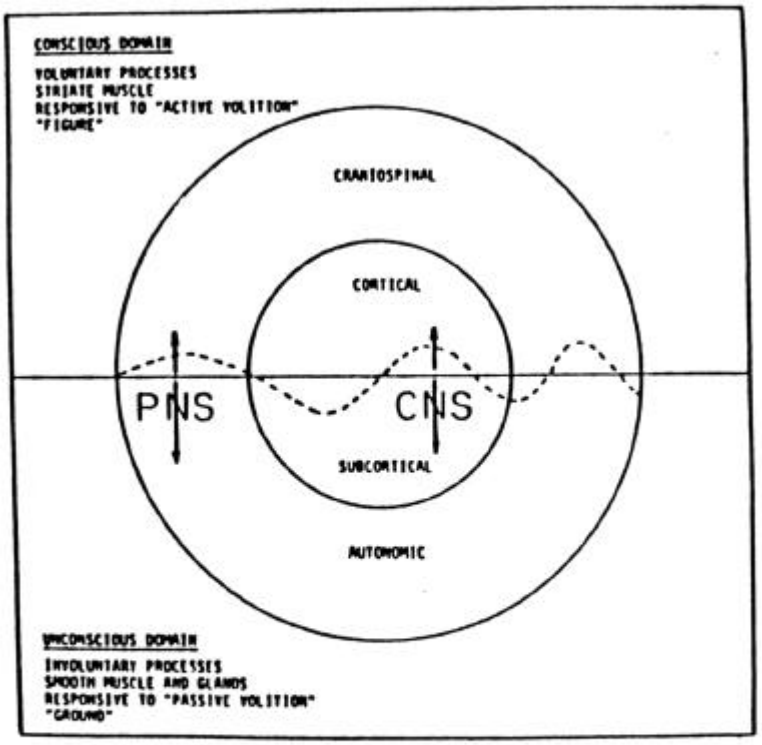
Units of control to achieve function. Most therapeutic intervention progress only to the level of muscle or movement retraining. (Modified after Mulder.)



. **Physical and psychological domains in which self-regulation is possible.** Witkin's idea of dependence on, or independence from, the external environment (Field 1) can be generalized to include the internal environment between the skin and the central nervous system (Field 2, roughly the peripheral nervous system), and, further, to include the central nervous system itself (Field 3).



. Simplified operational diagram of "self-regulation" of psychophysiological events and processes. Sensory perception of OUTS events, stressful or otherwise (upper left box), leads to a physiological response along Arrows 1 to 4. If the physiological response is "picked up" and fed back (Arrow 5) to a person who attempts to control the "behavior" of the feedback device, then Arrows 6 and 7 come into being, resulting in a "new" limbic response. This response in turn makes a change in "signals" transmitted along Arrows 3 and 4, modifying the original physiological response. A cybernetic loop is thus completed, and the dynamic equilibrium (homeostasis) of the system can be brought under voluntary control. Biofeedback practice, acting in the opposite way to drugs, increases a person's sensitivity to INS events, and Arrow 8 develops, followed by the development of Arrows 9 and 10. External feedback is eventually unnecessary, because direct perception of INS events becomes adequate for maintaining self-regulation skills. Physiological self-control through classical yoga develops along the route of Arrows 7–3–4–9–10–7, but for control of specific physiological and psychosomatic problems biofeedback training seems more efficient.



. Psychophysiological diagram relating the conscious-unconscious psychological domain to the various sections of the voluntary-involuntary physiological domain. The solid horizontal line separates the central and peripheral nervous systems, CNS and PNS, into functional subregions. The dashed line, conceptually visualized to be in continuous undulatory movement, separates the conscious and unconscious areas.

SUMMARY

1. Here we show how the photon affects the phonon, and what this means in the field of acoustic optics.

2. Using these various theories and Bragg cells we will develop a sound, photon and electron interaction machine for our quantum vibrational medicine.

3. The laws utilized in this chapter will ultimately be extremely important in the final chapter, as we work towards our quantum vibrational medicine instrument.

4. We discussed the phenomenon of medication testing and its electrical reactivity in the measurement of electroacupuncture points. This is also applied to an understanding of luminescence, which allows us to understand various photon reactivity throughout the body.

5. EMG activity, energy band conductance, chemiluminescence, and other factors are associated to deepen our understanding of biology.

Chapter 10

ELASTIC VIBRATIONS

According to the laws of physics, solid bodies tend to maintain their shape. When they are deformed by an external force, they tend to return to their original shape as the force is removed. This is the elasticity factor.

The law of elasticity developed by Robert Hook can now be offered. This states that the deformation of a solid body is proportional to the force acting upon the body, as long as the force does not exceed deformation limits that will produce structural deformity, and disallow the body to return to its original shape.

In analyzing Hook's law we will define a pair of technical terms: *stress* and *strain*. *Stress* refers to the internal force created within a material as a result of the forces applied to it. If we take the force and divide it by the cross section of the area, we get an idea of the stress that a material can use to resist the force. *Strain* is the measure of how much a body is deformed by stress. A deformation can be produced by stretching, bending or twisting. If we change the length that is pulled divided by the original length, we can determine the factor of stress.

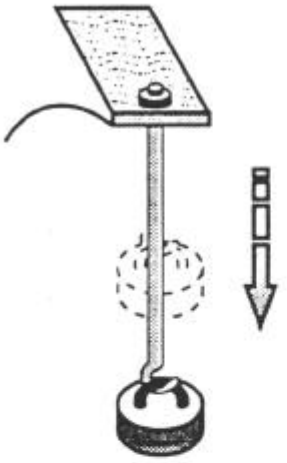
We may state Hook's law in a more useful way by saying that stress is proportional to strain. Thus stress divided by strain equals a constant of each substance. This is true within certain limits. If we stretch a wire too much, after a certain point, it will no longer return to its original length. This means that we have exceeded the elastic limit of the material. This modulous of the material will help us to understand.

We can show Young's modulous in certain known materials.

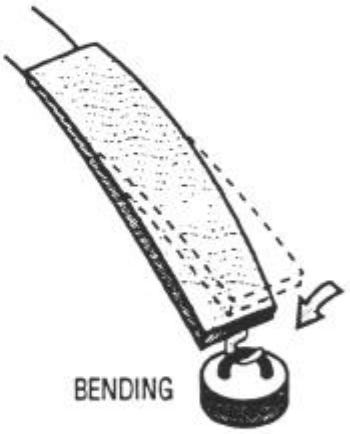
$$\frac{F/A}{\Delta l/l} = Y$$

Steel	**2×10^{12} dynes/cm^2**
Copper	**1×10^{12}**
Aluminum	**7×10^{11}**
Bone	**2×10^{11}**
Wood	**1×10^{11}**
Teeth	**3×10^{11}**
Cartilage	**$.9 \times 10^{11}$**
Ligaments	**$.9 \times 10^{11}$**

TYPES OF ELASTIC REACTIVITY

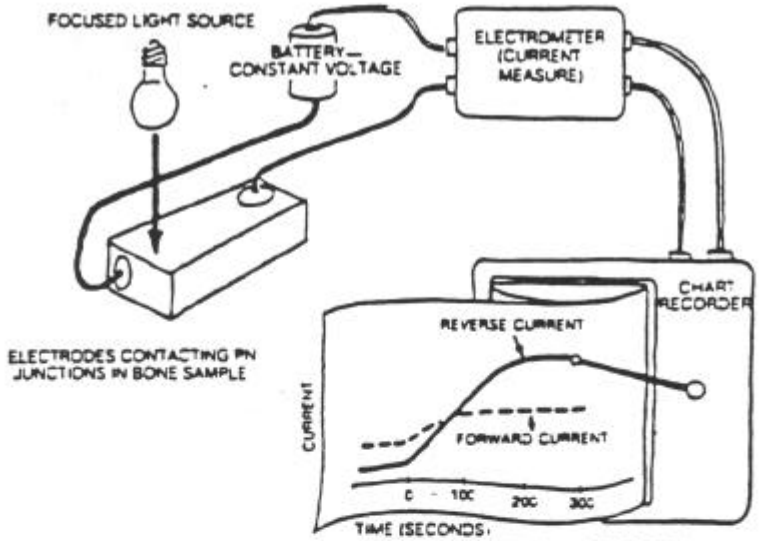


STRETCHING

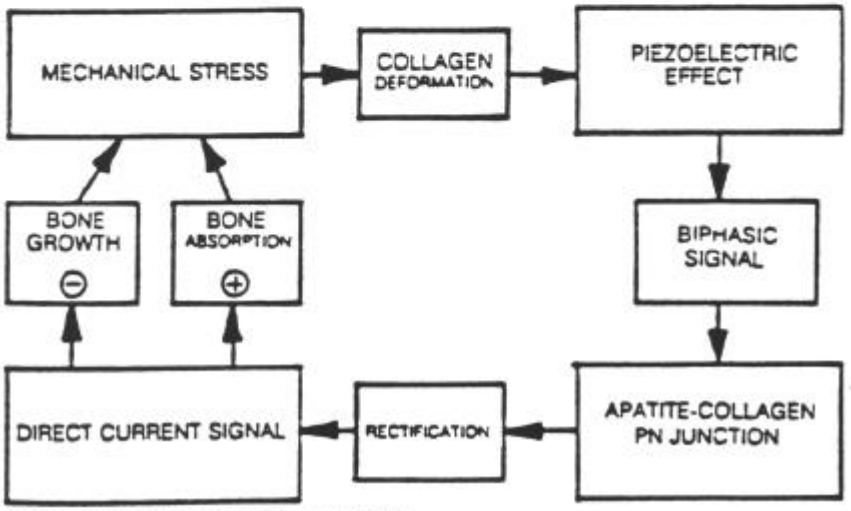


BENDING

TWISTING



THE LIGHT TEST CONFIRMS BONE'S ELECTRICAL SYSTEM



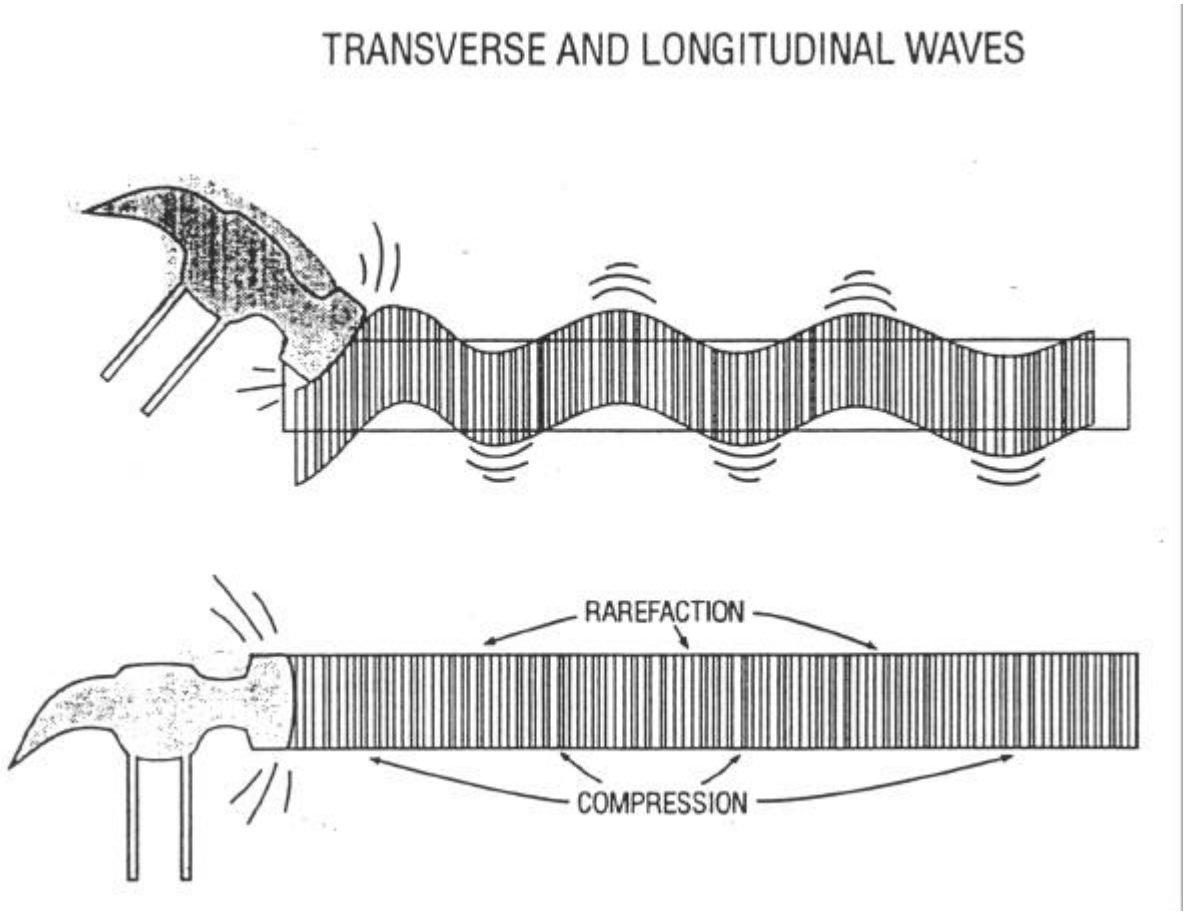
WOLFF'S LAW CONTROL SYSTEM

Now let us broaden our description into a procedure to analyze waves and wave pulses. We are now analyzing wave pulses through physical events. We are not talking about electron or photon waves; we are talking about the wave formations that will lead us into a development of sound. Sound will then be analyzed for its effect on the human body in medicine.

If we tie a rope to a wall and produce a simple wave by jerking the rope-holding hand from side to side, we can see that this wave will travel down the rope to the wall. It is easy to experiment with this, and to understand just how the waves travel the length of rope. If we increase the linear density, or substance of the rope, we will also see that it produces a slower wave. If we make a light rope, and get into a smaller linear density, it will produce a faster wave. The formula for velocity, tension and linear density can be related in the following way.

$$v = \sqrt{\frac{F}{m_c}}$$

We can see that there are many types of waves, such as the transverse and longitudinal wave. Examples of this are supplied below.

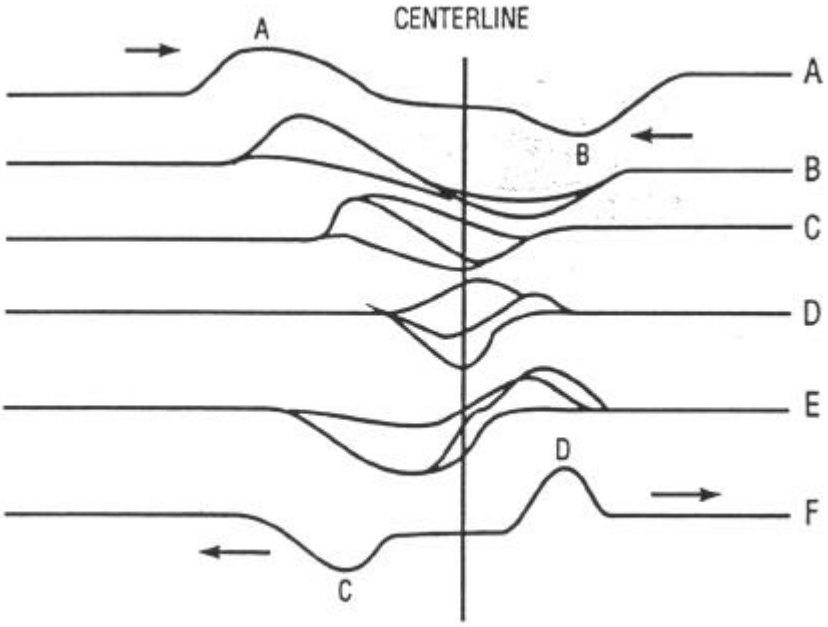


]

This wave is produced when the vibrating entity is oscillated from side to side. A longitudinal wave is achieved when there is compression and rarefaction of the material as the force is applied to the longitudinal side. Transverse waves travel at varying speeds. They depend on different characteristics of medium, resistance to bending of the transverse wave, and resistance to compression of the longitudinal wave.

Transverse waves can propagate only through solids because the transmission depends on the rigidity of the medium. Liquids and gases cannot transmit transverse waves easily. Longitudinal waves depend only on resistance to compression, and are propagated through any material medium because solids and gases will resist a change in volume. Sound is transmitted through longitudinal or compressed waves.

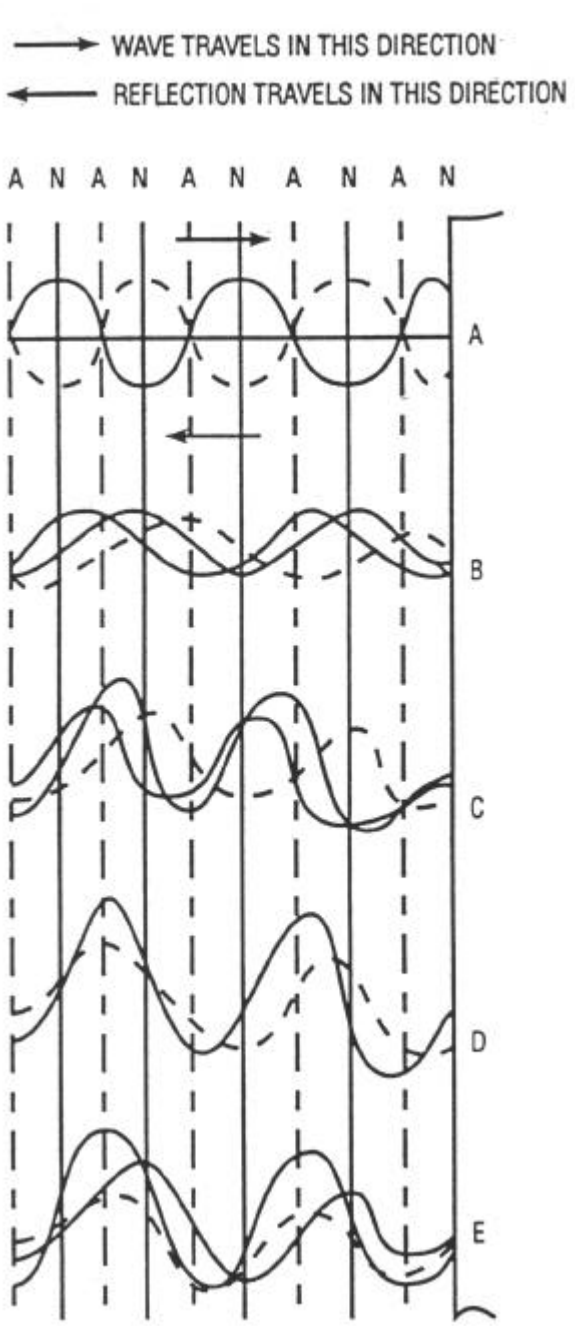
Interference and interaction of waves also can be calculated.



INTERFERENCE OF TWO PASSING WAVES

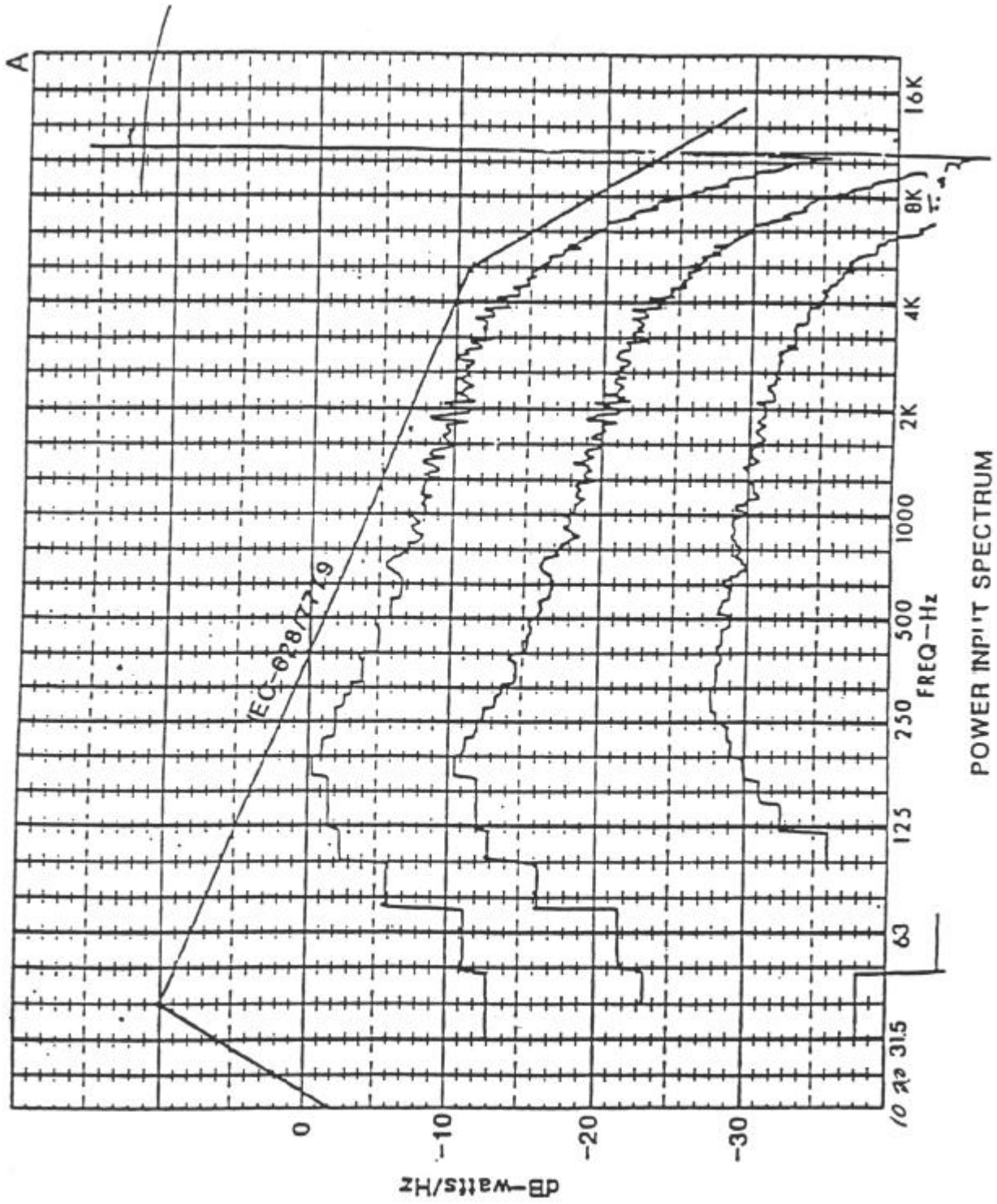
If we take our rope tied to the wall and produce a sine wave through it, we note that there are *nodes* and *anti-nodes* in the rope, which will help us to classify and measure the wavelength. A sine wave is produced when the nodes and anti-nodes are not moving, but remain in one spot. Musical instruments are produced if a standing wave continues to vibrate at a certain note. This is produced by clamping one end of the flexible material of the string, producing a standing wave whose oscillations rarefy and compress the air around it.

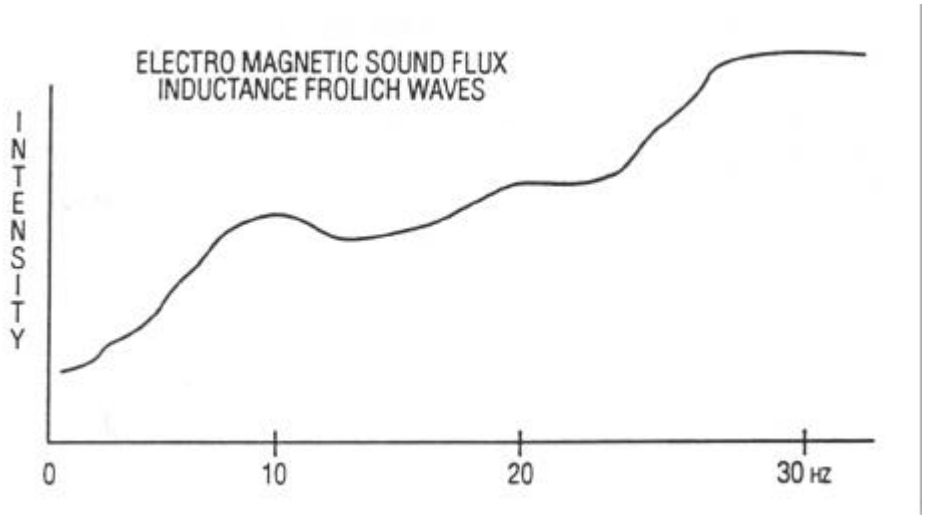
Vibrations of the longest wavelength and lowest frequency (since the frequency equals the velocity divided by the wavelength) produce the fundamentals in the vibration. In the figure below we see overtones of a fundamental.


WAVE TRAVELS IN THIS DIRECTION
REFLECTION TRAVELS IN THIS DIRECTION
A N A N A N A N A N
A
B
C
D
E

TYPES OF ENERGY

I.	Electro-static— friction standingg
II.	Electrolytic— chemical ionicc
III.	Electromagnetic induction Magnetic fields
IV.	Electromagnetic— light, heat (infrared), radio, etc.
V.	Heat conductivity— convectionn
VI.	Pressure— piezo-electric— soundnd
VII.	Viscosity (momentum)
VIII.	Nelson effect— interdimensional transfer through indeterminacy effect


A
16K
8K
4K
2K
1000
500
250
125
63
10 Hz 31.5
FREQ—Hz
0
-10
-20
-30
dB—watts/Hz
EQ-028/279
POWER INPUT SPECTRUM



Acoustical activity can be produced in linear systems. Destructive waves and also *constructive* waves can move through materials such as the human body. The purpose of our discussion here is to outline how sound and other wave frequencies can be utilized in the healing profession.

The speed of sound at sea level is roughly 1,100 feet per second. The speed of sound inside the human body is a little different. The velocity of sound is not appreciably changed by changes in pressure. We can justify this experimentally by comparing the transmission of the longitudinal waves of sound in air. Few transverse waves are transmitted in the rope. We should increase the speed with the compression or rarefaction, transmitted from one location in the gas to another location immediately adjacent, in the same way that increased tension speeds up the transmission of a transverse wave from one point in the rope to the next. Between the tension of the rope and the pressure of the gas is a great difference. Increased tension does not change the linear density of the rope enough to be of concern.

Air and other gases, however, are easily compressible. The increase of the pressure acts on the gas, reducing the volume; and therefore increases its density in direct proportion to the increase in pressure. Increasing pressure tends to speed sound velocity by increasing the springiness of the gas. Making the gas more dense increases the inertia of the gas enough to completely nullify the gain. Change in pressure usually has very little effect on the speed of sound. Temperature, however, tends to make the gas expand. If the gas is heated, it must expand and become less dense without changing the pressure. If the gas is confined so that it cannot expand, it will increase pressure while the density remains the same. We will now see that sound travels faster in warm gases or liquids than in cool. Sound will also travel more rapidly in hydrogen than in air, and slower in carbon dioxide.

The human ear can hear frequencies between 20 Hz and 20,000 Hz. The higher frequency limit is reduced. Humans only hear frequencies up to 10,000 Hz. Dogs and other animals can hear appreciably higher frequencies. Sound intensity is often measured in decibels. If we have a perfectly quiet surrounding, the faintest sound you can hear represents a very small amount of energy. If you hold up a finger inside a room with an audible sound, a fingernail measuring about 1 square cm. will be struck by sound waves representing an energy of about 10^{-16} joules per second. The human ear is sensitive to movement of one-half the radius of a helium atom.

The definition of decibels came from Alexander Graham Bell, with *deca* meaning the factor of 10 that was needed to represent the logarithmic description of sound intensity.

As we can see, the human being is very sensitive to vibrations of sound, as well as movement. Many vibrational massage techniques have been developed which utilize rhythmic vibrations made by the hand or machines to produce not only relaxing effects but also health-benefitting effects. The entire study of massage can be viewed as a form of vibrational medicine. Ultrasound techniques also must be looked upon as vibrational medicine. Many have speculated the possibility of derogatory effects from ultrasound techniques. This cannot be ruled out. Our development of vibrational science as it applies to biology and medicine will allow us to understand some of these areas more explicitly.

Sound also has its firm place in medicine. Songs are capable of producing different moods, and notes are capable of producing different effects as well. The science of sound in medicine is an ever-expanding one. One medical doctor has prescribed symphonies and classical pieces for a wide variety of mental states. He uses these treatments for melancholia, depression, schizophrenia, anxiety, stress, and a variety of other mental disorders.

In *The Natural Compendium* we list a variety of these sound vibrations that can be used in treatment of physical sickness. In this book, *Quantum Vibrational Medicine*, we merely must prove that there *is* an effect. The practical utilization of these theoretical aspects can be found in *The Natural Compendium of Diseases*.

SUMMARY

1. Here we show that the vibrations of sound affect biology, and the effects of the electrical and mechanical vibrations on the biological system. A medical Device could use these principles for diagnostics and healing such a device is the Quantum Med C.I.

2. Sound is another type of mechanical energy that can have intervening effects on biology. The types of energy are covered, as well as an introduction to the type of speaker system that will be used in developing our medical system.

Chapter 11

FOURIER OPTICS

Jean-Baptiste Joseph Fourier (1768-1830) was the one who recognized that periodic functions could be considered as the sums of various sine functions. Harmonic analysis is the basis of *Fourier optics*.

Fourier optics allows us to describe light waves based on harmonic analyses, using Fourier transforms and linear systems. A *Fourier transform* can be thought of as a curve fit, where we try to find out which curves go together to comprise complex waveforms. Fourier analysis allows us to take apart these complex waves, and look at their sinusoidal components.

This is very useful in many electronics settings, including communication systems, and it is proposed that there is a very good likelihood that these systems of Fourier analysis can be used in biology by living cells to communicate with each other and share information.

Let us now describe some basic ideas of Fourier transforms, and how they have been developed into certain biological medical devices for organism analysis.

The expansion of an arbitrary function of time is the basis of harmonic analysis. If we superimpose a harmonic function of time of various frequencies onto the cell of an integral, we can find the harmonic components that make up a wave. Harmonic functions have frequencies and complex amplitude; thus they go together in summation/additive ways, and also in negation and interference patterns to comprise complex waves. Thus each of these functions adds to the complexity of our understanding the time series.

We must know spatial frequencies to develop our Fourier analysis. We can put these into two-dimensional building blocks as a theory for our understanding. Our wavevector components in x, y and z will be labeled k for our discussion, and A is the complex constant. At points in the arbitrary plane $U(x,y,z)$ is a spatial harmonic function. In the $z = 0$ plane, for example, $U(x,y,0)$ is a harmonic function, where $f(x,y) = A \exp[-j2\pi(<x x + <y y)]$, where $<x = kx/2\pi$ and $<y = ky/2\pi$. These are the spatial frequencies, and kx and ky are the spatial angular frequencies in radians per mm. The one-to-one correspondence between the plane $U(x,y,z)$ and the spatial harmonic function $f(x,y) = U(x,y,0)$. This provides a spatial frequency and does not exceed the inverse wavelength of the proposition. Now we can analyze the two-dimensional x-y axes and their function, to understand the harmonic abilities.

It should be pointed out here that Fourier's technique was not a version of reductionism. In the Fourier analysis we are not trying to reduce a complex system to an approximation; we are trying to discover the curve fits and the actual waves that go into the composition of the other waves. We realize that we are statistically unable to be exact in graphing and sorting out the various waves.

But we are not looking for *reductionistic* techniques; we are looking for *comprising* techniques of how two different forms of a wave can get together to make a complexity. By understanding how these building blocks go into building complex analyses, we can then understand the various wavelengths, functions and vibrations of system, and how they interact. This is not to be seen as reductionism, where we try to approximate a situation. If we try to reduce a patient to a simple term of blood pressure, this is an approximation that is not comprised of all the various waves. If we were to use such a system in medicine as a Fourier analysis, we would break the patient's analysis down into blood pressure, serum levels of over a thousand variables, respiration rates, brain waves, etc. In other words, we would try to calculate the vast quantity of waves and vibrations that go into making up the patient, and in so doing we would not be doing reductionism; we would be doing complex analyses.

I. Electrostatic energy induced throughout the body by friction from the flow of blood, from the movement of muscles and tendons by the proprioceptive receptors and kinesthetic receptors for muscle tone and interoceptors for taste, smell, hunger, thirst, respiratory, circulatory, abdominal sensations, visceral pain, etc.; external friction being felt by exteroceptors of contact, etc.

II. Electrolytic induction from chemical changes and chemical reactions activate conduction in somatic exteroceptors for temperature, pain, chemical sensibility, pH balance, and visceral interoceptors for hunger, thirst, etc., pressure receptors, taste buds, temperature receptors, pain and tactile receptors for the sense of touch, etc. It has been estimated (Page 700 of Anatomy and Physics by Kimber, Stackpole and Leave, 13th Edition, 1958, Publ. by: The MacMillan Co.) that there are four million points for pain, 500,000 for pressure, 150,000 for cold, and 16,000 for warmth in the human body. The chemical changes themselves release electron energy into the system as is commonly taught in high school chemistry to move electrons into conduction bands.

III. Electromagnetic induction is seen by alteration of magnetic fields moving within the body when the nerves are moved from one position to another and where the body is constantly bombarded by electron waves from radio transmissions, house wiring, and other induction fields. Magnetic effects are represented by memories in the brain.

IV. Electromagnetic energy from light waves is received in the retina of the eyeball and transduced directly as electron energy through the optic nerves into the transformers wound in the brain, which cross and set up interference bands of refraction for resonance bands; conduction of electrons may then proceed for storage if required and may be released or charged up in hair, etc. Hair also exhibits and electrostatic charge.

V. Electromagnetic energy may be induced from heat produced by food, physiological oxidations, muscle exercise, fever; external stimuli such as the sun, sweat baths, electronic diathermy, heat lamps, etc.; heavy clothing, hot temperatures in the atmosphere, friction from working causing increased pulse, increased respirations, increased heart rate, toxins acting on the vasoconstricto centers, clogged lymphatics, malfunction of the liver, etc.

VI. Electromagnetic energy may be induced by pressure receptors such as somesthetic receptors, which are also concerned with touch, pain, position, temperature, movement, and visceral. Pressure may be induced by gravity, gas or pressure pains, temperature from expansion and contraction of parts of the body, osmotic pressure from the movement of fluids seeking concentrated chemical areas where water is about two thirds of body weight, chemical expansions of starch and other chemicals (starch, when confined, can exert 30,000 pounds per square inch pressure) when ionized with water and other solvents, changes in the constituents of protoplasm, diffusion, cell metabolism, electron contacts from frequency instruments and their transducers, etc.

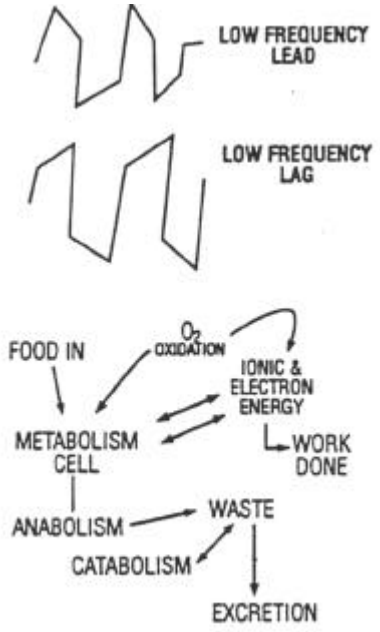


Table Frequency ranges and some psychological correlates of EEG waveforms.

0.0	flat line: death.
0.5- 3	delta: deep sleep.
4.0- 7	theta: drowsiness; creativity; relaxation.
8.0-13	alpha: relaxed wakefulness; receptivity.
12.0-14	sensorimotor rhythm: seizure control.

Table (continued)

14.0-28	beta: alert; problem solving; stress; anxiety; attention.
40.0	beta: short-term memory consolidation; problem solving; concentration.

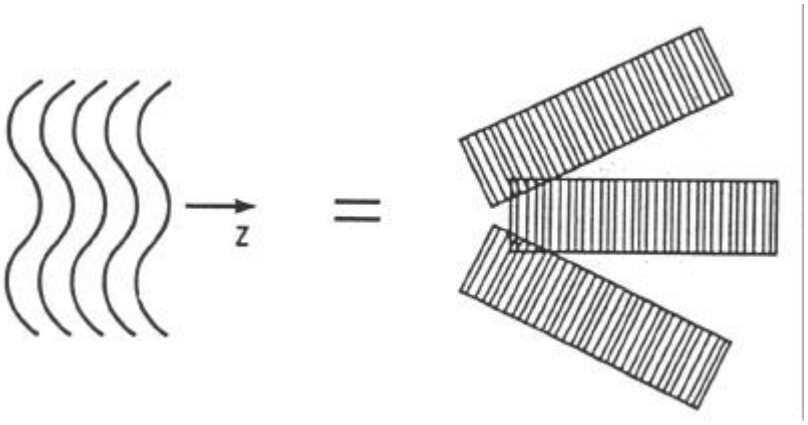
N.B. Frequency ranges are somewhat arbitrary and psychological correlates not identical from person to person.

In analyzing brain waves, the Fourier analysis can be helpful to determine certain ingrained patterns into the complex analyses. Each of the thousands of millions of cells in the brain has many synaptic clefts. It is the formation of these synaptic unions with other cells that account for our memories and our ability to learn.

As one neuron tries to fire into another through a synaptic cleft, this firing of the electromagnetic radiation, as well as the chemical spark across the neuron of the neurotransmitter, then has an electrical component. In each global area, where there are many different brain cells, we can put on an electrode and listen to the global electrical activity underneath it. This is kind of like putting a microphone above a city and listening for noise. We can tell when the city is or is not busy. We are not able to listen to one synaptic cleft or neuron. The global reactivity that happens in these areas seems to follow some type of yielded analysis that lends itself to a Fourier transform. When we exhibit beta waves we produce between 12 Hz. and 100 Hz. of a signal that is a jointed effect of the neurons underneath the electrode.

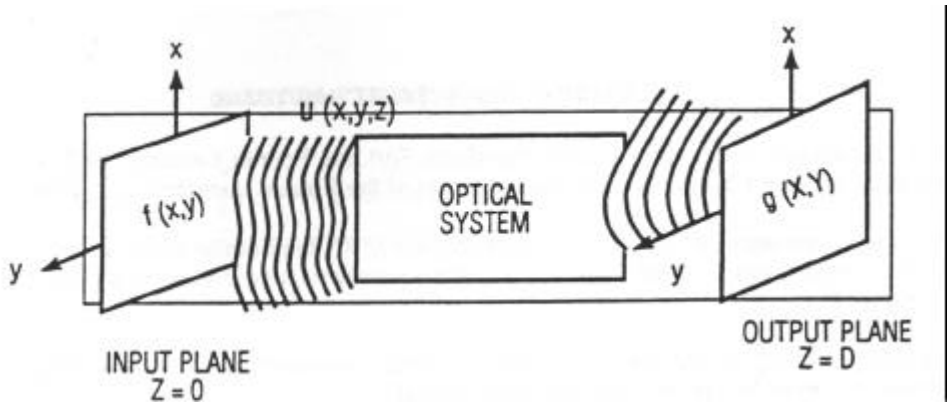
The overriding brain waves show us how these various neurons are firing. The beta waves between 12 Hz. and 100 Hz. are a reflection of the active mental thought of most people during the day, while they are discussing something with their friends or in the process of doing some work. If they become more introspective or relaxed, they can go into an alpha wave state, which is between 8 Hz. and 12 Hz. If they become more introspective still, they can go into a hypnogogic state. This would be reflective of a theta wave, between 4 Hz. and 8 Hz. If a person were to go into a deep sleep, then he would go into a delta wave state, 4 Hz. and below. At this stage people experience *paradoxical sleep*, where they exhibit beta waves and have rapid eye movements (REM).

These overriding brain waves show how the mitogenic radiation can contagiously spread across the brain, producing a type of ulterior rhythm. In the Fourier analysis of these rhythms we have discovered many other types of rhythms. There seem to be certain personality patterns that can be put into the body, as well as various addiction waves, demented waves, and other entities that can be measured with sophisticated brain wave equipment capable of Fourier analysis. These are Fourier analyses of the different polynomial functions that can be found inside the brain wave system.



Fourier analysis is so important in describing linear systems. Fourier analysis is useful in describing the propagation of light through linear optical components. These components could be free space, using a linear system approach.

Complex amplitudes in two planes normal to the optic *z* axis are regarded as input and output of the system. The linear system may be characterized by either its impulse response function or by its transfer function.



Our first description will be the idea of Fourier analysis in free space. Transfer function and impulse function of the free space then can be determined. This will allow us to calculate systems in biology with variant control factors.

The analysis of harmonic functions is very important for our bio-engineering. If a frequency and amplitude are known, then we can define a cosine function of the amplitude through a phase, and know the real parts of a wave. The variable *t* represents time, frequency is <, and units of cycle are known as Hz. Our harmonic functions are regarded as building blocks for more complex functions.

We can take these complex functions and break them down into simple components. To use this we might find

$$f(t) = \int_{-\infty}^{\infty} R(\nu) \exp(j2\pi\nu t)\, d\nu$$

Inverse Fourier Transform

and we also might be able to use

$$F(\nu) = \int_{-\infty}^{\infty} f(t) \exp(j2\pi\nu t)\, dt$$

f(<) is the Fourier transform, which is a function of time.

Our first equation above is a function of time, whereas the second equation is a function of frequency. If we take the absolute value of our function of time, *f*(*t*), and square it, this is called the *signal power*. If we take the absolute value of our function of frequency, *F*(<), and square it, this is the *energy spectral density*. If the energy spectral density (the absolute value of the function of the frequency squared) extends over a wide-frequency range, the signal is said to have a *wide bandwidth*.

Communication theory will involve these functions of time and frequency to allow us to know a signal and its time-domain representation. The function of frequency is known as the frequency domain representation, and the function of time is known as the time-domain representation.

Some important properties of Fourier transform are:

1. *Linearity*. The Fourier transform of the sum of two functions is the sum of their Fourier transforms.

2. *Scaling*. If *f*(*t*) has a Fourier transform *F*(<), and J is a real scaling factor, then *f*(*t*/J) has a Fourier transform *J**F*(J<). This means that if *f*(*t*) is scaled by a factor J, its Fourier transform is scaled by a factor 1/J. For example, if J > 1, then *f*(*t*/J) is a stretched version of *f*(*t*), whereas *F*(J<) is a compressed version of *F*(<). The Fourier transform of *f*(-*t*) is *F*(-<).

3. *Time Translation*. If *f*(*t*) has a Fourier transform *F*(<), the Fourier transform of *f*(*t* - J) is exp(-*j*2B<J)*F*(<). Thus delay by time J is equivalent to multiplication of the Fourier transform by a phase factor exp(-*j*2B<J).

4. *Frequency Translation*. If *F*(<) is the Fourier transform of *f*(*t*), the Fourier transform of *f*(*t*) exp(*j*2B<0*t*) is *F*(< - <0). Thus multiplication by a harmonic function of frequency <0 is equivalent to shifting the Fourier transform to a higher frequency <0.

5. *Symmetry*. If *f*(*t*) is real, then *F*(<) has Hermitian symmetry [i.e., *F*(-<) = *F**(<)]. If *f*(*t*) is real and symmetrical, then *F*(<) is also real and symmetrical.

6. *Convolution Theorem*. If the Fourier transforms of *f*1(*t*) and *f*2(*t*) are *F*1(<) and *F*2(<), respectively, the inverse Fourier transform of the product

$$F(\nu) = F_1(\nu)F_2(\nu)$$

is

$$f(t) = \int_{-\infty}^{\infty} f_1(\tau) f_2(t-\tau)\,d\tau \qquad \textit{Convolution}$$

The operation defined here is known as the convolution of *f*1(*t*) with *f*2(*t*). Convolution in the time domain is therefore equivalent to multiplication in the Fourier domain.

7. *Correlation Theorem*. The correlation between two complex functions is defined as

$$f(t) = \int_{-\infty}^{\infty} f_1^*(\tau) f_2(t+\tau)\,d\tau$$

Correlation

The Fourier transforms of *f*1(*t*), *f*2(*t*), and *f*(*t*) are related by

$$F(\nu) = F_1^*(\nu)F_2(\nu)$$

8. *Parseval's Theorem*. The signal energy, which is the integral of the signal power *f(t)*^{2}, equals the integral of the energy spectral density *F(<)*^{2}, so that

$$\int_{-\infty}^{\infty} |f(t)|^2 dt = \int_{-\infty}^{\infty} |F(\nu)|^2 d\nu$$

Parseval 's Theorem

There are other equations useful in our Fourier analysis. One is the *root-mean-square width* formula.

$$\sigma_t^2 = \frac{\int_{-\infty}^{\infty} (t - \quad)^2 f(t)\,dt}{\int_{-\infty}^{\infty} f(t)\,dt}, \text{ where } \bar{\tau} = \frac{\int_{-\infty}^{\infty} t f(t)\,dt}{\int_{-\infty}^{\infty} f(t)\,dt}$$

The *root-mean-square* spectral width is shown as

$$\sigma_\nu = \frac{1}{2\pi\sigma_t}$$

The duration-bandwidth reciprocity relation is

$$\sigma_t \sigma_\nu \geq \frac{1}{4\pi} \qquad \textit{Duration -Bandwidth Reciprocity Relation}$$

In quantum mechanics the position variable *x* cannot be known if we also know the momentum. Thus this duration-bandwidth reciprocity relation also has conversion factors, and can be put into

$$\sigma_x \sigma_p \geq \frac{\hbar}{2} \qquad \textit{Heisenberg Uncertainty Relation}$$

The power-equivalent width signal can be calculated by

$$\tau = \int_{-\infty}^{\infty} \frac{|f(t)|^2}{|f(0)|^2}\,dt$$

In evaluation of two-dimensional Fourier transforms we need to develop a slightly different equation where the function of *x* and *y* in two-dimensional space represents a spatial pattern. The harmonic function is treated as a building block from which other functions may be superimposed. The Fourier transform for this is

$$F(\nu_x, \nu_y) = \iint_{-\infty}^{\infty} f(x,y) \exp\left[j2\pi(\nu_x x + \nu_y y)\right] dx\,dy$$

Fourier Transform

Function	f (t)	F (v)
Uniform	1	$\delta(v)$
Impulse	$\delta(t)$	1
Rectangular	rect (t)	sinc (v)
Exponential	exp (- |t|)	$\frac{2}{1+(2\ v)^2}$
Gaussian	$\exp(-\pi t^2)$	$\exp(-\pi v^2)$
Chirp[8]	$\exp(j\pi t^2)$	$e^{j\pi/4}\exp(-j\pi v^2)$
Sum of M = 25 + 1 impulses	$\sum_{\pi=-s}^{s}\delta(t\pi)$	$\frac{\sin(M\pi v)}{\sin(\pi v)}$
Infinite sum of impulses	$\sum_{\pi=-\infty}^{\infty}\delta(t-\pi)$	$\sum_{\pi=-\infty}^{\infty}\delta(v-\pi)$

and its inverse Fourier transform is

$$f(x,y) = \int\int_{-\infty}^{\infty} F(\nu_x, \nu_y) \exp[-j2\pi(\nu_x x + \nu_y y)]\, d\nu_x d\nu_y$$

Inverse Fourier Transform

The properties of these two-dimensional equations can be:

Convolution Theorem. If $f(x,y)$ is the two-dimensional convolution of two functions $f_1(x,y)$ and $f_2(x,y)$ with Fourier transforms $F_1(<x,<y)$ and $F_2(<x,<y)$, respectively, so that

$$f(x,y) = \int\int_{-\infty}^{\infty} f_1(x'y') f_2(\nu_x, \nu_y),$$

then the Fourier transform of $f(x,y)$ is

$$F(\nu_x, \nu_y) = F_1(\nu_x, \nu_y) F_2(\nu_x, \nu_y).$$

Thus, as in the one-dimensional case, convolution in the space domain is equivalent to multiplication in the Fourier domain.

2. *Separable Functions*. If $f(x,y) = fx(x)fy(y)$ is the product of one function of x and another of y, then its two-dimensional Fourier transform is a product of one function of <x and another of <y. The two-dimensional Fourier transform of $f(x,y)$ is then related to the product of the one-dimensional Fourier transforms of $fx(x)$ and $fy(y)$ by $f(<x<y) = fx(-<x)fy(-<y)$. For example, the Fourier transform of $*(x - x_0)*(y - y_0)$, which represents an impulse located at (x_0,y_0), is the harmonic function $\exp[j2B(<xx_0 + <yy_0)]$; and the Fourier transform of the Gaussian function $\exp[-B(x^2 + y^2)]$ is the Gaussian function $\exp[-B(< + <)]$; and so on.

3. *Circularly Symmetrical Functions*. The Fourier transform of a circularly symmetrical function is also circularly symmetrical. For example, the Fourier transform of

$$f(x,y) = \begin{cases} 1, & (x^2 + y^2)^{1/2} \le 1 \\ 0, & \text{otherwise,} \end{cases}$$

denoted by the symbol circ(x,y) and known as the *circ function*, is

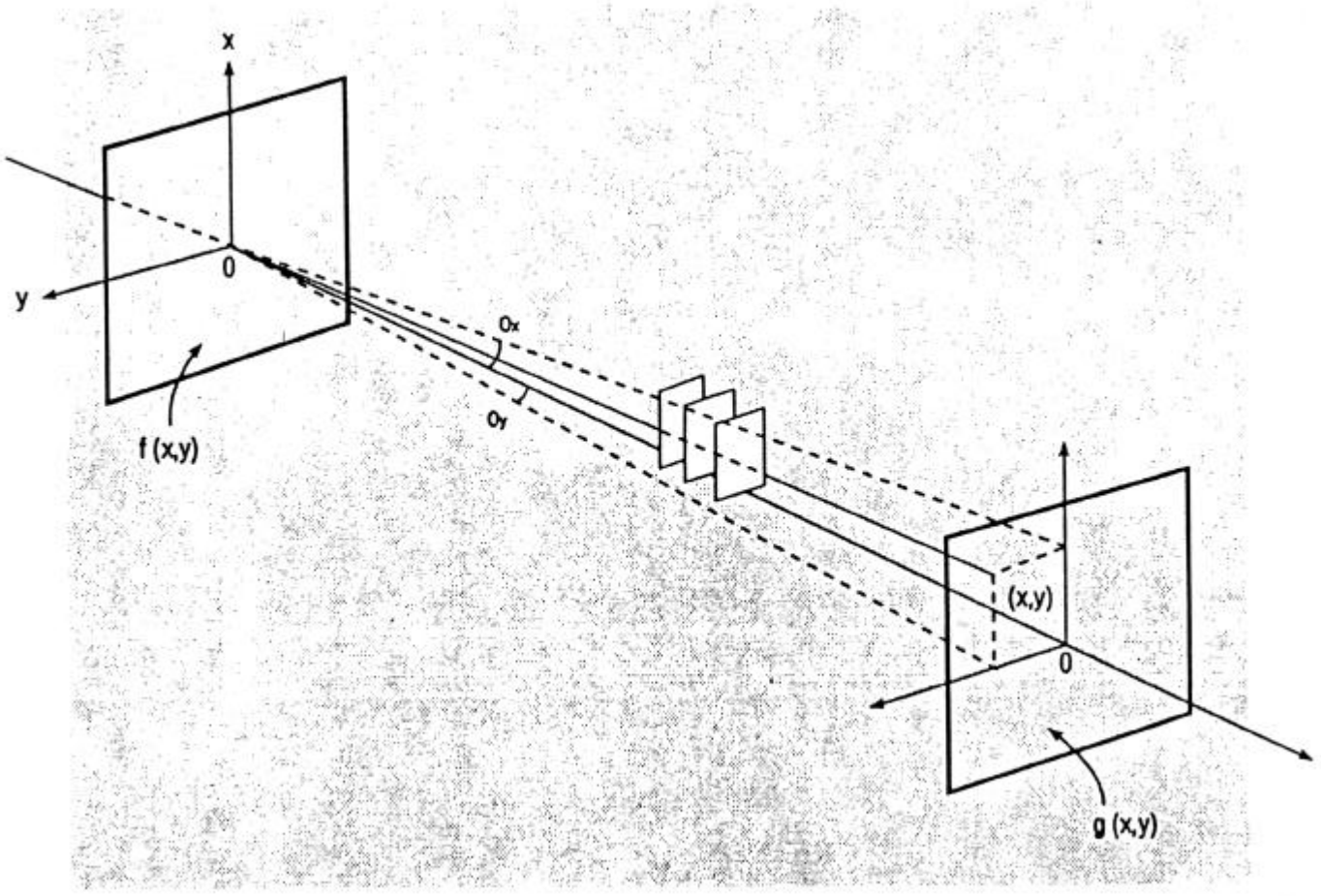
$$F(\nu_x, \nu_y) = \frac{J_1(2\pi\nu_\rho)}{\nu_\rho}, \qquad \nu_\rho = (\nu_x^2 + \nu_y^2)^{1/2}$$

where J_1 is the Bessel function of order 1. These functions are illustrated on page 210.

Now let us return to the Fourier system. If there is a far field, if our distance is sufficiently long, we will find that the plane wave that contributes at a complex angle is only the x-y, or up and down, output. We do not have to consider z if the distance is long. Here we have

$$g(x,y) = h_0 F\left(\frac{x}{\lambda d}, \frac{y}{\lambda d}\right)$$

Free-Space Propagation
(Fraunhofer Approximation)


x
y
0
f (x,y)
θx
θy
(x,y)
0
g (x,y)

There is a condition for this validity where we take the Fresnel number, which must be less than 1. If the Fresnel number is small, then the *Fraunhofer approximation* is valid.

In the Fraunhofer approximation the complex amplitude $g(x,y)$ of a wave of wavelength 8 in the z = d plane is proportional to the Fourier transform $f(<x,<y)$ of the complex amplitude $f(x,y)$ in the z = 0 plane, evaluated at the spatial frequencies <x = x/8d and <y = y/8d. The approximation is valid if $f(x,y)$ is confined to a circle of radius b satisfying, b2/8d « 1, and at points in the output plane within a circle of radius a satisfying a2/8d « 1.

Living cells must do Fourier analysis as well. This is part of the biological matrix and a function of the DNA, as we must take in wave forms and analyze them for their Fourier analysis by breaking up the signal and attaining the information in the signal versus the normal background noise factor behind most signals.

The neurological system and the brain will also need to do Fourier analysis. The reticular formation sits in the midbrain area, and must filter out signals from all the sensory inputs of the body. The human can then attend to whatever signal he wants to. He can then attend to a visual or sound signal, and block out others. The reticular formation then has to do a complicated Fourier analysis to be able to syphon out the various signals and provide them to only the attentive areas of the brain. The process of biological Fourier transforms offers profound implications for biology.

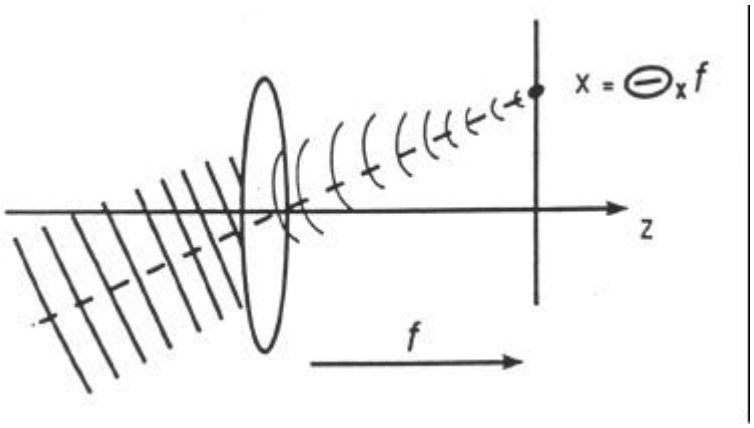
In biology the use of the pupil to focus external light and allow the human to draw an image into the back of the eye is extremely important to understand and analyze. In this treatise we are not analyzing the physics of the pupil or vision; we are analyzing some of the mitogenic radiation capacities. For a deeper analysis we think the reader should be directed to the field of optics to understand some of the visual pathway information.

To understand holography we now can look at just what a holographic image might be.

Holography involves the recording and reconstruction of optical waves. A *hologram* is a transparency containing a coded record of the optical wave.

Consider a monochromatic optical wave whose complex amplitude in some plane, say the z = 0 plane, is Uo(x,y). If, somehow, a thin optical element (call it a transparency) with complex amplitude transmittance $t(x,y)$ equal to Uo(x,y) were able to be made, it would provide a complete record of the wave. The wave could then be reconstructed simply by illuminating the transparency with a uniform plane wave of unit amplitude traveling in the z direction. The transmitted wave would have a complex amplitude in the z = 0 plane $U(x,y) = 1 \cdot t(x,y) = U$o($x$,$y$). The original wave would then be reproduced at all points in the z = 0 plane, and therefore reconstructed everywhere in the space z > 0.

As an example, we know that a uniform plane wave traveling at an angle 2 with respect to the z axis in the x-z plane has a complex amplitude Uo(x,y) = exp[-jk sin2 x]. A record of this wave would be a transparency with complex amplitude transmittance $t(x,y)$ = exp[-jk sin2 x]. Such a transparency acts as a prism that bends an incident plane wave exp(-jkz) by an angle 2, thus reproducing the original wave.

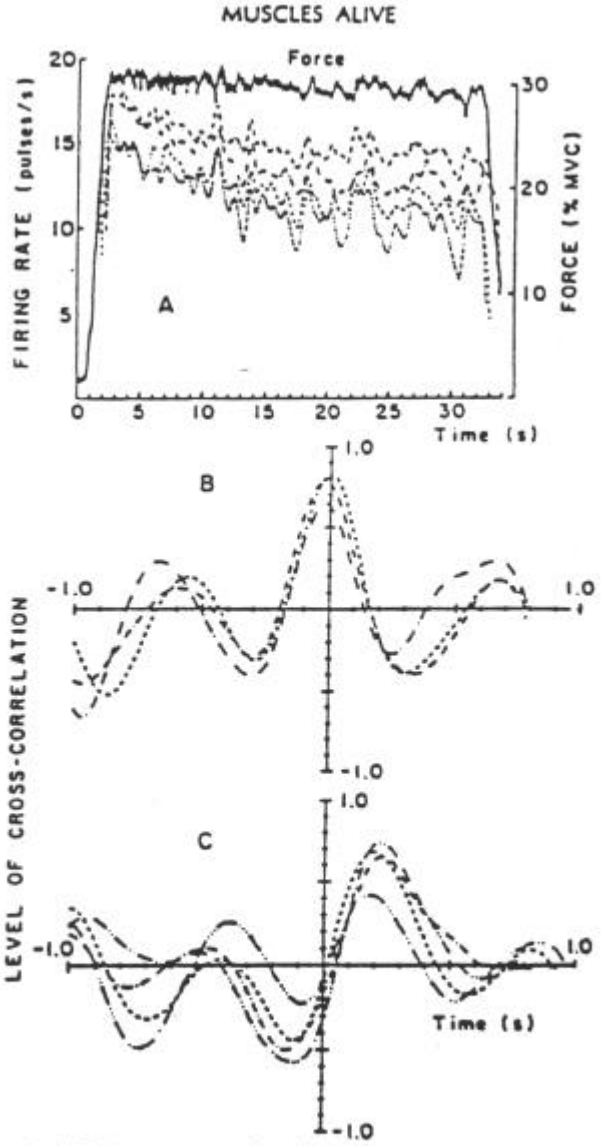


Mechanisms of Immune Injury

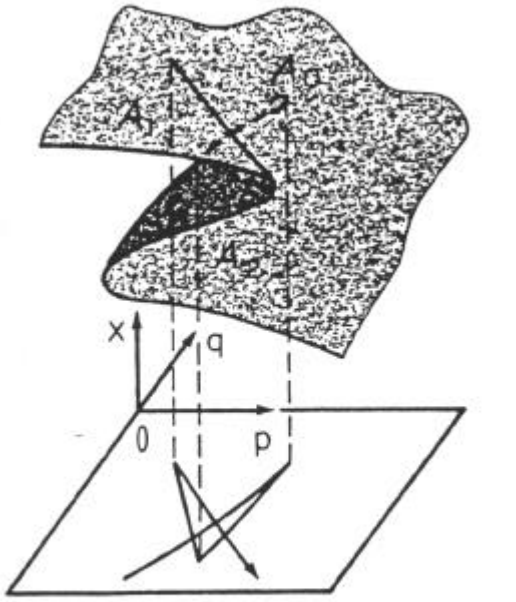
Mechanism	Immune Reactant	Accessory Component	Skin Reaction	Protective Function	Examples of Protection	Pathologic Mechanism	Disease States
Neutralization	IgG antibody			Inactivate toxins	Tetanus, diphtheria	Inactivation of biologically active molecules or cell surface receptors	Insulin-resistant diabetes, myasthenia gravis hyperthyroidism (LATS)
Cytotoxic or Cytolytic	IgM > IgG antibody	Complement, Macrophages		Kill bacteria	Bacterial infections	Cell lysis or phagocytosis (opsonization)	Hemolytic anemias, vascular purpura, transfusion reactions, erythroblastosis fetalis
Toxic complex	IgG antibody	Complement, Polymorphonuclear leukocytes	Arthus peaks in 6 hrs by 24 hr	Mobilize neutrophils to sites of infection	Bacterial and fungal infections	Polymorphonuclear leukocytic infiltrate—release of lysosomal enzymes	Glomerulonephritis, vasculitis, arthritis, rheumatoid diseases
Anaphylactic	IgE antibody	Mast cells, Mediators; End organ cells	Cutaneous anaphylaxis peaks in 15–30 min, fades in 2-3 hr Hives	Open vessels to deliver blood components to sites of inflammation	Helminthic infections	Bronchoconstriction, edema, shock	Anaphylactic shock, hives, asthma, hay fever, insect bites
Delayed hypersensitivity	T_h and T_D cells	Lymphokines, Macrophages	Delayed (tuberculin) peaks in 24–48 hr	Kills organisms, virus infected cells	Viral, fungal, mycobacterial infections	Mononuclear cell infiltrates, target cell killing	Viral skin rashes, graft rejection, autoallergic diseases; demyelination
Granulomatous	T_D cells	Macrophages (epithelioid and giant cells)	Granulomas (weeks)	Isolation of infectious agents	Leprosy, tuberculosis	Replacement of tissue by granulomas	Sarcoidosis, beryllium, tuberculosis

Power-Frequency Magnetic Fields of Household Appliances

Range	*Appliance*
10–25 gauss	Soldering gun Hairdryer
5–10 gauss	Can opener Electric shaver Kitchen range
1–5 gauss	Food mixer TV
0.1–1.0 gauss	Clothes dryer Vacuum cleaner Heating pad
0.01–0.1 gauss	Lamp Electric iron Dishwasher
0.001–0.1 gauss	Refrigerator



(*A*) Firing-rate records of four concurrently active motor units (*dashed lines*) are shown superimposed on the force output (*continuous line*) recorded during a constant-force isometric abduction of the deltoid. The force level is given in percent of maximal voluntary contraction (MVC) at *right*. (*B*) Functions obtained by cross-correlating between firing rates. (C) Functions obtained by cross-correlating between firing rates and force output. Positive shift of peaks in C indicates that firing-rate activity leads force output. (From C.J. De Luca et al, © 1982b, *Journal of Physiology*.)



A butterfly-type catastrophe

The question is how to make a transparency $t(x,y)$ from the original wave $U_o(x,y)$. One key impediment is that optical detectors, including the photographic emulsions used to make transparencies, are responsive to the optical intensity, $*U_o(x,y)*2$, and are therefore insensitive to the phase $\arg\{U_o(x,y)\}$. Phase information is obviously important and cannot be disregarded, however. For example, if the phase of the oblique wave $U_o(x,y) = \exp[-jk \sin 2\ x]$ were not recorded, neither would the direction of travel of the wave. To record the phase of $U_o(x,y)$ a code must be found that transforms phase into intensity. The recorded information could then be optically decoded in order to reconstruct the wave.

The Holographic Code

The holographic code is based on mixing the original wave (hereafter called the *object wave*) *U*o with a known *reference wave U*r and recording their interference pattern in the $z = 0$ plane. The intensity of the sum of the two waves is photographically recorded and a transparency of complex amplitude transmittance t, proportional to the intensity, is made.

In biology a single cell contains the code of the entire organism. This is not just a chemical process, but a holographic reflection of an organized wave pattern. By applying our energetic mathematics of holography we can see the field generation of the holography of the biological organism. Biology and medicine are presently locked in a chemistry model, which is inadequate for the prediction or description of life.

Now let us return to our mathematical discourse. The transmittance of the hologram is therefore given by

$$\begin{aligned} t &\alpha |U_0 + U_r|^2 + |U_r|^2 + |U_0|^2 + U_r^* U_0 + U_r U_0^*, \\ &+ I_r + I_0 + U_r^* U_0 + U_r U_0^*, \\ &+ I_r + I_0 + 2(I_r I_0)^{1/2} \cos [\arg \{U_r\} - \arg \{U_0\}], \end{aligned}$$

where *I*r and *I*o are, respectively, the intensities of the reference wave and the object wave in the $z = 0$ plane.

The transparency, called a *hologram*, clearly carries coded information pertinent to the magnitude and phase of the wave *U*o. In fact, as an interference pattern the transmittance t is highly sensitive to the difference between the phase of the two waves.

To decode the information in the hologram and reconstruct the object wave, the reference wave *U*r is again used to illuminate the hologram. The result is a wave with complex amplitude

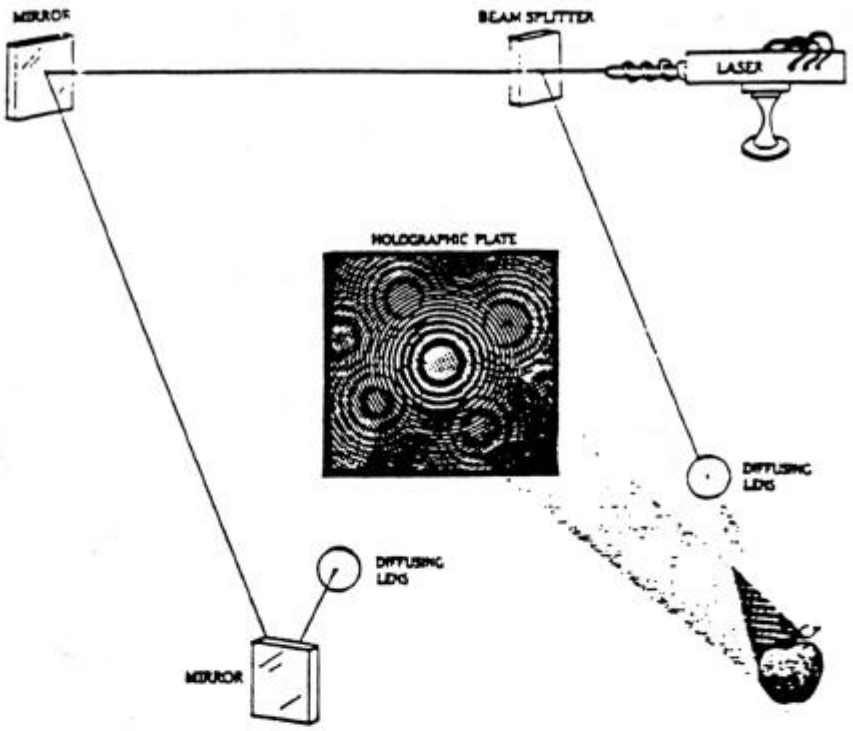
$$U + tU_r \alpha U_r I_r + U_r I_0 + I_r U_0 + U_r^2 U_0^*$$

in the hologram plane $z = 0$. The third term on the right-hand side is the original wave multiplied by the intensity *I*r of the reference wave. If *I*r is uniform (independent of x and y), this term constitutes the desired reconstructed wave. But it must be separated from the other three terms. The fourth term is a conjugated version of the original wave modulated by *U*r2. The first two terms represent the reference wave, modulated by the sum of the intensities of the two waves.

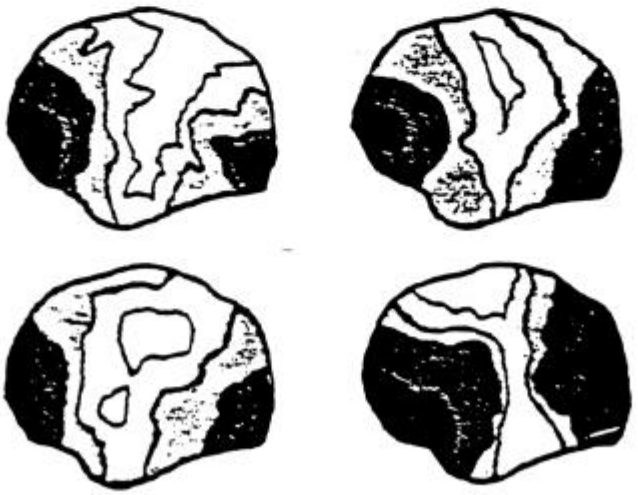
If the reference wave is selected to be a uniform plane wave propagating along the z axis, $I_r^{1/2} \exp(-jkz)$, then in the $z = 0$ plane $U_r(x,y) = I_r^{1/2}$ is a constant independent of x and y. Dividing by $U_r = I_r^{1/2}$ gives

$$U(x,y) \alpha I_r + I_0(x,y) + I_r^{1/2} U_0(x,y) + I_r^{1/2} U_0^*(x,y)$$

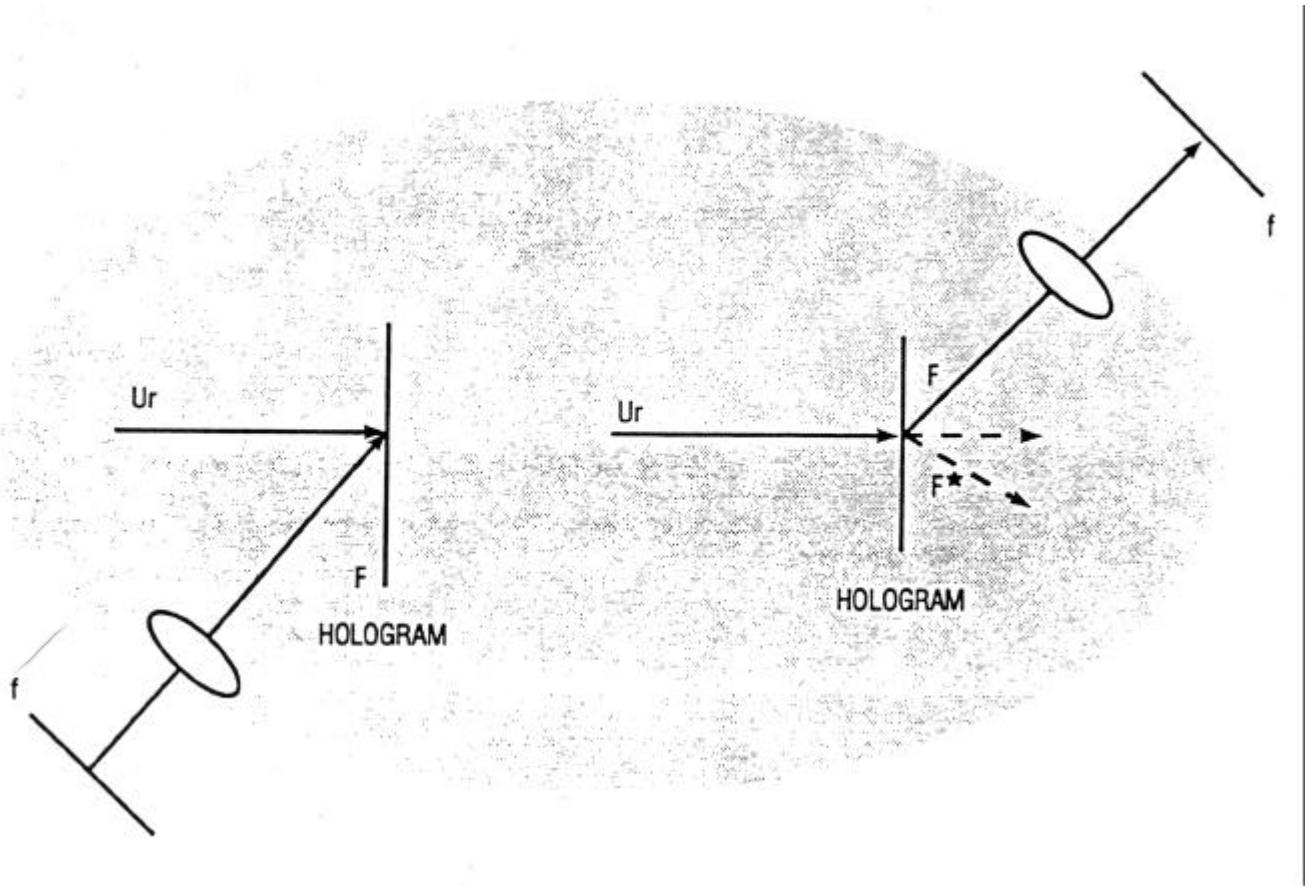
Reconstructed Wave in Place of Hologram

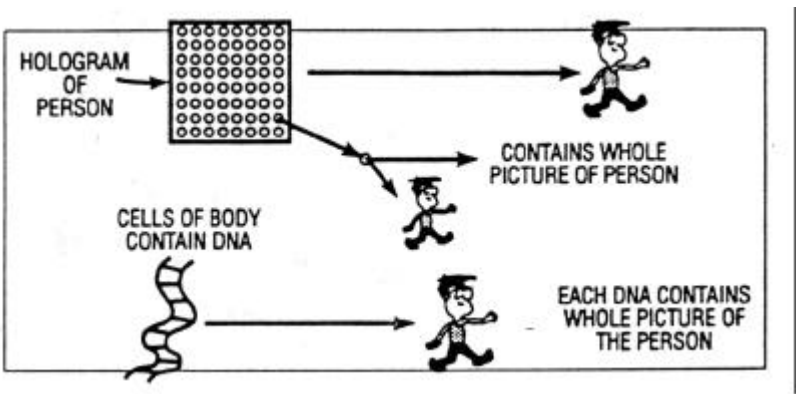


A hologram is produced when a single laser light is split into two separate beams. The first beam is bounced off the object to be photographed, in this case an apple. Then the second beam is allowed to collide with the reflected light of the first, and the resulting interference pattern is recorded on film.



The brain-wave patterns of four subpersonalities in an individual suffering from multiple personality disorder. Is it possible that the brain uses holographic principles to store the vast amount of information necessary to house dozens and even hundreds of personalities in a single body? (Redrawn by the author from original art in an article by Bennett G. Braun in the *American Journal of Clinical Hypnosis*)





The significance of the various terms in the above equation and the methods of extracting the original wave (the third term), are clarified by means of a number of examples.

To use a Fourier transform in holography we need to account for the function of the lens, both on the drawing of the hologram and on its recovery.

Cellular biology must use Fourier transforms, be able to handle the information coming and decipher it from background noise. Multicellular organisms must have superior abilities to transform the information coming into its focused sensory input. Thus a frog sitting on a pad must do a transform of its information to see the bug it wishes to eat.

In our development of biology we also must perform Fourier transforms on the body and compare the normal versus diseased patterns, but also to see and measure how well the body can perform its own transform analyses through its sensory input. Much of this is covered in *Physical Diagnosis* by Dr. Nelson, in which we ascertain how the wide variety of input signals into the brain can be measured and diseased conditions of the transform abilities of the brain can be cataloged and ascertained.

This will be profoundly important for our energetic medicine, as the smallest of transforms can help to tell us about the vibrational ability of the body to maintain health and wellness.

Vibrational medicine will result from an understanding of the complexity of the many different dimensions and vibrational entities the human body must be able to deal with successfully. These vibrations merge into other patterns, such as circadian rhythms, ultraradium rhythms, heart rate, brain waves; the list goes on. These are culminations of some very basic simple frequencies, which when compiled upon each other, produce dramatic effects.

SUMMARY

1. Here we introduce the basic understanding of Fourier analysis, which will allow us to apply curve fit techniques to understanding the electrical impulses read from the body.

2. We show how a system is able to apply mathematical Fourier analyses to developing the curve fit proposals that will see reactivity of the brain with various homeopathic substances.

3. In our understanding of Fourier analysis it is important to point to our electrical devices, which are able to chart overall variances in activity. This points toward phase and frequency distortion.

4. By going over the important properties of Fourier transforms such as linearity, scaling, time translation, frequency translation, symmetry convolution theories, correlation theorem, and Parseval's theorem, we can gain an understanding of how a system uses these various Fourier analyses mathematically to isolate various waveforms and bring them into an understanding of biology.

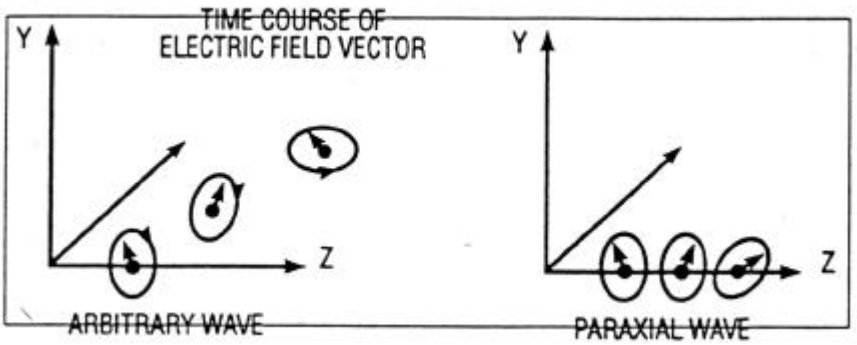
5. Biology must use Fourier transforms to take in various interactions of waveforms and transduce them into other signals for the cell or the organism to exist.

6. The concept of holography is introduced, and how holographic storage can help us to understand how the biological system of the body catalogues and stores data. This will broaden our understanding of DNA function as well.

Chapter 12

POLARIZATION OF LIGHT

The time course of the direction of the electric field vector determines the polarization of light. For monochromatic light we have three components of the electric field vector. They vary in a sinusoidal way with time. These three components will have amplitude and phases that are usually dissimilar. Each position will have an end vector in the electric field vector. This will move in a plane and trace an ellipse.



The orientation of the plane of the vector and often the shape of the ellipse will vary with the position in the three-dimensional space.

In the case of paraxial optics light will vary along the directions that lie within a narrow cone. This cone will be centered about the optical axis, known as the *z* axis. The waves are approximate to the transverse electromagnetic (TEM). The electric field vector lies in close approximation to the transverse plane (the *x*-*y* plane). This is illustrated in the above figure.

In an isotropic medium the polarization ellipse is approximately the same everywhere, and the wave is then pronounced to be *elliptically polarized*. The size of the ellipse is determined by its optical intensity. The orientation and degree of ellipticity of the ellipse is determined by the state of polarization of the optical wave. A *linearly polarized* or *circularly polarized* wave happens when the ellipse degenerates into a straight line or becomes a circle.

Polarization is very important for the interaction of light with the medium.

1. The amount of light reflected at the boundary between two materials depends on the polarization of the incident wave.

2. The amount of light absorbed by certain materials is polarization-dependent.

3. The light scattering from matter is generally polarization-sensitive.

4. The refractive index of anisotropic materials depends on the polarization. Waves with different polarization travel at different velocities and undergo different phase shifts. The polarization ellipse is modified as the wave advances.

5. The so-called optically active materials have a natural ability to rotate the polarization plane of literally polarized light.

In the presence of a magnetic field most materials rotate the polarization. When arranged in certain configurations liquid crystals also act as polarization rotators. In a monochromatic plane wave with a frequency travelling in a *z* direction with velocity of light, the electric field is described by

$$\mathcal{E}(z,t) = Re\left\{A\left[\exp j2\pi\nu\left(t - \frac{z}{c}\right)\right]\right\}$$

The complex envelope is

$$A = A_x x + A_y y$$

There are vector components *A*x and *A*y that describe the polarization of the wave.

To determine the polarization of the ellipse we use

$$\mathcal{E}(z,t) = \mathcal{E}_x x + \mathcal{E}_y y$$

where

$$\mathcal{E}_x = a_x \cos\left[2\pi\nu\left(t - \frac{z}{c}\right) + \varphi_x\right]$$

$$\mathcal{E}_y = a_y \cos\left[2\pi\nu\left(t - \frac{z}{c}\right) + \varphi_y\right]$$

Thus the *x* and *y* components of the electric field vector can be calculated. The parametric equations of the ellipse are

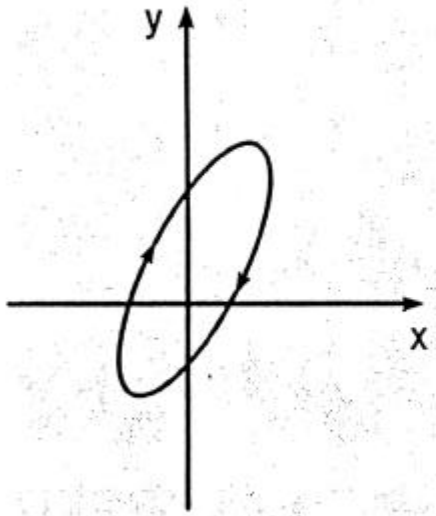
$$\frac{\mathcal{E}_x^2}{a_x^2} + \frac{\mathcal{E}_y^2}{a_y^2} - 2\cos\varphi\,\frac{\mathcal{E}_x\mathcal{E}_y}{a_x a_y} = \sin^2\varphi$$

Linearly Polarized Light

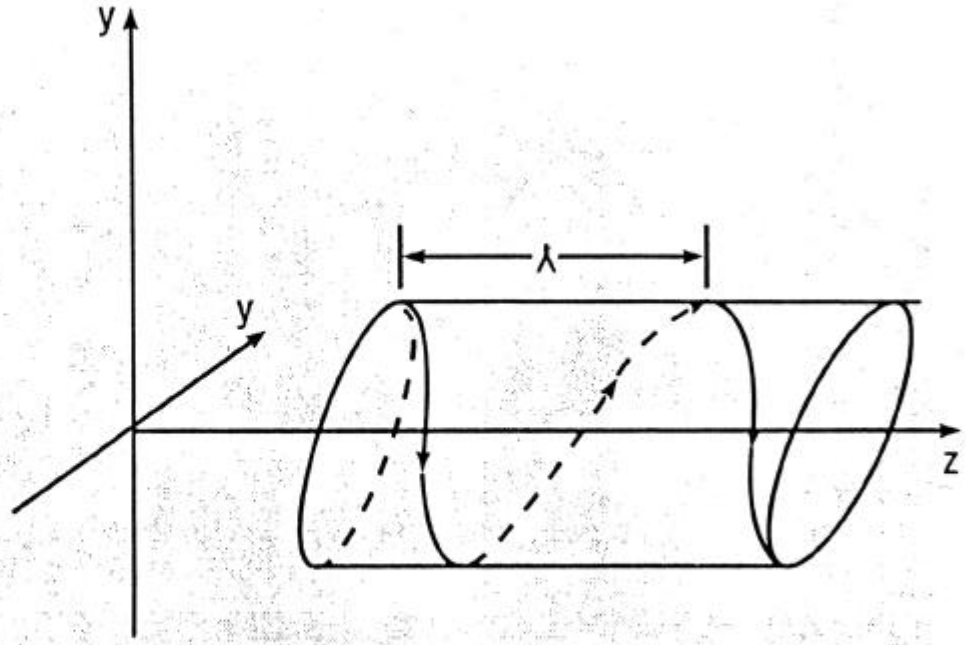
If one of the components vanishes (ax = 0, for example), the light is linearly polarized in the direction of the other component (the *y* direction). The wave is also linearly polarized if the phase difference n = 0 or B, since the illustration gives õy = ±(ay/ax)õx, which is the equation of a straight line of slope ±ay/ax (the + and - signs correspond to n = 0 or B, respectively). In these cases the elliptical cylinder collapses into a plane, also illustrated below. The wave is therefore also said to have *planar polarization*. If ax = ay, for example, the plane of polarization makes an angle 45E with the *x* axis. If ax = 0, the plane of polarization is the *y*-*z* plane.

Circularly Polarized Light

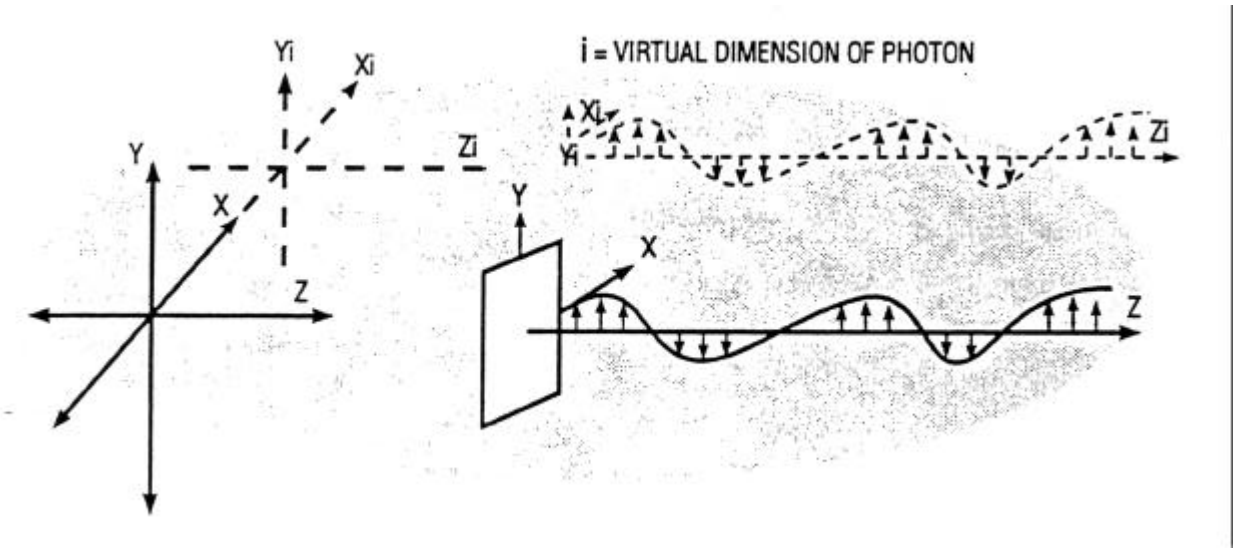
If n = ±B/2 and ax = ay = a0, gives õx = a_0 cos[2B<(*t* - *z*/*c*) + n_x] and õy = a_0 sin[2B<(*t* - *z*/*c*) + n_x], from which õ + õ = a, which is the equation of a circle. The elliptical cylinder in Fig. 6.1-1(*b*) becomes a circular cylinder and the wave is said to be circularly polarized. In the case n = +B/2 the electric field at a fixed position *z* rotates in a clockwise direction when viewed from the direction towards which the wave is approaching. The light is then said to be *right circularly polarized*. The case n = -B/2 corresponds to counterclockwise rotation and *left circularly polarized* light. In the right circular case, a snapshot of the lines traced by the endpoints of the electric-field vectors at varying positions is a right-handed helix (like a right-handed screw pointing in the direction of the wave). For left circular polarization a left-handed helix is followed. The biophoton exhibits these types of criteria.



ROTATION OF THE ENDPOINT OF THE FIELD ELECTRIC VECTOR IN *XY* PLANE



TRAJECTORY OF ENDPOINT OF THE ELECTRIC FIELD VECTOR AT A FIXED POINT IN TIME *T*



Matrix Representation

The Jones Vector

A monochromatic plane wave of frequency < traveling in the *z* direction is completely characterized by the complex envelopes $A_X = a_X \exp(jnx)$ and $A_Y = a_Y \exp(jny)$ of the *x* and *y* components of the electric field. It is convenient to write these complex quantities in the form of a column matrix

$$J = \begin{bmatrix} A_x \\ A_y \end{bmatrix},$$

known as the *Jones vector.* Given the Jones vector, we can determine the total intensity of the wave, $I = (*Ax*^2 + *Ay*^2)/20$, and use the ratio $a_y/a_x = *A_y*/*A_x*$ and the phase difference $n = n_y - n_x = \arg\{A_X\}$ to determine the orientation and shape of the polarization ellipse.

The intensity in each case has been normalized so that $*A_X*^2 + *A_y*^2 = 1$ and the phase of the *x* component
$n_x = 0$.

Since we are able to present our waves in the Jones vector, we can now develop the *Jones matrix*

$$T = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$$ *Linear Polarizer Along x Direction*

giving us the *linear polarizer*.

LINEARLY POLARIZED WAVE IN *X* DIRECTION

$$\begin{bmatrix} 1 \\ 0 \end{bmatrix}$$

LINEARLY POLARIZED WAVE PLANE OF POLARIZATION IN ANGLE θ WITH *X* AXIS

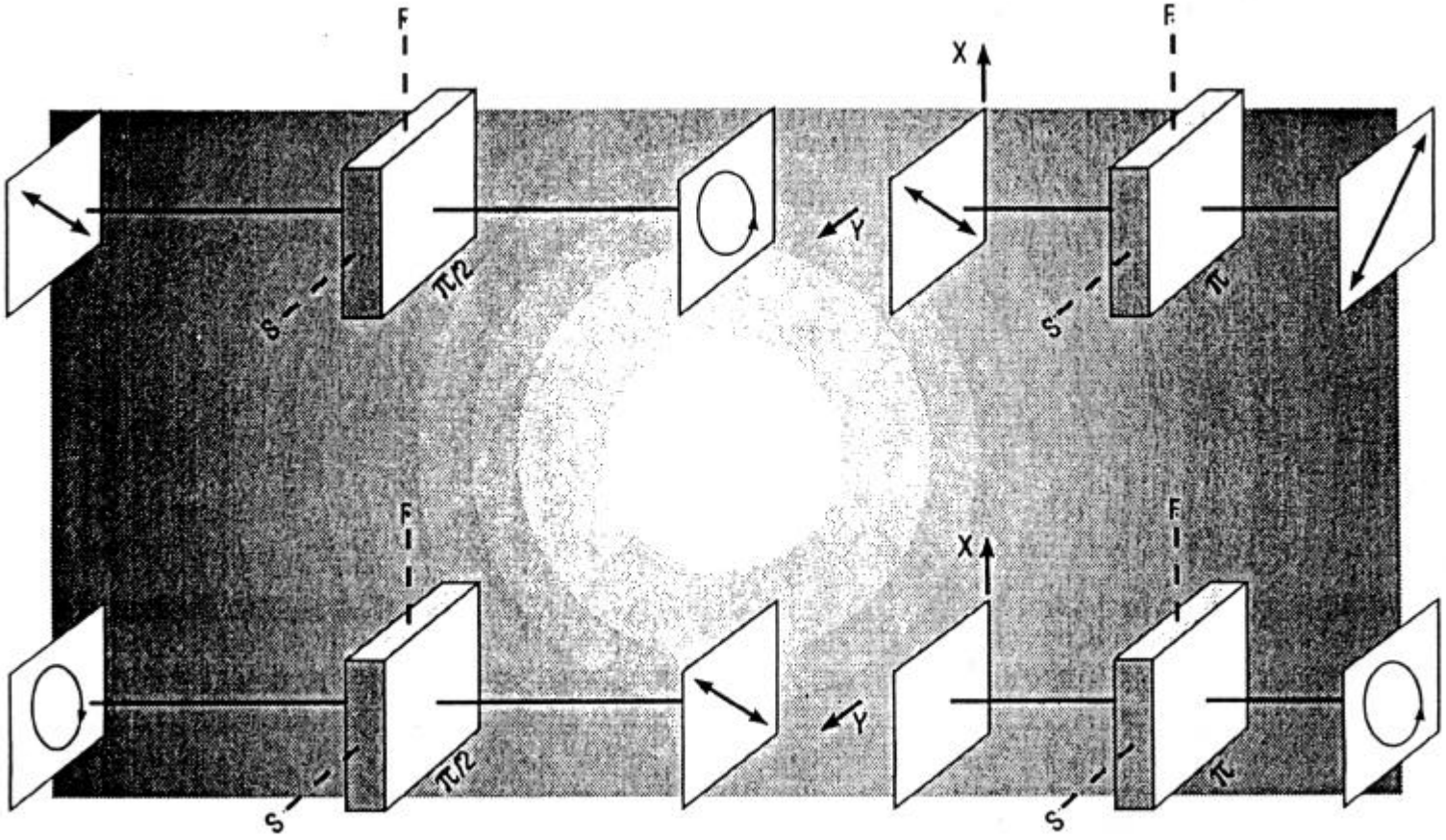
$$\begin{bmatrix} \cos\theta \\ \sin\theta \end{bmatrix}$$

RIGHT CIRCULARLY POLARIZED

$$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ f \end{bmatrix}$$

LEFT CIRCULARLY POLARIZED

$$\frac{1}{\sqrt{2}} \begin{bmatrix} 1 \\ -f \end{bmatrix}$$


F
X
F
Y
S
π/2
S
π
F
X
F
Y
S
π/2
S
π

If we use a *wave-retarder*, we can develop

$$T = \begin{bmatrix} 1 & 0 \\ 0 & \exp(-j\Gamma) \end{bmatrix}$$

Wave-Retarder (Fast Axis Along x Direction

$$R(\theta) = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$$

Coordinate Transformation Matrix

The matrix analysis developed in *Bio-Quantum Matrix* can be utilized in this system as well.

These types of wave-retarders can reduce a quarter-wave-retarder when we reduce it by B/2. If we reduce it by the factor of B, we have a half-wave-retarder. This can convert the linearly polarized light into linearly polarized light rotating at a polarization of 90E.

The polarization rotator in a Jones matrix can be presented as

$$T = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$$

Polarization Rotator

If we cascade an optical system by polarizing the light in different directions, we produce the *cascade polarization effect*. This was similarly used in the Academy test kit, which will be covered later in this chapter.

Now let us describe some liquid crystal devices in used.

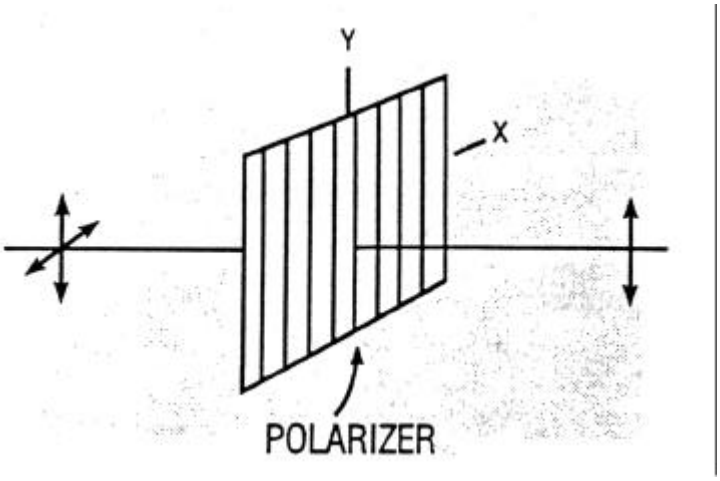
We can look at how liquid crystal is a state of matter in which there are elongated molecules that have an orientational order very much like crystals, yet they exist in a liquid state.

There are three phases of liquid crystals:

1. The *nematic* liquid crystal, where there tends to be a parallel, but their positions are often random.

2. The *smectic* liquid crystal, where the molecules are parallel, but their centers are stacked in parallel layers within which they have random positions, so that they have positional order in only one dimension.

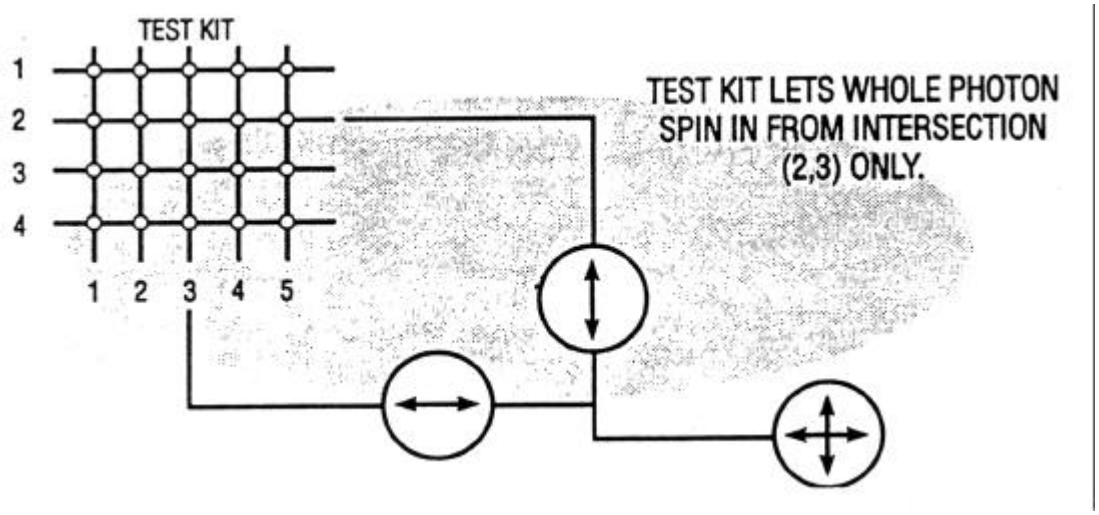
3. The *cholesteric* phase, which is a distortion of the nematic phase, in which the orientation undergoes helical rotation about the axis.

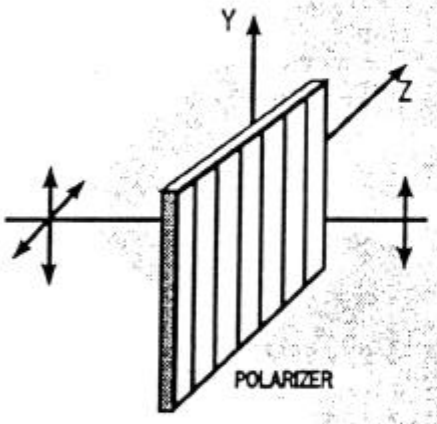


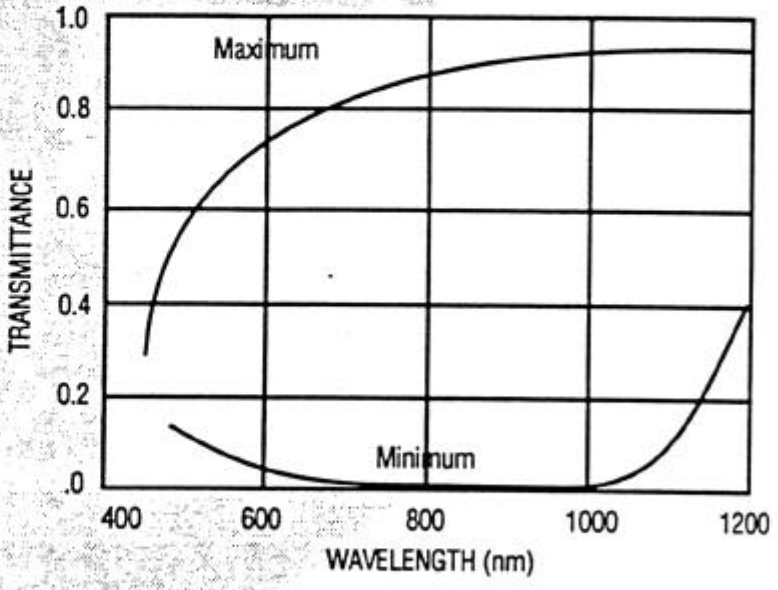
The *liquid crystal entity* is a fluid state of matter. The molecules change orientation when subject to a force. As an example, if a thin layer of liquid crystal is placed between two parallel glass plates, the molecular orientation is changed if the plates are rubbed. The molecules orient themselves along the direction of rubbing. The twisted nematic liquid crystals (often referred to as cholesteric) are also shaped by external forces.

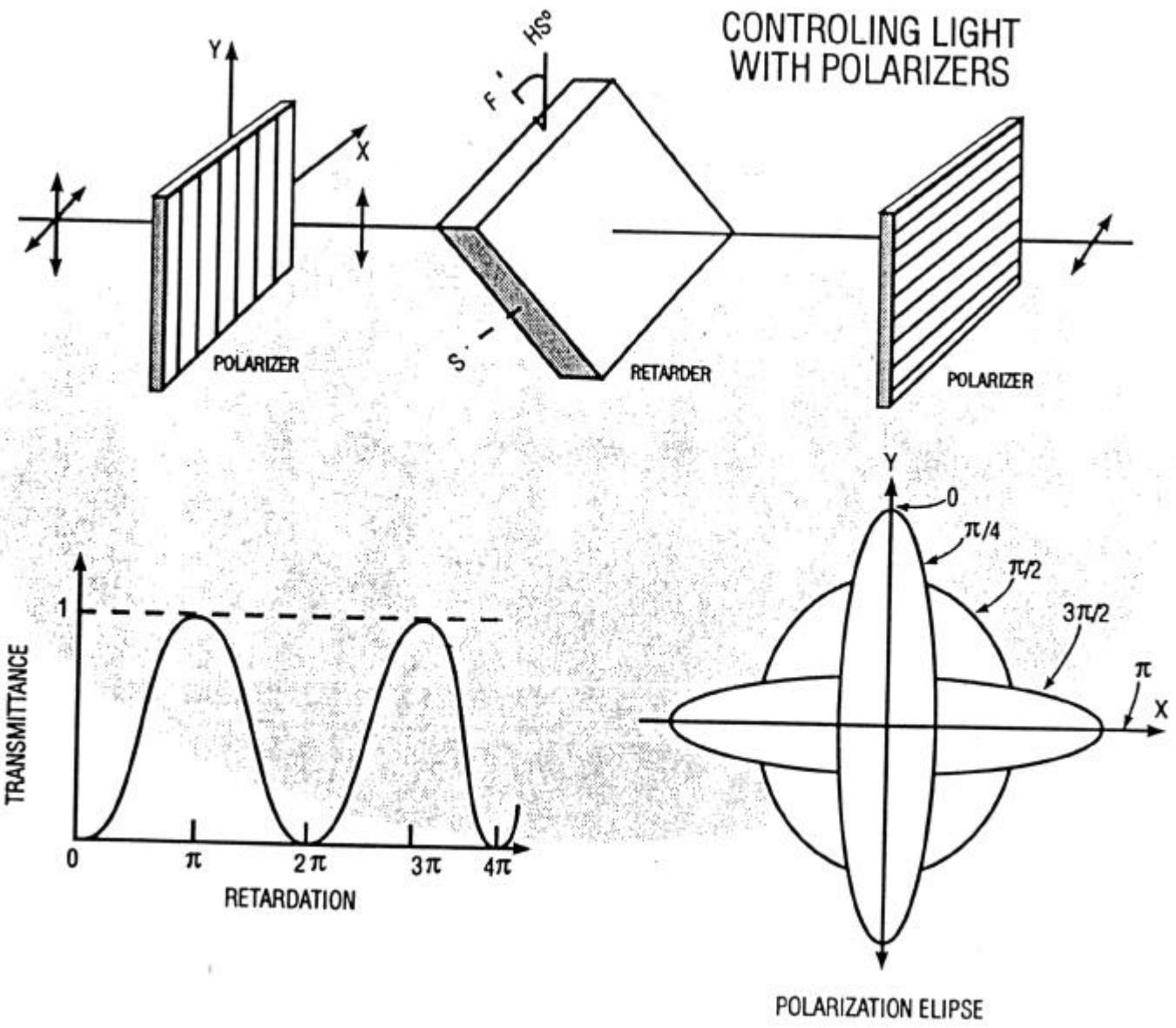
Thus these liquid crystals can be used to shape into most any type of electro-optic property. They can be used as optical modulators in switches. This type of device is used by the Academy in the development of its test kit. The optical properties are conveniently studied by dividing the material into thin layers perpendicular to the axis of twist. Each of these acts as a uniaxial crystal, where the optic axis rotation develops in a helical fashion.

Thus our device, which can polarize light, and the electromagnetic field as well as the magnetic field has effects on the transmission access to block the orthogonal components. The preferential treatment of the two components of the electric field is achieved by selective absorption, selective reflection from an isotropic medium and selective reflection refraction at the boundary of the anisotropic medium.



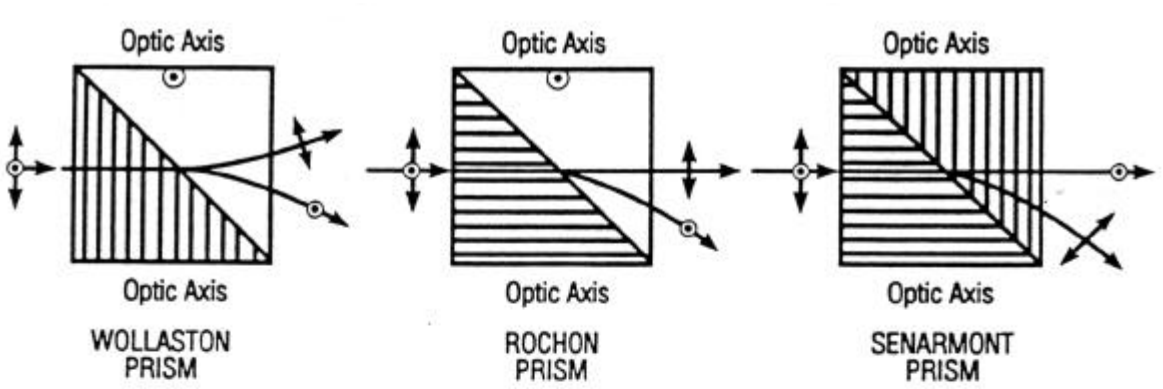

Y
Z
POLARIZER


1.0
0.8
0.6
0.4
0.2
.0
TRANSMITTANCE
Maximum
Minimum
400
600
800
1000
1200
WAVELENGTH (nm)

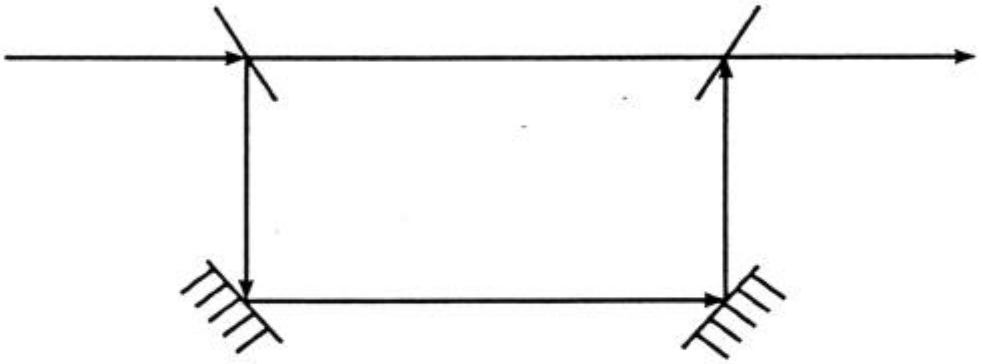

CONTROLING LIGHT
WITH POLARIZERS
Y
X
F'
HS°
S'
POLARIZER
RETARDER
POLARIZER
TRANSMITTANCE
1
0
π
2π
3π
4π
RETARDATION
Y
0
π/4
π/2
3π/2
π
X
POLARIZATION ELIPSE

The results of the absorption of light by certain anisotropic materials are called *dichroic* materials. This depends on the direction of the electric field. These materials have an anisotropic molecular structure whose response is sensitive to the direction of the applied field.

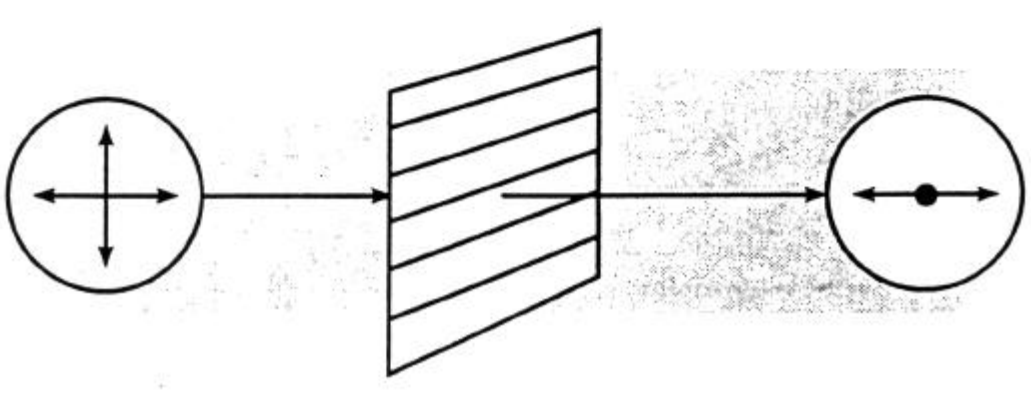
Many polaroid H sheets (sheets of poly-vinyl alcohol heated and stretched in a certain direction) are impregnated with iodine atoms, and then have polarization effects. When light refracts at the surface of an anisotropic crystal, the two polarizations refract at different angles. One is allowed through, and one is polarized away. This is the effect of the *polarization prism*.



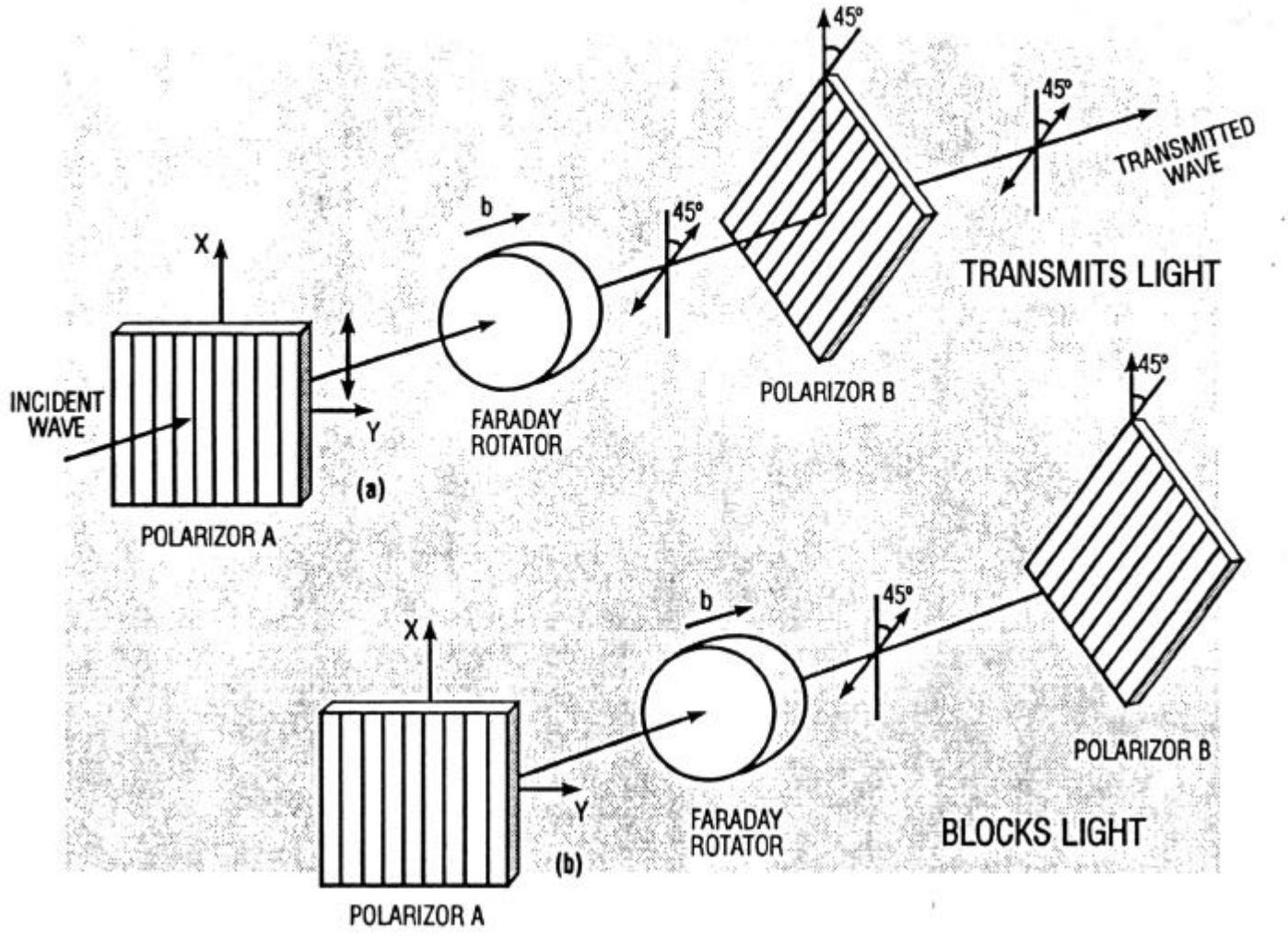
Thus these polarizers can also serve as beamsplitters.



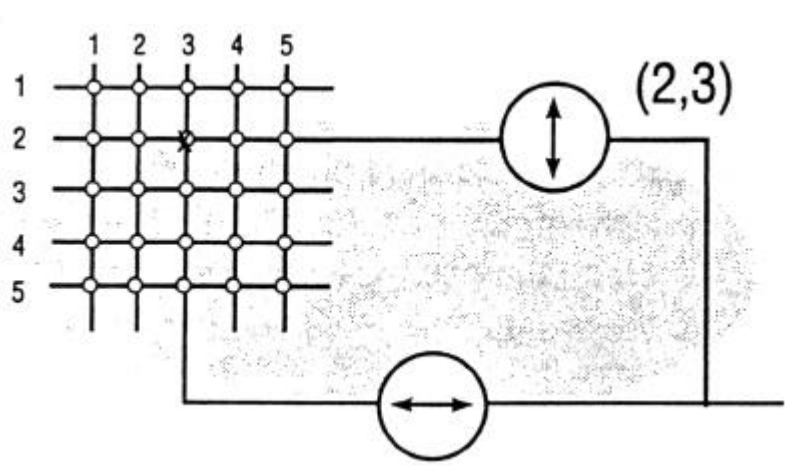
An optic isolator is a device that translates light in only one direction. This acts as a sort of one-way valve allowing various types of photons to go through, and other types to be refractive. Thus we have the polarization effect.



OPTICAL ISOLATOR USING A FARADAY ROTATOR



The Academy, in developing the polarization filter, realized first of all that there are virtual photons around every item. Thus a test kit can be made that will have many different vitamins, amino acids, minerals and homeopathics in it. This is in a grid system, such as that shown below.

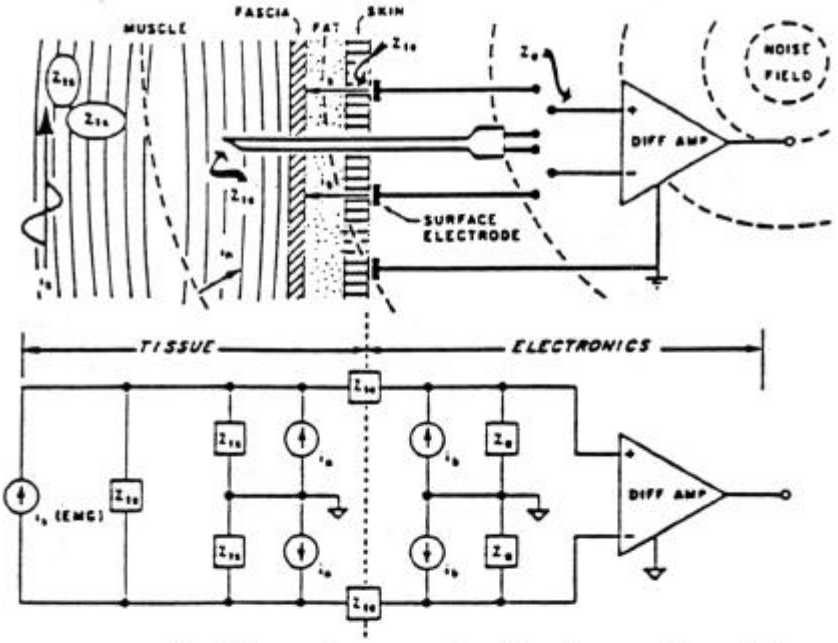


If we allow contact in from every item in a row, and pass this through a polarized filter, we will polarize the virtual photons flowing through the electromagnetic medium of the wire. These virtual photons will be allowed to pass from one direction, but not from another. If we then pass electrical conductivity through an entire column, we now have row and column. If we pass the column through a polarization filter that has a 90E shift, now we are letting half the virtual photon field come in from every row in a north-to-south orientation, and half the virtual photons from the column that come in from an east-to-west orientation. The only item in both contacts that has both north-to-south and east-to-west fields is that of the intersect at the row and column. Thus an electrical sorting device can be built that calls any of these items through contact. Since we are passing it through a polarization field, only one item will have the true, whole field; that is the intersect.

Thus the patient's reactivity will be to the item that is at the intersect, which will have the whole north-south, east-west field. Since the other items that have half-fields will not have the entire electromagnetic field, the body will not react to such items, but the body will react to the item that has the full field at the intersection.

A thorough discussion of the virtual photon field and its importance in medication testing, and thus energetic medicine, is discussed in *Quantum Biology*. In this book we talk about mitogenic radiation, virtual photons, Feynman's diagram, and other entities that prove the effects of medication testing. For scientific papers on such we point to the *Natural Repertory*, in which many scientific papers are presented that describe the functions and the capacities of how medication works, and the clinical aspects.

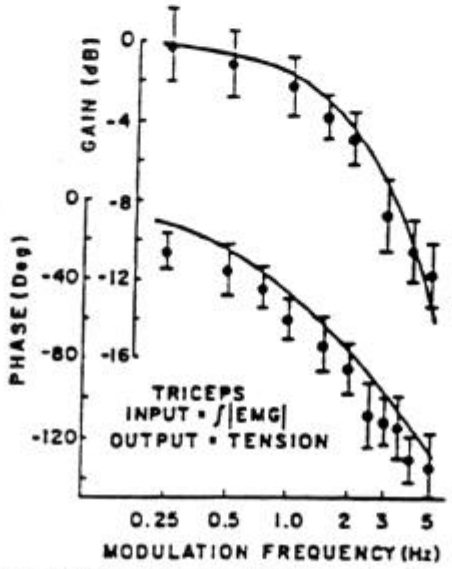
In doing the LTBM* test we need to have a virtual photon field test kit with a grid system that allows us to proceed through the test grid at computer speed. This computer speed can be set even down to below the microsecond range. Thus to do the complete test and for five thousand items with ten or more dimensional (electrical) changes, we must have a virtual photon test kit that would allow rapid transition. This was the purpose of the virtual photon test kit, and the direction of that patent application.



(*Top*) Diagramatic representation of impedances and currents in the tissues, electrode, and amplifier:

- i_s = source current from EMG signal
- i_c = common current from noise
- i_b = input bias current from amplifier
- Z_{ts} = tissue impedance seen by source current
- Z_{tn} = tissue impedance seen by noise current
- Z_{te} = tissue electrode impedance of the metal electrolyte interface
- Z_a = input impedance of amplifier

(*Bottom*) The schematic diagram representing the electrical interaction of the EMG signal, extraneous noise, electrode, and amplifier.



Gain and phase relationships between the integrated rectified amplitude of the EMG signal and isometric force in the biceps brachii. (From J.F. Soechting and W.J. Roberts, © 1975, *Journal of Physiology*.)

SUMMARY

1. In this chapter we go over the various effects of polarization, and how light transmits in a circular, other-dimensional fashion.

2. We introduce the concept of the polarization test kit to isolate various homeopathic compounds for testing, which allows for the LTBM* effect.

3. We show the implications of polarized light in biology.

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* Licensed Trinary Biofeedback Manufactures

Chapter 13

HARMONIC RESONANCE

In our analysis of vibrations we must be able to discern the concept of harmonicity, and also explain the concept of resonance.

The concept of resonance is that of power being rhythmically added to a system. If the power is added at a certain interval that corresponds to the correct interval needed within the system, the system will produce resonance. The system gains more and more in power. The concept of resonance is very similar to that of a child riding a swing. If the pumping action of the legs and the distribution of the weight to gravity is in a resonance harmony with the swing action, then the child will gradually increase the swing to a higher and higher degree, until the amount of energy displaced by the pumping action has reached its maximum, meaning that the swing action has reached its highest zenith. This action describes resonance.

In Tacoma, Washington a bridge was built without the ability to counteract resonance. A resonant frequency built up in the wind one day that allowed the swinging bridge to increase its push a little more and more, until finally the entire bridge snapped and crumbled because of the pressure of the resonant force of the wind. Since then all bridges have been built to have no structural resonance, in that they would have separate entities that would resonate at different times.

So when a system that has a certain periodicity is pushed by another type of periodic wave form, resonance can occur if there is a compatibility between the existing structure and the inputted push.

Another example of this is seen when a singer shatters a glass by singing a certain pitch. If the glass's shape has a certain type of periodic structure, the resonance between the note and the structure can produce an ever-increasing vibration fed by the push of the singer. This can destroy the glass by making it vibrate past its stable level.

In biological terms many resonances can happen in various ways. Viruses, bacteria and fungi all have resonant frequencies. Every trivector field has a resonant frequency because of its' electrical and shape dynamics. If the virus is put into a certain resonant frequency field, it could effect the body differently than if the frequency is not present. In psychology a certain set of neurons could be sensitive to a resonant condition if the rhythms are present. Agoraphobia might produce a resonant factor within the neurological circuits, pushing the organism to extremes and often inducing an anxiety or panic attack. Obsession, compulsion, and many other psychological problems can also be seen as resonant factors, in which a certain ideation cannot be let go of because of its vibrational sticky quality. Ideas get caught in resonant circuits within the brain. The QXCI system is designed the challenge and test the total resonant patterns in the patient. This can provide significant insight into the health and sickness of a patient.

Of the millions of neurons in the brain, certain ideations and thought patterns can be amplified through resonance if an individual has these thought patterns too often or in inappropriate circumstances. These resonant thought forms can have increasingly larger and larger effects, and be imprinted into the engrams of the human being. Certain humans will be sensitive to certain types of thoughts. So a person might inherit a tendency towards depression , or the inherited tendency might be amplified by the living conditions of the environment, in which the mother and father might teach depression techniques to their child as a means of coping. Then the child, having resonant effects, can build this depression into his brain, making it impossible for him to break free from it without large-scale help. This is one of the keys to developing a new-age type of psychology; being able to defeat the resonant patterns within the brain. But since sometimes small things effect fractal systems adversly homeopathy and energetic medicine can have dramatic curing effects on patients.

This resonance is also one key to understanding behavioral psychology. In behavioral psychology what we reward we get more of; what we ignore we get less of. This is a display of neurological resonance reaching into the psychological world of treatment. This is the key to NeuroLinguistic Programing NLP as used in the QXCI.

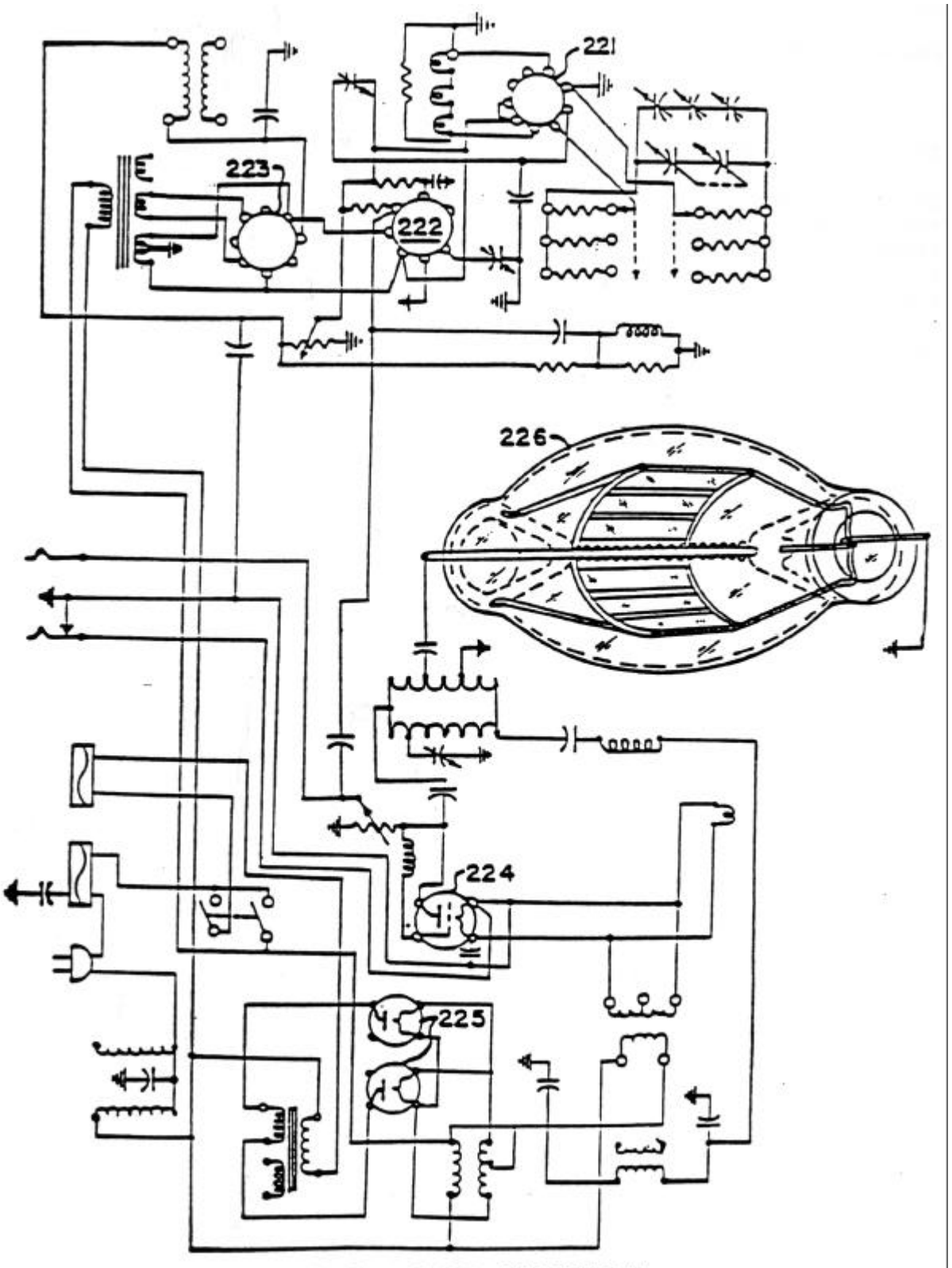
Since computers can control input and output pulses, we can design a system to completely perform energetic medicine. The computer can act as a signal generator or a frequency counter. Since the ionic exchanges of reaction take place in the body at speeds in the centisec range our computer can easily interact to measure the energetic components of the body. Then with a feedback loop, the computer can autfocus treatment. A self adjusting treatment loop can be made

easy to operate, affordable, and safe to use.

The QXCI device is the ultimate in energetic medicine devices. The windows environment and the simple operation makes for easy and safe use. This article is but a brief description of one hundredths of the mathematics used in the system. The complete mathematics description is proprietary and is not needed for operation of the system.

Now let us review some data on degenerative disease.

Cancer also has resonance dynamics. We outline this thoroughly in the PROMORPHEUS. But here let us briefly review the cancer resonance frequencies and and thier treatment.



RIFE RAY TUBE FREQUENCY INSTRUMENT DIAGRAM

TUMOR CLASSIFICATION - (HISTOLOGICAL)

The exact frequencies and thier harmonics are proprietary and are contained in the QXCI system

Group I - Connective Tissue

(A) Fibroma	composed of	connective tissue
(B) Chondroma	"	cartilage
(C) Chordoma	"	tissue of charda dorsalis
(D) Osteoma	"	bone
(E) Lyxoma	"	mucous tissue
(F) Lipoma	"	fat tissue
(G) Angioma	"	blood vessels
(H) Lymphoma	"	lymphatic tissue

(I) Sarcoma a cellular tumor composed of anaplastic tissue of any of the above types.

Group II - Muscle Tissue - Myoma and Myosarcoma

(A) Leiomyoma	composed of	smooth muscle tissue
(B) Rhabdomyoma	"	striated " "

Group III - The elements of the nervous system

(A) Neuroma	composed of	nerve fibers
(B) Neuroma Ganglionare	" "	" " and Ganglion cells
(C) Glioma	"	glia tissue
(D) Neuro-Epithelioma	"	neuro epitheliom

Group IV - Endothelium Endothelioma

(A) Papilloma: A tumor of pavement epithelium, with supporting tissue in normal arrangement
(B) Adenoma: a benign tumor of glandular epithelium with supporting tissue in normal arrangement
(C) Epithelioma: or epidermoid carcinoma - a tumor of epithelium in a typical arrangement
(D) Carcinoma: a tumor of glandular epithelium in a typical arrangement

Group V - Complex Tissues

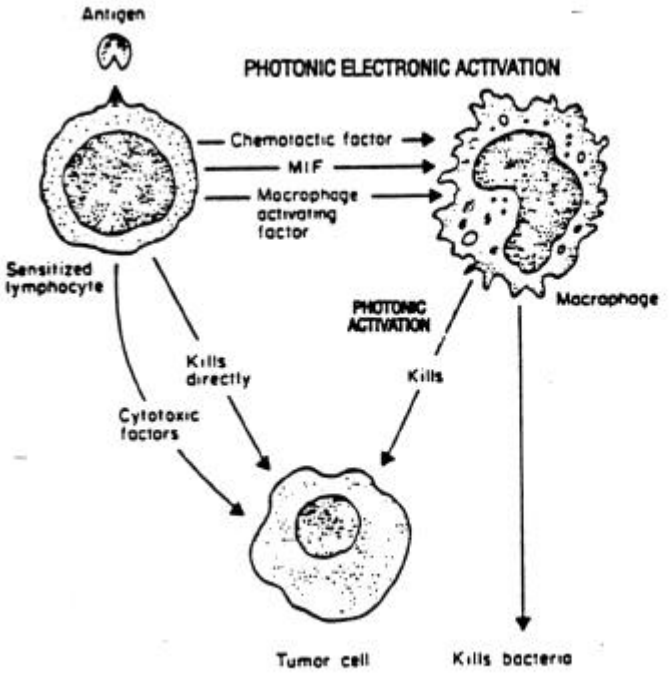
(A) Simple mixed tumors: composed of more than one type of neoplastic tissue, named according to composition, as chandro-epithelioma, adenosarcoma

(B) Teratoma: composed of tissues and organs of one, two or three germinal layers, mono dermal, bi-dermal, or tridermal types

(C) Embryoma: composed of tissue from three germinal layers in more or less orderly imitation of a fetus

Some Cancer Virus Characteristics

1. Not destroyed by X-Ray, ultraviolet ray or infrared ray.
2. Thermal death-point in twenty-four hours is 42^{o} C or 107.6^{o} F.
3. Sporogenous.
4. Non-liquefying (media).
5. Non-chromogenic and non-aerobic.
6. - (Cathode) polarization.
7. Width of ovoid or microorganism is 1/20 u.
8. Length of ovoid microorganism is 1/15 u.
9. Flagellated and nonparasitic.
10. Highly motile and plastic.
11. Highly pathogenic.
12. Seen at 12 $3/16^{o}$-angle of refraction on universal microscope.
13. Color of chemical refraction is purple-red, which results from the coordination.



Lymphocytes and macrophages active in tumor cell killing.

ELECTRICAL PROCESS OF CANCER CELL DESTRUCTION

Harmonicity, or the production of various harmonics, is something else we must analyze in vibrational medicine.

A note produced by a sound has harmonics produced at certain intervals. Thus a certain generated note will have a harmonic at a higher note that is the same or similar note in a different octave. This is different from the resonance we have discussed, because the true, pure resonance seeks rhythmic similarities. In harmonic resonance we often do not need to have extremely similar vibrations to induce harmonic resonance. Harmonic resonance can be induced often by other notes that are at harmonic levels to the original pattern.

If we hammer a piece of steel, we will see that this produces a certain note. There is a harmonic note that can be produced by a hammer of another size, and even higher harmonics produced by other hammers. Harmonics have infinite numbers of series, but often are limited to seven series, in the case of octaves in music. All vibrations, whether they be photon, electron, neutron, etc., have harmonicity at various levels. These harmonic frequencies have interference and amplitude factors on other carrier waves. Harmonics work in many strange and wondrous ways. The effects extend to other dimensions.

As we look at the wide variety of vibrations that occur within the cells of the body and the vibrations that occur later within the networking of the cells, we can see a tremendous number of opportunities for harmonicity interaction. Various harmonics can interplay not only in photons but electrons, sound, and other energetic activities. Our best example of harmonicity is that of the barbershop choir, where three or four singers can develop different notes and blend them into a harmonic, producing a much more pleasant-sounding note. This is known as a consonant harmonic resonance. This is very important for the factors of biology in helping to produce various states for biology and health.

In producing a calming, stress-reducing environment, we will need to involve many types of vibration including pleasant sounds, pleasant lighting for photons, and pleasant ionization. In Bio-Quantum Matrix we described a paradise in which the negative ion factors produced a maximum health-generating environment. Here we can see that in a harmonic way these factors can be additive, and that the sum can be greater than the sum of their parts. This is another way of describing the factors of harmonic resonance, where the summation of forces interacting can become greater than the sum of the individual forces themselves.

We can find that interference patterns are also produced, and that certain vibrations can be used to cancel out or negate other types of bad frequencies. Here we have the development of a Rife-type machine. Rife was rumored to have developed a machine that could generate various types of vibrations that could break up viral, bacterial and other microorganisms. This was done through developing a pattern forced into the body at these various frequencies that would attempt to harmonize with the microorganism intruder, and through the factors of resonance, shatter them.

As we have pointed out, we are not sure if Rife really did develop this to its full extent . The amount of energy it would take to shatter a virus would be dramatic according to our calculations, and seemingly above that which a Rife instrument could develop. Perhaps the harmonic instruments he used had stimulating effects on the immune system and its ability to deal with these frequencies.

Also it must be pointed out in our discussion of vibrational medicine that almost any type of electrical photon or sound vibration given to the body can have positive effects. We speak in psychology about the Westinghouse effect, in which a researcher went into a Westinghouse plant to try to find psychological ways of improving production. He found that when he moved the cafeteria, he had an increase in production. When he moved it again, he also had an increase in production. He found that whenever he set up studies and did operations, production seemed to increase. In other words, the final conclusion of the Westinghouse effect was that attention given to the system of the plant seemed to increase of productivity; the people liked the attention.

This is often the case with the body itself. The body likes to have attention. When it is given photon, electron, sound or ionization attention, it seems to respond. Often this response is interpreted by certain experimenters as being more profound in its effects, and they build machines to use universally. The machines do not always work differently from placebo.

We must develop a more scientific vibration theory, which is the purpose of this book on vibrational medicine. As we look into the factors of various waves, we must be able to chart out and statistically evaluate the types of vibrational medicine we are going to use. It is the plan of this book to help to open new dimensions for scientific thought in vibrational medicine, and to dispel some of the rumors and ploys evident in other events.

Many researchers have developed equipment that have attracted rumors, and it has become a strong factor in alternative medicine. Many of these inventions have true potential; many are just flim-flam operations that really do not have a strong basis in science. We attempt in this

book to develop a firm scientific understanding of these vibrational factors, and then challenge them through statistical measurement endeavors to produce more refined and dynamic healing techniques. Many alternative practitioners will be put off by the fact that there are numbers, physics, statistics and mathematics in this book. It is with great dismay that I wish to challenge them, because it is numbers that have given us so much of our technology. Some of this technology has gone unchecked and needs humanization. So we have tried to involve human qualities in our technology as well as the science and statistics, so that we do not dispel or throw away any of our factors. We try to control them in human ways, and let science be our servant, not our master.

In Dr. Isaacs's "Matrix" we are shown that numbers exist that dictate interplay of matter as well as interplay of forces. This interplay of forces is key to our understanding of biology .

We have shown in the Bio-Quantum Matrix book that the factors of harmonicity and resonance have possibly been built by nature, or God Himself. This matrix seemingly has harmonic and Fibernaci relationships built into the system. The Bio-Quantum Matrix should be reviewed at this time for an understanding of some of the mathematical relationships built into the matrix that determine reactivity. These mathematical relationships allow for biology, and will dictate our vibrational medicine.

Harmonic resonance also dictates and shows us another form of reverence that we must build into our system. The total knowledge of all the resonance factors and the ways that a cell or set of cells in an organism can interact is infinite. As one organism interacts with another and with the environment, it goes past our understanding. This should produce some reverence; a way for us to look at natural systems of medicine in our vibrational medicine model. We do not want to just develop synthetic waveforms and think that their mathematical formulae are all we should consider in vibrational medicine.

The best vibrational medicine technique we can use on a system is the vibration of medicine in nature; the gentle waterfall, the pleasant wind, the non-toxic air, the gentle refrain of a loved one, the reassuring touch of a doctor with a good bedside manner. These are the factors that really should be looked at in vibrational medicine. Our development of harmonic frequency generators and function generators are merely side issues in comparison to the true healing factors of the human.

As we develop various mathematical precepts and devices, please let us not lose sight of some of the more dynamic healing factors that biology can assail. These devices should only be secondary, if not tertiary, in our treatment modality plan. Reverence of God and nature should always be our primary directive in setting our healing forces and directing our medical intervention (see the Natural Compendium of Dr. Nelson).

Causes of Disease

Stress	Toxicity
Lack of Awareness	Trauma
Heredity	Pathogens
Allergy	Nutritional
Mental Factors	Inadequacies
	Perverse Energy

If we calculate a sine wave by frequency domain analysis, we can see that this type of wave will generate harmonic series. The harmonics will be raw integer multiples of the frequency. So if we see that the frequency equals 1 over the period, this will tell us what the basic frequency is that establishes the fundamental or lowest frequency of our proposed harmonic series.

$$f_1 = \frac{1}{T} \qquad (Fundamental)$$

The second harmonic has a frequency and the third harmonic has a frequency, and this continues to the nth harmonic, which has a frequency.

$$f_2 = 2f_1$$
$$f_3 = 3f_1$$
$$f_n = nf_1$$

Fourier developed the Fourier series, which states that

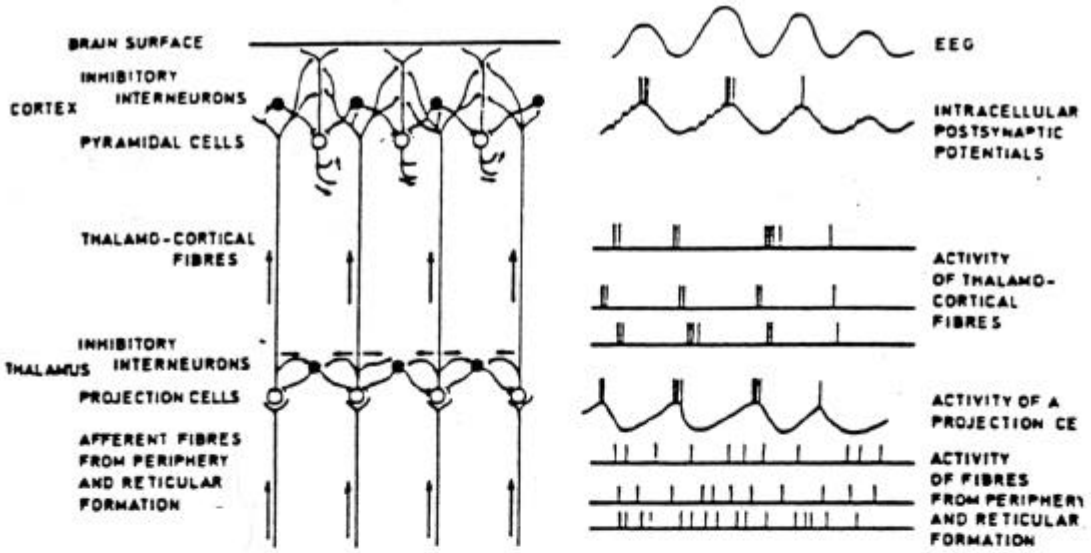
$$\text{Periodic wave} = \text{dc component} + \text{first harmonic} + \text{second harmonic} + \text{third harmonic} + \ldots + \text{nth harmonic}$$

In precise mathematical terms we can expand the Fourier series to

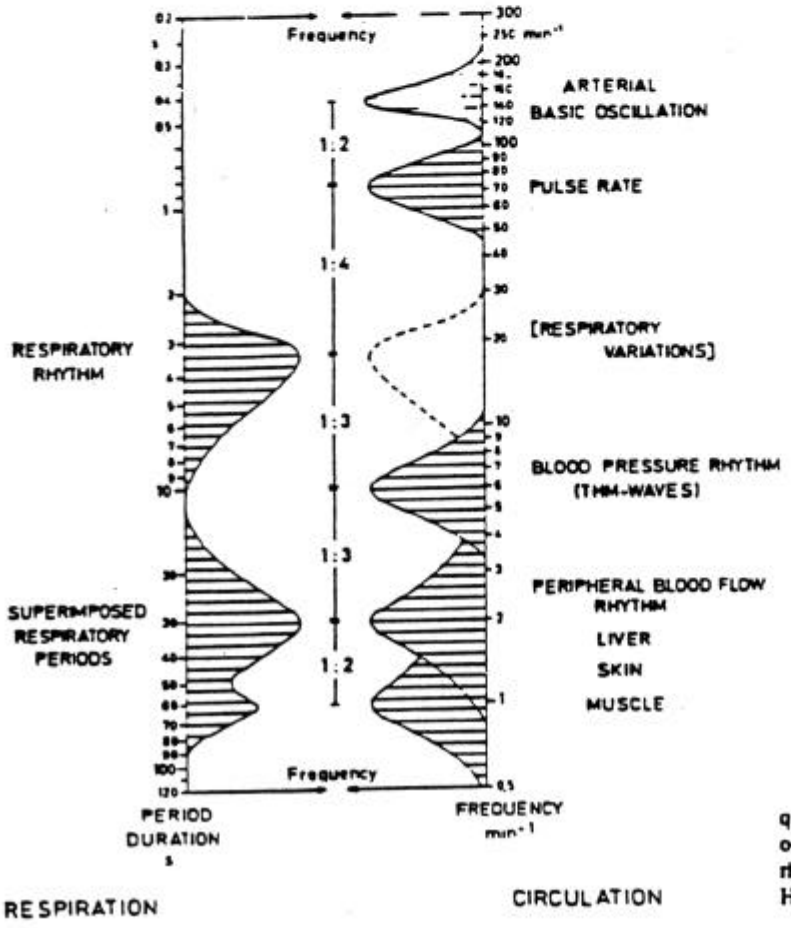
Fourier found that if we superimpose these harmonic sine waves onto themselves, we can produce any type of wave within the structure. Thus we can produce a sawtooth wave, a triangular wave, a half-rectified wave or even a diamond-shaped wave. The dramatic complexity of waveforms in biology results from a vast number of interfacing waveforms. These are interactions between electron, photon, sound, and chemical waves, etc. These can be of a positive health-enhancing, derogatory, or disease nature. This difference is between entropic-type waves or organized quantum waveforms. If these waves are in harmonic action, meaning that they are multiples of each other, they will still have the same intersections. But we can produce a wide variety of shapes. In Fourier analysis, if the waveforms combined with each other are not in a harmonic series, then we can produce random shapes that also can be delineated into their Fourier components.

The Fourier theorem is the key to our understanding of frequency domain analysis. We already know a great deal about our sine waves. It is also possible for us to reduce periodic waves to their sine wave components. Analyzing these sine waves allows us to analyze the periodic wave.

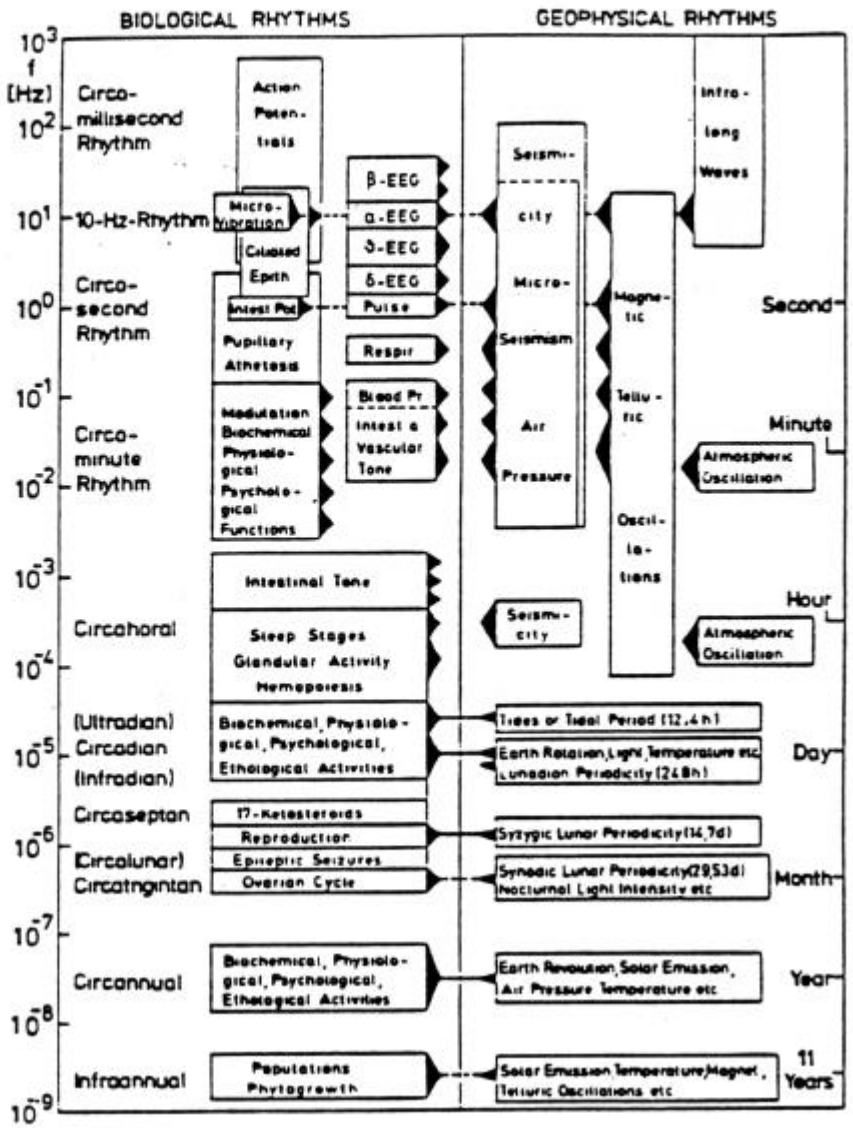
Thus two approaches of nonsinusoidal circuit analysis can be developed. We can calculate the periodic wave and what it does at each instance in time or we can calculate what each harmonic does. Sometimes our first approach, which is dependent on time-domain analysis, is faster; and sometimes the second approach of frequency domain analysis is superior.



Schematic presentation of the generation of EEG waves (adapted from Creutzfeld in Haider [22]).



Distribution rate of frequency and period duration of various respiratory and circulatory rhythms (large collectives) (from Hildebrandt [29]).

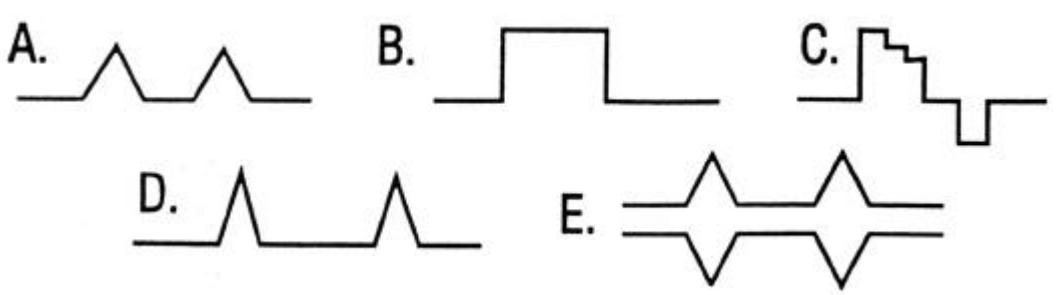


Correspondence of preferential frequencies of biological and geophysical rhythms (adapted from Sinz [61]).

In a sawtooth wave we can use mathematics to show that

$$V_n = \frac{A}{n\pi}$$

There are five basic spectra or types of waves we can calculate.



Type A is the triangular wave, where we have placed functions 1, 2, 3, 4, and 5, the five harmonics of the basic fundamental. In type B we have a square wave, which is a combination of the fundamental plus f_3 and f_5. Type C is a collection of the 1, 2, 3, 4, and 5 types of waves in a certain proposition obeying the mathematical formula Vn = 4 x A/Ð x $(1/4n^2 - 1)$. We can also see that in D we have the sawtooth wave, which is a collection of the harmonics supplied by 1, 3, and 5. We can also see that in E we can build a diamond square wave from our mathematical spectrum.

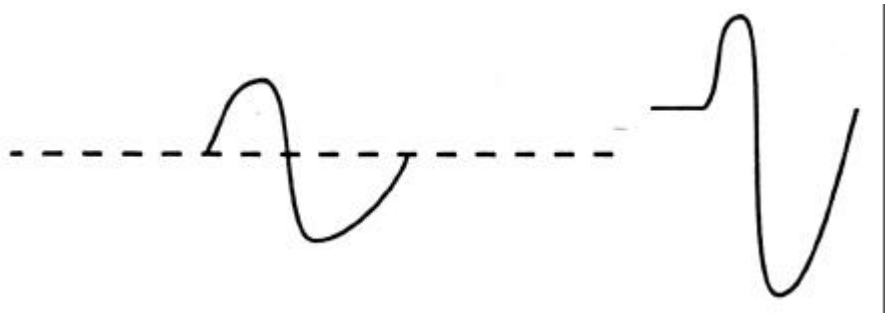
The dc component is the average value of the periodic wave. This is defined as dc component = the area under one cycle " the period. As an example, if we have a peak of 10 volts in a sawtooth wave that has a period of 2s, we will see here that under one cycle the area is 1/2 the base x the height, which = 1/2 2s x 10V which is the height, which equals 10V x s. Dividing by the period gives the average value of the sawtooth, where the period is 2s. This gives us an average period of 5 V as the value of the dc component.

If we add a dc component to a waveform, there is only an apparent change in the spectrum at the appearance of the line at zero frequency. The height of the line will represent the dc voltage. Thus if we add a dc component to a waveform, it has no effect on the harmonics.

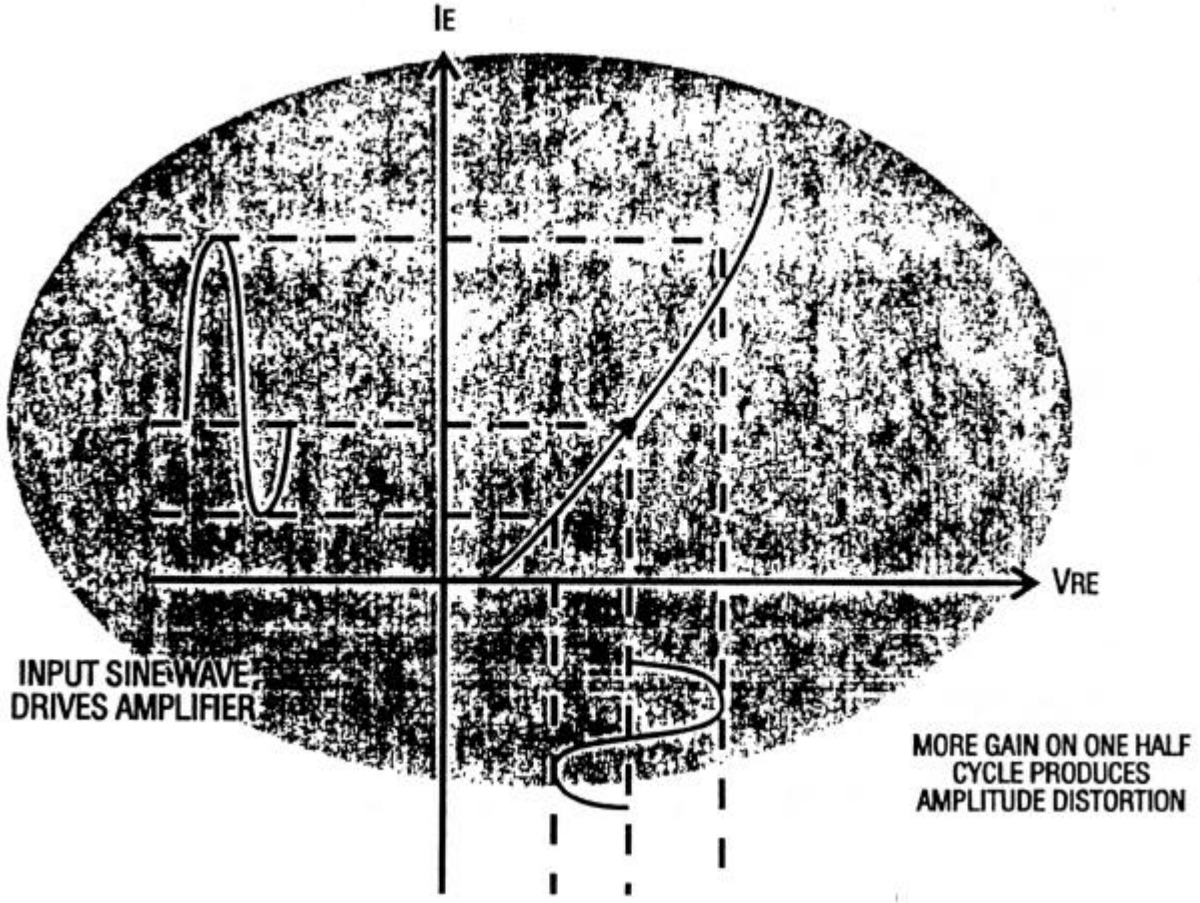
There is a spectral change that is induced at the new line of zero frequency. When the amplified signal is very small, a small part of the transconductance curve is utilized. The operation that takes place over an almost linear mark of the curve causes this phenomenon. Operations like this are called linear because changes in their output current are proportional to changes in their input voltage.

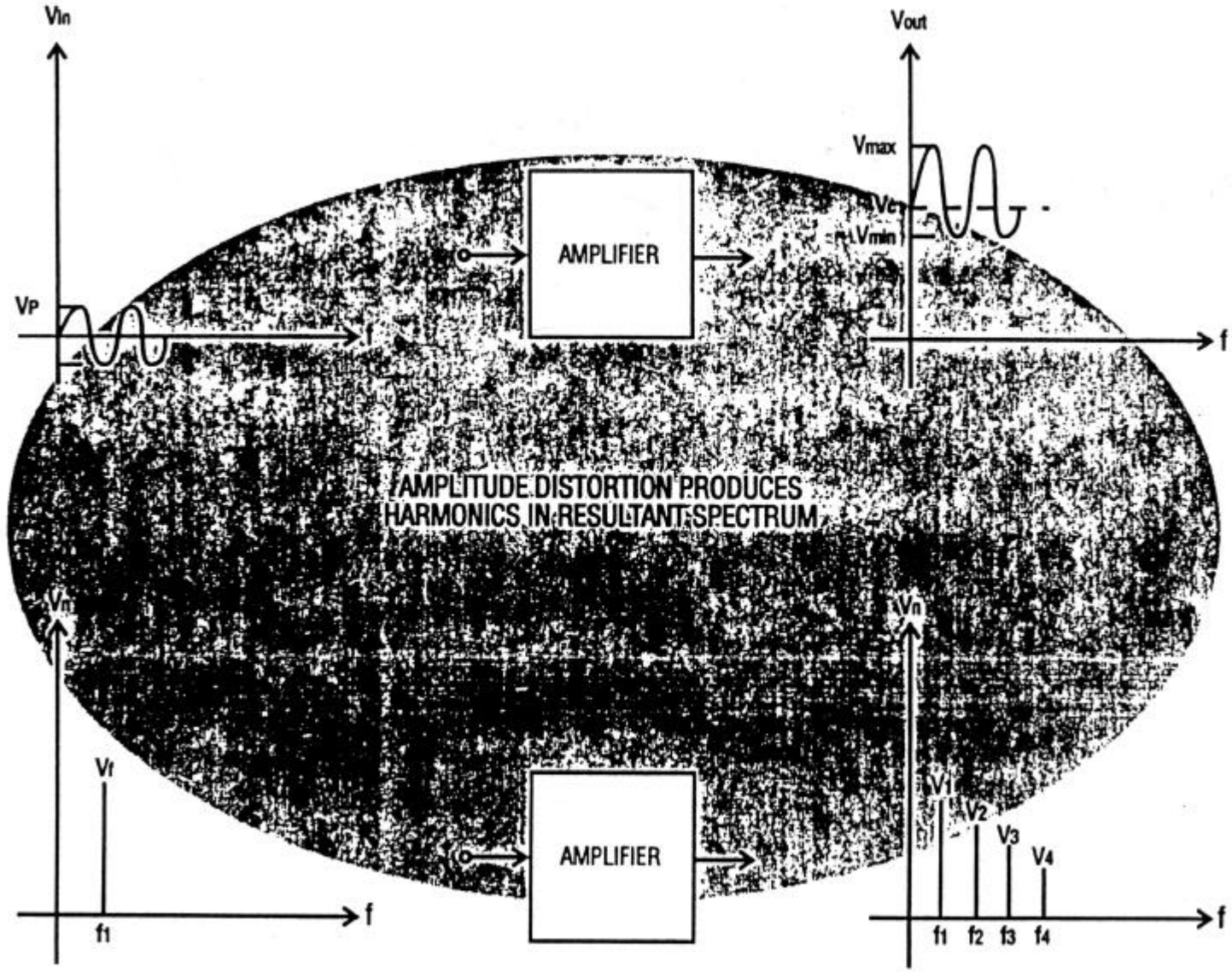
Linear operations mean that the shape of the amplified waveform is the same as the shape of the input waveform. So we get no distortion when the operation is linear, or of a small signal. When the signal is large, we no longer treat the operation as linear. Here we will find that changes in the output current are no longer proportional to changes in the input voltage. Biology depends on a linear and nonlinear distortion control. In developing vibrational medicine instruments we must affect cybernetic (biological) events. Because of this, we get a state of nonlinear distortion.

From the frequency domain effect, we can see that when a signal swings large, the operation becomes nonlinear.



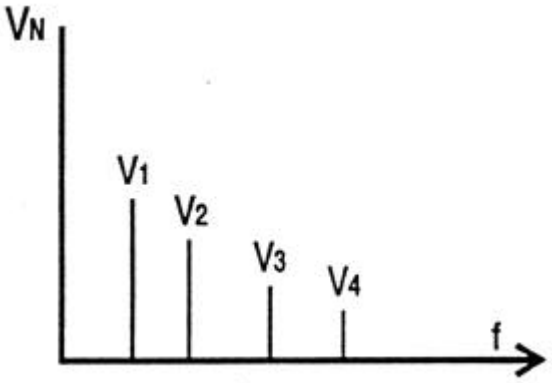
NON LINEAR DISTORTION FROM THE TIME DOMAIN VIEWPOINT




Vin
Vout
Vmax
Vc
Vmin
AMPLIFIER
VP
f
AMPLITUDE DISTORTION PRODUCES
HARMONICS IN RESULTANT SPECTRUM
Vn
Vn
Vf
AMPLIFIER
V1
V2
V3
V4
f
f1
f1 f2 f3 f4
f

On page 244 (the lower figure) we have an example of a sinusoidal voltage producing a large swing along a transconductance curve. The nonlinearity of this curve will then produce current that is no longer sinusoidal. So the shape of the output curve is no longer a true duplication of the input shape. Since the output current flows through a load resistance, the output voltage will also have nonlinear distortion. This happens in cellular biology through membrane resistance, which affects the output capacities. This happens in the mega system of the body in acupuncture point resistance changes that regulate meridian voltage.

Below is shown nonlinear distortion from the time domain viewpoint.



The input sine wave drives the amplifier. The operation if a large signal will allow for an amplified output voltage that is no longer a pure sine wave. We can see now that there is more gain on one-half cycle than on the other. This kind of distortion is often called amplitude distortion. This happens in overloaded systems such as muscular fatigue or stress syndromes.

The frequency domain will give us insight into the amplitude distortion. In the above diagram we will see that the same situation can be shown from frequency domain. The input spectrum is at a single line of our fundamental frequency f1. The output signal is distorted, but is still periodic. Therefore it contains the dc component and the harmonics shown. We have stopped with the fourth harmonic. The point is that the waveform with the amplitude distortion contains a fundamental and harmonics. The strength of the higher harmonics then is the clue as to how bad distortion will be. Stress distorts the higher harmonies of the human system by enhancing their strength. This results in higher-dimension sensitivity in stress-related diseases.

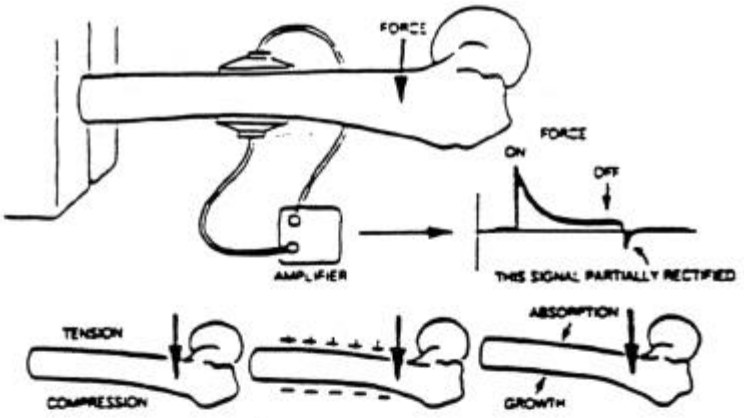
Amplitude distortion is also termed harmonic distortion. In developing our vibrational medicine model this will be extremely important for us to be able to deal with these distortion models. The larger the peak values of the harmonics the larger the harmonic distortion. Stress treatments must be system-wide to be effective.

The simplest way to compare the amplifiers is to take the ratio of the harmonics to the fundamental. This will help us to calculate the harmonic distortion. The total harmonic distortion will be equal to the square root of the second distortion squared plus the third distortion squared plus the fourth, and all the way up to the nth distortion squared. This is developed in the system of mathematical analysis developed bThe Quantum Med C.I.*. This allows for waveform analysis through Fourier techniques. Reactivity is then charted as the log of total harmonic reduction.

* Licensed Trinary Biofeedback Manufacturers

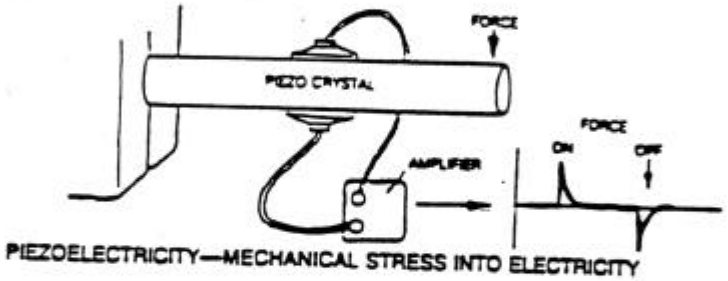
```
i1 := int( sin(x), x);

I1 := - COS(X)

i2 := int( sqrt(tan(x)), x);

I2 := INT(SQRT(TAN(X)),X)

i3 := int( x/(x^3-1),x);

I3 :=

 1                2*X + 1      1         2      1
---*SQRT(3)*ATAN(---------) - ---*LOG(X  + X + 1) + ---*LOG(X - 1)
 3               SQRT(3)       6                   3

i4 := int( x/sin(x)^2, x);

                 -1                    X  2                 X
I4 :=  - SIN(X)  *COS(X)*X - LOG(TAN(---)  + 1) + LOG(TAN(---))
                                      2                    2

i5 := int( log(x)/sqrt(x+1), x);

I5 := 2*(SQRT(X + 1)*LOG(X) - 2*SQRT(X + 1) - LOG(SQRT(X + 1) - 1)

        + LOG(SQRT(X + 1) + 1))

i6 := int( exp(-a*x^2), x);

              1
I6 := INT(-------,X)
            2
          A*X
         E

i7 := int( x/(log(x))^3, x);

              X                  -1  2    1         -2  2
I7 := 2*INT(--------,X) - LOG(X)  *I  - ---*LOG(X)  *I
            LOG(X)                     2

i8 := int( x/(sqrt(1+x)+sqrt(1-x)),x);

          1                          1
I8 :=  - ---*SQRT( - X + 1)*X + ---*SQRT( - X + 1)
          3                          3

          1                          1
       + ---*SQRT(X + 1)*X + ---*SQRT(X + 1)
          3                          3

i9 := int( 1/(2+cos(x)),x);

                              X
                          TAN(---)
     2                        2
I9 := ---*SQRT(3)*ATAN(----------)
     3                   SQRT(3)

i10:= int( sin(x)/x^2, x);

            SIN(X)
I10 := INT(-------,X)
             2
            X
```

- Everything that runs on a battery produces a DC magnetic field—from digital watches, cameras, flashlights, and portable radios to car ignition systems.
- Strong magnetic fields are used in industry to refine ore, concentrate and recycle scrap iron, purify sewage, soften water for steam boilers, and many other tasks.
- The starting and stopping of an electric train turns the power rail into a giant antenna that radiates ELF waves for over 100 miles.
- Electromagnetic fields vibrating at 60 hertz (50 hertz in Europe and Russia) surround nearly every person on earth from appliances at home and machines at work.
- Over 500,000 miles of high-voltage power lines crisscross the United States. Innumerable smaller lines feed into every home, office, factory, and military base, all producing AC or DC fields. Metal objects near the lines concentrate the fields to higher levels. In addition, high-voltage lines are, in effect, gigantic antennae operating at 60 hertz in the ELF band, the largest "radio" transmitters in the world. Switching stations, where the current is changed from one voltage or type to another, emit radio-frequency waves as well.
- AC magnetic fields vibrating at 100 to 10,000 hertz emanate from antitheft systems in stores and libraries, and from metal detectors in airports.
- Low-frequency radio waves are used for air and sea navigation, time references, emergency signals, some amateur radio channels, and military communications.
- Medium frequencies between 535 and 1,604 kilohertz are reserved for AM radio transmitters, which are limited to 50,000 watts in this country but are sometimes much more powerful abroad.
- HF and VHF channels are filled with chatter from the nation's 35 million CB radios, as well as shortwave bands for more ham radios, air and sea navigation systems, military uses, spy satellites, and police and taxi radios. VHF television and FM radio also inhabit this region. There are now over ten thousand commercial radio and TV stations in the United States alone, and 7 million other radio transmitters, not counting the millions operated by the military
- Weather satellites, some kinds of radar, diathermy machines, upward of 10 million microwave ovens, more cop and cab radios, automatic garage-door openers, highway emergency call boxes, and UHF television compete for the low microwave frequencies.
- Higher microwave bands are crowded with more military talk channels and radar, navigational beacons, commercial communications satellites, various kinds of walkie-talkies, and America's two hundred fifty thousand microwave phone and TV relay towers.
- Like the infrared rays above them in the spectrum, radio waves and microwaves produce heat when directed in high-intensity beams. Hence they're used for all sorts of industrial chores—bonding plywood, vulcanizing rubber, manufacturing shoes, sterilizing food, making plastics, and heat sealing the trillions of plastic-wrapped products in our stores, even opening oysters. Modern electronics would be impossible without the perfect silicon and germanium crystals grown in microwave furnaces.



PIEZOELECTRICITY IN BONE

* After writing up this experiment, we found that it had been done before. Iwao Yasuda, a Japanese orthopedist, had shown that bone was piezoelectric back in 1954; he and Eiichi Fukada, a physicist, had confirmed the fact in 1957. We made note of their prior observations but published our paper anyway, since our techniques were different and ours was the first report in English.



PIEZOELECTRICITY—MECHANICAL STRESS INTO ELECTRICITY

- *Reye's syndrome*. First described in 1963, this condition begins with severe vomiting as a child is recovering from the flu or chicken pox. It then progresses to lethargy, personality changes, convulsions, coma, and death. The mortality rate, initially very high, has now been reduced to about 10 percent, but the incidence has increased greatly.
- *Lyme disease*. A virus disease carried by certain insects, it produces severe arthritis in humans. It's one of several similar illnesses that have appeared only recently.
- *Legionnaire's disease*. This is a pneumonia caused by a common soil bacterium that has found a second home in air-conditioning systems. The organism caused us no recognized problems before the initial outbreak in Philadelphia in 1976.
- *AIDS*. Autoimmune deficiency syndrome is a condition in which the body's immune system fails completely and its owner often dies. The patient is unable to resist common, otherwise harmless bacteria and viruses, and can no longer suppress the seeds of cancer that reside in all of us. At present, some sort of virus is suspected as the precipitating cause.
- *Herpes genitalis*. This disease isn't new, but its prevalence and severity have increased tremendously in one decade. Sexual permissiveness generally takes the blame, but a decline in immunocompetence may be more important.

ENERGETIC EVALUATION OF THE BODY - - - - - - signal unit input and output and comparison tests can evaluate body functions and diseases that are vital to life and health conditions:

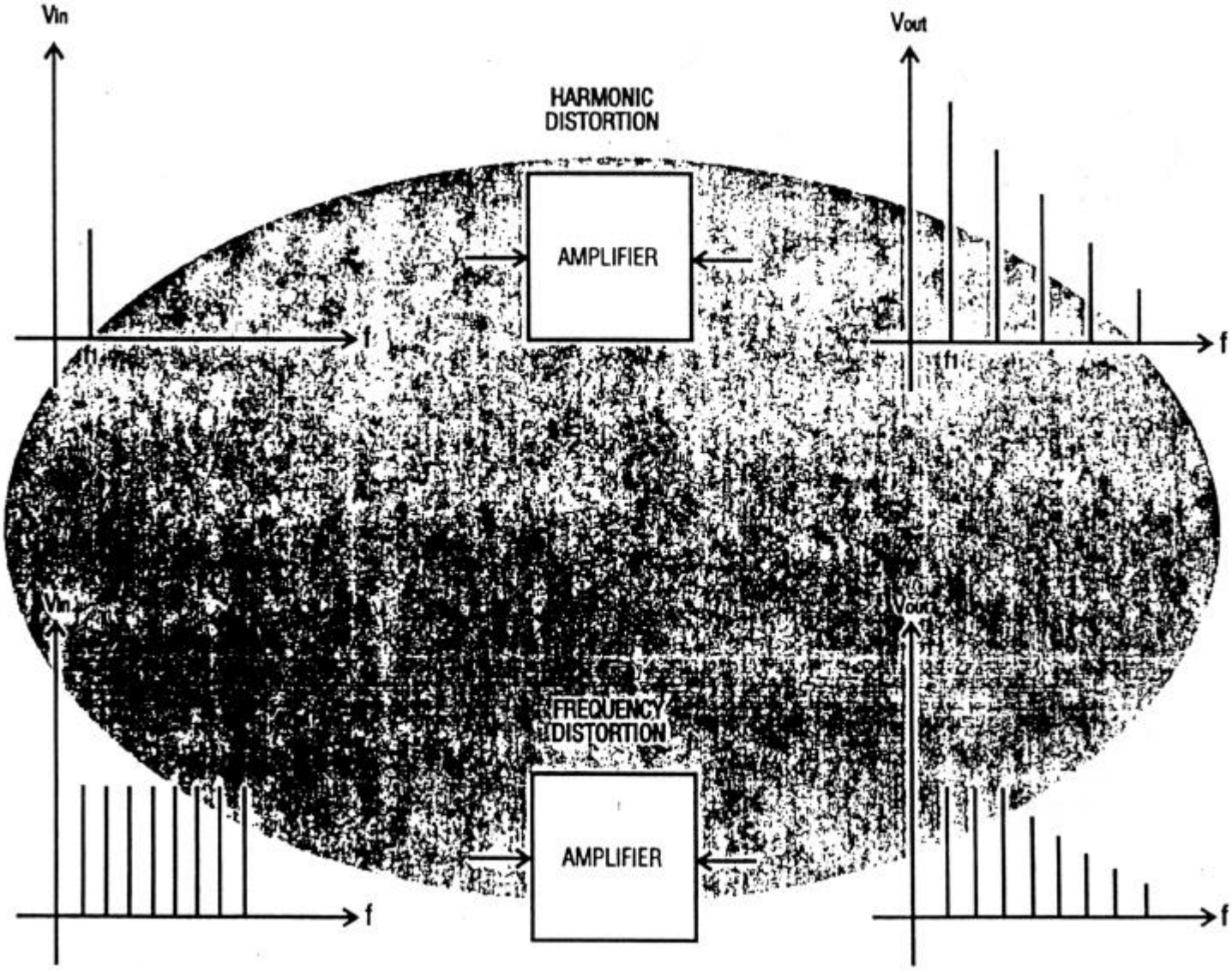
(1) Attenuation for reduction of wave amplification; High and Low frequencies.

(2) Phase angle meter to check independent body variables; phase shift: inductive and/or capacitive.

(3) Current potential handled normally by the human body.
- a. Restoration in discriminating circuits
- b. Degree of conductivity - low, medium, high
- c. Voltage - low, medium, high. Normal potential energy
- d. Resistance - low, medium, high. Normal impedance
- e. Constant power dissipation at test time rate
- f. Dynamic transfer capacity of body electrons
- g. Amplification factor; gain; stability factors; degree od detection at varying frequencies and amplitudes
- h. Electrical balance - right and left sides
- i. Stabilization: frequency, voltage, ohms, temperature

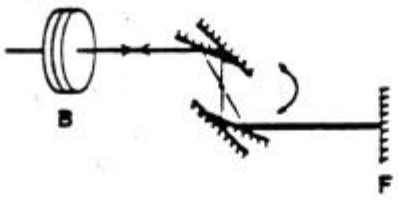
(4) Frequency response - wave length - wave form
- a. Distortion of frequencies in the nervous system
- b. Reliability of sync-pulses from normal impulse reactions
- c. Filter cut-off points of harmonics and resonance units
- d. Impedance at resonance and frequency range therein
- e. Percent modulation; voltage drop; voltage ratio; RMS
- f. Time constant of nerves; short, medium, long
- g. Pulse width: narrow, medium, wide
- h. Body “Q” at resonant conditions
- i. Characteristic curves with amplitude changes
- j. Stability factor and impedance coupling measurements
- k. Noise factor and level of auditory system and vocal, heart, circulatory and muscular systems
- l. Initial and sustained oscillations from impulses
- m. Pulse characteristics - rise time, fall time, wave form
- n. Demodulation and amplification potentials of the body
- o. Feedback in human nervous systems and nerve damage
- p. Heartbeat control with dual variable phase angle audio generators
- q. Electromagnetic potential energy level of the body
- r. Electrostatic potential energy level of the body
- s. Reaction from body degeneration
- t. Reaction of visual system by pulse response
- u. Reaction of electromagnetism and induction

```
i1=INT(SIN(x),x)
i1=-COS(x)

i2=INT(SQRT(TAN(x)),x)
i2=SQRT(2)*ATAN(SQRT(2)*SQRT(TAN(x))+1)/2+SQRT(2)*ATAN(SQRT(2)*
SQRT(TAN(x))-1)/2-SQRT(2)*LN((COS(x)*(SQRT(2)*SQRT(TAN(x))+1)+SIN(x))/
COS(x))/4+SQRT(2)*LN((SIN(x)-COS(x)*(SQRT(2)*SQRT(TAN(x))-1))/COS(x))/4

i3=INT(x/(x^3-1),x)
i3=SQRT(3)*ATAN(SQRT(3)*(2*x+1)/3)/3-LN(x^2+x+1)/6+LN(x-1)/3

i4=INT(x/SIN(x)^2,x)
i4=LN(SIN(x))-x*COT(x)

i5=INT(LOG(x)/SQRT(x+1),x)
i5=-4*LN((SQRT(x+1)-1)/SQRT(x))+2*SQRT(x+1)*LN(x)-4*SQRT(x+1)

i6=INT(x/(SQRT(1+x)-SQRT(1-x)),x)
i6=((x+1)^(3/2)-(1-x)^(3/2))/3

i7=INT(%e^(-a*x^2),x)
i7=SQRT(pi)*ERF(SQRT(a)*x)/(2*SQRT(a))

i8=INT(x/LOG(x)^3,x)


i9=INT(SIN(x)/x^2,x)
i9=INT(COS(x)/x,x)-SIN(x)/x

i10=INT(1/(2+COS(x)),x)
i10=-2*SQRT(3)*ATAN(SIN(x)/(COS(x)+1))/3+2*SQRT(3)*ATAN(SQRT(3)*SIN(x)/
(3+(COS(x)+1)))/3+SQRT(3)*x/3

d1=INT(1/(2+COS(x)),x,0,4*pi)
d1=4*SQRT(3)*pi/3

d2=INT(SIN(x)/x,x,-inf,inf)
d2=INT(SIN(x)/x,x,-inf,inf)

d3=INT(%e^(-x)/SQRT(x),x,0,inf)
d3=INT(%e^(-x)/SQRT(x),x,0,inf)

d4=INT(x^2*%e^(-x)/(1-%e^(-2*x)),x,0,inf)
d4=INT(x^2*%e^x/(%e^(2*x)-1),x,0,inf)

d5=INT(%e^(-x^2)*LOG(x)^2,x,0,inf)
d5=INT(%e^(-x^2)*LN(x)^2,x,0,inf)

d6=INT(x^3*%e^(-x^2)*LOG(x)^2,x,1,inf)
d6=INT(x^3*%e^(-x^2)*LN(x)^2,x,1,inf)

d7=INT(x^2/(1+x^3),x,0,inf)
d7=inf

d8=INT(1/x^2,x,-1,1)
d8=-2

d9=INT(%e^(-x)*x^(1/3),x,1,inf)
d9=INT(%e^(-x)*x^(1/3),x,1,inf)
```

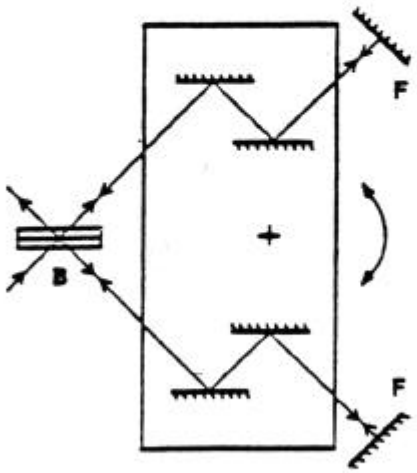

Vin
Vout
HARMONIC
DISTORTION
AMPLIFIER
f
f1
f
f1
Vin
Vout
FREQUENCY
DISTORTION
AMPLIFIER
f
f

One way to reduce harmonic distortion is through negative feedback. Negative feedback will reduce the harmonic or nonlinear distortion by desensitivity. If an amplifier has an open-loop harmonic distortion of ten percent, and the amplifier is used with negative feedback where the desensitivity is 100, then the closed-loop harmonic distortion will be reduced from ten percent to point one percent. The treatment system used on patients utilizes this type of negative feedback.

Another type of distortion is frequency distortion. This has little to do with nonlinear distortion. Frequency distortion can occur even in a small-signal operation. The primary cause of frequency distortion is a change in amplifier gain with frequency. Anxiety states are one example of this distortion occurring in a human system. This induces a hormonal or chemical component related to the neurological regulating system. Reductionistic techniques, which reduce these diseases to just their chemical nature, are inappropriate.

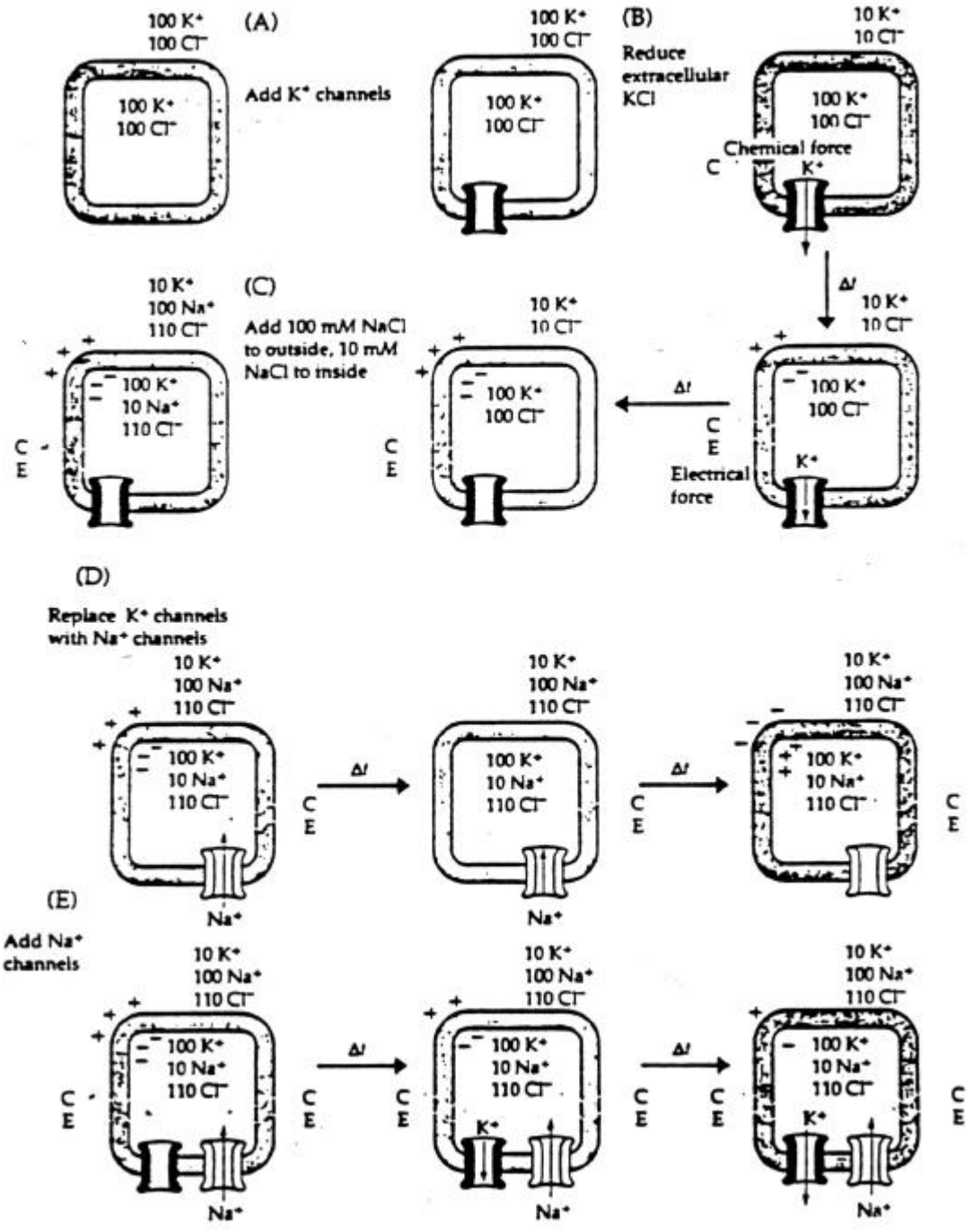


Generation of optical path difference using a rotating mirror pair



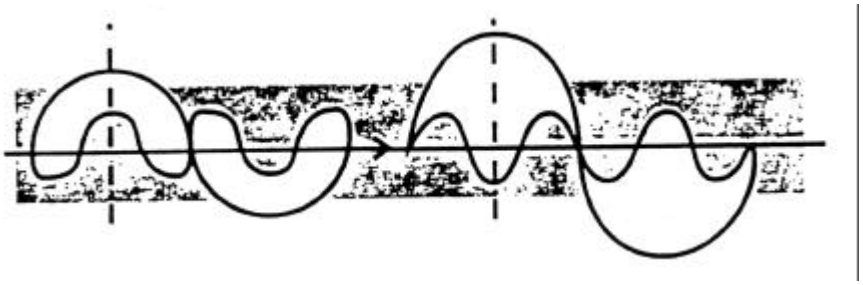
Interferometer Schematic

* *Rotary scanning interferometer.*


100 K+
100 Cl−
(A)
Add K+ channels
(B)
Reduce extracellular KCl
10 K+
10 Cl−
Chemical force
K+
Δl
Electrical force
C
E
(C)
10 K+
100 Na+
110 Cl−
Add 100 mM NaCl to outside, 10 mM NaCl to inside
100 K+
10 Na+
(D)
Replace K+ channels with Na+ channels
(E)
Add Na+ channels
Na+

The input spectrum contains many equal-amplitude sinusoidal components. If the cutoff frequency of the amplifier is less than the highest sinusoidal frequency, the higher frequencies in the output spectrum are attenuated. Frequency distortion then is just a change in the spectrum of signal caused by amplifier cutoff frequencies. This affects the quality of speech and musical signals , as we can cut off some of the top-range frequencies. This is also the normal operation of the reticular formation in the midbrain, as it sorts and filters information frequencies. This also happens in higher-dimension interactions, and gives way to an idea of how higher dimensions can produce disease-causing frequencies.

Phase distortion happens when the phase of a harmonic is shifted with respect to the fundamental.



We can see the input signal with the third harmonic peak in phase with the peak of the fundamental. If there is a phase distortion, the third harmonic will change the phase with respect to the fundamental at its output. This can be measured in the patient by the Quantum Med C.I.* system.

Frequency and phase distortion usually occur together, happening at the midband of an amplifier. Voltage gain and phase shift are constant in this case.

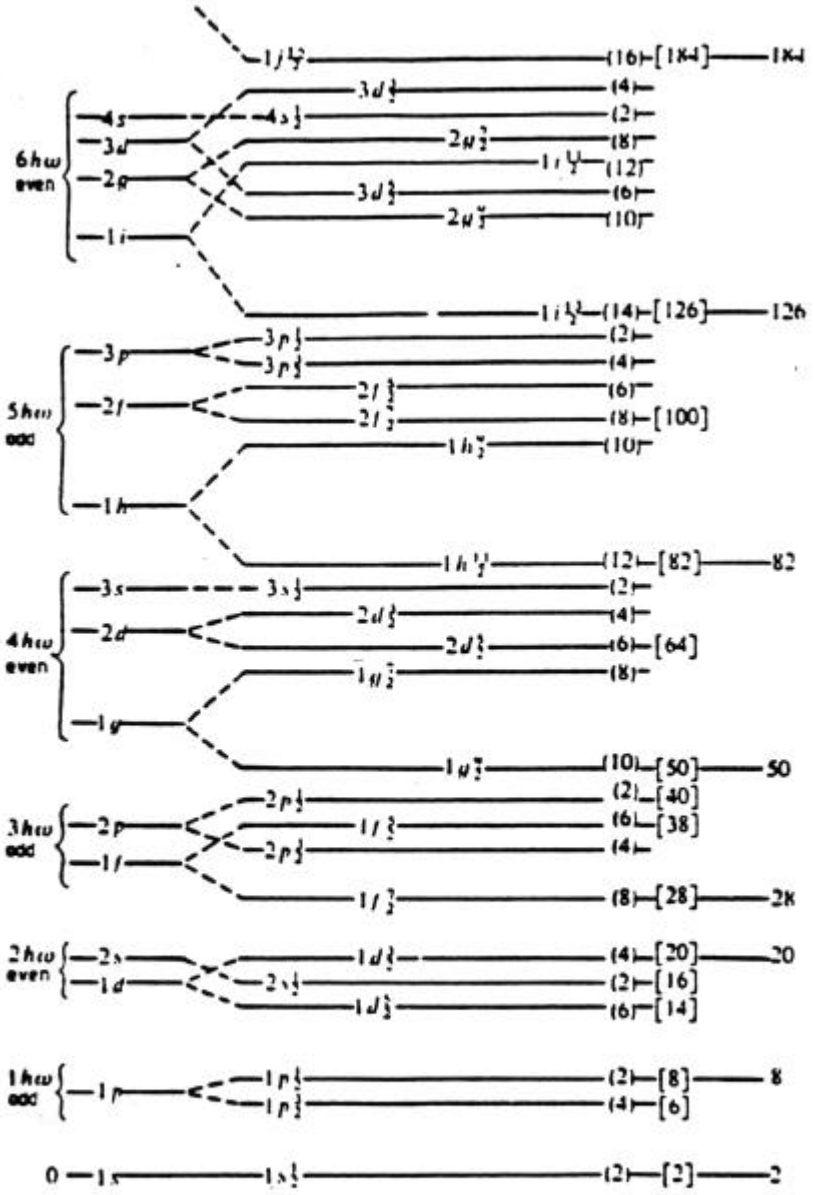
Let us look into some descriptions of negative feedback. One of the most basic types of negative feedback used in electronics is noninverting voltage feedback. This type of feedback used input signals to drive a noninverting input of an amplifier. A fraction of the output voltage is then sampled and fed back to an inverting input. An amplifier with noninverting voltage feedback will tend to act like a perfect voltage amplifier, one with infinite input impedance, zero output impedance, and constant voltage gain. A biological example of this is proprioceptive connection of sensors and muscles. This feedback system allows for motion, or for standing still.

In positive feedback amplification the output is sampled and returned to the input. This feedback signal can produce remarkable changes in circuit performance. In negative feedback, however, this means that the returning signal has a phase that opposes the input signal.

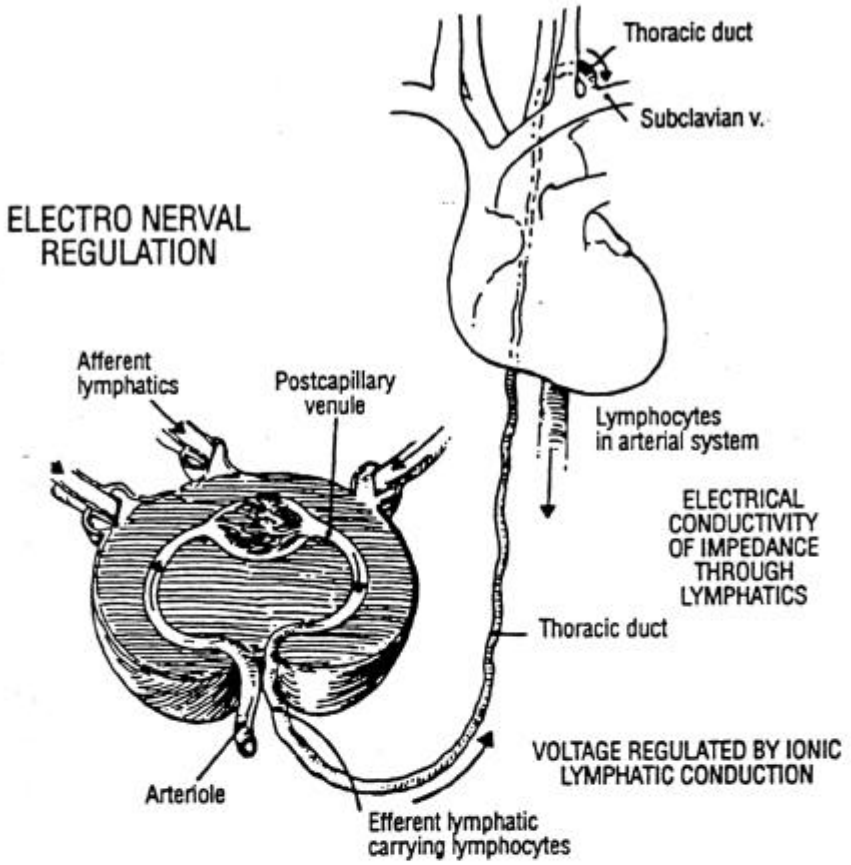
Negative feedback then provides stable gain, less distortion, and more bandwidth. The first attempt to patent such a device was by H. S. Black. His original patent was rejected because it was supposedly another perpetual motion folly. But as it turns it, it was very important and valuable for electronics.

In feedback amplification the difference between the noninverting and inverting input voltage is called error voltage. Its symbols are $U_{error} = U_1 - U_2$. Error voltage is amplified to get an output voltage in which output = A error. A is very large. To avoid saturation of the output transistors, the error voltage is kept very small. Biology uses many such error voltage units in the cellular and neurological levels. An example is in heart arrythmia, where regulation of proper electrical rhythm depends on error voltage regulation.

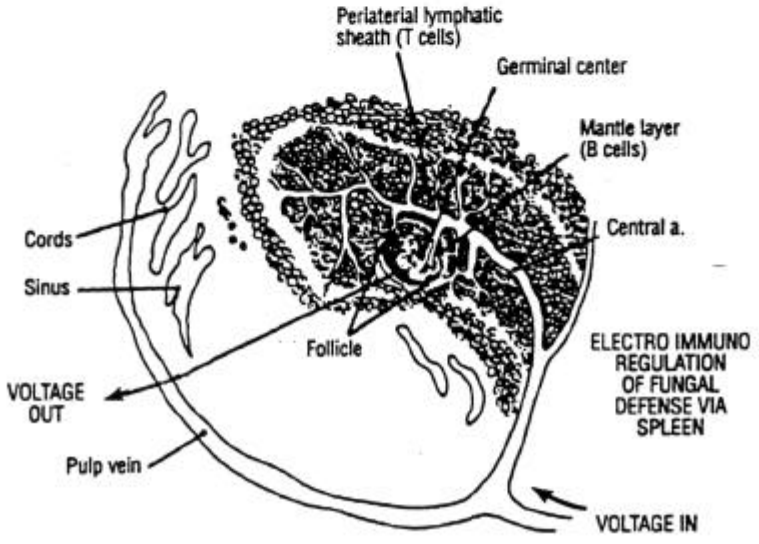
Many op amps are made which can use this type of inverting circuitry. Most op amps have extremely large voltage gains, very high input impedance, and very low output impedance. The 741C chip has values of A = 100,000, r_{in} 2 MÙ, and r_{out} = 75Ù. Voltage dividers return a sample of the output voltage to the inverting input.



Energy levels of the potential of a harmonic oscillator, left without and right with spin–orbit interaction. The numbers in brackets give the maximal nucleon occupancy of the respective subshell and of the potential up to and including this shell (from Baumgärtner and Schuck (1968)).



Circulation pathway of lymphoid cells in lymph through lymphatics, vascular system, and lymph nodes.



Distribution of lymphoid tissues within the spleen.

and can be reduced to

$$U_2 = \frac{R_2}{R_1 + R_2} U_{out}$$

If B is fed back into an input, then the symbols can be converted to

$$U_2 = BU_{out}$$

$$B = \frac{R_2}{R_1 + R_2}$$

This assumes that the input impedance is greater than r2, a condition which is usually satisfied
in most op-amp circuitry. The exact equation is

$$B = \frac{R_2 | r_{in}}{R_1 + R_2 | r_{in}}$$

The error voltage to the amplifier is

$$U_{error} = U_1 - U_2 = U_{in} - BU_{out}$$

Finally we arrive at a ratio of voltage out and voltage in of

$$\frac{U_{out}}{U_{in}} = \frac{A}{1 + AB}$$

Where U_{out} = *output voltage*
U_e = *input voltage*
A = *differential voltage gain*
B = *fraction of output voltage fed back to input*

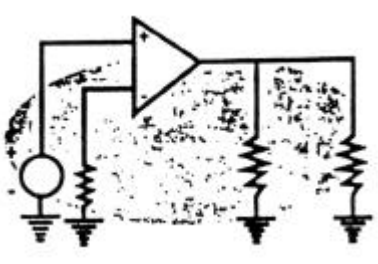
This is the key to the microvolt amplifier used by The Quantum Med C.I. in just one of it's' many treatment modes* . It is similar to the Mora unit made in Germany, but is superior in its bandwidth ability. The product of AB is known as the loop gain. For noninverting voltage feedback to be effective, the designer must deliberately make the loop gain greater than 1. This will allow for

$$\frac{U_{out}}{U_{in}} = \frac{1}{B}$$

For the sake of simplicity to understand this last equation, we can see that the inverting input voltage is boot-strapped to within microvolts of the noninverting input. This means that

$$U_1 = U_2$$
$$U_{in} = BU_{out}$$

Open-loop voltage gain is another way of describing the voltage out and voltage in ratio.



BACTERIA ELECTROCUTION

From “Fundamentals of Bacteriology” by Martin Frobisher, Jr. S.B., etc., Associate Professor of Bacteriology, The John Hopkins University, 3rd Ed. 1945, Publ. by W.B. Saunders Co. , Phila., Pa. at page 89:

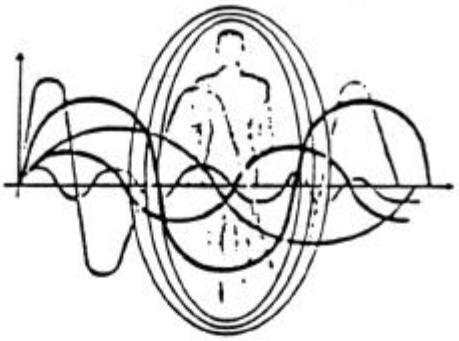
ELECTRICITY— “The passage of an electrical current through a bacterial suspension probably has little effect by itself. If a current of great intensity be passed through a culture for a long time, however, electrolysis of some of the constituents of the medium will result, their nature and concentration depending on the voltage, and the composition of the medium and of the electrodes. Some of the products of electrolysis have deleterious effects. Heat, also, will be generated and, if sufficient, may kill the bacteria.”

Such false statements are not only misleading but tend to destroy a student’s faith in the possible reality of bacteria electrocution. The devitalization of bacteria is readily demonstrated by simple ionization of the cells causing their complete breakdown into atoms and microscopic pieces. No one questions the fact that the human cell organism can be electrocuted . It is merely done by applying the proper voltage to provide the resonant or death impulse. The cells of virus, bacteria, worms, and microscopic fungi are in the neighborhood of 1,000,000 times less strong in the strength of their cell walls than the cell walls of the human body. Thus by application of the proper resonant frequencies for these parasites their destruction is accomplished without harm to human cells, but, in fact, an aid to the metabolism of the human cell by inducing needed energy from an already weakened condition owing to lack of potential electron energy. Frequency instruments provide these electrocuting resonant frequencies to devitalize parasitic human killers, which cannot be considered in any sense a USELESS DEVICE. The organized suppression of the truth is a crime of the state of California and a sin of the men who rally to the cause of drug addiction.

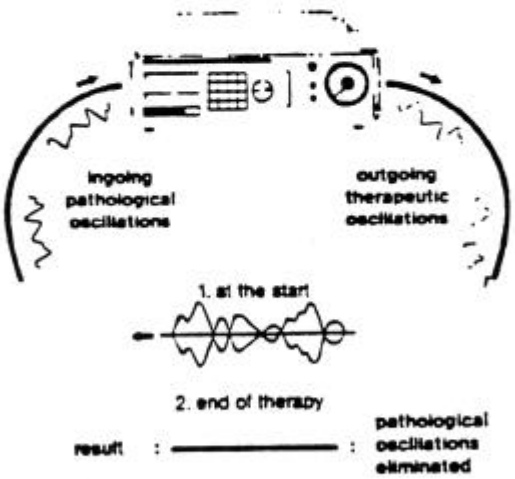
“If a current of great intensity is passed through a culture... however, electrolysis will result...” In a saline solution electrolysis causes the ionization of sodium and chlorine. Chlorine gas does kill bacteria, viruses, etc., so in this area the electrical current does not have a little effect; it means total destruction for the bacteria. “Heat, also, will be generated and, if sufficient, may kill the bacteria.” Thermal death points have been well established by Royal R. Rife’s laboratory research over a period of many years. Thermal death point merely tells us when the last survivor of all has expired in time. In milk pasteurization 62è C is used for 30 minutes. 80è C is considered the high level for thermophilic (heat-loving) bacteria. Currents generating temperatures over 80è C will kill even these “high-temperature” organisms, and so in this area the electrical current does not have a little effect; it means total destruction for the bacteria.

The potential energy level of the force in electrons to kill bacteria is known in common terms as microvoltage, millivoltage and voltage. The resonant frequency level at which the band pass of the bacteria, virus or worm, etc. reaches its resonant peak with respect to frequency is induced by frequency instruments that generate the required electron potential resonant level, originally known as the Mortal Oscillatory Rate (MOR). Royal R. Rife discovered a MOR for each parasitic virus (like cancer, T.B., polio, etc) and for each parasitic bacteria (like staph, strep, syph, tetanus, typhoid, etc.) by using critical energy levels on pure culture strains in controlled experiments for twenty years.

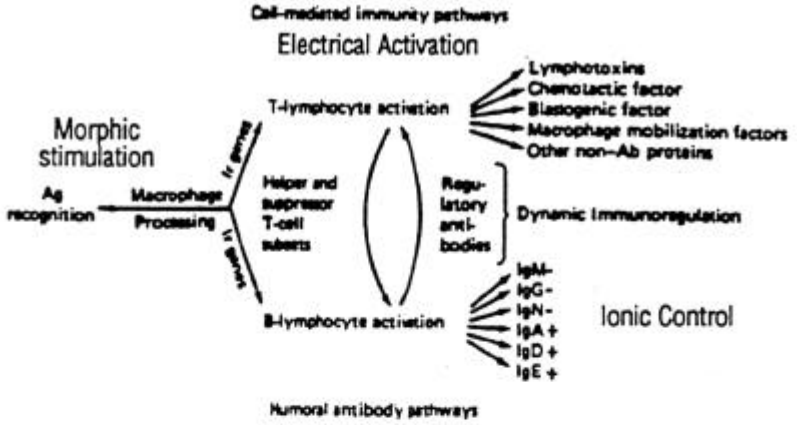
When the microorganisms reach resonance, their atoms are ionized and disintegrated just as salt dissolved in water, and their death occurs in microseconds and the kill is 100%, not 90% or 80% as in pH death, from chemicals that only reach surface contact areas. The electrons go into every cell in the human body to do a thorough “housecleaning”.



The body is controlled by a superior energy field. This "control level" has electromagnetic qualities.



The basic principle of bioresonance therapy: The pattern of the patient's oscillations is led into the device and converted there into a therapy oscillation (inverted). The precise counter-oscillation of the pathological signals is absorbed by the receptors: the pathological energy is thereby extinguished.

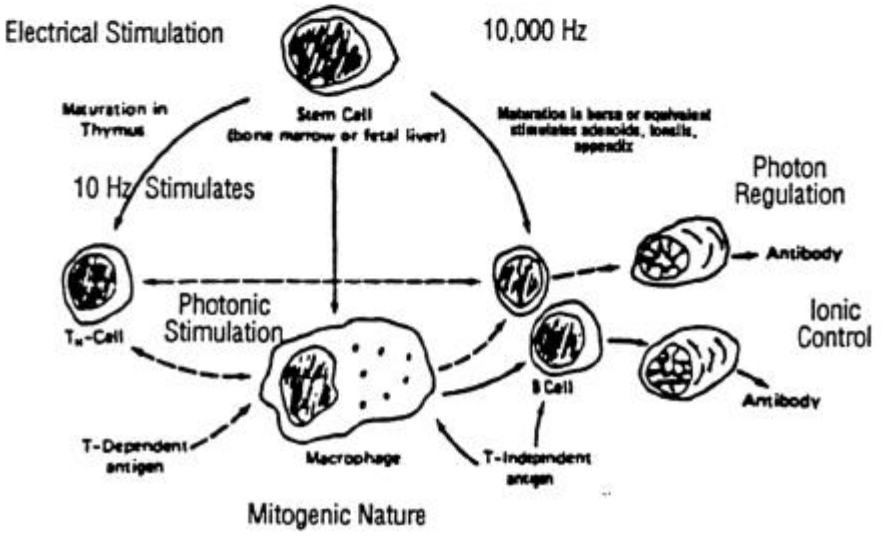


Major pathways of mammalian immune responses.

Source: From Hildemann, *Fed. Proc.* 37:2103, 1978.

Interactions among immunocytes leading to antibody production.

Source: From Hildemann et al., *Comprehensive Immunogenetics*. Elsevier, New York, 1981.



THERAPEUTIC SIGNIFICANCE:

The value of electrical stimulation in the treatment of paralyzed muscles is advocated by some workers and condemned by others. Good results have been reported in using this treatment in poliomyelitis, but stimulation should never be started too soon after injury since more harm than good may be done. 3 V max is good.

OTHER ABNORMAL FORMS OF ELECTRICAL REACTION:

A. Jolly's myasthenic reaction - In myasthenia gravis the involved muscles show a phenomenon of rapid fatigue upon repeated stimulation.

B. Myotonia reaction - In myotonia congenita (Thomsen's disease) the muscles show a "curare-like" response to a single stimulus.

C. Tetanic reaction - In tetany the muscles are hyperexcitable (Erb's sign) and show a spasm.

D. Cadaveric reaction - or complete absence of electrical excitability is seen in the acute stage of family periodic paralysis, a rare disease characterized by periodic attacks of flaccid paralysis.

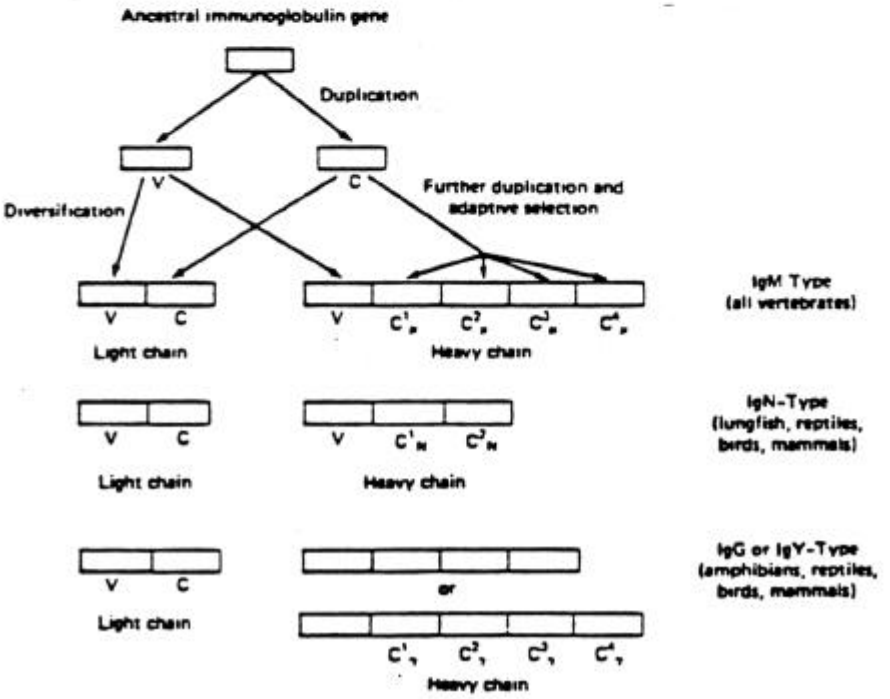
Phylogeny of Immunologic Characteristics Among Vertebrates: Phylogenetic Progression Is Evidenced by Increasing Diversification of Immunocytes and Immunoglobulin Classes/Subclasses

Class or group	Typical reactions to primary tissue allografts (cell-mediated immunity)		Blood granulocytes and lymphocytes
	Moderate	Strong	
Hagfish and lampreys	+	O	+
Sharks and rays	+	O	+
Bony fishes	+	+	+
Amphibians	+	+	+
Reptiles	+	O	+
Birds[a]	+	+	+
Mammals	O[b]	+	+

Source: From Hildemann et al., *Comprehensive Immunogenetics*, Elsevier, New York, 1981

Immunogenetic scheme to account for origin of vertebrate immunoglobulins and molecular representation of heavy and light polypepetide chains. The lengths of the chains are proportional to the carbohydrate-free molecular weight. The basic unit of homology is approximately 110 amino acids, for which the ancestral gene presumably coded. The letters V and C identify the variable and constant regions of the chains. The particular class of C-region homology units is given by the subscript, whereas the superscript numeral gives the position.

Source: (Modified from Hildemann, *Annu. Rev. Genet.* 7:21, 1973. Reproduced with permission by *Annual Review of Genetics*, Annual Reviews, Inc.)



THE POSTULATES OF ELECTROSTATIC PHENOMENA

1. An electric field may be divided into lines of force. These lines organize in a trivector signal.

2. Each line terminates at a positive charge on one end and a negative charge on the other.

3. The lines throughout the field coincide with the direction of the electric stress.

4. The lines behave as though they were stretched electro-elastic forces, always tending to contract and bring together the negative and positive charges.

5. A line of force between two conduction surfaces must always meet the conducting surfaces perpen dicularly. This must be so from the very nature of the assumed static conditions. If a line of force entered or left a conducting surface at any other angle than normal, it would have a tangential com ponent at the surface that would cause the movement of charges within the conductor. This would constitute a continuous electric current. Since currents do not flow along the surface of a conductor in an electric field in a static system, the junction of the line of force and the surface must be at right angles.

Characteristics of Thymic "Hormones"

Putative hormone	Molecular characteristics	Biologic activities	Electro-Magnetic Static Component
Thymosin	12,000 da Protein	Restores T-cell immunity following thymectomy in mice. Increases number of bone marrow cells with Thy-1 marker. Increases helper T cells, GVH, and MLC activity in mice. Increases T cells, PHA, and MLC activity in vivo and in vitro in humans.	Magnetic-Strong Static-Mod.
Thymopoietin I and II	7000 da Protein	Impairs neuromuscular transmission. Increases number of bone marrow cells with Thy-1 marker.	Static-Strong Electro-Mod.
Thymic factor	1000 da Peptide	Increases Thy-1 antigen and ConA reactivity in mouse marrow cells. Increases intracellular cAMP.	Electro-Strong Magnetic-Mod.
Thymic humoral factor	>700–<5000 da Polypeptide	Increases MLC reaction in mice. Increases GVH activity in mice. Increases intracellular cAMP. Increases T- and B-cell cooperation in antibody production. Is lymphocytopoietic. Restores ability to reject tumor and skin allografts following thymectomy.	Magnetic-Strong Static-Mod. Electro-Strong
Thymic replacing factor	45,000–60,000 da (Unknown)	(Unknown)	Magnetic-Strong
Lymphocyte-stimulating-hormone	15,000 & 60,000 da Proteins	Increase plaque-forming cells and antibody responses in mice.	Static-Strong

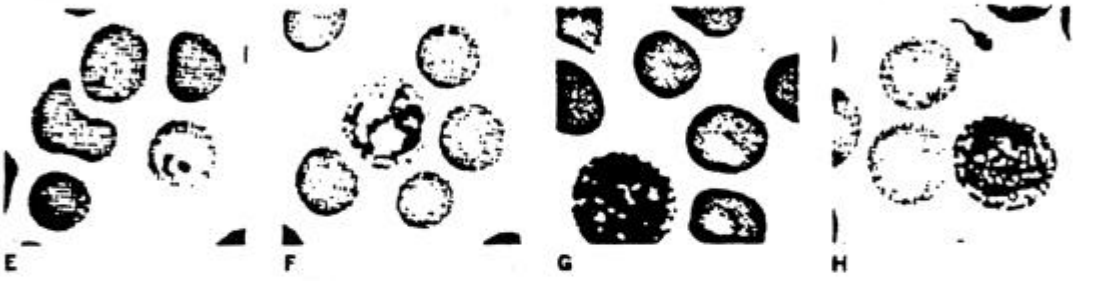
Abbreviations: Thy-1, T-cell differentiation antigen of mice; GVH, graft-vs.-host reaction; MLC, mixed lymphocyte culture; PHA, phytohemagglutinin.

Microorganism	X-ray Death	Infrared Death	Ultraviolet Death	Dye	Acid Dye Resist	Stained under the Universal Microscope	
Syphilis	slight	no	no	Silver Nitrate	no		
Tuberculosis	no	slight	no	Gentian Violet	yes		
Gonorrhea	no	helps growth	slight	Carmine	no		
Leprosy	slight	no	no	Carmine	yes		
Actinomycosis	slight	no	no	Bismark Brown	no		
Typhoid	no	no	no	Gentian Violet	no		
Catarrhal Inflammation	no	no	no	Gichma	no		
Bacillus Coli	no	slight	no	Gentian Violet	no		
Bubonic Plague	no	no	increases culture	Silver Nitrate	no		
Tetanus	no	slight	no	Silver Nitrate	slight		
Diphtheria	slight	no	no	Hematoxyline	no		
Symptomatic Anthrax	no	slight	no	Gentian Violet	yes		
Anthrax	slight	no	no	Gentian Violet	no		
Pneumonia	no	no	no	Hematoxyline	no		
Spinal Meningitis	no	no	slight	Silver Nitrate	no		
Glanders	no	no	no	Bismark Brown	no		
Cholera	no	no	slight	Hematoxyline	no		
Typhus	--	--	--	Bismark Brown	no		
Influenza	no	no	slight	Silver Nitrate	no	Color of Spectrum	Angle of Refraction for light
Conjunctivitis	no	no	no	Silver Nitrate	no		
Staphylococcus	no	helps growth	no	Hematoxyline	no	Refraction	
Streptococcus	no	no	no	Hematoxyline	no		
Cancer Virus	no	no	no		no	purple-red	-12 3/10°
Typhoid Virus	no	no	no		no	turquoise-blue	+4.8°
E. Coli Virus	no	no	no		no	dark brown	+7°
Polio Virus					no	reddish-brown	+8.3°
Herpes Virus					no	coral pink	+14°

Microorganism	Motile	Flagellated	Polarity Plus	Polarity Minus	Length (microns)	Width (Microns	Death Pt. ma. D.C.	Death Pt. 24 hrs. °C	Death Pt. 24 hrs. °F
Syphilis	yes	no		X	3.5-15.5	.33-.5	80	39.5	103.1
Tuberculosis	no	no	X		1.5.3.3	.2-.5	168	42.5	107.8
Gonorrhea	no	no	X	X	1.6	.8	8.3	39	102.2
Leprosy	no	no	X		1.4-3.3	.2-.5	53	42	105.8
Actinomycosis	no	no	X	X	long	.3-.5	12.2	40	104
Typhoid	yes	yes		X	1.3-2.4	.5-.8	28	39.5	103.1
Catarrhal Inflammation	no	no	X	X	2.0	1.0	75	47	116.6
Bacillus Coli	yes	yes	X		1.3	.4-.7	7	45	113
Bubonic Plague	no	no	X	X	1.5-2	.5-.75	140	48	118.4
Tetanus	no	no	X	X	2.4	.3-.5	64	51.5	122.9
Diphtheria	no	no		X	1.5-6.5	.3-.8	175	45	113
Symptomatic Anthrax	yes	yes	X		3.5	.5-.6	71	49.5	120.4
Anthrax	no	no	X	X	5.2	1-1.25	75	45	113
Pneumonia	no	no		X	.2-.5 Diam.		12	47	116.6
Spinal Meningitis	no	no		X	.2-.6 Diam.		110	48	118.4
Glanders	no	no	X		1.5-3	.25-4	95	50.6	123.08
Cholera	yes	yes	X	X	.5-2.5	.1-.04	74	43	109.4
Typhus	yes	yes	-	-	-	-	-	-	-
Influenza	no	no		X	.5	.2	120	50	122
Conjunctivitis	no	no	X	X	1-2	.25	89	42	105.8
Staphylococcus	no	no		X	.7 Diam.		89	40	104
Streptococcus	no	no	X		.4-1 Diam.		120	50	122
Cancer Virus	yes	yes		X	1/15	1/20	175	42	107.6
Typhoid Virus	yes	yes	X		1/8	1/11	128	41	105.8
E. Coli Virus	yes	yes	X	X	1/8	1/10	86	43	109.4
Polio Virus	no	no		X	1/10	1/14			
Herpes Virus	no	no	-	-	1/11	1/15			

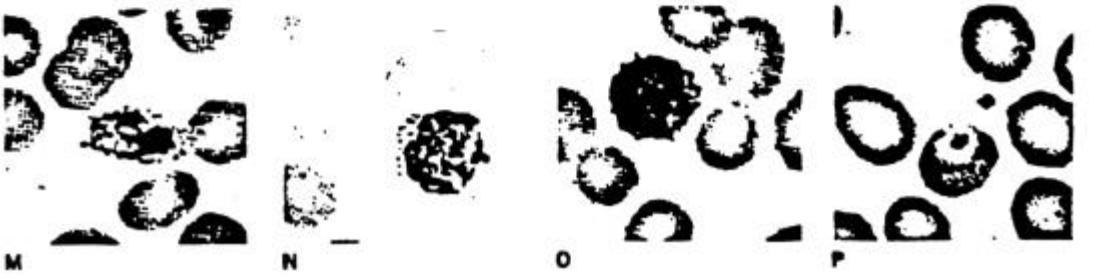
Plasmodium falciparum

Plasmodium vivax

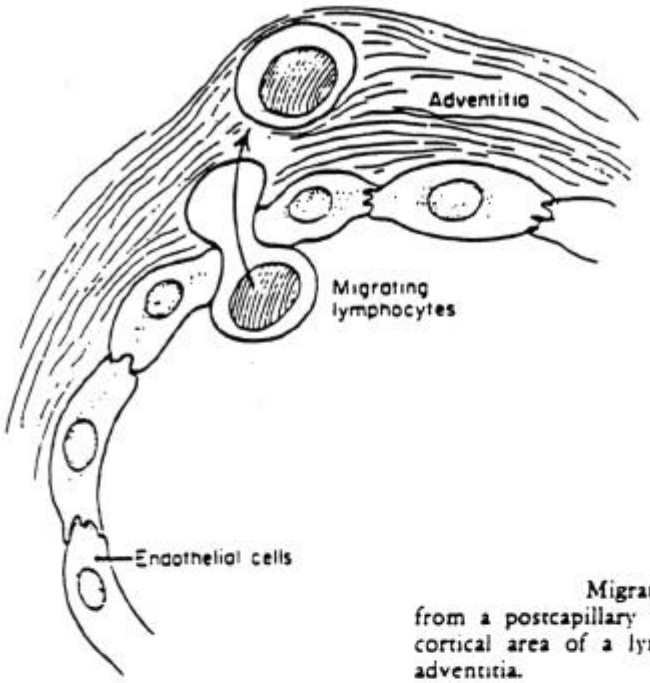


Plasmodium malariae

Plasmodium ovale



Platelet on RBC



Migration of lymphocytes from a postcapillary venule in the paracortical area of a lymph node into the adventitia.

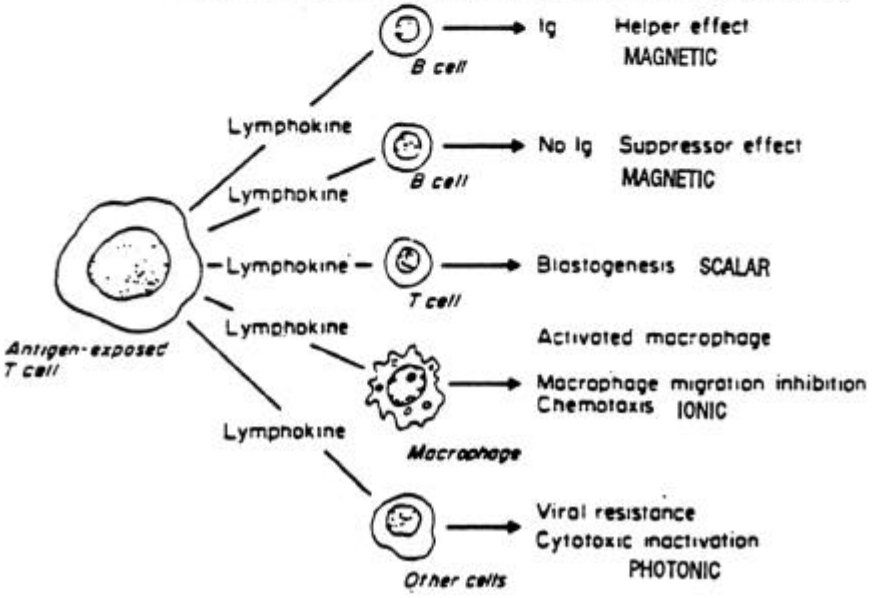
Features of Human Immunocompetent Cells

Characteristic	T	B	Macrophages MØ	NK
Origin	Bone marrow	Bone marrow	Bone marrow	Bone marrow
Differentiation	Thymus	Bone marrow	Bone marrow	Thymus?
Life span	Month–years	Days–weeks	?	?
Localization in peripheral lymphoid tissues	Perifollicular & periarteriolar	Germinal centers	Diffuse	?
Recirculate	Yes	Mostly stationary	Yes	Yes
Surface receptors				
FC	Yes	Yes	Yes	Yes
Ig	Ig−	Ig+	Ig−	Ig−
C3	No	Yes	Yes	No
Sheep RBC	Yes	No	No	No
Functions				
Cell-mediated immunity	Yes	No	Yes	Yes
Humoral Immunity				
Helper function	Yes	No	Yes	No
Antibody synthesis	No	Yes	No	No
Memory	Yes	Yes	No	No
Magnetic	Yes	Yes	No	No
Static	Yes	Yes	No	Yes
Electron	No	Yes	No	No
Photon	Yes	Yes	Yes	Yes

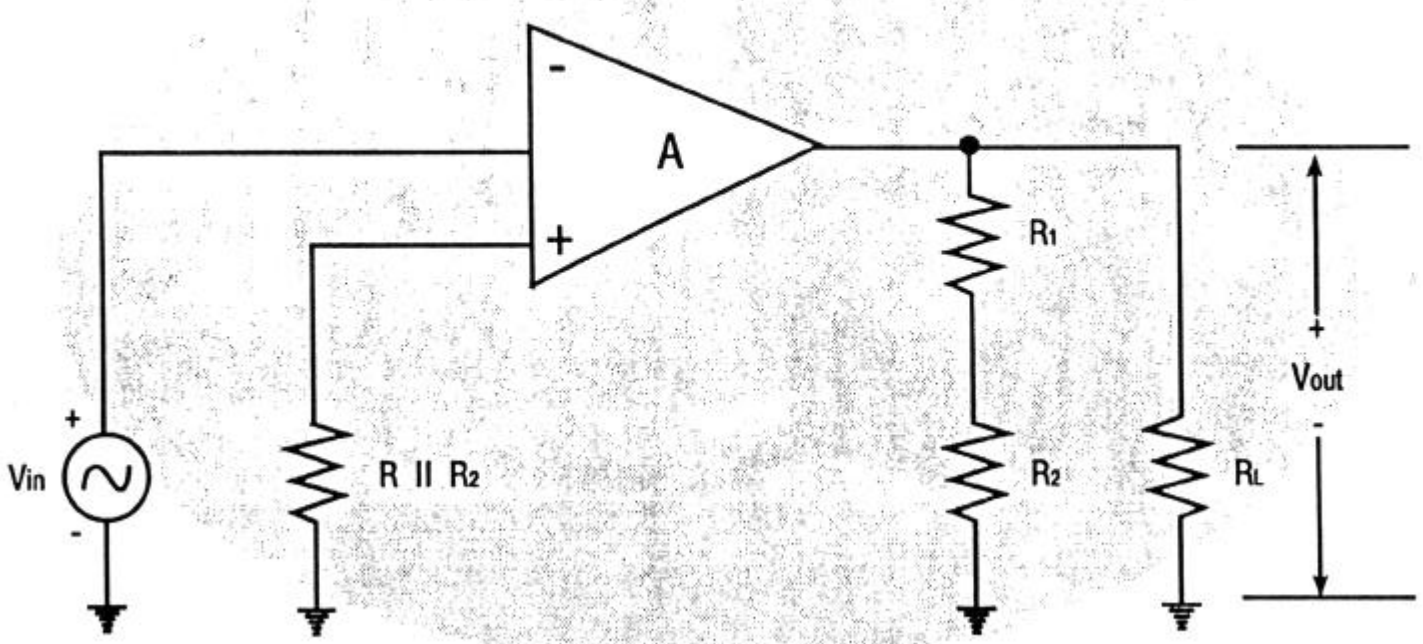
Functions of Lymphokines in Summary

Lymphokine	Function	Comment
Blastogenic factor	Initiates cell growth	Synonymous with mitogenic factor and lymphocyte transformation factor
Chemotactic factor	Attracts macrophages	Other T-cell lymphokines attract granulocytes
Interferon	Confers protection on host cells against viruses	A family of proteins, also a monokine
Interleukin-1	Initiates T-cell proliferation	Probable macrophage-derived protein that promotes short-term proliferation of T-cells
Interleukin-2	Promotes continuing T-cell proliferation	Probable lymphocyte-derived protein that promotes long-term proliferation of T-cells
Lymphotoxin	Destroys target cells	A family of proteins
Macrophage-activating factor (MAF)	Summons "angry" macrophages	May be identical to MIF
Macrophage aggregation factor (MAF)	Agglutinates macrophages	Probably same as MIF
Migration inhibition factor (MIF)	Prevents macrophage migration	

Diagrammatic representation of diverse effects of lymphokines.



OPEN LOOP



The resistance ration can be described as

$$R_B = R_1 \| R_2$$

The equivalent resistance of the output terminal is

$$r_L = (R_1 + R_2) \| R_L$$

Typical open-loop voltage gains on most op amps are in the 100,000 range. A closed-loop voltage gain is an overall voltage gain when the feedback path is closed.

$$A_{CL} = \frac{A_{OL}}{1 + A_{OL}B}$$

where A_{CL} = closed-loop voltage gain
A_{OL} = open-loop voltage gain = A
B = feedback fraction

In most feedback amplifiers our loop gain is greater than 1, and can be presented by

$$A_{CL} = \frac{1}{B}$$

In using a noninverting voltage feedback system we will see that there are stable voltage gains, as a possible plus. It also can help to improve input impedance, output impedance, nonlinear distortion and output offset voltage. Desensitivity in the feedback amplifier is how much voltage gain is reduced by negative feedback. This is also an advantage of our noninverting voltage feedback system.

In a noninverting current feedback system an input voltage drives the noninverting input of an amplifier, and the output current is sampled to get the feedback voltage. An amplifier with noniverting current feedback will be similar to a perfect voltage-to-current converter, one with infinite input impedance as well as infinite output impedance in the presence of a stable transconductance. In the next figure we can see an example of an ac equivalent circuit, which is a feedback amplifier of a noninverting current feedback.

Load resistor and feedback resistor are in series within this circuit. The load current passes through a feedback resistor. Feedback voltage is proportional to the load current because

$$v_2 = i_{out}R_F$$

Wherever a feedback voltage is proportional to the output current, the circuit is said to have current feedback. This is the key to neural transmission, and controls the sodium pump.

Current feedback will stabilize the output current. This will show that a constant input voltage produces an almost constant output current despite changes in open loop, gain and load resistance. If we try to increase output current, negative feedback will eliminate its effect. If we analyze this mathematically, we can see

$$A_{CL} = \frac{A}{1 + AB}$$

$$B = \frac{R_F}{R_L + R_F}$$

$$i_{out} = \frac{v_{out}}{R_L + R_F} = \frac{A_{CL}v_{in}}{R_L + R_F}$$

This can be transposed to

When the loop gain is high, we can find

$$\frac{i_{out}}{v_{in}} = \frac{(R_L + R_F)/R_F}{R_L + R_F}$$

$$\frac{i_{out}}{v_{in}} = \frac{1}{R_F}$$

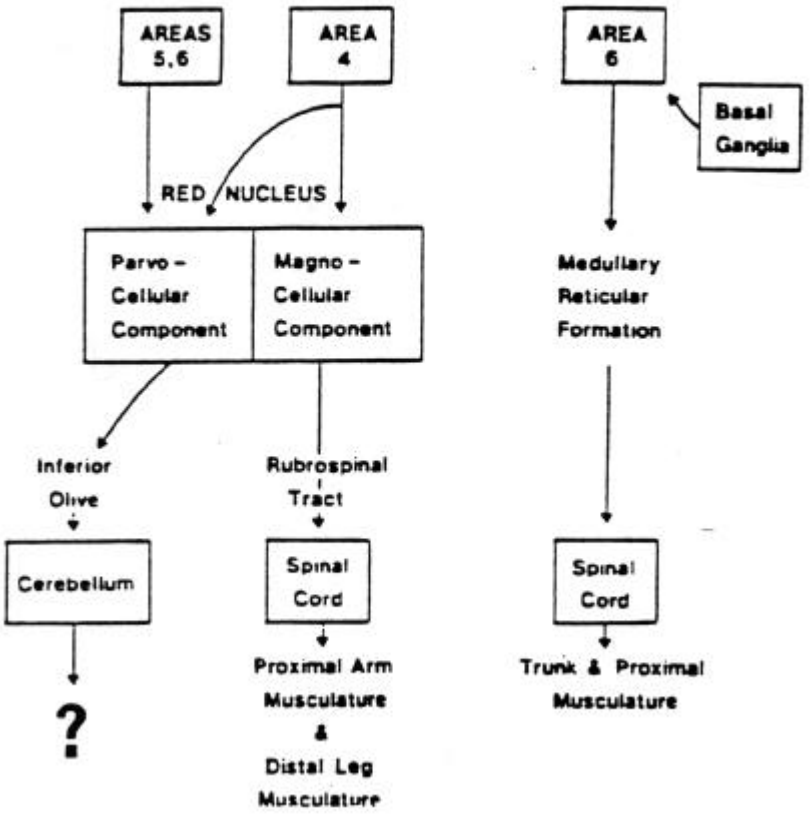
If a feedback amplifier has noninverting current, feedback is a transconductance amplifier. This has a mathematical relationship of

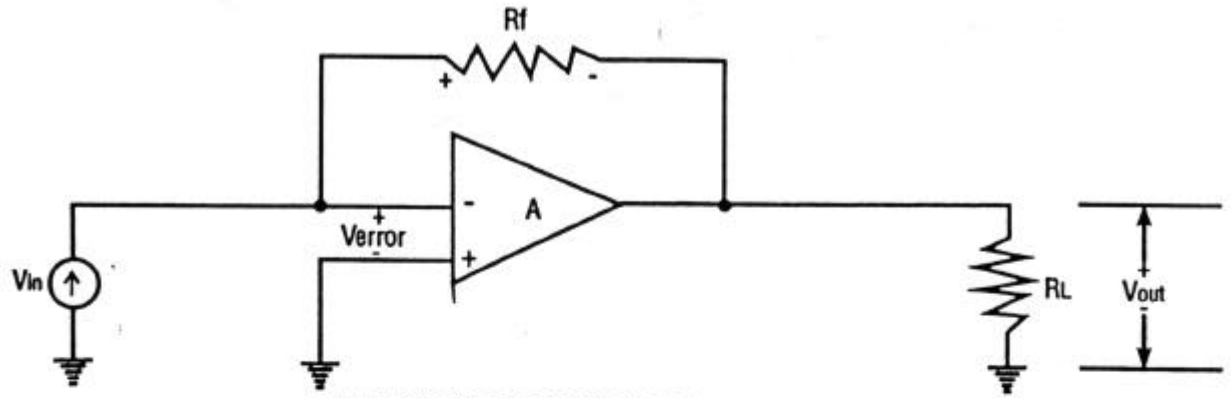
$$g_m = \frac{1}{R_F}$$

where g_m = transconductance , i_{out}/v_{in}
R_F = current -feedback resistor

A voltage-to-current converter exists if the input voltages control an output current. We can express this output current as

$$i_{out} = \frac{v_{in}}{R_F}$$

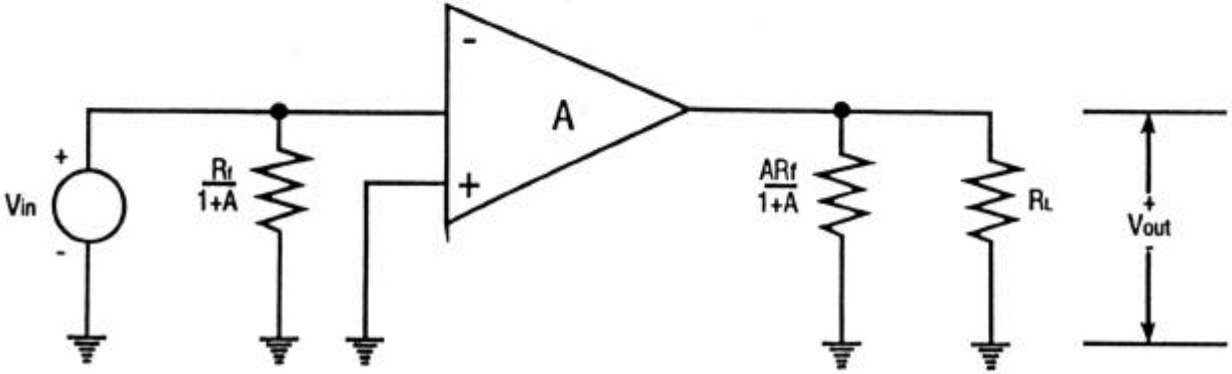




INPUT SIGNAL DRIVES INVERTING INPUT

NON INVERTING CURRENT FEEDBACK

MILLERS THEREOM

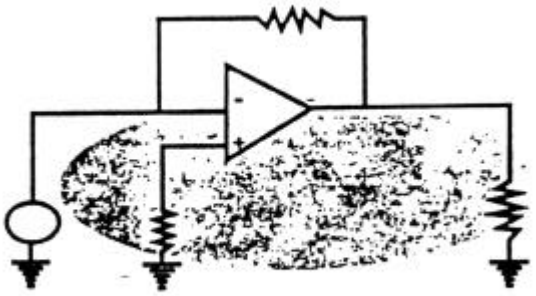


Known inverting current feedbacks differ from some of the others because of the closed-loop output impedance. Since the loop is no longer grounded, but is part of the feedback circuit, there is a different thevenin output impedance. It can thus be shown that

$$r_{out(CL)} = (1 + A) R_F$$

where $r_{out(CL)}$ = closed-loop output impedance
A = open-loop voltage gain
R_F = feedback resistor

The figure below shows an inverting voltage feedback device.



(SEE PREVIOUS DIAGRAM)

Here the noninverting input is grounded in an amplifier. The input signal can drive the inverting input of the output voltage, which is sampled. This produces an inverting voltage feedback. The amplifier with the inverting voltage feedback will tend to act like a perfect current-to-voltage converter, a device with zero input impedance, zero output impedance, and a constant voltage-out to impedance-in ratio. The firing activity of the heart muscle is a similar function.

This voltage-out to impedance-in is sometimes referred to as the transresistance ratio. It involves a resistance connected between the input and output. A feedback amplifier with inverting voltage feedback can sometimes be referred to as a transresistance amplifier. A circuit like this is called a current-to-voltage converter. This current-to-voltage converter uses an input current to control an output voltage.

In the above diagram we have a closed-loop impedance, which is the ratio of the error to impedance$_{in}$. Because the error voltage approaches zero, the closed-loop input impedance also approaches zero.

In dealing with our feedback amplifiers we can understand that driving the noninverting input will result in a high-input impedance. If we drive the inverting input, this produces a low-input impedance. Voltage feedback stabilizes the output voltage (at low-output impedance). Current feedback will stabilize the output current (high-output impedance). In all types of negative feedback we will see reduction in nonlinear distortion and output offset voltage.

A virtual ground happens when any point in a circuit has zero voltage and draws no current.

Here the inverting input is a virtual ground because it acts like a ground as far as voltage, but not regarding current. The ordinary ground has zero voltage, and can sink infinite current. A virtual ground has zero voltage and zero current. In inverting voltage feedback, we imply that the error voltage is zero. The virtual ground can have dc potential of zero with respect to the ground.

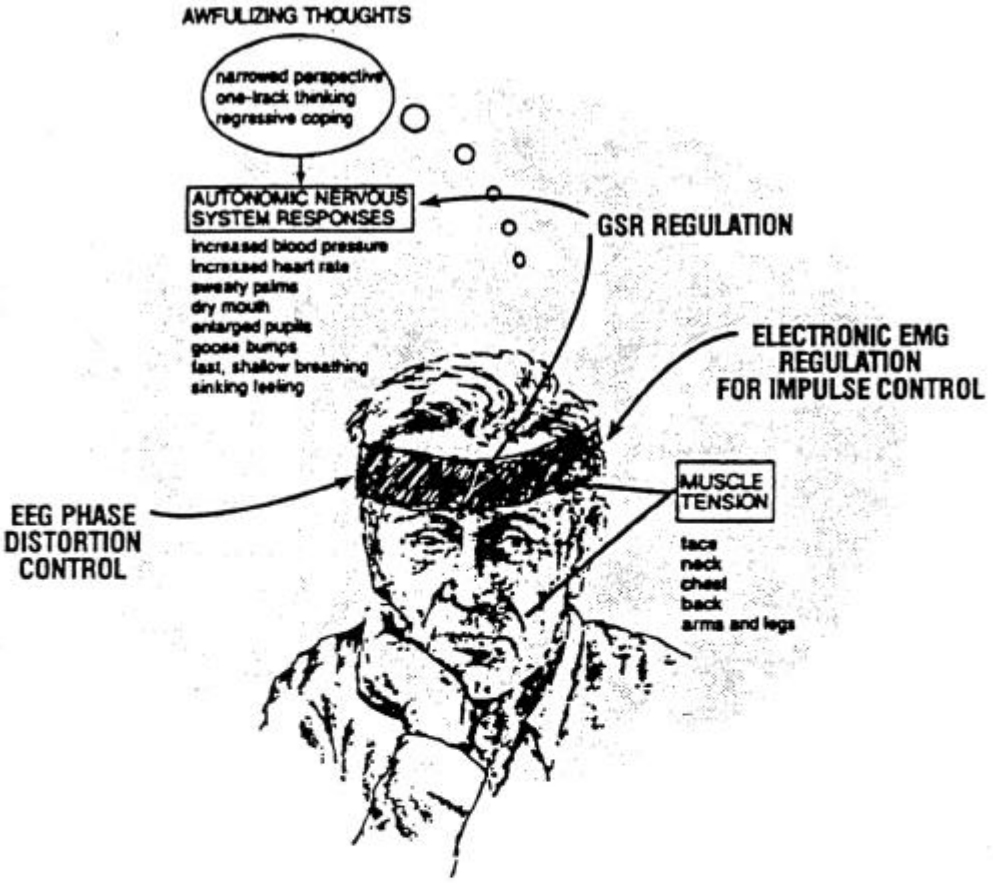
The virtual ground is not always at dc ground potential. Some circuits have noninverting inputs that are biased at positive and negative dc levels. A bypass capacitor is then used to ac-ground the noninverting unit. In this case the virtual ground has a dc potential, but it is still a virtual ground to ac signals, meaning that it has zero ac voltage and draws no ac current.

The above diagram shows us a schematic of an electronic am-meter whose input resistance apptoaches zero. The typical open-loop voltage gain of a 741C is 100,000. Here we can see the voltages.

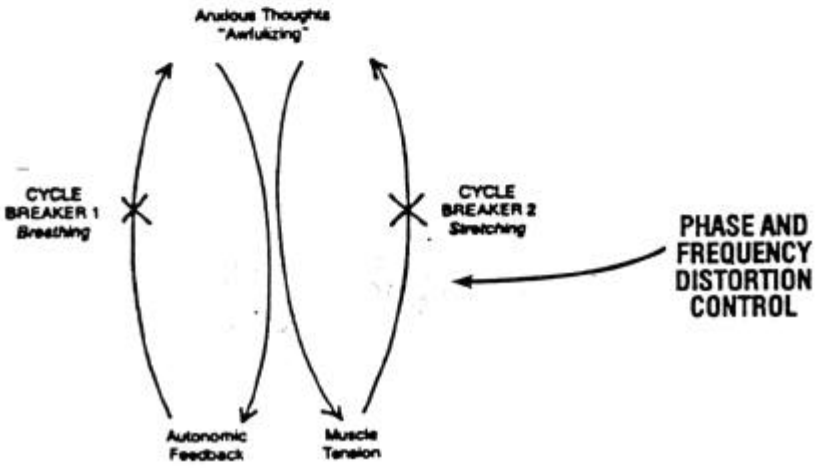
$$r_{in(CL)} = \frac{100\ k\Omega}{100,000} = 1\ \Omega$$

$$V_{out} = (100\ k\Omega)\, i_{in}$$

Breaking the Anxiety Cycle



The Anxiety Cycle

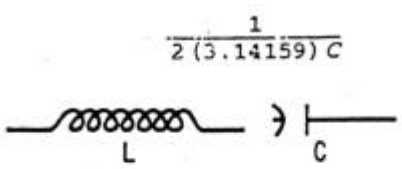


Cycle Breakers

RESONANT CIRCUITS

1) The series-resonant circuit will resonate at a point or at that frequency where $X_L = X_C$.
Therefore: 2(3.14159) fL =

$$\frac{1}{2(3.14159)C}$$



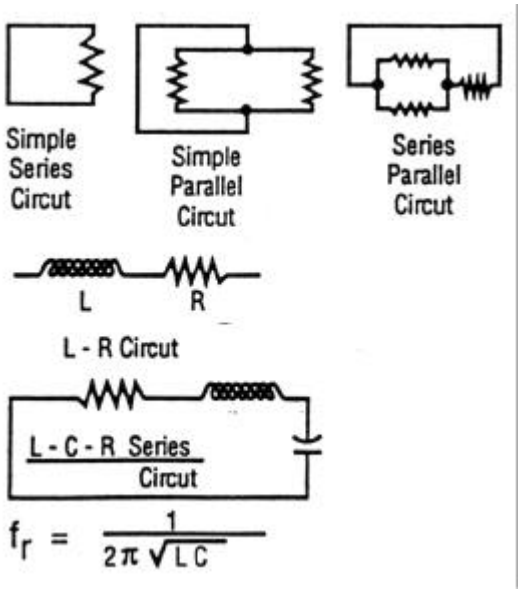
Series-Resonant Circut LC Diagram

Solving for Resonant Frequency:

$$f_r = \frac{1}{2(3.14159)\ (L)\ (C)}$$

where C = Capacitance in microfarads; L = Inductance in henries (of inductor)

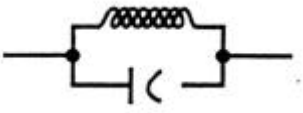
2) A series resonant circuit is defined as one in which the impulse originates within the resonant circuit (like a nerve). A series circuit is resonant if: $X_L = X_C$; $EL = E_C$; $E = E_R$; $Z = R$ where E = applied voltage; and Z = circuit impedance; R = resistance of circuit; EL = inductive voltage; EC = capacitive voltage.



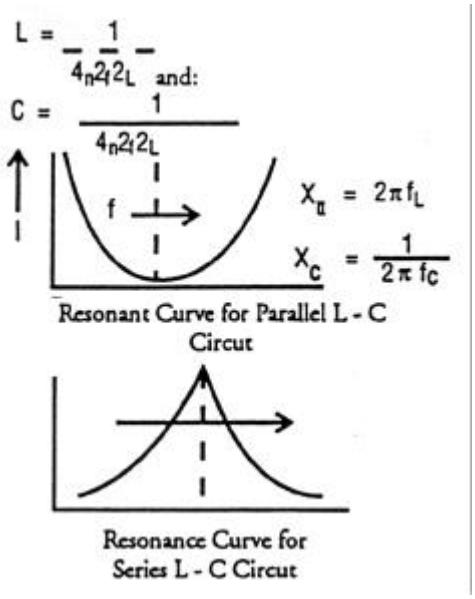
where fr = Hertz at resonance

3) The parallel-resonant circuit offers a high resistance to the flow of impulses at its resonant value. Such a circuit is often termed a rejector circuit because of its ability to pass all but a narrow band of impulses about its resonant frequency; in an oscillator— a tank circuit; in an antenna circuit-a wave trap.

Parallel-Resonant Circuit



Other parallel circuits may be: L-R; R-C; L-C was shown. If the value of L or C is known, the value of the other component may be found where:

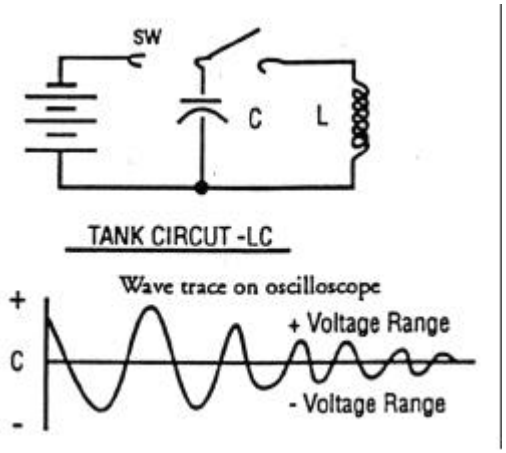


It is evident that a circuit will be in a state of resonance at only one particular frequency, and that the flow of current will be opposed by the inductive or capacitive reactance in the circuit. When the difference between the inductive and capacitive reactance approaches zero, there is less opposition to the flow of current in the circuit. As a result, current begins to flow and reaches a maximum flow at resonance.

Initial oscillation may be externally excited or self-excited. The cry of a newborn baby after being spanked is an example of external excitation where the heartbeat oscillation is activated. Oscillations build up to a point limited by the normal operation of the heart— beat oscillator, its feedback energy from the parasympathetic system, and the nonlinear condition of the circuit.

PRINCIPLES OF IMPULSE OSCILLATION

Having reviewed briefly L and C, it is noted that oscillation occurs naturally in a simple parallel LC circuit. The voltage in the circuit is everywhere the same, the currents 90è out of phase, and the resultant line current either lagging (L-R) or leading (C-R) the applied voltage by some angle less than 90è. In addition, the line current is greater than the current in either branch and therefore, the total impedance is less than the impedance of either branch. The increase in R lessens the current through that branch and increases the relative effectiveness of the inductance or capacitance, resulting in a more reactive circuit as the phase angle approaches 90è. The limiting condition in this instance would be a resistance of infinite ohms, effectively opening that branch and making current and voltage across the reactive element 90è out of phase.



OSCILLATION GOING TO ZERO

If SW is thrown left, battery charges C by removing electrons from the top plate and storing them on the lower plate. This action stores energy in the electric field of the capacitor. Now turn the SW right and C discharges through L with electrons moving from the lower plate back to the upper. The rising current through L will store energy in the magnetic field around it. When C becomes discharged, the energy of its charge will have been transferred to the magnetic field L. This stored energy in L will begin to charge C as it continues the flow of electrons to charge C with a reverse polarity. This continues until all the energy in the magnetic field has been transferred to C. Then C begins to discharge again with a reverse direction of electron flow. The period of frequency determined by its resonant frequency is:

$$f_r = \frac{1}{2(3.1416)LC}$$

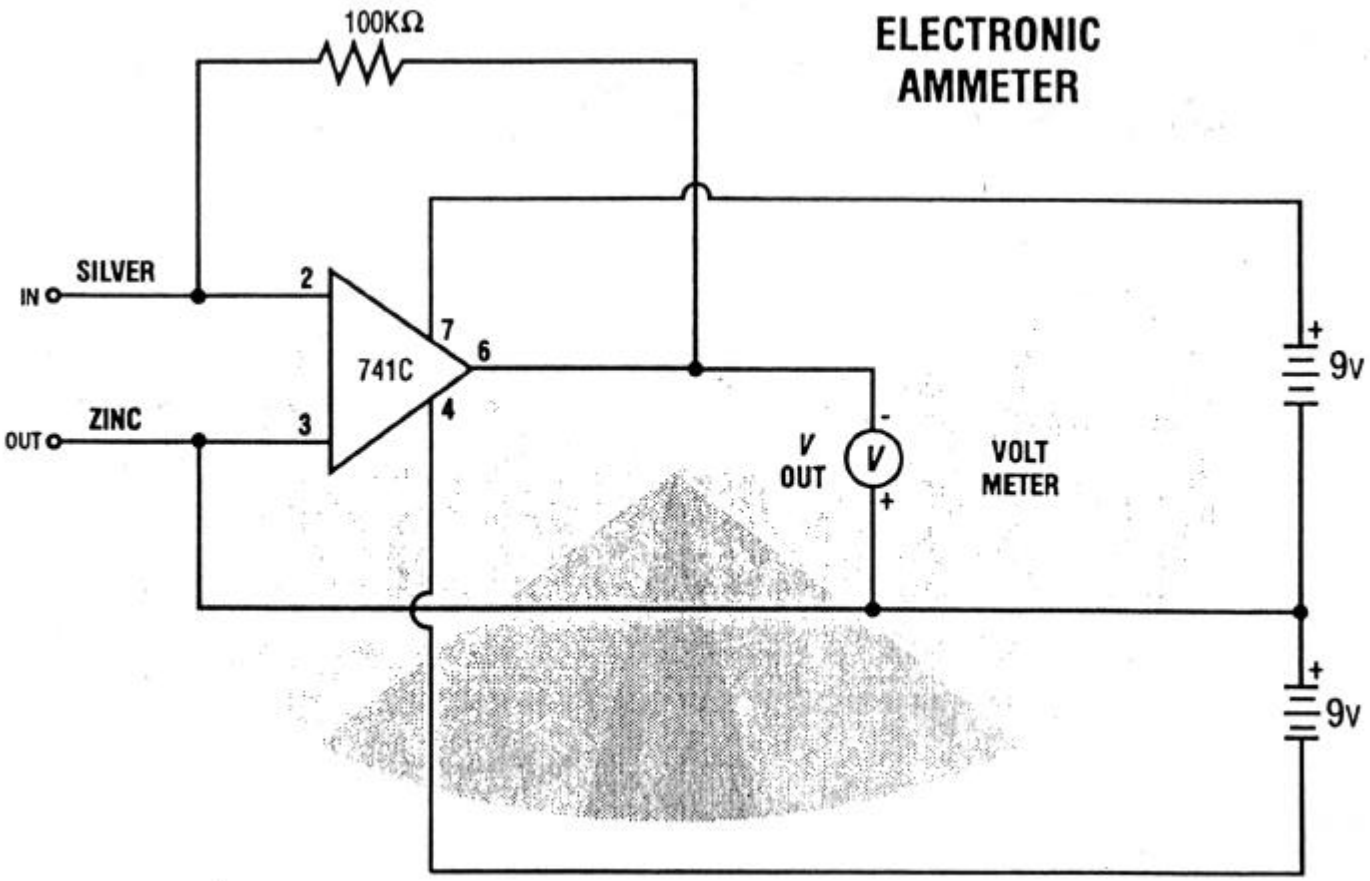
The cycles per second may be controlled by changing L or C. Thus the impulses are controlled by a combination of these forces acting in all circuits and within the components of the human body.

The output of the tank circuit shown above is shown at its peak-to-peak value with oscillations going down to slowly reach zero. In starting up, this process is reversed as C and then L “fire” their collected electron energies back and forth to create any frequency required for functions.

In practice oscillators are classified by waveform and principle used for excitation with four methods: (1) feedback (external), (2) negative resistance, feedback (internal); (3) mechanical (crystal vibration), (4) relaxation. The human body oscillator for the heart is described as a negative resistance internal feedback in the control heart in the carotid plexus (artery), which is connected by the vidian nerve and the superior cervical ganglion of the sympathetic part of the autonomic nervous system, which branches off from the spinal cord in the thoracic area. This tiny heart acts as a monitor for the large heart. When the body is excited or exercised, the parasympathetic nervous system releases additional negative feedback, which throws a bias on the oscillator tank circuit and increases the frequency and stimulus rate so that the muscles of the hearts can beat faster to compensate for the demands of additional oxidation made by such excitement or exercise. Burning up energy or exciting new rates of oxidation in the body cells increases the release of electrons or negative potential. On recovery, fatigue may follow as the body seeks to balance the reactions.

Accompanying the frequency are the harmonic frequencies which are multiples of the original or fundamental frequency rate where the number of impulses are measured in cycles per second. Fourier’s law states that any compound wave may be regarded as the sum of a series of simple waves whose (resonant) frequencies bear to one another in the ratios of 1, 2, 3, 4, 5, etc. For example: middle C = 264 cps; 1st overtone is 528 cps; 2nd overtone is 792 cps, etc., and where the fundamental frequency is 264 cps. Thus vibrating strings have periods of resonant moments just as electrons have resonant frequencies in nonlinear harmonic distortion , which can be displayed by waveforms using and introducing filtered or nonfiltered harmonics of the original frequencies.

Like most complex waves a square wave has harmonics that decrease in voltage as their frequency increases. The relative voltages of harmonics in a square wave are easily measured with the use of an LC ringing circuit.


ELECTRONIC
AMMETER
100KΩ
SILVER
IN
ZINC
OUT
2
3
741C
7
6
4
V
OUT
V
VOLT
METER
9v
9v

In checking inverting current feedback, we can see that an amplifier with an inverting current feedback will act like a perfect current amplifier that has zero input impedance, infinite output impedance, and a constant current gain. Here we can see that the inverting current feedback has some advantages and disadvantages.

Inverting Current Feedback

Quantity	Symbol	Effect	Formula	Electroacupuncture Reading
Current gain	i_{out}/i_{in}	Stabilizes	1/B	Body voltage
Input impedance	$r_{in(CL)}$	Decreases	$r_1/(1 + AB)$	Acupuncture point resistance
Output impedance	$r_{out(CL)}$	Increases	$(1 + A)r_2$	Acupuncture point resistance
Distortion	$U_{dist(CL)}$	Decreases	$U_{dist}/(1 + AB)$	Brain wave
Output offset	$V_{oo(CL)}$	Decreases	$V_{out(off)}/(1 + AB)$	Brain wave

In developing a system of medicine we can see that there are many types of feedback that can be utilized by the electronic system of the human body. This also has chemical counterparts . In developing all the electrical correlates, the body has chemical backups through the endocrine or hormonal system. The chemical, electrical, and consciosness all blend to produce us.

Our system of energetic medicine must develop ways of analysing the feedback loops within the system, and how they regulate acupuncture point, voltage, resistance, impedance, capacitance and inductance. This document has been written to help us discover many ways to not only diagnose diseases through the reading of the electrical nature of these acupuncture points, but also to develop treatment modalities in which our systems can be utilized to help regulate the overall feedback loops of the body, and thus return the patient back to a state of good health.

The QXCI system is designed to perform these energetic medicine functions with ease, accuracy, and affordability.

It is the purpose of the Promorpheus is to define some of the probable laws we must keep in mind while we develop these systems further. This article has no pictures or designs. This article should serve to just satisfy some moderate questions on energetic medicine. To chart practical systems, we point the reader towards the Natural Compendium of Dr. Nelson. This can be used to deal with patients on a therapeutic basis. The Physical Diagnosis of Dr. Nelson relates various ways in which the electrical readings of the body can be utilized in complex systems to help us diagnose diseases.

Mention must also be made of morphic resonance as an inter-dimensional shape transfer. This is covered in our first book, Quantum Biology, which should be reviewed at this time. Thus we can see that there are unexplored and untapped factors in biology and medicine.

$$Volts = Amps \times Resistance$$

$$Amps = \frac{Volts}{Resistance}$$

$$Resistance = \frac{Volts}{Amps}$$

The network in the human body is as complex as any network known in electronics today. It involves:

INTERCELLULAR TRANSMISSION

1. Inductance, counter-electromotive force, inductive reactance, voltage and current in L-R circuits, mutual inductance, etc.

2. Capacitance, generation of conductance, capacitive reactance, phase shift, current and voltage in an R-C circuit and phase angles, impedances, Time constants, series and parallel circuits, etc.

3. A-C circuits with inductance, capacitance, and resistance including series and parallel L-C-R circuits and their components.

4. Tuned circuits and resonance, frequencies at resonance, bandwidth, Q of circuits, filter circuits, etc.

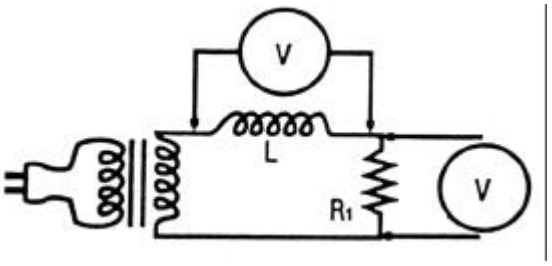
5. Transformers for audio and light waves, impedance matching, etc. The networks of windings are in the cerebral hemispheres.

6. Audio amplifiers, hybrid parameters, open-circuit and short-circuit parameters, stabilizing circuits, pH controllers, bridge connections, feedback circuits, switching characteristics, triggered circuits, gating circuits, summing junctions, PNP-type junctions, NPN-type junctions, motor boating of low frequencies, collectors, emitters, bases, assumed biasing, and related reactions, etc.

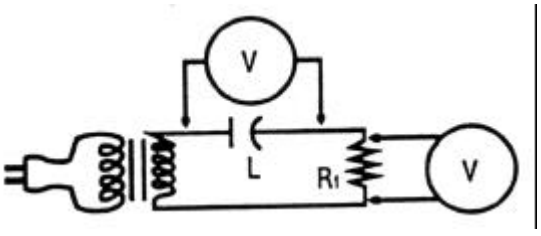
Frequency impulses of 5 to 150 cycles per second are sent over closed-circuit nerve fibers of 1/100 mm in diameter. Intensity of sensation is dependent upon the rate at which one impulse follows another frequency or
impulse. A nerve may contain several thousand nerve fibers.

L AND C MEASUREMENTS WITH STANDARD EQUIPMENT

Unknown values of capacitors and inductors in the human body or in circuits can be measured to a relatively high degree of accuracy by using a low voltage source and a handful of resistors ranging from 50 to 6K ohms, or a standard resistance box if there is one handy. A VTVM filament transformer may be used as a low-voltage source. The following diagram shows how to measure the unknown values , which calls for adding the amount of resistance necessary to obtain the same voltage reading across the unknown as the resistor combination:



Components connected in series for determining inductance “L” value of unknown inductor.



Components connected in series for determining capacitance “C” value of unknown capacitor.

The total resistance of the resistor combination is known as X_L or X_C, inductive or capacitive reactance. Reactance is the resistive property of magnetic induction of a charged field about a conductor like a nerve, a wire or a coil, and is also an electron charge within a capacitor named in the human body a synapse. Reactance is symbolized by the letter X.

To find the actual value of inductance use the following formula:

$$L = \frac{X_L}{w}$$

where inductance L is in henries. X_L is equal to the value of resistance needed in the circuits to obtain equal voltage readings across the inductor as across the resistors. w = the angular velocity or 6.28 times the frequency. If a filament transformer is used, the frequency will be 60 cycles per second. To find the actual value of capacitance use the following formula:

$$C = \frac{.159}{fX_c}$$

where capacitance C is in farads. The constant .159 is the reciprocal of 6.28. XC is equal to the value of resistance needed in the circuit to obtain voltage readings across the combination equal to that of capacitor. Thus if R_1 equals 254 ohms, then C would equal 254 ohms to balance.

A simple problem will tend to clarify the procedure. To find the value of an unknown inductor, the circuit is connected as shown above. Resistance is added at R_1 until the voltage reading is the same across R_1 as across L. Assume the resistance comes to be 5420 ohms. Insert these values into the inductance formula:

$$L = \frac{X_L}{6.28f} \quad \frac{5420}{6.28\,(60)} =$$

$$\frac{5420}{376} = 14.4 \text{ henries}$$

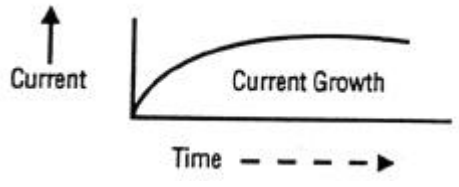
To find the value of an unknown capacitor, connect the components as shown above. Assume we find that a value of 254 ohms is required to balance the voltage readings across the unknown and the resistor combination. Insert these values into the capacitance formula:

$$C = \frac{.159}{fX_c} = .00001043 \text{ farads}$$

Hence the value of the capacitor is 10.43 microfarads or uf.

GROWTH AND DECAY OF INDUCTIVE CIRCUITS

Now that concepts of cemf and inductance have been discussed, it is easy to analyze what goes on when current increases in a circuit containing inductance. In a simple circuit containing an inductor and a resistor, the rise of current can be plotted with respect to time:



where: I is current
R is total resistance
in current
L is inductance

Thus there are three voltages in the circuit: (1) applied circuit impulse voltage, (2) IR drop across resistor, (3) cemf, L(di/dt), across inductor.

When L is small, current in circuit rises rapidly and vice versa.

CAPACITANCE

It has been explained that inductance is that property of an electrical circuit that tends to prevent a change of current.

Capacitance is that property of an electric circuit that tends to oppose a change in voltage. Capacitance is then seen to be an electrical inertia opposite in effect to inductance and similar to a natural property that opposes a change of forces high in either positive- or negative-polarity electrons. A capacitor offers no immediate opposition or reaction to applied current flow but offers maximum reaction to removal of applied voltage from a charged capacitor. Thus a capacitor always offers a delayed reaction to voltage. Capacitance is defined as that property of an electric circuit that opposes voltage changes.

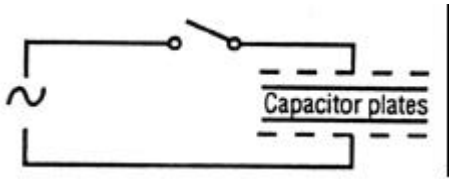
A capacitor consists of any two conductors separated by an insulator. If impulses are applied to a capacitor, current flows at a maximum instantly and then falls to a minimum as the voltage across charged capacitor builds up. A charged capacitor stores voltage for an indefinite period.

If a charged capacitor is short-circuited, current flows at a maximum instantaneously in the opposite direction of charging and then gradually falls to a minimum as voltage goes to zero. For a given capacitor the ratio between the charge on one plate and the voltage causing it is always a constant.

The ration of electron charge “Q” to voltage “E” is the measure of capacitive action, called capacity, labelled “C”, and is measured in farads. Thus C = Q/E. A farad is the capacity of a capacitor on one plate in which a charge of 1 coulomb is deposited by a difference in potential of one volt.

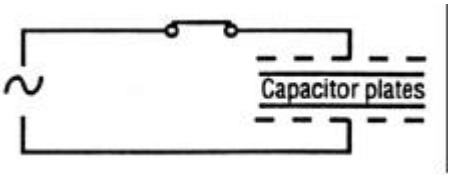
Different insulating materials or dielectrics show electrostatic permittivity and different resistances in breakdown voltages, usually having unit thicknesses of 0.001 inch. A capacitor prevents instantaneous rise or fall of voltage in a circuit, the delayed counter-voltage aiding an impulse current flow.

A capacitor is an open circuit to direct current and a conducting path to alternating current. In semiconductors the average value of collector-base capacitance may vary from 2uuf for high Hertz to 50 uuf for low frequencies (audio) while collector-emitter capacitance is normally ten times greater. The effect is used to modulate oscillators. Capacitance coupling is used where input impedance is below 75 ohms resistance.



When switch is open, capacitor is uncharged; that is, (in relation to electrons) no difference in potential exists between the plates.

When switch is closed, both plates are in different potentials from the source of electrons; free electrons are attracted to positive side.

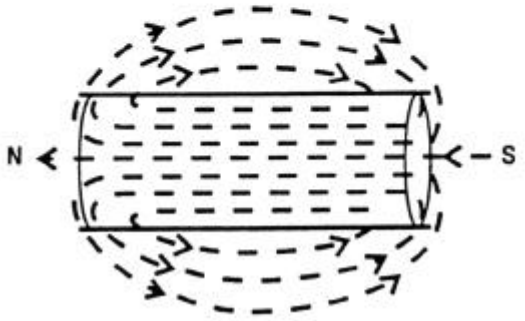


The rate of change depends upon the Hertz or impulses per second. Each impulse or cycle means that electrons have been taken from one plate to another in polarity charges as illustrated above.

$$\text{Current } (I) = \frac{\text{Electromotive Force}}{\text{Resistance } (R)}$$

For the magnetic circuit a similar law may be stated as follows:

$$\frac{\text{(phi or) Flux (lines of force)}}{\text{Magnetomotive Force (M.M.F.) in gi.}}$$
$$\text{Reluctance (in oersteds)}$$



Lines of Force Producing a Magnetic Field in Conductor

The induced electromagnetic induction can be further activated by an electromotive force in a neighboring conductor, and is known as Mutual induction from parallel conductors as in the spinal cord of the human body or from coils around blood vessels, etc. An emf (electromotive force) is induced in any circuit in which the amount of flux linking it is changing with respect to time by impulse rates, etc.

A circuit has an inductance of 1 henry when a current change of one ampere-per-second causes a cemf (counter-electromotive force) of one volt to be induced in it as per formula:

$$L \text{ (Inductance in henries)} = \frac{\text{Infrared voltage } E \text{ (in volts)}}{\text{Rate of change of current (amps per second)}}$$

INDUCTANCE

Rearranging the above formula for inductance: Induced voltage equals inductance times rate of change of current or:

e = L (rate of change of current)

To further simplify and shorten this formula the expression “rate of change of current” has been replaced by the symbol

$$\frac{di}{dt}$$

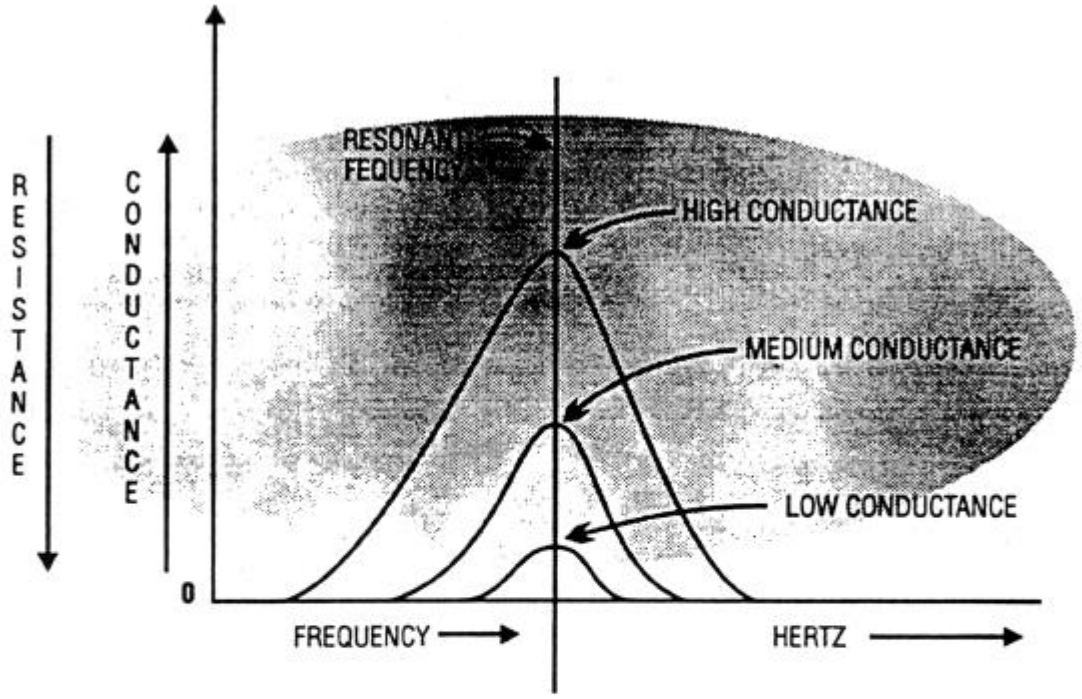
$$\text{wehere e (induced voltage)} = L\frac{di}{dt}$$

It will be noted, however, that the voltage induced in the conductor has a cemf that opposes the change of current. To indicate this a minus sign is placed in front of L and the equation then reads:

$$e = -L\frac{di}{dt} \quad \text{where L = Inductance}$$

Below the resonant frequency we realize practically the same voltage gain as the resonant frequency itself, where the effective limits of the band pass are taken to be the points on the resonant curve corresponding to .707 of the peak voltage or current, whichever is plotted.

TIPICAL RESONANCE CURVES



$$\text{VOLTS} = \text{AMPS} \times \text{RESISTANCE}$$

$$\text{AMPS} = \frac{\text{VOLTS}}{\text{RESISTANCE}}$$

$$\text{RESISTANCE} = \frac{\text{VOLTS}}{\text{AMPS}}$$

SUMMARY

1. In this chapter we introduce some electrical devices that are very important in developing our harmonic resonance. Since computers can control input and output pulses, we can design a system to completely perform energetic medicine. The computer can act as a signal generator or a frequency counter. Since the ionic exchanges of reaction take place in the body at speeds in the centisec range our computer can easily interact to measure the energetic components of the body. Then with a feedback loop, the computer can autofocus treatment. A self adjusting treatment loop can be made easy to operate, affordable, and safe to use.

2. We introduce the Rife technology, using the vibrational medicine of electrons and photons to help in biological disruption.

3. We show how an understanding of these vibrations and their harmonic transmission can help us to isolate the body and to increase our ability to utilize vibrational medicine devices.

4. The application of computerized analysis of waveforms to biology is introduced.

5. The development of a biological system will allow us to understand the Fourier techniques of mathematical translation of electrical numbers into vibrational medicine intervention.

6. We show how electromagnetic pollution can have its effect by disruption of the vibrational medicine patterns of the body.

7. We introduce some of the energetic evaluations of the body that were covered in the Promorpheus. We have advanced this to a deeper form for our energetic evaluation.

8. We introduce some of the bacteria electrocution work from Crane and Rife, and how various electrical instruments (QXCI)can be utilized for immune stimulation as well as invader destruction.

Chapter 14

VIBRATIONS FROM OTHER DIMENSIONS *(Subspace Connectivity)*

In our discussion of vibrational medicine we must now point out some of the factors of other dimensions, and how they apply to our vibrational medicine model.

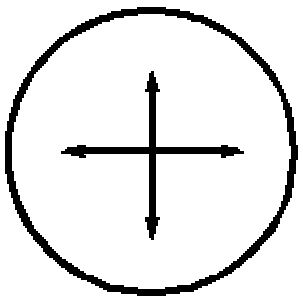
As we discussed in *Quantum Biology* and *Bio-Quantum Matrix*, sections existence seems to hold more than just the four dimensions through which the conscious mind interacts. The dimensions of length, width, height and time make up the four dimensions in which our conscious minds exist. Physicists have long since insisted that there are other dimensions. Perhaps the best analysis for our purposes is the analysis offered by *Bio-Quantum Matrix*, in which we can show that the first four dimensions are *real* dimensions, and the other six dimensions included in our ten-dimensional model are virtual. The connection of these dimensions occurs through the subspace principle. We wish to review the literature on this from the *Quantum Biology* and *Bio-Quantum Matrix* sections at this time.

As we have pointed out, many physicists believe that there are more than ten dimensions. Some believe that the actual quantity has not yet been proved. This author leans towards the ten-dimensional model because it seems to parallel some of the ancient mystical thinking of the Hindu, Buddhist, Hasidic, and other religions. Thus this model of ten dimensions will be used now in our vibrational medicine model.

We have talked about the existence of virtual photons. Once in existence these photons can be exchanged for *real* photons. It is the same for these other dimensions. They are virtual, but in certain instances, they can appear to be real; often even *acting* real. This is our ten-dimensional model by which we explain the phenomena of ghosts, hauntings, possibly Big Foot, and others. These might be other-dimensional beings that sometimes pass through our dimensions.

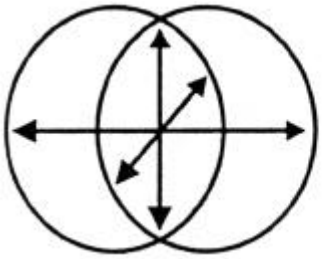
If we looked at a one-dimensional item, we would see a line. If we existed only on this line as a one-dimensional creature, we might think that we lived in an endless dimension.

One day we might find that this line actually curves around on a *seemingly* endless line, but it actually comes back around to where it started, and becomes a circle. Once we realize that this is a circle, then suddenly we become aware of *two* dimensions. Now we have length and width, as we can measure the length of the circle and the width of the circle. If the two are different, then we might have an ellipse, or some ellipsoid-type shape.



**LINE
MAKES
CIRCLE
YIELDS
2 DIMENSIONS**

In our two-dimensional model we might think that the two-dimensional surface goes on and on forever, as people did in old times when they thought that the world was flat, and thus two-dimensional. Finally somebody realized by watching ships sail out of a harbor that their masts seemed to sink into the water. This gave him the realization that possibly the world was a sphere, and that the endless two-dimensional model did not go on forever. In fact, it was a *three*-dimensional model produced in the sphere, which then had length, width and height.



Now in the four-dimensional model of length, width, height and *time*, we think and interact as humans. As such we do not look past these dimensions into others.

The other dimensions past these four are virtual dimensions, and have been characterized by certain physicists in their thinking. Also certain Buddhist meditation practices and the like have been able to recreate these types of experiences in other dimensions, using meditation rites that allow the meditator to transcend past the perspective of a permanent four-dimensional model and into other dimensions. This also happens in many other religious cultures including the Hasidic, which is the mystical part of the Jewish religion.

In these experiences the meditator or mind practitioner can transcend his feelings and perceptions of the four dimensions and be able to step into and experience other dimensions. These other dimensions indeed have some reality. What is their impingement on the factors of medicine?

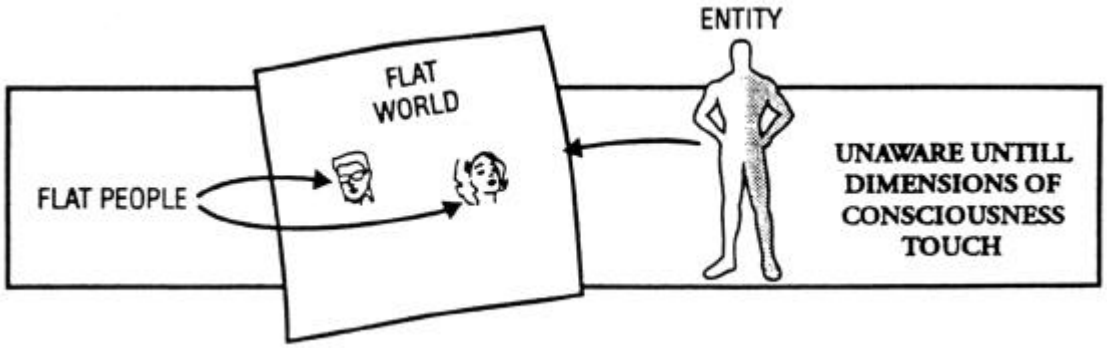
Samuel Hahnemann dealt very little with the causative factors of disease, in his development of medicine towards homeopathy. He felt that most causative factors of disease came from what he called other dimensions, and that perhaps karma experience and other types of virtual mental factors were the causative conditions of disease. Thus he developed a system of medicine in which, several times, he said, “Let’s ignore the cause, and deal with the disease in its symptomatic format.” Thus, rather than looking for the causative factors of a cold and telling a person to stay out of the rain, Hahnemann would perhaps prescribe Belladonna to treat the redness of the throat, and perhaps Alum Sepia to treat the runny nose and eyes.

Hahnemann’s perspective was that the causative factors of these other dimensions were not able to be analyzed, and thus were not important in disease. In our *RWC Book* we can point out that there are many causes of disease that can be dealt with very directly. Some of them are stress, toxicity, pathogens, perverse energy, diet and a multitude of other factors, which indeed have agents that can be canceled and dealt with in the disease picture. Subspace offers the conection between these dimensions.

But Hahnemann was right to a certain extent; disease can result from these other dimensions, and when it does, it is beyond our four-dimensional model to treat it. It is *not* beyond our vibrational medicine model.

Thus with vibrational medicine and the factors discussed in this book, we will look at ways in which we can heal, relieve causes, and dispense the disruptive forces that come from these other dimensions.

If we return to the line people, who have realized now that they are on a two-dimensional surface, these two-dimensional flat people will think, feel, exist, transmit and communicate in their two-dimensional way. If an entity should come from the third dimension, which is not within their flat two-dimensional surface, the flat people would not be able to deal with it, except



as it passed through their two-dimensional surface. If the entity were outside their two-dimensional surface, the flat person would have the illusion that he heard the voices from within because he would not have the perspective to find the direction from which the voices came. This might be part of what happens in certain psychotic experiences in which people's brains might become able to attend to other-dimensional items.

Beyond mere psychosis there are many factors of disease that can be explained by our multi-dimensional model. In these other dimensions we will find that there are entities living; so-called virtual entities because they live in so-called virtual dimensions. Solomon spent the last twenty years of his life cataloging over a quarter of a million demons and spirits that lived in what he called other dimensions. The Grimorie of Solomon is a catalog of how to access and communicate with these forces, as well as to access angels, and how to achieve help.

It is not known what the original grimorie of Solomon was, because at the time many writers of grimories attributed praise to other people, such as Solomon, by signing those people's names to documents. This means that if you wrote a book and wanted to revere Solomon, you might sign his name as the author. Plagiarism was unknown at this point in history; in fact, many people signed other names. John of Ephisis signed the name of John the Disciple in the Book of John in the Bible. It is clear from a historical perspective that the Book of John was not written by the true disciple; it was written by John of Ephisis, who lived thousands of miles away in Turkey. John of Ephisis was not present during the last days of Christ, and thus was not able to give a true historical account. His glowing, beautiful description is lyrical, poetic and inspirational, but it is not historical fact. Historians often refer to Matthew, Mark and Luke as the "synoptic gospels", meaning the true gospels, whereas John is known as a non-synoptic gospel.

We can see in our description of Solomon that it is hard to track down exactly what Solomon's words might have been, as we are unsure of the true historical record. Many people coming after Solomon have tried to recollect *their* recounting of the forces of the other dimensions in the spirit world, and have tried to work with them and their different ways. As we have pointed out in *Quantum Biology*, since medicine has become indeterminate, we have all become mystics in our analysis of biology. So we must be familiar with the mystical documents, and realize that there is some degree of truth that must enter into medicine. We are not trying to make all medical doctors Shamans, nor to make all medical doctors mystics, but any doctor who does not realize that there is a spiritual side to the being he is working with and that the individual might find solace and healing in spirituality will struggle with his ability to transcend into the new medicine.

As we deal with these forces from other dimensions, we must realize that just as there are good and bad people in the four-dimensional world, there are good and bad spirits in the virtual dimensions. It is wrong to think that anything that communicates with us from the spiritual world is pure and holy; there are self-motivation, trickery, deception, and other factors happening there as well. In fact, Leviticus Chapter 18 warns us of divination and warns us of this intervention into the spiritual world. This strong warning must be heeded.

In pursuing these virtual forces too hard, we are setting ourselves up for trickery. We must go into this with a strong spiritual background, a belief riveted in God; the Father, the Son and the Holy Spirit. Then we will be armed with the realization that those forces can help guide us through this

quagmire.

As we develop medical techniques of reading and interacting with these spiritual forces, we will see that the human body becomes our greatest instrument; the human being has the greatest ability to react to these forces. The human being is very sensitive in his perception of the virtual dimensions. Even our most subtle machines, such as electroacupuncture machines, have difficulty receiving direct input. Yet, we can get direct input from the human being if we measure his subtle electrical reactions to these forces. We also must realize that when we are dealing with the virtuality of these other dimensions, it is impossible for us to get pure data. The idea of channeling must also be taken with a grain of salt. As one person tries to channel the thoughts of a person from another dimension, we must realize that his channeling is also clouded through his own perspective, and that it is absolutely impossible for us to get pure information. We cannot get pure information all the time through our channeling; we must realize that there is the limitation of the device and its interactive ability with the virtual dimensions. It is not perfect. We must realize that all channeling is of a statistical nature. Some of it is pure, some of it is less than pure, and we cannot get pure data all the time. Eventually the statistical side of this will catch up with us.

Thus certain people who channel information for other people open themselves up to the consequences of the warning of Leviticus. We must be cautious and realize that what we are getting can lie to us, and that the spiritual forces can delude and deceive us in our pursuits. This does not mean that we should totally do away with the idea of channeling and/or talking to these other dimensions. In our form of medicine we can use them, but we should never let them dominate our medical thought. We should never throw away our blood analysis, stethoscopes or blood pressure equipment; neither should we stop doing energetic medicine testing. To switch to pendulum work and medical astrology, we must include the other forces of medicine to add to our statistical data, and to help guide us with our patients. But to throw away all those things and just do medical astrology might work, even for a long period of time, but eventually it will break down because the forces of these virtual dimensions are unreliable.

For many years hospitals have had church chapels built into them, and they have had clergy and chaplains in the hospitals to help with the spiritual side of healing. This phenomenon has already been working for a long time.

To allow faith healers with crystal balls and pendulums, who are not strongly based in a religious reverence for the Almighty God, would be wrongful intrusion. These people are suspect to more of the dark forces, and might actually *bring in* spiritual entities of disease more than they can banish them. It is pointed out that only through the strong light forces of God and purity through the church does this author believe that these forces can be successfully dealt with.

If we look at the virtual dimensions through their expounding forces, we can see that mathematically these other dimensions will still follow certain resonant mathematical laws. The laws of mathematics keep their significance throughout our universe.

The forces and material that entered this universe at the “Big Suck” which initiated the universe came through a very small hole, a pinprick (10^{-23}) entrance of matter into this universe. When this cascade of forces came in, it applied itself to a certain construct of laws that would dictate existence in this universe. This universe exists in dimensions beyond the four. We as people, through physics, medicine and biology, are coming to the realization that we are setting ourselves free of the limits of the first four dimensions, and we are able to tap into the thoughts and abilities of the other-dimensional entities.

The entities in each of these dimensions must obey certain laws. The question might come: Can God disobey these laws? The retort might be: God *is* the laws, because God is the structure and the existence of the universe.

Our vibrational medicine techniques will concentrate on the spiritual healing techniques taught in the churches (and at Lafayette University, in the Theology department, where this author is presently Professor of Wellness Studies. Our wellness studies are taught in a spiritual context based on the church).

In Dr. Richard Gerber’s book on “Vibrational Medicine”, much is made of the forces of the body that make up the astral, mental, ethereal, and causal bodies, as well as the physical. He outlines these forces as vibrations.

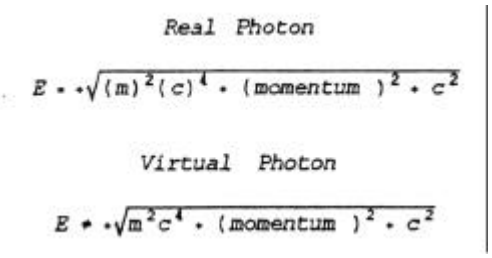
We have not found a true vibrational rate that seems to echo this. We have gone through

analyses of various resonant factors, which can harmonize different vibrations. We have not been able to find resonant frequencies that echo a true causal body versus ethereal, mental or astral. We think that these things echo other-dimensional factors, as the human body must have other-dimensional existence. These virtual dimensions are where these other entities exist. The vibrational nature is probably secondary to their existence of a true virtual-dimensional side.

Chakra also exist in the body as virtual entities, and do not have reality in the true sense; meaning that they do not have mass in the first four dimensions. The chakra is more of a virtual entity, but it still has existence.

It must be pointed out here that even the mass of the body is an illusion, for it truly is not a solid thing. The only reason we have solidity and regularity of the body is because of the dramatic speed the electrons are using around their orbits, as well as the dramatic vibration of the molecules that appears to make them hard. Even if we look into the existence of the electrons, protons, neutrons, and other subatomic particles, we can see that there is a strong vibrational rate that condenses them from energy into a type of mass. The $e = mc^2$ construct of Dr. Einstein allows us to realize that everything that exists is energy, and everything that exists is matter.

Virtual dimensions also must exist as some type of energy, and in some type of matter. Their matter is very tenuous and ethereal, as it is not of the sort of matter we recognize. This virtual dimension of itself can at times be illusory, and at other times, more real.

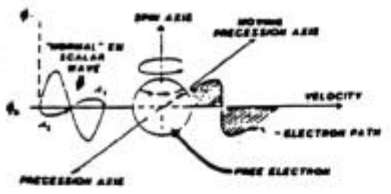


These various virtual entities of ourselves will harmonize and vibrate at certain precepts. Thus the concept of vibrational medicine is valid in our ability to measure and treat these forces if they are out of balance. They could produce an out-of-balance entity in our virtual dimensions. It becomes a very essential question in our etiology of the disease factors.

Hahnemann supposed that many disease factors came from inherited tendencies from our forebears. The concepts of Confucianism are based on ancestor worship, in which the effects of our ancestors are profound in shaping who and what we are. The Confucian worshipper respects his ancestors and reveres their memory.

Hahnemann intuited that the diseases of our ancestors could have effects on us. These effects he labeled *miasms*. It is not without some degree of intuition that Hahnemann chose sexual diseases as the primary cause of his miasms. Syphilis is directly related to Syphilinum. If an ancestor had syphilis, that type of guilt factor could have developed into the body as either a mental entity or a physical alteration of the genetic structure, which then could have resulted in the miasm of syphilis.

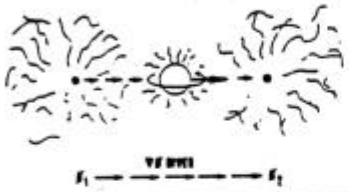
ELECTRON PRECESSION (SIMPLIFIED)



AN OBSERVABLE CHARGED PARTICLE IS DIRECTLY CONNECTED TO VIRTUAL PARTICLE FLUX VACUUM

IN A $\nabla\Psi$, A CHARGED PARTICLE MOVES ITSELF

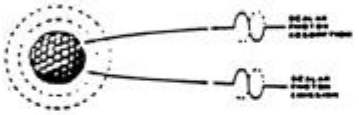
$\nabla\Psi \neq 0$ IMPLIES A DIFFERENCE, AND THE CHARGED PARTICLE IS "DRAGGED TO" THE DIFFERENCE



AN ACTIVE ZERO-VECTOR SYSTEM PRODUCES "STRESS ENERGY OF VACUUM"

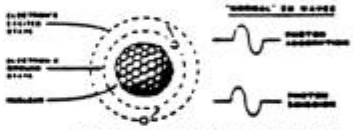
- WHERE DID THE "LOCKED-IN" ENERGY OF AN ACTIVE ZERO-VECTOR SYSTEM GO?
- IT PRODUCES "STRESS-ENERGY OF VACUUM".
- IT THUS PRODUCES A CURVATURE OF SPACETIME.

HIGHER ORDER PHYSICAL REALITY



- HEAVY NUCLEUS AFFECTED
- MACROSCOPICALLY, MASS APPEARS FLUID AND CHANGEABLE
- GENERAL RELATIVITY AND KALUZA-KLEIN GEOMETRY APPLY

FIRST-ORDER PHYSICAL REALITY



- HEAVY NUCLEUS RELATIVELY UNAFFECTED
- MACROSCOPICALLY, MASS APPEARS STABLE AND "BRICK-LIKE"
- SPECIAL RELATIVITY APPLIES

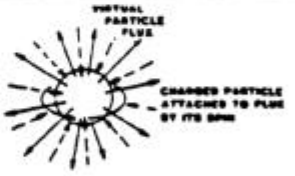
FORCE DEFINITION

- A TRUE DEFINITION IS AN IDENTITY.

IF IS ANY SUM

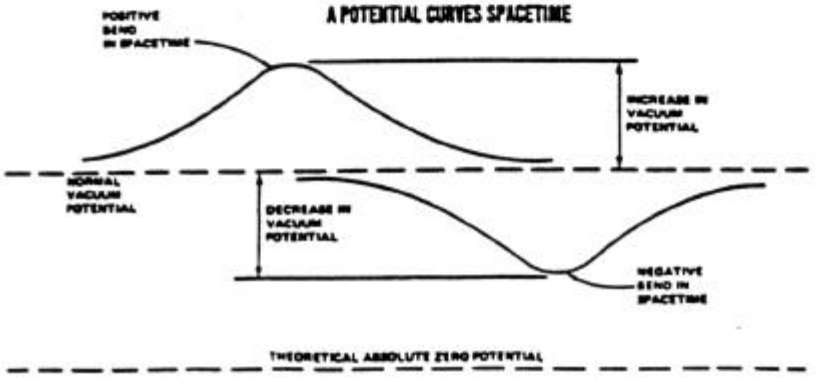
- FORCE CONSISTS OF THE TIME RATE OF CHANGE OF MOMENTUM
- MOMENTUM IS A MASS SMEARED THROUGH A LENGTH IN A CERTAIN TIME
- FORCE CONSISTS OF MASS-MOVING-CHARGE
- FORCE IS AN EFFECT, NOT A CAUSE !

A SIMPLIFIED CHARGED PARTICLE

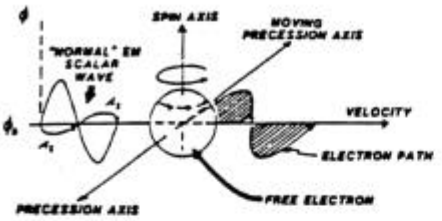


THINK OF THE FLUX IN AND OUT, EXCEPT GRADIENTS ARE SPIRAL-LIKE, DUE TO PARTICLE'S SPIN

A POTENTIAL CURVES SPACETIME



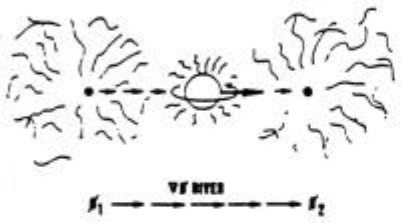
ELECTRON PRECESSION (SIMPLIFIED)



AN OBSERVABLE CHARGED PARTICLE IS DIRECTLY CONNECTED TO VIRTUAL PARTICLE FLUX VACUUM

IN A $\nabla\Phi$, A CHARGED PARTICLE MOVES ITSELF

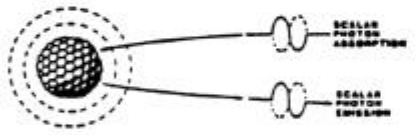
$\nabla\Phi \neq 0$ IMPLIES A MOVING RIVER, AND THE CHARGED PARTICLE IS "HOOKED TO" THE RIVER



AN ACTIVE ZERO-VECTOR SYSTEM PRODUCES "STRESS ENERGY OF VACUUM"

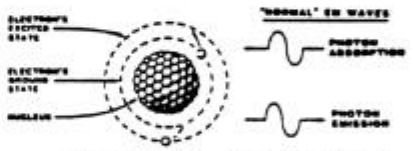
- WHERE DID THE "LOCKED-IN" ENERGY OF AN ACTIVE ZERO-VECTOR SYSTEM GO?
- IT PRODUCES "STRESS-ENERGY OF VACUUM".
- IT THUS PRODUCES A CURVATURE OF SPACETIME.

HIGHER ORDER PHYSICAL REALITY



- HEAVY NUCLEUS AFFECTED
- MACROSCOPICALLY, MASS APPEARS FLUID AND CHANGEABLE
- GENERAL RELATIVITY AND KALUZA-KLEIN GEOMETRY APPLY

FIRST-ORDER PHYSICAL REALITY



- HEAVY NUCLEUS RELATIVELY UNAFFECTED
- MACROSCOPICALLY, MASS APPEARS STABLE AND "BRICK-LIKE"
- SPECIAL RELATIVITY APPLIES

ENERGY IS DERIVED, NOT FUNDAMENTAL

- ENERGY IS CONSUMED TO WORK
  $dW = \vec{F} \cdot \vec{ds}$
- BUT FORCE IS AN EFFECT, NOT A CAUSE
- THUS WORK IS AN EFFECT, NOT A CAUSE
- ENERGY = WORK CAPACITY
- A MORE FUNDAMENTAL MECHANISM GENERATES "ENERGY"
  $\Delta E = \frac{\Delta \Phi}{\Delta T}$
- ENERGY IS AN EFFECT, NOT A CAUSE

IN ITS AXIOM FOR THE ZERO VECTOR, VECTOR ANALYSIS DISCARDS ZERO-VECTOR SUMMATIONS OF ACTIVE SYSTEMS OF VECTORS.

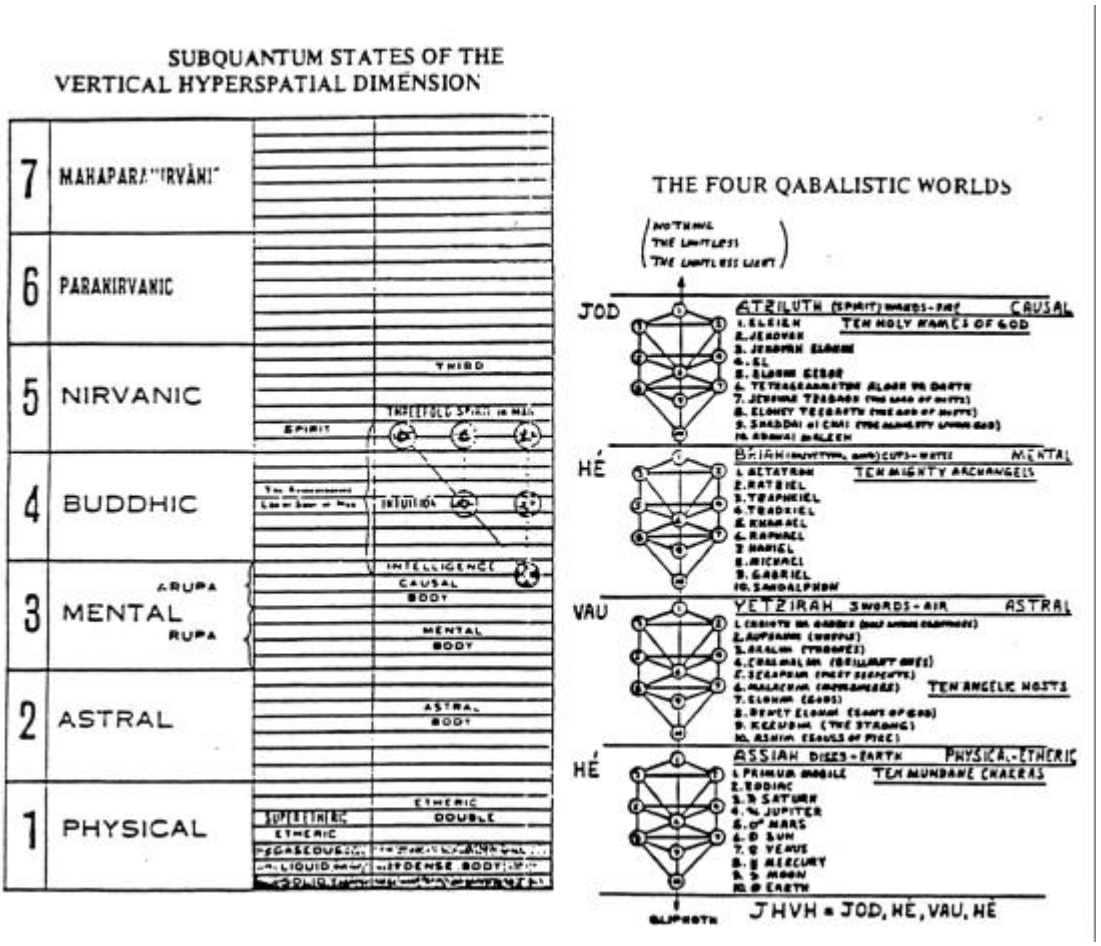
VECTOR ZERO IS MADE THE ABSENCE OF ALL VECTORS.

IT CAN ALSO BE THE PRESENCE OF REAL VECTORS WHOSE VECTOR SUM IS $\vec{0}$!.

- TO THE EXTERNAL OBSERVER, A ZERO-VECTOR SYSTEM APPEARS TO HAVE NO ENERGY AND DO NO WORK.
- TO AN INTERNAL OBSERVER, IT MAY HAVE A GREAT DEAL OF ENERGY AND CONSTANTLY BE DOING A GREAT DEAL OF WORK, NONE OF WHICH IS ESCAPING THE ZERO-VECTOR "CLOSED SYSTEM."

Gonorrhea resulted from other types of sexual contact, which then caused another type of miasm known as *psychosis* to the miasmatic entity. This does not mean that the descendants of grandparents who had syphilis or gonorrhea have these diseases; on the contrary, they have some type of disease preference in that they tend towards certain diseases that might be akin to the syphilis and gonorrhea complex.

We have not been able to find any actual chromosome or structure of chemistry within the genetic coding that actually proves the concept of miasms. This author knows of no studies or analyses that have yielded that. This does not imply that one might not be discovered or looked at in the future. This would be an exciting endeavor of research. Another possible explanation of how a miasm might work is that it might affect a virtual dimension of the chromosomes. Thus it might affect a more vibrational level or virtual dimension of our own existence. This might result from guilt over (for example) the sexual act if it was performed irregularly or out of religious contexts, or it might have some other negative emotion tied to it that could be disruptive of the vibration field.



This author has worked with many types of mental aberrations including psychosis, schizophrenia and a wide variety of others. Early in my studies I noticed that schizophrenics in particular almost always seemed to have some type of undealt-with guilt over a sexual act; often homosexuality that induced large amounts of guilt which then led to the psychotic episode. In many cases I have dealt with, patients have alluded that their psychotic episodes started when they could not deal with homosexual thoughts and/or homosexual acts that might set them off. Often this extreme guilt could induce a problem resulting in schizophrenia.

A change in the ethereal and mental bodies could induce a vibration rate that could be disruptive to a certain chemistry of the physical body. This disruption could result in an inability to handle B vitamins, or an inability to control bowel bacteria. The guilt factors are indeed in line, and are communicative. This description does not mean that this author feels that the act of homosexuality is irregular; this means that the patient felt that it was irregular at the time. If any patient were to see an act as irregular, he might induce guilt, which could upset vibrational balance.

In Eskimo cultures it is often the practice for a husband to share his wife with one of his friends who is visiting. There is no guilt in this culture over this event, but if this were done in many other cultures, such as American and European, dramatic amounts of guilt and negative emotion could be generated, and could be very upsetting to the slight vibrational virtual realities.

It is part of the treatise of this book that the human being is particularly sensitive to these virtual realities. It is our treatise that the chromosomes and complexities of the human being allow him to find solutions to questions of the universe. Thus the solution of the unified field theory is in the biology of the human itself. The twenty-three chromosomes were not an accident.

These twenty-three chromosomes could indeed be the solution to the unified field theory. The theory of this book is that the biology of the human is the solution of all the universe. Thus from our theory the possibility is good that the human being is much more sensitive to the vibrations of existence from these other various entities. Thus guilt, fear, anxiety, and so on are more accentuated as emotional disturbances in the complicated human.

Animals often can feel these vibrations as well, and sometimes have more attenuation to them because of the lack of conscious constriction. The conscious brain of the human being (specifically the left hemisphere where verbal thought is) often doubts its ability to perceive and deal with these other dimensions. It thus becomes in many people a very strong limiter or silencer of vibrational reactivity.

Thus the conscious brain becomes a damper on the circuit. This does not mean that the circuit cannot feel these things; it means that it is dampened by this conscious brain. The conscious brain often wants more proof than just one feeling. If the feeling is not totally reiterative, or if the communication does not repeat five or ten times, the conscious brain accepts it as an irregularity or aberrant thought. Animals seem to be more sensitive to these vibrations than humans, but *trained* humans seem to be more sensitive than animals. There is a very complex hormonal structure in the human being to be able to sense and work with these forces.

The conscious brain allows us to finally communicate our feelings to our fellow human beings. This is another function that few animals develop well. The human is able to talk, and by talking is able to help his other human beings to understand, feel, and deal with various entities. The whole concept of counseling, psychology and the like are expressions of this human skill.

Humans have the profound ability to affect people through their speech, as we have seen through the eons of existence. Human speech has helped people to reshape their thoughts and constructs, and has helped to improve, as well as disprove, their lives. The factors of human speech cannot be isolated into a total chemical construct. There is a vibrational quantity in picking up the subtleties from the ear in its ability to detect vibration and isolate different functions. There is also a vibrational skill of the brain to transmit vibrations from the brain into the larynx, to produce another vibrational communication such as speaking, singing, shouting, whistling, and other factors. The brain has the profound ability to receive vibrations and transmit them back. These vibrational methods are very profound in their ability to heal. We can see that these vibrational techniques do prompt chemical reactions in the brain. There could be a connection to another vibrational entity such as the ethereal body, and its ability to help process these communications by reception, and then by transference.

Thus our analysis of vibrational medicine cannot be complete without a look at the vibrational quantities of human speech reception and utterance. By the power of speech and words we can affect patients' expectations, stresses, motivations, perceptions and emotional states. Since this can happen through the power of speech, which is vibrational, perhaps speech is the most profound of vibrational medicine techniques.

SUMMARY

1. In this chapter we show that the limitations of the universe go beyond the four dimensions of our experience and knowledge.

2. We show that there is a correlation of the biological system to this other-dimensional understanding.

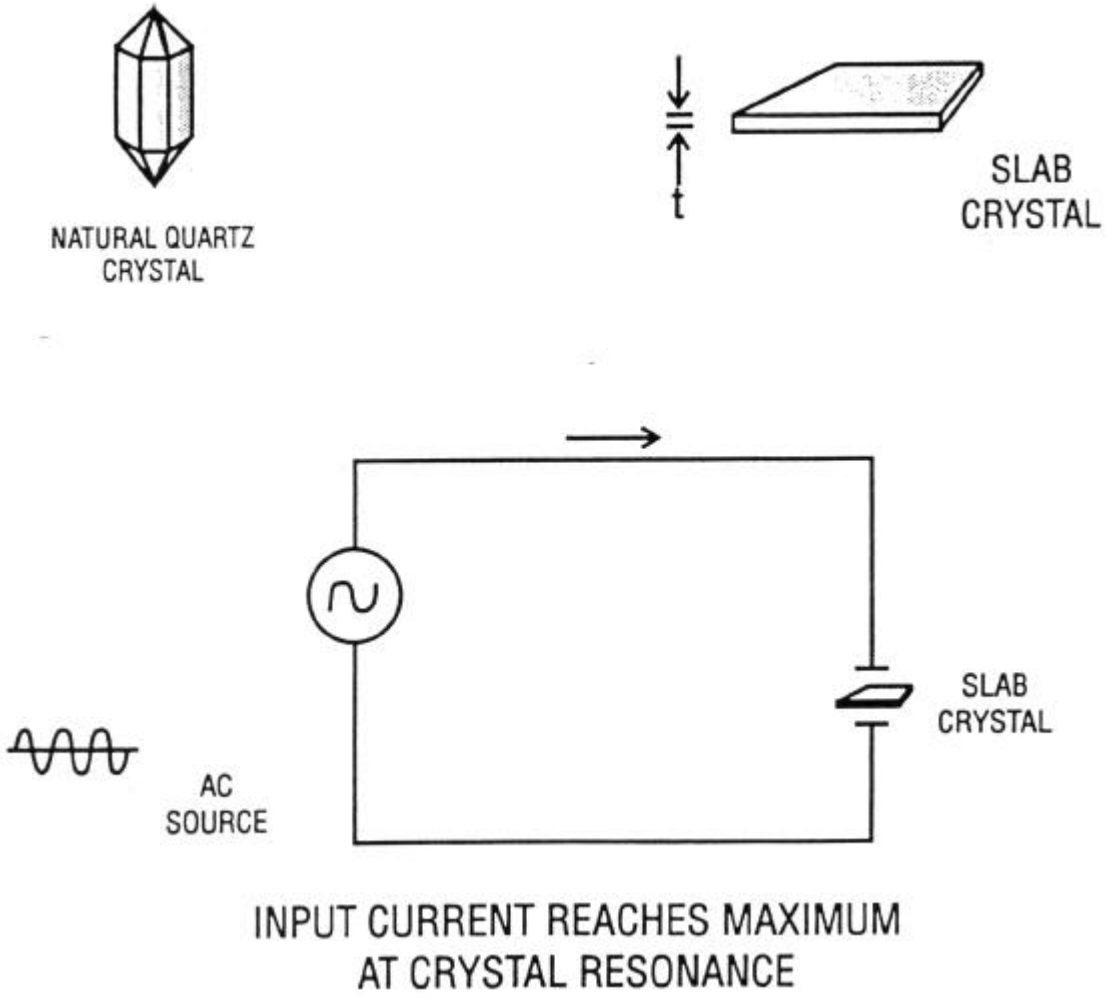
3. A new type of biology must be proposed that allows for virtual effects from other dimensions on our system.

4. Thus vibrational medicine has a long way to go in its total understanding of biology.

Chapter 15

CRYSTALS IN HEALING

Our vibrational medicine approach must include a discussion of crystals. Often in the alternative medicine profession one only need mention that there is a crystal in a device to sell it. Although the crystal might have nothing to do with healing, “crystal” seems to be a real buzz word, and aids in the sale of many items. As a recent example, a person put crystals into a pen-like structure, and claimed that when swished around through water the pen could nullify pollutants and make the water clear because of the crystals embedded m its cap. The crystals embedded in its cap were grains of sand which are known to be quartz crystals. There is no scientific proof that would lend us to believe that these crystals could neutralize toxic elements in the water.



Quartz crystals have mariy profound effects on photons and electrons. Let us now analyze the oscillation frequency of a quartz crystal oscillator that can be utilized in a feedback signal. This can help to set resonant frequencies that are very stable in various circuits. This is why quartz crystal watches are so integral in their use. Many of these crystals have a piezoelectric effect. When you apply an ac of voltage across them, they vibrate at a frequency of the applied voltage. Also if you mechanically force them together with pressure, they can generate a type of ac voltage. The main substances that have this piezo effect are quartz, tourmaline, and rochelle salts.

The greatest piezo activity is provided by the rochelle salts, for given ac voltage they vibrate more than quartz or tourmaline. Mechanically they are the weakest; they break apart easily under pressure, and thus cannot be used in some ways. Rochelle salts have been used to make microphones, phonographs, headsets and loudspeakers. Tourmaline shows the least piezoelectric activity, but is the strongest of the three. It is also the most expensive. It is often used at very high frequencies. Quartz is the compromise between the salts and the tourmaline. It is inexpensive and readily available in nature, and is used in RF oscillators and filters.

The above figure shows us what the quartz crystal looks like. To get a usable crystal we must take a slice of this rectangular slab out of the natural crystal. We can see how the thickness (t) is involved in the production of its fundamental frequency by the following formula.

$$f = \frac{K}{t}$$

The fundamental or lowest frequency equals the crystal constant over the thickness. The aystal constant will tell us about the cut and other factors of the crystal. The fundamental frequency is thus inversely proportional to the thickness. So we can see that there is a practical limit as to how high in frequency we can go. The thinner the crystal the more fragile it becomes, and the more likely it is to break m the course of vibration.

Quartz crystals work well up to 10 mHz on a fundamental frequency. To reach higher frequencies we can use a crystal mounted to vibrate on overtones. In this way we can reach frequencies up to 100 mHz. Occasionally the more expensive and stronger tourmaline can be used at higher frequencies.

The diagram below shows how a quartz crystal can be used with a capacitor to help produce a loop current. The series resonant frequency of a crystal is the resonant frequency of the branch shown in our above diagram. At this resonant frequency the branch current reaches a maximum value because inductance resonates with capacitance. The formula for the resonant frequency is

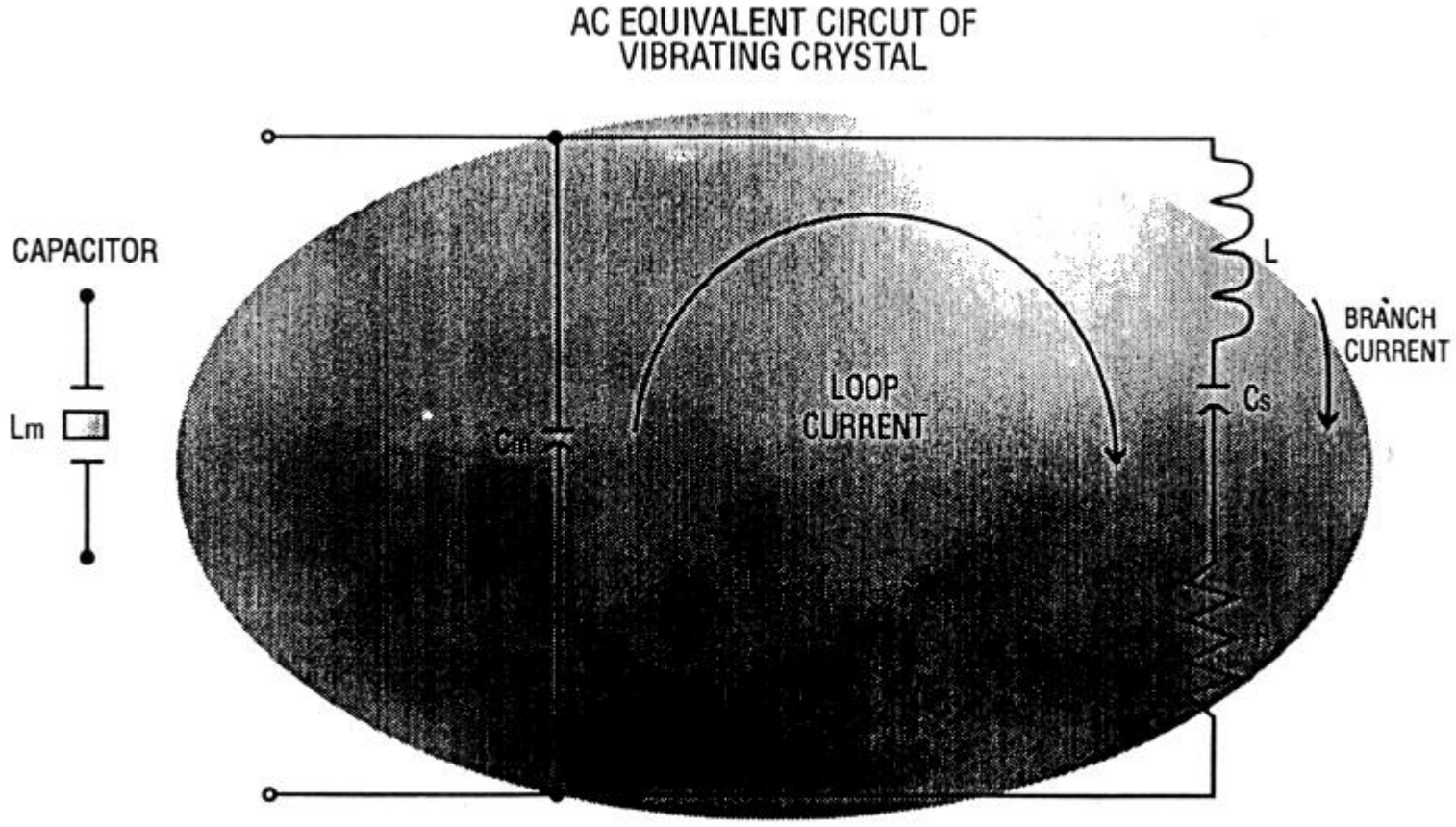
$$f_s = \frac{1}{2\pi\sqrt{LC_s}}$$

The parallel resonant frequency of acry stal is the frequency at which the circulating or loop current reaches a maximum value. The loop current must flow throwgh a series combination of two different capacitors. The equivalent is the capacitance of the loop.

$$C_{loop} = \frac{C_m C_s}{C_m + C_s}$$

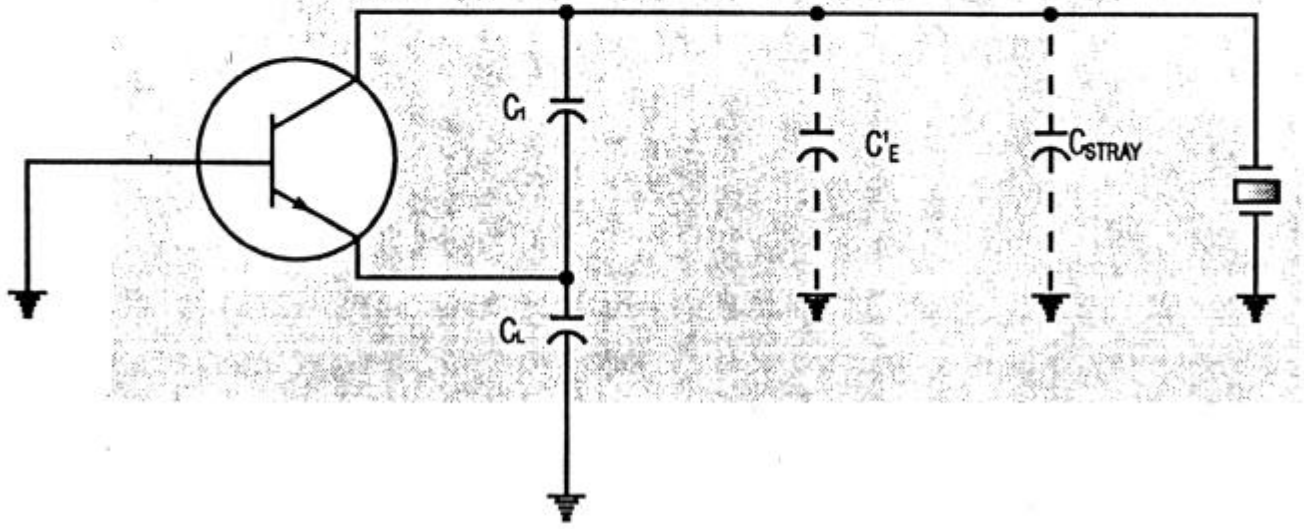
Thus the parallel resonant frequency is

$$f_p = \frac{1}{2\pi\sqrt{LC_{loop}}}$$


AC EQUIVALENT CIRCUT OF
VIBRATING CRYSTAL
CAPACITOR
Lm
Cm
LOOP
CURRENT
L
Cs
BRANCH
CURRENT

$$f_p = \frac{1}{2\pi\sqrt{LC_{LOOP}}}$$

STRAY CIRCUT CAPACITANCES IN PARACCEL
WITH MONTING CAPACITANCE



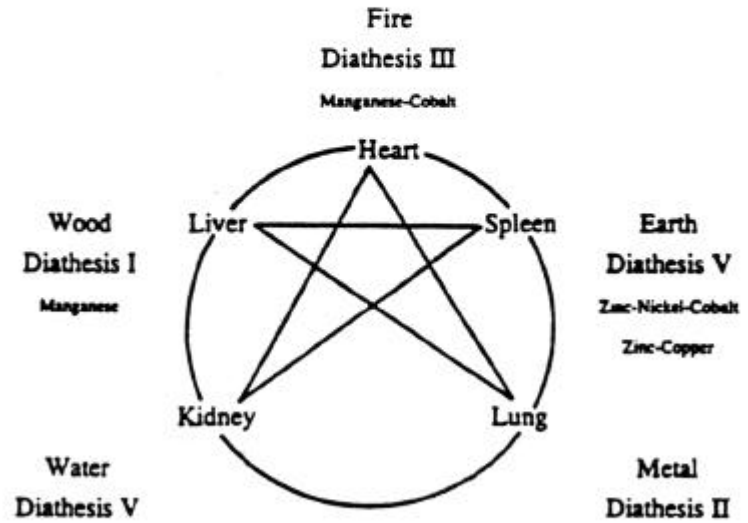
Two capacitances in a series always produce a capacitance smaller than either. So the loop capacitance is less than the other capacitors, and the frequency f_P is greater than f_S. The value of knowing f_S and f_P allows us to calculate the upper limits of the frequency of the crystal oscillators.

The frequency of an oscillator tends to change slightly with time. This drift is produced by temperature, aging and other causes. In a crystal oscillator the frequency drift with time is small, typically less than one part in 10^6, or one millionth percent per day. Stability like this is important in electronic watches using crystal oscillators in precision temperature-controlled ovens. Crystal oscillators have been built that have frequency drift of less than one part in 10^{10} per day. Stability like this is needed in frequency and time standards. A clock this accurate will take three hundred years to lose one second.

In the books *Quantum Biology* and *Bio-Quantum Matrix* we show how these crystal substances inside a cell can be used to help guide photons and electrons. Thus the biology of the cell had to have these different elements that are essential for life to help regulate the control of photons and electrons.

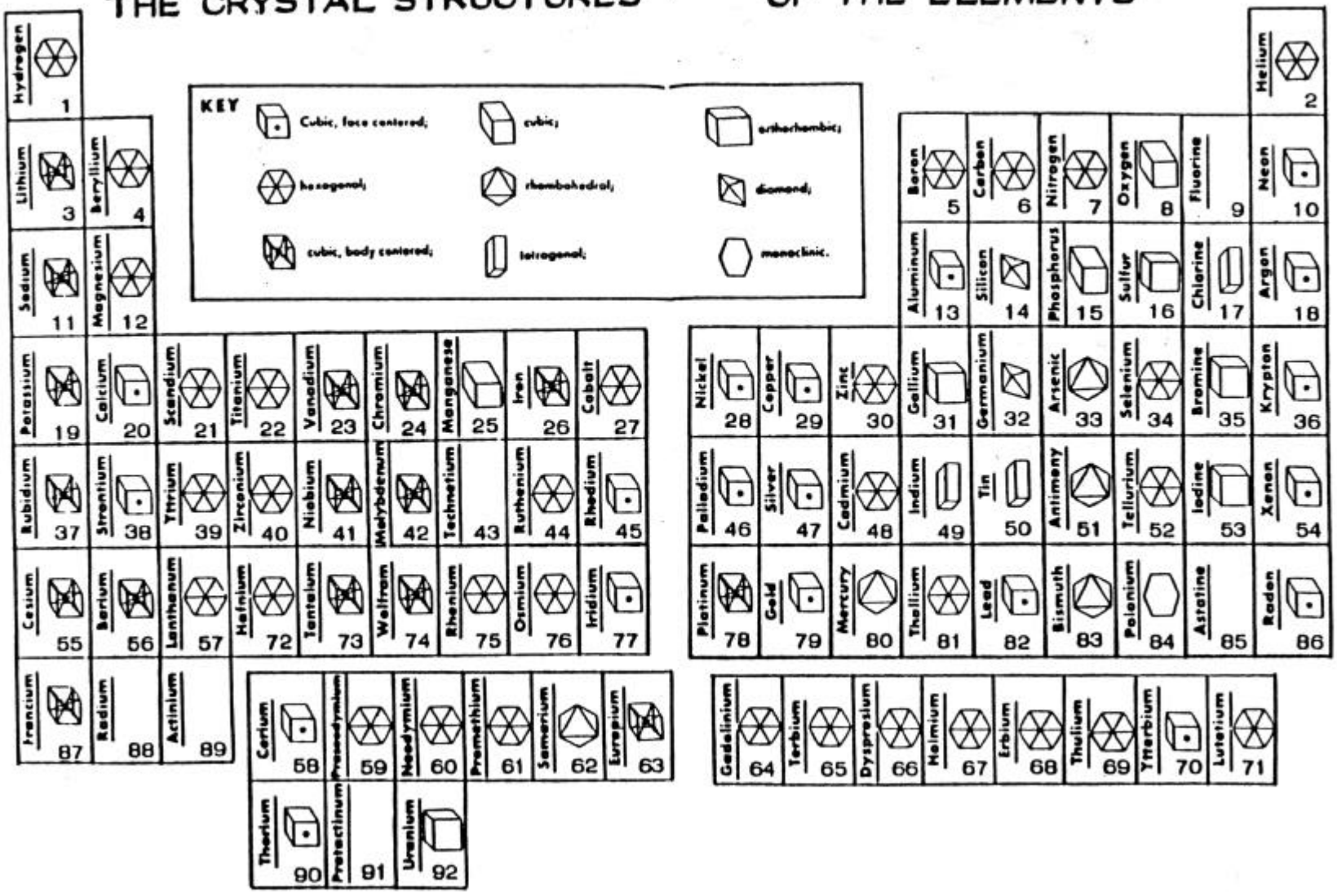
It is immediately apparent that there are correlations between the five diatheses, as they are defined by Menetrier, and the five elements that are the basis of the physiology in traditional Chinese medicine. Indeed, when descriptions of physical, intellectual and psychological behavior, as well as the actual syndromes presented by patients, are classified by the various diatheses, everything between the five diatheses and the five elements seems to coincide. This is presented in schematic fashion.

If we refer to the table of correspondences of the five elements (Table I) and confirm it with the five diatheses, we can see that the allergic diathesis corresponds to the element Wood; to the optimistic or aggressive temperament (Wood-anger); to allergies of the respiratory system (rhinitis, seasonal asthma) linked to the liver (Wood-liver); and to migraines, linked to the gallbladder (Wood-gallbladder). These correlations are confirmed by Chinese pathology.[1]



Correspondences of the Five Diatheses and the Five Elements

THE CRYSTAL STRUCTURES OF THE ELEMENTS



ELECTROENCEPHALOGRAPHIC VIBRATIONS OF THE BRAIN

It has long been known that the brain thrives on electroencephalographic vibrations, and that the various neurons of the brain are activated chemically, electrically and photonically. This activation can be picked up by surface electrodes placed on the skin. In 1929 Berger discovered that cortical activity was similar to the electrical activity of peripheral nerves and muscles, and that there were changes in electron potential, along with muscles, nerves and cortical activity. Using electrodes placed on the skin of the skull, the brain waves and electronic frequencies could be displayed and recorded.

A correlation of activity and brain activity was found with these neurons. The slower the wave the more relaxed the brain seemed. In fact, at deep sleep the brain wave pattern was at its lowest cycle. In heavy-anxiety thinking the brain wave was at its highest cycle. Thus they coined the brain waves *alpha, beta, theta* and *delta.*

It was also shown through electropotential that if there was a stimulus given to the person, the brain might show reactivity. In the recent movie "Awakenings" Robin Williams's doctor character is amazed when one of his catatonic patients responds to his name through electrical activity. This is known as *evoked potential;* stimulation is given to a patient and some type of reaction is observed. This is used in an allergy test performed by many biofeedback systems. We give the body a possible allergic substance. If the person is allergic, there will usually be a heightened heart rate, decreased skin resistance, muscle activity and neuron activity.

From our work in quantum physics we know that the electrical phenomenon is dependent on the photon, and thus is *photonic.* Every time an electron changes an energy state, a photon is either absorbed or released. So in dealing with our brain wave activity we must realize that there is photon activity and electron activity. There is also ion activity, and hormonal activity acting on shape receptors in the brain. A hormone can be released from the synaptic cleft. Touching a shape receptor on the other side of the cleft can stimulate the electrical firing of a neuron. This happens from a polymorphic shape receptor, after which the hormone is often released and reabsorbed into the original spot in the synaptic cleft. In the *Quantum Biology* book we have proven that this activity must fall under quantum theory, and it is not for statistical thermodynamics.

As we now look into the various activities of the brain for our vibrational medicine, we will see that this combination of hormonal, electrical, photonic, chemical, ionic, and mechanical action must be dealt with.

In the function of heat we will see that the brain must be cooled from its activity, and that parts of the sinuses and the ventricles are actually there to help cool some of the mental activity. Our new PET scan shows that mental activity causes an increase in metabolism, which also has an increase in infrared heat energy from its photon release. This increased heat or photon activity in the infrared band tells us where the person is spending his mental energy. If this heat gets too high, it can cause a problem with the brain, and cause aberrant thinking and/or dementia. So the temperature of the head is very important in our vibrational medicine, and it applies to the vibration of the infrared area.

In many societies we talk about "hot heads", who do damage to a society. These people are often told to go "cool their heads". We can see that there must be some social correlate to this one part of the vibrational matrix theory.

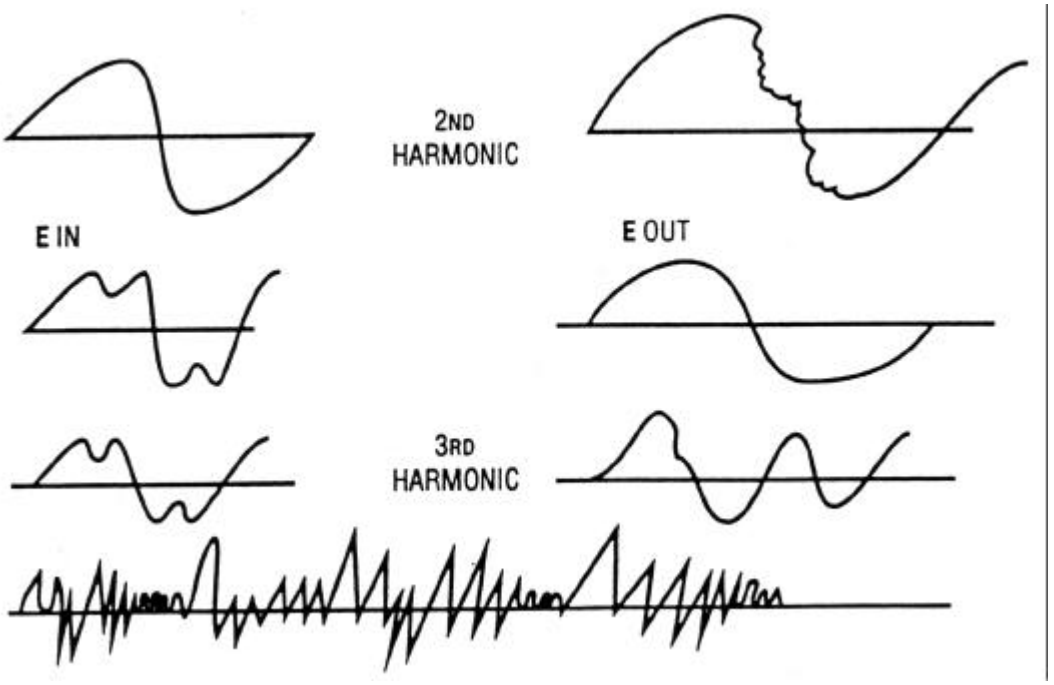
Let us now look into how this signal can proceed through the brain and cause activity.

As a radiated modulated carrier signal reaches the receiving point, the signal and information must be extracted therefrom. The process by which the signal is recovered from the modulated wave is broadly known as demodulation. Modulation may be considered as the signal frequency W_m. The signal generated relative to zero-frequency reference level is shifted upward on the frequency scale and the side bands are symmetrically disposed onto the carrier frequency W_c. This frequency shifting happens by mixing the signal-frequency group, centered about the zero frequency, with the carrier frequency in appropriate multiplying circuits. A nonlinear characteristic is essential in the modulator to affect the mixing or multiplication of the two waves. The Fourier combination principle is obeyed here.

Demodulation of the signal spectrum is centered about W_c and is shifted downward on the frequency scale so that it is centered. This is relative to the zero-frequency level, then returning it to its original frequency position. This frequency shifting is accomplished by mixing the signal-frequency group. The signal is centered about the carrier frequency W_c, with the carrier frequency W_c in appropriate multiplying circuits. A nonlinear characteristic in the demodular is required to mix the resultant variations of resonance of the two signal waves.

Both the modulating and demodulating processes involve frequency shifting. Both frequency shifts are made by an amount W_c Both processes occur in circuits that possess nonlinear characteristics in order to affect multiplication of the waves. Similar circuits are used in certain cases for both processes, although certain quasi differences exist. In the modulating process the carrier signal is generated in one channel, and this is combined in the modulator with the audio signal, which has been generated in another channel. In the demodulating process the required carrier wave is ordinarily contained in the incoming modulated carrier, and no separate carrier generating circuit is necessary. If the carrier is missing from the incoming wave, as is true in suppressed-carrier transmission, it may be necessary to provide a separate locally-generated carrier so that the original signal frequencies can be extracted. We usually consider frequency changing, which is the process of eliminating the original carrier from the modulated signal and substituting for it a new carrier, as demodulation. The h-f carrier component must be eliminated. This is readily accomplished by the use of appropriately placed low-pass filters in the circuit network. Frequency distortion occurs when certain impulses are amplified more than others from varied L or C impedances.

Frequency distortion exists when the voltage gain at one frequency is not equal to the gain at another frequency:



Frequency distortion is another form of over-activity that can occur within the brain. This type of frequency distortion can produce hyperactivity, schizophrenia, mania, and other perverse diseases. It is up to us with our device to find ways to help the brain to modulate and regulate this activity. Thus treatment modalities can be made to help the patient in getting back to balanced brain function.

The most significant harmonic is the second harmonic, with higher-order harmonics diminishing rapidly in amplitude. Our design must limit distortion to exceed no more than five percent.

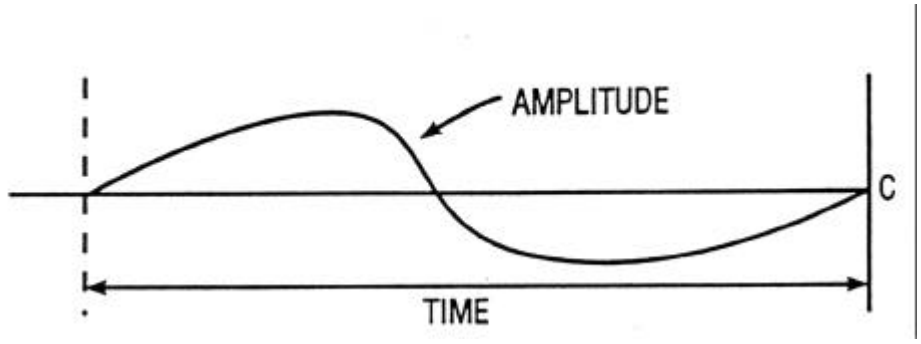
The device we will construct will be able to monitor and regulate this cortical activity throughout the body. It is our point not only to deal with the electrical functions of the brain but to deal with the entire electro-nerval pattern of the body. We are doing holistic medicine, and we know that the photonic, electrical, hormonal, ionic, chemical and mechanical actions of the body perform as one.

Phase distortion occurs because of electrical reactance in the circuit and principally in the coupling circuits. In audio applications phase distortion may not be serious because the human ear cannot detect time-delay variations within the audio pass band. Random signals may be caused by thermal agitation, produced by random movements of electrons in a material. This produces minute pulses of current that contain energy in the entire frequency band and limit the lowest amplitude of signal voltage that can be amplified.

Phase distortion occurs in biology when differing thoughts intertwine, and the patient cannot differentiate one form of thinking from another. A type of this can happen with transference, obsessive/compulsive thinking, sublimation, and other psychological diseases in which one pattern of thought interferes with another.

The brain requires an amplitude-modulation process. Higher signal strength levels may mean loud or more intense excitations. Lower levels indicate moderate inducements. Filters provide impulse "cut-offs" at selected frequency rates. With such filters we cannot only cut off the selected frequency rates but also allow for zero reproduction, and thus certain types of frequencies or waveforms can be eliminated and controlled within the system. We must point out that we cannot know all the intricacies of the signal. We will be able to take various frequencies, isolate them and feed them back after being filtered and modulated. Although we do not know the full implication of conscious thought from these signals, we will be able to help the patient to regulate thought activity, to reduce negativity, to increase positive thought, and also to develop some of the lost parts of the brain that age-old cultures had in accomplishing virtual activity that is called "psychic" in some societies.

It is possible to measure the quantity and quality of information that is contained in an electronic message. In addition; it is possible to measure the capacity of a communication channel to transmit information.



Part of the brain's message is contained in choices of symbols. We say "part" because there is a holographic capacity of the brain that goes beyond mere symbols. The connotation of symbols expresses a connotation of binary philosophy, which is inappropriate to the brain. In our other books we have shown that the brain works on atrinary logic system)(Quantum Med C.L)' (see *Quantum Biology).* In the trinary system we see that indeterminacy is allowed, and thus thoughts can affect the indeterminacy generator of the brain. So the brain is able to reach beyond itself into the morphic states of the universe and pull up a variety of shapes or thoughts, and achieve them in the workings of the neuronal pattern. This is the morphic resonance theory of Dr. Sheldrake.

This type of shape theory has its philosophical backings in the work of Plato as he dealt with the world of forms. He said that in the world of forms there were ideal shapes that would affect us on this more flawed plane. These shapes would be received by the human brain, thus causing the human to strive for perfection; e.g., increased athletic activity, mental activity, accomplishments for society, and personal growth. This world of forms must be put into our analysis of the brain as well. This can be achieved through our indeterminacy generator, and can be filtered through the system.

There also must be a set of electrical symbols passed through the brain to be processed by the brain. These are reflected in the electroencephalographic reading. But it is wrong for us to think that this is the entirety of the symbol production. There is also photonic coding in a type of Morse code, because photons will work on quanta strategy. They will either be there, not be there, or be indeterminate, and provide a trinary type of Morse code handling of the shared communications within the brain. So our modulation signal must work with the antenna effect, as well as the electrical connection of the body.

So our biological intervention device must measure electrical activity in the body to be able to judge just what type of intervention can proceed. We must measure polarity, or magnetic, effects; the conductance effects and their correlate of resistance. We need to know the electropotential by placing two dissimilar metals over the skin. The electrolytes of the body can act as a battery. This will help to tell us the electropotential and polarity of the various areas. We also need to know the inductance, reactance, capacitance, capacitive reactance, phase shift current voltage, time constants, impedance, circuitry (AC versus DC nature), bandwidth, and frequency resonance effects. In order for our machine to do impedance matching and to filter the circuitry, it must know the amplitude of the circuitry, its resonant frequency, and how to filter some of the signal. Many of these things must be charted to find out normal activity, so that we can proceed to diagnoses of the abnormal electrical body, and thereby correct its electrical disturbances.

In brain wave analysis, which will go into our biocircuitry, we need to understand the various modulations and filter effects of the brain wave that will allow us to help the human body with our electrical intervention.

The brain relates to the body through signals. A signal such as this may be sent from the brain to the autonomic nervous system as a sequence of the sampled values. For the signal to carry information there must be prior agreement of relations between the brain and autonomic system as to what meaning should be interpreted from the sequence of values that have been received. When this is done and when distortion conditions are such that it is known from the received signal exactly what type of signal was transmitted, then all the morphic information sent is received. A message may consist of the sequence of n sampling values plus morphic values. The maximum total number of messages that are possible is L^{n2}. If the various permutations of sampling values are not distinguishable in a transmission channel, then the maximum rate of transmission of information in the channel is ineffective.

Consider now the term "information in a message". A definition of this expression is given in statistical terms. As stated by Goldman, S., "Information Theory", Prentice-Hall, Inc., New York, 1953: the amount of information received in a message is defined as:

$$\text{Information Received} = -\log \left[\frac{\text{Event Probability After Message is Received}}{\text{Event Probability Before Received}} \right]$$

$$\frac{\text{Probability at the receiver of the event after the message is received}}{\text{Probability at the receiver of the event before the message is received}}$$

Suppose now that the message alphabet consists of s symbols and that the message contains n symbols (not necessarily different) from the message alphabet. Suppose also that there is associated the probability p; with each symbol s; of the total alphabet of s symbols. The average information H in each message will evidently be a function of these probabilities. Thus in the functional notation:

$$H = H(p_1, p_2, p_3, \cdots p_n)$$

Shannon, C. E., 'The Mathematical Theory of Communication", University of Illinois Press, Urbana, III. 1949, chose the following general and reasonable properties that must be possessed by H: (1) H shall be continuous in the p_i, (2) if the probabilities p_i for each symbol of the set s are equal, then p = 1/s, and H shall increase monotonically with s, (3) if the selection of symbols is broken down into two successive selections, then H of the original selection of symbols should be equal to the weighted sum of the H's of the two successive selections.

Subject to these properties he deduced the following expression for the average information of frequencies in the message of n symbols:

$$H = -n \sum_{j=1}^{n} p_i \log p_i$$

$$H = n \log n - n \log n \sum p_i - \sum np_i \log p_i$$

$$= n \log n - \sum np_i \log n - \sum np_i \log p_i$$

$$H = n \log n - \sum np_i \log np_i$$

Now for an *ergodic* system of symbols (one for which the occurrence of symbols is controlled by probability), the various messages become equally probable for messages of sufficient length. Of course, messages of n symbols contain fewer than n symbols, and thus will generally occur with various frequencies. In fact, the number of occurrences of the i symbol wilI be

$$n_i = np_i$$

Because of this repetition of symbols the average information will be reduced. The reduction of information that is due to the repetition of the i symbol may be written as

$$H_i = n_i \log n_i = p_i n \log p_i n$$

The average information contained in a message of n symbols is H - n log r.

$$H = n \log n$$

According to Seely, S., “Radio Electronics”, McGraw Hill - Electronic Engineering Series, n_n gives the number of possible messages of n letters, all n letters being different.

If M denotes this number of possible messages, then

$$M = n^{n_n}$$

And the total information in the message is

$$H = \log (M \cdot N)$$

One of the most significant early contributions to the theory of information was that of Hartley, R.V.L., Bell System Tech. J., 7, 535 (1928), who developed a quantitative measure of the amount of information in a message, and based on it, a measure of the amount of information in a measure of capacity of a communication channel in terms of its bandwidth. Subsequent work has extended these results to include the influence of noise distortion. In the more general case the waveform need not be periodic. Consider a signal, in the form of continuous function, which has passed through a transmission system having a finite band width. For signals of this type, Shannon, C.E., Proc. IRE, 37, 10 (1949), gives a sampling theorem, which states:

> If a function f(t) contains no frequencies higher than B cycles per second, it is completely determined by giving its ordinates at a series of points spaced 1/2B seconds apart, the series extending throughout the time domain.

The proof of this theorem follows directly from considerations of the Fourier transform and is now given. If F(w) denotes the frequency spectrum of f(5), then

$$f(t) = \frac{1}{2\pi}\int_{-\infty}^{\infty} F(w)\, e^{\delta wc}\, dw$$

The finite capacity of the channel may be expressed in terms of the relative magnitudes of the signals and of the fluctuations that are imposed upon them during transmission (Tuller, W.G., Proc. **IRE,** 37, 468 (1949)).

A geometricalapproach to the modified Hartley law has been developed further where signal strength is represented by circular spheres of electron energy levels traveling along conductors including transmitted, random noise, and received powers. Sommerville, **D.M.Y.,** “An Introduction to the Geometry of N-Dimensions”, p. 135, E.P. Dutton, New York, (1929) gives the volume relationships where the volume of an n-dimensional sphere of radius r is _n

$$V = \frac{\frac{n}{2}}{\Gamma\left(\frac{A}{2} \cdot 1\right)} r^n$$

Another good discussion is also given by Leifer, M. and W.F. Schreiber, “Communication Theory” in L. Marton, ed., “Advances in Electronics”, vol. III, Academic Press, Inc., New York (1951).

In pulse systems the term pulse modulation as distinct from pulse code modulation is used to designate unquantized pulse modulation. These systems include pulseamplitude modulation (PAM), pulse-duration modulation (POM), and pulse-position modulation (PPM). The overall bandwidth required for pulse-modulated systems depends on the pulse repetition rate, the pulse waveshape, and the pulse width, which require relatively large bandwidths in their operation. Pulse-amplitude modulation is the most efficient form of pulse modulation from the standpoint of bandwidth. Nerve pulses have been well recorded.

Brain waves are currently analyzed for epilepsy, tumors, location of troubled areas and responses therefrom by a handful of “specialists”. The MD receives little or no training at all in school because of the all-out suppression of electronics- even this day and age makes no finite difference to hide-bound moss-backs as the throttling and choking off of knowledge is applied.

The senses are shown with additional references in ‘The Senses of Animals and Men” by L. Milne and M. Milne, Copyright 1948, 1959, 1961, 1962; Library of Congress Catalog Card No. 62-9411, publ. by: Murray Printing Co., Forge Village, Massachusetts.

This cycling of the brain wave has received much research, although it is secondary to the real activity of performance in the brain. There is no way we can use an electrode and measure trillions of brain cells from a surmising of the electrical functions. It is our intent, however, to develop a device that will assist in the regulation of improper frequency modulation. Thus we wish to develop a system that will be able to correct polarity disturbances and overall frequency disturbances of the phase and frequency distortion types, as well as foster creative, positive thought and reduce negativity.

Thus many different electrical aberrations that result from our causes of disease can have disturbing effects on the brain and the electrical metabolism of the body. It must be pointed out that the system is a somapsychic and psychosomatic loop. Thus as the body and its metabolism have effects on the brain, the brain has effects on the body.

It is wrong for us to think that anatomically the brain is a separate area of study. To study medicine and biology we must drop our reductionistic modalities and broaden into a holistic science. With this holistic science, in our attempt to deal with the patient,

Algorithm: Calculation of DISTORTION CONTROL

```
METHOD: Random walk with transition probabilities that depend
on the direction of motion.
INPUT: BranchNum - number of fibers in the bundle  (20)
DelTheta  - scale factor for theta                 (0.5)
Delr      - scale factor for r                     (0.05)
Alpha     - probability of transmission            (0.1)
N         - number of steps                        (35)
x0, y0    - initial position
```

```
do j = 1 to branchnum;
 x=x0; y=y0; r = 0;                                  (* initialize *)
 theta=0;
 do i = 1 to N;                                  (* number of steps *)
  if i = 1 then do;                              (* first time      *)
   Random(result);        (* create random num. between (0-1) *)
   if result > .5 then direc=1; else direc=-1;
   Random(result); result=result*direc;
   theta=theta+(result*deltheta);
   r=r+delr;
   x=r*cos(theta)+x; y=r*sin(theta)+y;   (* convert from polar *)
   MoveTo(x,y);
   last_direc=direc;
  end;
  else do;
   (*- determine threshold - *)
   if last_direc=-1 then thresh=alpha; else thresh = 1-alpha;
   Random(result);
   if result > thresh then direc=1; else direc=-1;
   Random(result); result=result*direc;
   theta=theta+(result*deltheta);
   r=r+delr; x=r*cos(theta)+x;  y=r*sin(theta)+y;
   DrawTo(x,y);
  end;
  last_direc=direc;
 end; /*i loop */
end;  /*j loop */
```

Algorithm: Calculation of spiral DISTORTION CONTROL

```
Variables: rz, iz = real, imaginary component of complex number
i = iteration counter
u, z = complex numbers
Notes: This approach iterates the network of 9 equations below.
Some of the equations are not necessary when in this order, but
are left in the code since the reader may wish to shuffle the
order of equations and view the results.
```

```
u = .35 + .35 i;
DO rrz = -2 to 2 by .005;  /* real axis      */
 DO iiz = -2 to 2 by .005; /* imaginary axis */
  a,b,c,d,e,f,g=0;
  z = cplx(rrz,iiz);        /* cplx returns a complex number   */
  InnerLoop: DO i = 1 to 30;/* iteration loop                  */
   a=z;                     /* main computation in next 2 lines*/
   b=a**2+u; e=a**2+u; c=e**2+u; b=c**2+u; f=c**2+u; d=f**2+u;
   d=b**2+u; e=d**2+u; a=f**2+u;
   z=a;
   /* convert to real and imag component*/
   rz = real(z); iz = imag(z);
   if sqrt(rz**2 + iz**2) > 10 then leave InnerLoop;
  END;                  /* InnerLoop                          */
  color = i;            /* assign color index based on i      */
  if abs(rz) < 10 OR abs(iz) < 10 then PrintDot(rrz,iiz,color);
 END;                   /* iz loop                            */
END;                    /* rz loop                            */
```

we also must be able to correct his nutritional balances, stress impingements, and mental factors. We must work through the patient's neurolinguistic programming to help to reconstruct a more apropos system of analysis and a system of therapy, as well as a system of living for patients to correct the base disturbances that exist within their cosmology.

If there is an improper matrix of the system, it will result in an inability of communication to occur within the body. It will also result in an inability of the person to communicate with family, society and the environment. This will produce a further failure to integrate, interpret, and facilitate communication. As this inability occurs it will develop frustration, which may drive the person towards more addictive, irregular or diseasecausing behavior, which would then make the inability to communicate worse. Thus we have an ever-increasing downward spiral of disease in which the frustration of not being able to communicate produces more stress on the system, which further destroys communication, which produces more frustration, and so on; until finally disease results. Disease results in the system, where the weak link is. Thus if the weak link is digestive in nature, the disturbances might include ulcer, esophageal disturbances, colitis, and so on. If the weak link in the system is the immune system, then reticulo-endothelial disturbances may result, including cancer and infection. If the weak link is the liver, then disturbances will also exist in immune diseases and inflammatory conditions. If the weak link is in the brain or nervous system, then a wide variety of psychological disturbances can ensue. It is our job to help facilitate this interpersonal communication and to erode the negativity, so that we can foster positive thought, and set the patient in a new direction towards health.

A TYPE OF IMPEDANCE

Characteristic impedance is the resistance in ohms of the entire network that an ohmmeter reads: the true value. Formulae are

$L \cdot C \cdot R$ Circuit (series): $Z = \sqrt{R^2 + (X_L - X)}$

At resonance $Z = R$

$L \cdot R$ Circuit (parallel): $Z = \sqrt{R^2 + X_L^2}$

The greatest power is delivered to the load when the impedance of the load is equal to the internal impedance of the source.

$$Z_T = \frac{X_L X_C}{X_L X_C}; \quad Z = \sqrt{R^2 + X_C^2}$$

The parallel resonant circuit is

Then, as the sum of XL and Xc approaches zero, the impedance in the line approaches a maximum.

$$Z_L = \sqrt{R_L^2 + X_L^2}$$

Where R_L is the DC resistance of the coil and X_L is the inductive reactance of the coil. As the signal frequency increases, the inductive reactance increases, and vice versa. Therefore the impedance of the load rises with frequency. Frequencies, acting on characteristic impedances, are an important diagnostic aid in all parts of the anatomy of the human body or in an organic or inorganic system.

Ref: “HEART RECORDING”; Radio & TV News, November, 1957, p. 65. Frequencies from 1 cps to 1,000 cps are recorded and diagnosed.

Ref: Page 78: “ELECTRONICS CAN SAVE YOUR HEART’ by B.S. Post, MD. From : Radio-Electronics, May 1960 showing frequency instruments are not USELESS. Ref: Page 79: “ELECTRONICS CAN SAVE YOUR HEART’ Page 55 and 56 on opposite side:

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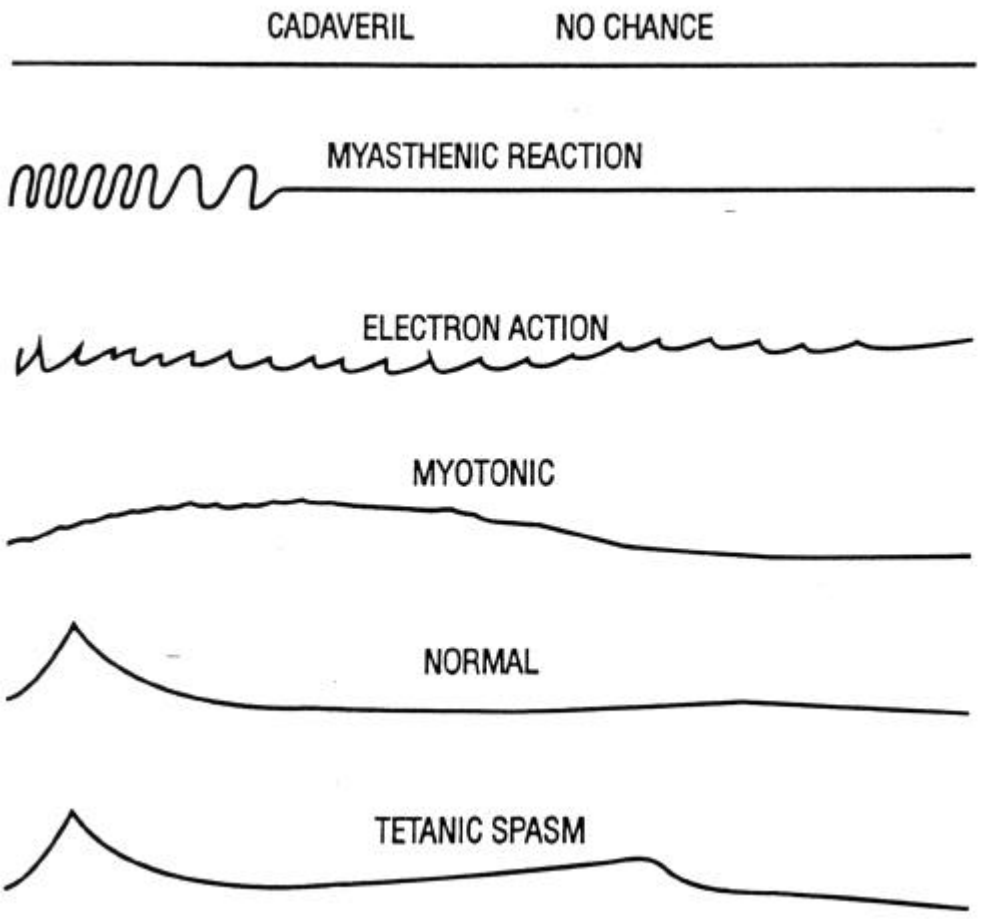
Thus unattended negativities and other unconscious principles also will help to shape the attenuation process and what is achieved from the data presented through not only the ear but all of the senses. Thus a person who has a cognitive mind set about something will channel his experiences and data regarding that item through his own cognitive experience. The cognition process is thereby paramount in developing our new techniques of medicine.

For a deep analysis of the cognitive philosophy we point the reader to “The Cognitive Psychology” of Dr. Michalbaum, which ascertains and develops a very intriguing cognitive experience. Alpo the research of Festinger on cognitive dissonance also must be analyzed to understand some of the workings of the cognitive unconscious and conscious processing.

The ear and eye also can handle startle activity, and trigger autonomic nerval processes for defense.

A loud sound does not produce a stronger impulse along the appropriate nerves than a soft sound; it produces a greater number of pulses. If the vibration is too feeble to stimulate even one nerve pulse, then it is not audible. This determines what is called the “threshold of audibility”. When a sound has become audible it is able to produce one pulse along the nerve about every fortieth of a second. This is interpreted as a continuous sound.



From an article editorial on “Bio-Electronics” by Hugo Gernsback, Editor of RadioElectronics, April 1961, page 31, it was disclosed that Dr. W.R. Volkers, President of Millivac Instruments Division of Cohu Electronics of San Diego and his medical collaborator, Dr. W. Candib, MD presented a paper, “Detection and Analysis of HighFrequency Signals from Muscular Tissues with Ultra-Low-Noise Amplifiers” to the IRE National Convention in New York, March 1960, which stated: “We are satisfied that highfrequency components exist, at least within frequencies ranging far beyond the old limits of electromyography, 1,000 cycles, 2,000 cycles, or at the very most 10,000 cycles. In tracing the frequency spectra of various muscles it was discovered that the frequency components of muscle signals reach much farther into the high-frequency region beyond the audio range than had been anticipated. Of great interest was the fact that diseased muscles were found to give various high-frequency signals from those given by normal muscles. This suggests practical applications in the diagnosis of muscle disorders in the future. If a neuromuscular mechanism should be discovered in the human body, which is capable of correlating elementary fiber or junction signals in the manner in which the more primitive creature can do it, radio transmission and reception between individuals would no longer be a wild speculation but a perfectly plausible phenomenon that engineers could easily explain to their medical colleagues.”

From “Radio Waves and Life” by Tom Jaski, Radio-Electronics, September 1960, page 43 - 45, there is strong evidence that all life may be able to detect, or be affected by, radio waves from thermal effects, nerve effects, optical and growth effects, behavior effects, etc., affecting molecular resonance in the chemical bonds in our very substance. Evidence of these effect functions is described and illustrated, proving without any doubt that frequency instruments are *effective.*

“Electronic Sterilization” by M.L. Briggs (from Radio-Electronics, July 1956, page 82 - 84) destroys bacteria by electrostatics and was developed as an electrosterilization device. We will use this philosophy to discourage infection in the patient’s body.

There is a particular resonant point on the path of conduction of the auditory nerve fibers. The auditory nerve has between twenty thousand and twenty-nine thousand ganglion nerve fibers, each of which carries “information” about a particular frequency of sound being heard.

The following is quoted from “Stereophonic Sound” by N.H. Crowhurst; Library of Congress Catalog Card No. 57-14754; Rider Publication, 1957: “Careful research into the modes of transmission along the nerves between the ear and the brain shows that this information is passed along in the same way as the nerves in the rest of the human body work, by a system of pulses.”

Human nerves do not transmit continuous electric currents, but a succession of pulses. The brain interprets all information received along the sensory nerves by analyzing how many pulses are received and noting along what fibers they arrive.

This sound system an-ives via the reticular formation, which filters the signal into the brain to decide just what needs to be attended to. This filter will run unattended material into the unconscious for its own particular type of sorting. The conscious mind will sort this along the computer principle, looking for binary bits of data and trying to analyze the binary coding. The ability of the conscious mind to take in data will be a reflection of what is going on in the conscious mind and its ability to sort out the data. Thus the condition of the conscious mind is very important. The data run through the unconscious mind will emphasize more of the trinary principle, and utilize a polymorphic resonance of

the shape of the impulse as it comes through the holographic criteria into the more unconscious parts of the brain. Many have said that the right hemisphere is the unconscious part of the brain. This might be the anatomical concentration, but the unconscious parts of the brain extend throughout the brain, body and universe, which is echoing in and out of the polymorphic state and the virtual photon activity.

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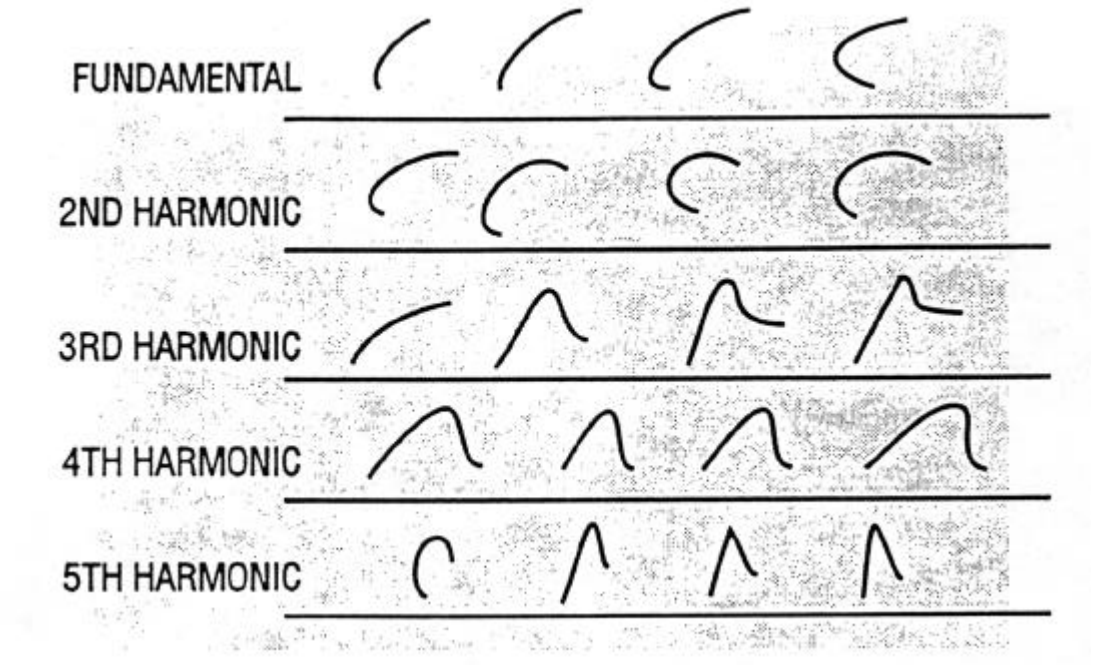

The human ear is sensitive to vibrations along the auditory nerve down to about 11 Hz. Most commercial sound systems play frequencies down to about 20 Hz. This is due to the limitations of the design capacities in the system. They feel that the experience of music is purely an auditory one. Frequencies below the 20 Hz area are more fell by the body (the nerves of the muscles and skin) than they are felt by the car. But these tones have their importance. The ability to receive very high tones is often taken out of most home stereos because they also have design limitations. The experience of an actual live performance, such as a rock concert, is one in which a person can feel the high and low frequencies that are not presented by the home stereo. Therefore the rock concert experience cannot he totally duplicated at home by most stereo systems. In development of our system we will generate frequencies that go into the natural ranges, beyond the limitations of most stereo systems. These frequencies can b,: reproduced in the body electronically.

The limitations of the frequencies arc not on the magnetic inductance side of the speaker; they are on the mechanical side of the paper cone that is attached to these magnetic inducers. By removing the paper cone and placing this magnetic inducer of a full-spectrum speaker to the skin, we can than allow the magnetic effect to transfer through the Davydov solitons carried on the Fröchlich waves of the body (see *Towards a Bio-Quantom Matrix).* Thus the connection of the water molecules and their clash rote structure throughout the body can carry these electromagnetic signals of any frequency. To accomplish this we also will need a sound system that will be able to impose frequencies below the range of the 20 Hz and above the range of the 20,000 Hz. This new type of sound system has been developed by many manufacturers, and is often used with subsonic generators and high-fidelity speaker systems. To accomplish this for the human body we must apply a complete full-spectrum sound system to the body via an eleclromagnetic connection, not just a speaker.

So our system will have this electromagnetic speaker system running through the body, as well as a high-fidelity sound system using a headphone system. The patient will he able to hear and experience the normal sound system, but also will feel the electromagnetic vibrations as they

Further increase in its intensity or loudness will eventually cause a second pulse to be transmitted in an interval less than one fortieth of a second. The rapidity with which the pulses are traveling or transmitted along the nerve fiber (conductor) representing a particular frequency, indicates to the brain how loud that frequency is.

So in the processing of data, the human brain must interpret data provided along its channels of sensory input. Much has been made of the psychological and sensory delusions that can be achieved in the laboratory. This happens in the visual cortex as well -as in the auditory. Thus the brain must generate activity for interpretation. When we watch a movie, we are actually seeing flashes of pictures, yet they come at such a speed that we are deceived into thinking that there is actual movement happening before us.

So the brain's ability to process material offers many problems in our interpretation of reality. Our sensory biases cloud our thinking, and often produce both individual and social delusions in which truth is not really found. Science is able to look beyond the sensory input of the human system and look at various experiments that can prove the inadequacies of that system in its ability to understand the functioning of the universe.

Auditory nerves terminate in a section of the brain similar to that where all other sensory nerves end. The nerves tell what might be going on around us. As a pattern of nerve impulses received from our fingers can tell us the shape and texture of an object we may be feeling, the pattern of pulses received along the auditory nerve can tell us what we want to know about sound we may be hearing.

The grouping of individual nerve fibers along which impulses arrive at the same instant, together with the way in which the impulses speed up or slow down to indicate the change in intensity (amplitude) of various components of the tone, tell us what kind of instrument or sound we may be listening to. One grouping indicates a vibrating string; another indicates a wind instrument, where the tone comes from the air particles vibrating in the mouth of a horn or an organ pipe.

The way the individual component tones vary, causing difference in pulse rate, tells us whether the string has been plucked, bowed of struck. We could go on describing the different qualities about sound that can be identified by listening, but the possible variety in the *way* impulses can arrive over some twenty-nine thousand nerve fibers, (either from frequency instruments or from audible sound) is virtually infinite.

The nerve pulses are alternating current (A-C), an electric current that moves first in one direction for a fixed period and then in the opposite direction for the same period; linear patterns are symmetrical while variable patterns are called nonlinear.

The lowest frequency radiated by a string bass is about 41 cycles per second. In air sound travels at one thousand eighty-six feet per second. 1086/41 = a little over twenty-five feet, so each wave will be that long radiating from its origin, which grows by harmonics and dies away revealing characteristics of that instrument, all of which varies with different types of sound sources. A comparison of frequencies involves: current to dB, impedance to potential resonance, voltage drops to amplitude and velocity of sound, phase angle to .distance and direction of the origin of sound. From a showing of the additive and resultant harmonics above and below the fundamental frequency even the layman can see how resonant "peaks" excite the nerve impulses:

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So our system will have this electromagnetic speaker system running through the body, as well as a high-fidelity sound system using a headphone system. The patient will be able to hear and experience the normal sound system, but also will feel the electromagnetic vibrations as they circulate through the body. Thus even very large frequencies (at 5 or 6 in the ELF (extremely low frequency) range) can be transmitted through the body via the Davydov solitons carried over the Fröehlich waves of the water and ionic compounds of the body.

Thus our system of treatment will use the finest sound frequencies available taken into electromagnetic phenomena along electron and ionic conductivity, and even photonic conductivity, presenting the total vibrational medicine device to help patients regulate and correct electronic imbalances.

EMG ACTIVITY

All muscles in the body are controlled by audio-type frequencies from the brain either directly or indirectly, voluntarily or involuntarily, to impart motion and motility to your movements. This control is centered in the function of contractility in muscle tissue. You may have witnessed an electrician who has become “frozen” by muscle contraction andcan’t let go of a high-voltage “hot” wire or switch gears. Stimulation of muscles by frequency impulses activates contraction and extension depending on the commands sent. Contractility is that property which enables muscles to change their shape and become shorter and thicker. Extensibility of a living muscle cell means that it can be stretched or extended, and elasticity means that it readily returns to its original form when the stretching force is removed.

A muscle is excitable because the muscle fibers composing it are excitable. All protoplasm possesses the property of excitability; any force that affects this excitability is called an impulse or.stimulus by conductivity where the response travels throughout the cells causing contraction. Muscles have sensory and motor nerve fibers. Sensory fibers convey to the brain over the nervous system the state of contraction or location of the muscle. The muscle fibers of the motor fibers convey impulses from the brain, over and through the nervous system, to the muscles, thereby controlling their contraction. If a motor nerve is cut or the center in the brain or cord is damaged, no impulse stimulus is carrying any command for contraction to the muscle, and sensation is lost while the muscles isolated by the severing of the conductor are useless.

Involuntary muscles are called “smooth” muscles and are found in the walls of the stomach, intestines, and other internal organs that are controlled by your autonomic nervous system. Their contractions can be very slow and can be kept up almost indefinitely. These muscles squeeze food through the alimentary canal, contract to help push the blood through the arteries, control the release of urine, and do odd jobs to maintain life by using audio frequencies as impulse stimulation to do and to control functions. That audio frequencies are not useless is well known, even in our high school classes. Audio frequencies from frequency instruments range from 15 cps to 20,000 cps. Such electron therapy frequencies can heal, regenerate and devitalize.

Electrical stimulation of muscles and nerves is of value clinically in the diagnosis, prognosis, and to some extent in the treatment of motor disorders. Two types of current are utilized:

1. Galvanic (direct or continuous) current, normally produces momentary contraction of a muscle upon “making” or “breaking” the circuit. It may be used to stimulate the nerve or the muscle directly.

2. Faradic (induced or interrupted) current normally produces a continuous tetanic contraction due to the rapidly repeated stimuli. It is ordinarily used only in stimulating the nerve.

In the muscle-nerve preparation a variance is noted in the excitability of the various parts:

1. The nerve - is most sensitive to stimulation.
2. The myoneural junction - is intermediate in sensitivity.
3. The muscle itself - is the least sensitive.

Clinically, stimulation is applied over the course of the nerve, or at the “motor point” of the muscle being tested.

Overdone stress has a severe reactivity problem on the electromotive state of the muscles. Thus this musculoskeletal stress causes not only the blockage of proper blood flow and oxygenation because of the muscular constriction and its effects on circulation, but also profound sickness. Thus this excessive electromagnetic stress is the cause of many disease patterns and is complicating in many other disease patterns. Thus to deal with a wide variety of diseases presenting in America, dramatically deep muscle relaxation is profoundly important. The system we are developing must produce profoundly deep muscle relaxation in order to be highly successful.

Deep muscle relaxation alone will help in almost any disease state. In our device we wish to go beyond that. By helping to regulate the various frequencies within the body, we hope to have the most effective energetic medicine activity.

R.D. or REACTION OF DEGENERATION:

The characteristic electrical changes in lower motor neuron (nerve) lesions are known as the “Reaction of Degeneration”. This may be partial or complete depending upon the severity of the injury. It is always necessary to wait until ten or fourteen days after the injury before testing the R.D., since it requires that much time for degeneration of the nerves to occur. Both Galvanic and Faradic current are used to test the degree of R.D.

A. Mild partial R.D.

1. Faradic stimulation of nerve - requires more current than normal.

2. Galvanic stimulation of nerve and muscle - normal.

B. Severe partial R. D.

1. Faradic stimulation of nerve - no contraction.
2. Galvanic stimulation of nerve and muscle - normal.

C. Complete R. D.

1. Faradic stimulation of nerve - no response.

2. Galvanic stimulation of nerve - no response.
3. Galvanic stimulation of muscle - vermicular contraction.

PROGNOSTIC SIGNIFICANCE:

A. Mild partial R.D. - recovery expected in six weeks.

B. Severe partial R.D. - recovery expected in six months.

C. Complete R.D. - recovery will take 1-2 years or may never recover or occur. Time for recovery depends somewhat upon the distance that the regenerating fibers must grow. The rate of growth is about 1 mm per day or 1 inch per month.

DIAGNOSTIC SIGNIFICANCE:

A. Differential diagnosis of upper and lower motor neuron paralysis.

1. Upper motor neuron lesions - no R.D.
2. Lower motor neuron lesions - R. D. present.

B. Differential diagnosis of motor loss due to cut tendons from nerve lesions.

As we have shown in many books, vibration is essential to the existence of the universe, and is a dramatic factor in health. But to think that it is the only factor would be ludicrous. Many have thought that they could put a compound into the body by just taking the vibration of that compound. The contrary can be demonstrated. If we ask one of these people to tape their nostrils and mouths closed and put in the vibration of oxygen, we will see that the vibration of oxygen is not enough to maintain metabolism. With this in mind we must realize that there are many factors in health that must be dealt with to set up a person for the vibrational medicine techniques we will perform.

This table shows many factors that must be dealt with in releasing the causes of disease, so that we can properly proceed with our vibrational medicine technique. Here we see that nutrition must be dealt with, and pathogens must be dealt with. Perverse energy, forgiveness, psychological regulation, lifestyle, behavioral medicine; all these things must be done. So we can see that the patient needs to follow his homework assignments and work

on regulating his lifestyle, psychological stress, nutrition, and all the other causes of disease. This is pointed out in the RWC Book, in which we go into detail about how to not only measure the causes of disease but also to release them. This machine will be able to analyze various toxic events, as it will be able to analyze the body's reactivity to thousands of compounds, including isodes, nosodes, sarcodes, allersodes, classical homeopathics, and many combinations as well.

It is very important that our patient have proper nutrition, including an adequate fatty acid pool, amino acid pool, protomorphogen basis, and minerals. Thus the patient must have the right number of physical entities in the body, so that our reconstructive work with vibrational medicine can reach its maximum. The vibrational medicine techniques we are about to use will help anyone to deal with his disease picture. By dealing with these causes of disease we will be able to maximize the healing potential, and thus help the patient in a dramatic way to deal with disease. The question might be asked as to what types of disease will respond to this. If we pursue the philosophy taken from the *RWC Book,* and now maximize with the vibrational medicine technique, we can see that we have constructed an entirely new medicine that can deal with virtually any type of disease picture and maximize either the person's ability to totally heal and cure the disease or live with whatever type of disorder there might be.

PRELIMINARY THERAPY TO SET STAGE FOR VIBRATIONAL MEDICINE DEVICE

1. Lifestyle regulation (behavioral medicine)

   A. Reduce addiction
   B. Reduce negativity, increase positivity
   C. Exercise, stretch, oxygenate
   D. Reduce all toxic exposure
   E. Spiritual satisfaction

2. Psychological restructuring

   A. Forgiveness (self, others)
   B. Accept responsibility for self
   C. Reduce desire
   D. Control bad attitude
   E. Reduce judgmentalism
   F. Increase awareness
   G. Control emotions

3. Reduce stress during recovery

4. Balance nutrition

   A. Adequate fatty acid pool
   B. Adequate amino acid pool
   C. Adequate protomorphogen pool
   D. Adequate mineral pool
   E. Fresh and raw foods

5. Reduce all other causes of disease (see *RWC Book)*

6. Realize that vibration balancing can help but cannot compensate for these other problems.

In constructing our vibrational medicine device we must now consider the following types of vibrations and the techniques we can use to regulate and control these vibrational techniques. These techniques use phase modulation, flux control, volt ammetry evaluation, distortion reduction, and also other dimensions, including those involving suggestibility and positivity.

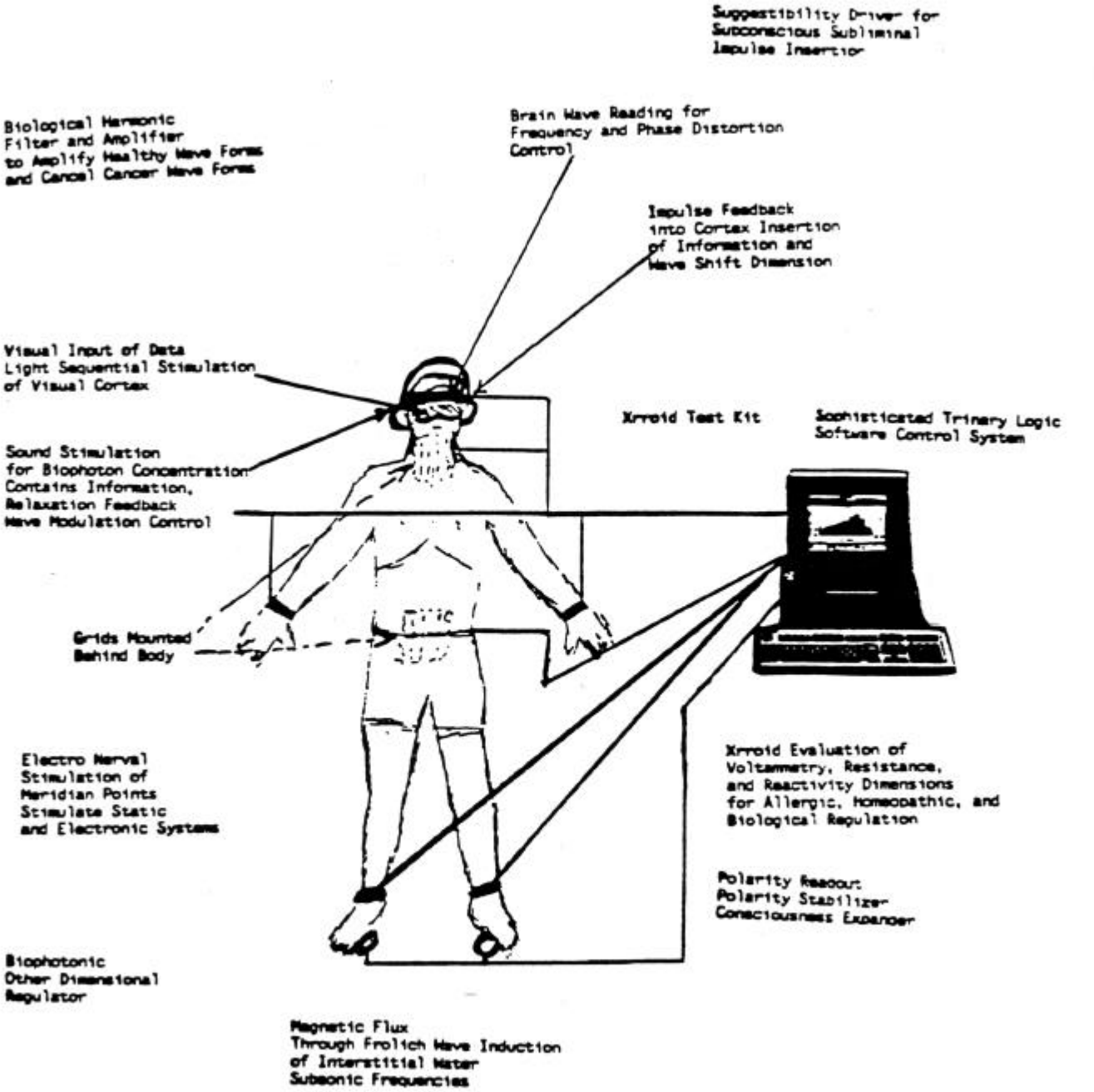
The following table will tell us some of the various ways we can construct such a device.

Medicine Vibration Type	Hz	Technique Used To Regulate Vibration
1. Sound - compression, rarefaction	1 - 30,000 Hz	Subsonic generator induction stimulation sound transducer
2. Magnetic flux inductance	Fult spectrum	Magnetic polarity modulation
3. Static flux (capacitance)	Full spectrum	Static polarity modulation
4. Resistance flux (impedance) Reactivit challen e	0 - 100,000 ohms	Conductivity Polarity modulation
5. Volt ammetry evaluation (life force vs. willpower) electromotive ionic	-2 - +2 volts	Hormonal regulation metabolic therapy electro-stimulation
6. Frequency and phase distortion (photonic, electronic, sound, psych	Full spectrum	Bio-photon stimulation Harmonic regulation Band wave separator Amplitude regulation Interactivit modulator
7. Virtual photonic, other-dimensional (ethereal, mental, causal, astral, subspace	Full spectrum in time-dependant variation	Psychotronic vibration regulation other-dimensional modulation
8. Positivity vibration (negativity release)	Full emotional spectrum	Suggestibility driver negativity releaser memory reconstruction emotional stabilization enlightenment enhancer

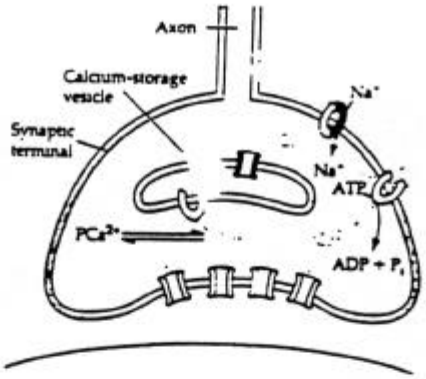
In the following pages we will outline some of the equipment utilized in constructing this device and how it can be utilized to maximize vibrational medicine healing techniques in the patient.

In this book are all the formulas and procedures for constructing such a device. The reader can ascertain and develop a quantic philosophical base. We point the reader to *Quantum Biology, Towards a Bio-Quantum Matrix, Quantum Biophysics,* and the *Quantum Quality Control* text in discovering this final development procedure. This device has also been developed by the Nature Knows Corporation of Europe for healing energies.

TOTAL VIBRATIONAL MEDICINE INSTRUMENT



Transconductance, Open Loop, Inverting, and Non-Inverting Current, and Voltage Feedback System, Reduces Systemic Electronic Disturbances

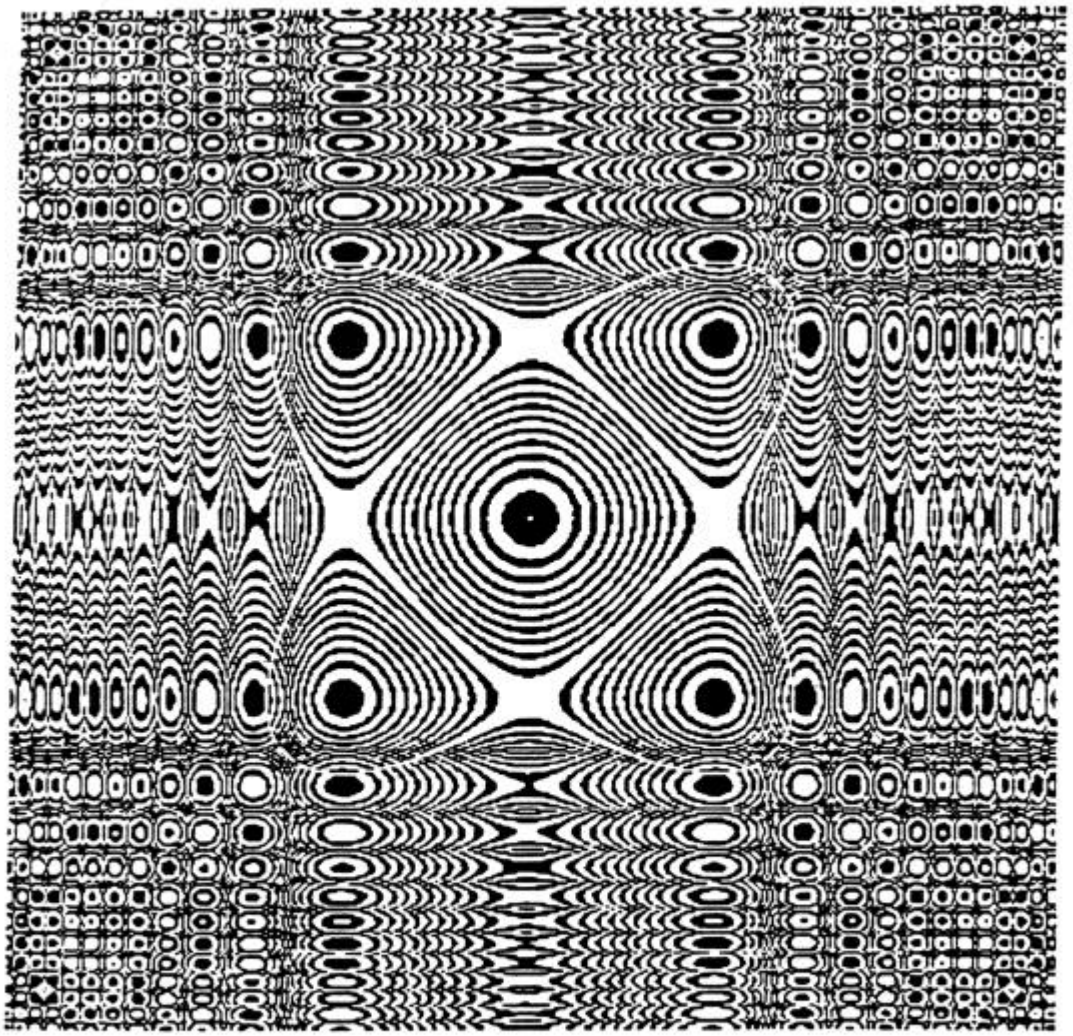


Schematic diagram of Ca^{2+} influx and removal from the cytosol following an action potential in the presynaptic nerve terminal. Ca^{2+} enters through voltage-gated calcium channels at the active zone and diffuses into the terminal, where it binds proteins (P), is taken up into a Ca^{2+} storage compartment, and is actively transported out of the cell. As the cytosolic concentration falls, the storage compartment slowly releases Ca^{2+} to be transported out of the cell by a Ca^{2+} ATPase and an Na^+/Ca^{2+} exchange pump (see Chapter 7). At high concentrations of cytosolic Ca^{2+} (0.5 μM), mitochondria also take up Ca^{2+}.

A partial list of small-molecule neurotransmitters and peptides that are co-localized in neurons[a]

Small molecule	Peptide
ACh	Enkephalin
	VIP
	CGRP
	Substance P
	Somatostatin and enkephalin
	LHRH
	Neurotensin
	Galanin
Dopamine	CCK
	Enkephalin
	Neurotensin
Ephinephrine	Enkephalin
	Neuropeptide Y
	Neurotensin
	Substance P
GABA	CCK
	Enkephalin
	Somatostatin
	Neuropeptide Y
	Substance P
	VIP
Glutamate	Substance P
Glycine	Neurotensin
Norepinephrine	Enkephalin
	Neuropeptide Y
	Neurotensin
	Somatostatin
	Vasopressin
Serotonin	CCK
	Enkephalin
	Substance P and TRH
	TRH

[a]Most of these combinations are based on immunohistochemistry. The structure of the immunoreactive material has not been determined in most cases. Abbreviations: CCK, cholecystokinin; VIP, vasoactive intestinal peptide; TRH, thyrotropin-releasing hormone; CGRP, calcitonin gene-related peptide; LHRH, luteinizing-hormone–releasing hormone.



Cheby-rings. These were produced by $z_{xy} = a(T_n x + T_n y)$. The picture boundaries are (-2,2) in the x-y direction. Only the rings in the central bull's eye are real contour lines; the rest are beautiful artifacts of the sampling process (known as "aliasing"); these artifacts dominate outside the central region on (-1,1).

. *Magnification.* (One of the small "nodules" (bubble-like structures) in Figure 15.12 is magnified.) Successive close-ups reveal self-similarity in the pictures: the pattern of nodules seems to repeat on all size scales.

SUMMARY

1. WE SHOW THAT THERE IS A DYNAMIC FUNCTION IN CRYSTALS; MECHANICALLY, PHOTONICALLY, ELECTRONICALLY, AND OTHER-DIMENSIONALLY.

2. THIS BROADENS INTO AN UNDERSTANDING OF THE VARIOUS MORPHIC RESONANCE FACTORS, AND HOW WE CAN ANALYZE THE VIBRATIONAL PATTERNS AND BRING THEM INTO A MORPHIC RESONANCE UNDERSTANDING.

3. WE GO INTO AN ELECTROENCEPHALOGRAPHIC ANALYSIS OF THE BRAIN, AND HOW THE VARIOUS READINGS OF THE BRAIN FUNCTIONS CAN BE NOT ONLY UNDERSTOOD BUT ALSO FED BACK ONCE PHASE AND FREQUENCY DISTORTION HAS BEEN REDUCED IN THE SYSTEM.

4. WE PROPOSE A TOTAL VIBRATIONAL MEDICINE DEVICE, WHICH WILL USE SOUND, MAGNETIC, STATIC, RESISTANCE, VOLT, AMP, FREQUENCY, PHASE DISTORTION, LIMITATION, VIRTUAL PHOTONIC, OTHER-DIMENSIONAL, AS WELL AS POSITIVITY VIBRATIONS AND SUGGESTIBILITY CONTROL FOR PSYCHOLOGICAL INTERVENTION.

5. THUS THE DEVELOPMENT OF AN ENTIRE QUANTUM VIBRATIONAL MEDICINE DEVICE IS ACHIEVED, AND PROPOSED IN THIS FINAL CHAPTER.