Part One
On The Nature of Water

To begin any discussion on the nature of water is to first recognize how it appears in nature. Water (H2O) is the most abundant compound on Earth's surface, covering more than 70 percent of Earth’s surface. In nature, it exists in liquid, solid, and gaseous states.

It is in dynamic equilibrium between the liquid and gas states at standard temperature and pressure. At room temperature, it is a tasteless and odorless liquid, nearly colorless with a hint of blue (associated with the oxygen atom).

Many substances dissolve in water and it is commonly referred to as the universal solvent. Because of this, water in nature (and use) is rarely pure and some properties may vary from those of the pure substance. It is the only common substance found naturally in all three common states of matter.

It is essential for all life on Earth, and makes up to 78% of the human body.

One of the more interesting aspects on the chemistry of water is that it is the smallest, yet most common molecule to have a dipole moment. In physics, the electric dipole moment is a measure
of the separation of positive and negative electrical charges in a system of electric charges, that is, a measure of the charge system's overall polarity.

The two hydrogen molecules, combining with a single oxygen molecule, create this dipole. As such, it could be seen as the smallest door in physical space, going from one point in space-time to another. After all, a dipole moment is what determines the direction of electric flow, while creating a magnetic field around the molecule itself.

In modern physics, this concept is often referred to as a “dimensional gate,” going from one set of space-time coordinates to another. Water is the smallest known molecule with a dipole moment.

**Ortho- and Para- Water** - Molecular hydrogen occurs in two isomeric forms, one with its two proton spins aligned parallel (ortho-hydrogen), the other with its two proton spins aligned antiparallel (para-hydrogen). Each hydrogen molecule (H2) consists of two hydrogen atoms linked by a covalent bond. An isomer is when this alignment goes either to the left or the right.

If we neglect the small proportion of deuterium and tritium which may be present, each hydrogen atom consists of one proton and one electron. Each proton has an associated magnetic moment, which is associated with the proton's spin of 1/2. In the H2 molecule, the spins of the two hydrogen nuclei (protons) couple to form a triplet state known as ortho-hydrogen, and a singlet state known as para-hydrogen.
Para-hydrogen is in a lower energy state than is ortho-hydrogen. At room temperature and thermal equilibrium, thermal excitation causes hydrogen to consist of approximately 75% ortho-hydrogen and 25% para-hydrogen. After hydrogen is liquified, there is a slow spontaneous transition to a predominantly para-ratio, with the released energy having implications for storage.

The ratio between the ortho- and para- forms is about 3:1 at standard temperature and pressure - a reflection of the ratio of spin degeneracies. However if thermal equilibrium between the two forms is established, the para-form dominates at low temperatures (approx. 99.8% at 20 K).

**The Isotopes of Water** - Hydrogen (H) has three naturally occurring isotopes, sometimes denoted 1H, 2H, and 3H. Other, highly unstable nuclei (4H to 7H) have been synthesized in the laboratory but not observed in nature. The most stable radioisotope is tritium, with a half-life of 12.32 years.
Hydrogen is the only element whose isotopes have different names that are in common use today. The 2H (or hydrogen-2) isotope is usually called deuterium, while the 3H (or hydrogen-3) isotope is usually called tritium. The symbols D and T (instead of 2H and 3H) are sometimes used for deuterium and tritium.

**Clustered Water Forms** - In chemistry a water cluster is a discrete hydrogen bonded assembly or cluster of molecules of water. These clusters have been found experimentally or predicted in silico in various forms of water; in ice, in crystal lattices and in bulk liquid water, the simplest one being the water dimer (H2O)2.

Ongoing academic research is important because the realization that water manifests itself as clusters rather than an isotropic collection may help explain many anomalous water characteristics such as its highly unusual density temperature dependence. Water clusters are also implicated in the stabilization of certain supramolecular structures.
So little is understood about water clusters in bulk water that it is considered one of the unsolved problems in chemistry.

The most common form today is called “activated water,” usually associated with a waterfall. The actually mechanics causes the water to structure as H7O9+, plus a free radical ion (-). It is considered the healthiest form, and is why we often feel “refreshed” when near a waterfall.

This cluster form can be generated via a negative ion generator. Gilbert Ling, who was a pioneer in this field, discovered that water in human cells is not ordinary water (H2O), but something far more structured and organized.

_I began to think about water in the context of biology: if water inside the cell was ordered and structured and not bulk water or ordinary water as most biochemists and cell biologists think, then it is really important,..._

Dr. Jerry Pollack

_The Fourth Phase of Water: Beyond Solid, Liquid, and Vapor_
Dr. Jerry Pollack - I first met Dr. Jerry Pollack in 1970, when he hired me to work under him (lead) at the University of Washington, School of Medicine, and Department of Anesthesiology. Boeing had just lost the B-1 Project, and more than 30,000 scientists were left unemployed in a single day, including me.

There was even a sign on the outskirts of Seattle stating “Would the last person out of town please turn off the lights?”

Professor of Bioengineering at the University of Washington, Dr. Gerald Pollack is now an international leader in the field of water research. He received his Ph.D. from the University of Pennsylvania in 1968.

Since then, his research interests have ranged broadly over the scientific spectrum, from cardiac dynamics and electrophysiology, to muscle contraction, cell biology, and more recently to the role of water in nature.
At age 72, Jerry currently runs the Pollack Laboratory at the University of Washington, which focuses on uncovering some of nature’s more deeply held secrets. He is also the Editor-In-Chief of the scientific journal WATER, a multidisciplinary research journal that brings together water-oriented research from diverse disciplines.

Professor Pollack has earned many distinctions, medals, and honors. He was awarded the highest faculty honor bestowed by his university, the Annual Award Lectureship at the University of Washington in 2008. Jerry is now in demand internationally as a catalytic lecturer, with a dynamic way of presentation.

In his spare time in Seattle, his joy lays in gardening, cooking, and skiing. He also ruminates on subjects as diverse as the origin of weather, the molecular basis of brain function, and attempting to solve the world’s crises (water, energy, health). He has also been known to build ponds, harpsichords, and tree houses.

**EZ Water** - Water is clearly one of the most important factors for our health - especially when we consider that it is in over 99 percent of our body. Water is a really underappreciated part of the equation of optimal health.

Dr. Gerald Pollack is one of the leading premier research scientists in the world when it comes to understanding the physics of water, and what it means to your health. His book, *The Fourth Phase of Water: Beyond Solid, Liquid, and Vapor*, is a phenomenal read that is easy to understand even for the non-professional.
Dr Jerry Pollack, and his newest book:
*The Fourth Phase of Water*

It clearly explains the theory of the 4th phase of water, which is nothing short of ground-breaking. This 4th phase of water is, in a nutshell, living water. It’s referred to as EZ water - EZ standing for “exclusion zone” - which has a negative charge. This water can hold energy, much like a battery, and can deliver energy too.

For years, Dr. Pollack had researched muscles and how they contract, and it struck him as odd that the most common ideas about muscle contraction do not involve water, despite the fact that muscle tissue consists of 99 percent water molecules.

*I began to think about water in the context of biology: if water inside the cell was ordered and structured and not bulk water or ordinary water as most biochemists and cell biologists think, then it is really important*

Dr Jerry Pollack

**The Water in Human Cells**

Gilbert Ling, who was a pioneer in this field, discovered that water in human cells is not ordinary water (H2O), but something far more structured and organized.

Dr. Pollack’s book also touches on some of the most basic features of water, many of which are really not understood. For example, how does evaporation take place? Why does a tea kettle whistle? Also, despite the fact that conventional science tells us freezing is supposed to occur at zero degrees Celsius, experiments show that it can freeze in many different temperatures down to minus 50 degrees Celsius.
There’s actually no one single freezing point for water! Other experiments show that the boiling point of 100 degrees Celsius (or 212 degrees Fahrenheit) does not always hold true either. There are actually 18 phases of water, which will be part of next month’s article.

This is where several various states can exist (like liquid, gas, or ice) at the same time, under specific boundary conditions. For example: because of the very low pressure on Mars, the water Curiosity rover discovered was in a slushy-ice form due to the lack of pressure in that atmosphere.

*There’s a famous website1 put together by a British scientist, Martin Chaplin. Martin lists numerous anomalies associated with water. In other words, things that shouldn’t be according to what we know about water...*

Dr Jerry Pollack

The more anomalies we have, the more we begin to think that maybe there’s something fundamental about water that we really do not yet know.

*That’s the core of what I’m trying to do. In our laboratory at the University of Washington, we’ve done many experiments over the last decade. These experiments have clearly shown the existence of this additional phase of water.*

Dr Jerry Pollack

The reason this 4th phase of water is called the exclusion zone or EZ is because the first thing Dr. Pollack’s team discovered is that it profoundly excludes things. Even small molecules are excluded from EZ water. Surprisingly, EZ water appears in great abundance, including inside most of your cells. Even your extracellular tissues are filled with this kind of water.
EZ Water in the Cell Membrane Structure - Other inherent differences between regular water and EZ water include its structure. Typical tap water is H2O. But, this 4th phase is not H2O; but H3O2. This is a stabilized hydrogen peroxide, with an extra hydrogen molecule.

It’s also more viscous, more ordered, and more alkaline than regular water, and its optical properties are quite different. The refractive index of EZ water is about 10 percent higher than ordinary water. Its density is also about 10 percent higher, and it has a negative charge (negative electrical potential). This may provide the answer as to why human cells are negatively charged.

*Everybody knows that the cell is negatively charged. If you insert an electrode into any of your cells, you’ll measure a negative electrical potential. The textbook says that the reason for this negative electrical potential has something to do with the membrane and the ion channels in the membrane.*

Dr Jerry Pollack

Oddly, if you look at a gel that has no membrane, you record much the same potential - 100 to 150 millivolts negative. The interior of the cell is much like a gel. It’s kind of surprising that something without a membrane yields the same electrical potential as the cell with a membrane.
That raises the question: where does this negativity come from? Well, I think the negativity comes from the water, because the EZ water inside the cell has a negative charge. The same is true of the gel - the EZ water in the gel confers negativity.

*I think the cells are negatively charged because the water inside the cell is mainly EZ water and not neutral H2O.*

Dr Jerry Pollack
Part 3: The Many Phases of Water

The Phases of Matter - In the physical sciences, a phase is a region of space (a thermodynamic system), throughout which all physical properties of a material are essentially uniform. Examples of physical properties include density, index of refraction, magnetization and chemical composition.

A simple description is that a phase is a region of material that is chemically uniform, physically distinct, and (often) mechanically separable. In a system consisting of ice and water in a glass jar, the ice cubes are one phase, the water is a second phase, and the humid air over the water is a third phase. The glass of the jar is another separate phase.

Figure 1: A Basic Snowflake Structure

The term phase is sometimes used as a synonym for state of matter, but there can be several immiscible phases of the same state of matter. Also, the term phase is sometimes used to refer to a set of equilibrium states demarcated in terms of state variables such as pressure and temperature by a phase boundary on a phase diagram.

Because phase boundaries relate to changes in the organization of matter, such as a change from liquid to solid or a more subtle change from one crystal structure to another, this latter usage is similar to the use of "phase" as a synonym for state of matter.

However, the state of matter and phase diagram usages are not commensurate with the formal definition given above and the intended meaning must be determined in part from the context in which the term is used.
The Phase Diagram - A phase diagram in physical chemistry, engineering, mineralogy, and materials science is a type of chart used to show conditions at which thermodynamically distinct phases can occur at equilibrium.

Figure 2: Basic Phase Diagram

These diagrams show the preferred physical states of matter at different temperatures and pressure. Within each phase, the material is uniform with respect to its chemical composition and physical state. At typical temperatures and pressures (on Earth) water is a liquid, but it becomes solid (that is, ice) if its temperature is lowered below 273 K and gaseous (that is, water vapor) if its temperature is raised above 373 K, at the same pressure.

Each line (phase line) on a phase diagram represents a phase boundary and gives the conditions when two phases may stably coexist in any relative proportions (having the same Gibbs free energy). Here, a slight change in temperature or pressure may cause the phases to abruptly change from one physical state to the other.

Where three phase lines join, there is a 'triple point', when three phases stably coexist (having identical Gibbs free energies), but may abruptly and totally change into each other given a slight change in temperature or pressure. Under the singular conditions of temperature and pressure
where liquid water, gaseous water and hexagonal ice stably coexist, there is a 'triple point' where both the boiling point of water and melting point of ice are equal.

A 'critical point' occurs at the end of a phase line where the properties of the two phases become indistinguishable from each other. For example when, under singular conditions of temperature and pressure, liquid water is hot enough and gaseous water is under sufficient pressure that their densities are identical.

At temperatures above the critical temperature a gas cannot be liquefied. Critical points are usually found at the high temperature end of the liquid-gas phase line. Notice how many different phases of ice are found in nature…

Figure 3: Phase Diagram for Water
The Crystalline Structures of Ice - Ice can assume a large number of different crystalline structures, more than any other known material. At ordinary pressures the stable phase of ice is called ice I, and the various high-pressure phases of ice number up to ice XIV so far. At this time, there are 18 known different phases of ice.

There are two closely related variants of ice I: hexagonal ice Ih, which has hexagonal symmetry, and cubic ice Ic, which has a crystal structure similar to diamond. Ice Ih is the normal form of ice; ice Ic is formed by depositing vapor at very low temperatures (below 140°K). Amorphous ice can be made by depositing water vapor onto a substrate at still lower temperatures.

Ice Ih (pronounced: ice one h, also known as ice-phase-one) is the hexagonal crystal form of ordinary ice, or frozen water.[1] Virtually all ice in the biosphere is ice Ih, with the exception only of a small amount of ice Ic that is occasionally present in the upper atmosphere. Ice Ih exhibits many peculiar properties that are relevant to the existence of life and regulation of global climate.[2]

Ice Ih is stable down to −200 °C (73 K; −328 °F) and can exist at pressures up to 0.2 GPa. The crystal structure is characterized by hexagonal symmetry and near tetrahedral bonding angles.

Each oxygen atom inside the ice Ih lattice is surrounded by four other oxygen atoms in a tetrahedral arrangement. The distance between oxygens is approximately 2.75 Angstroms. The hydrogen atoms in ice are arranged following the Bernal-Fowler rules:

1) two protons are close (about 0.98A) to each oxygen atom, much like in a free water molecule;
2) each H₂O molecule is oriented so that the two protons point toward two adjacent oxygen atoms;
3) there is only one proton between two adjacent oxygen atoms;
4) under ordinary conditions any of the large number of possible configurations is equally probable.
Ice 1X - Ice-nine is a fictional material appearing in Kurt Vonnegut's novel Cat's Cradle. Ice-nine is supposedly a polymorph of water (invented by Dr. Felix Hoenikker[1]). It is more stable than common ice (Ice Ih); instead of melting at 0 °C (32 °F), it melts at 45.8 °C (114.4 °F).

When ice-nine comes into contact with liquid water below 45.8 °C (thus effectively becoming supercooled), it acts as a seed crystal and causes the solidification of the entire body of water, which quickly crystallizes as more ice-nine. As people are mostly water, ice-nine kills nearly instantly when ingested or brought into contact with soft tissues exposed to the bloodstream, such as the eyes.

In the story, it is developed by the Manhattan Project in order for the Marines to no longer need to deal with mud, but abandoned when it becomes clear that any quantity of it would have the power to destroy all life on earth. A global catastrophe involving freezing the world's oceans with ice-nine is used as a plot device in Vonnegut's novel.
Part 4: The Formation of the 4th Phase of Water

**What Creates or Builds EZ Water?** - The key ingredient to create EZ water is light (electromagnetic energy), whether in the form of visible light, ultraviolet (UV) wavelengths and infrared wavelengths. Infrared is the most effective, particularly at wavelengths around three micrometers. The EZ water can build on any hydrophilic or water-loving surface when infrared (heat) energy is available.

It builds by adding layer upon layer of EZ water, and can build millions of molecular layers. This is how it occurs in nature. For example, ice doesn’t form directly from ordinary H2O. It goes from regular water to EZ water to ice. And when you melt it, it goes from ice to EZ water to regular water. EZ water is like an intermediate state.

*Glacial melt is a perfect way to get EZ water. And a lot of people have known that this water is really good for your health*

Dr. Jerry Pollack
Testing water samples using a UV-visible spectrometer, which measures light absorption at different wavelengths, Dr. Pollack has discovered that in the UV region of 270 nanometers, just shy of the visible range, the EZ actually absorbs light. The more of the 270 nanometer light the water absorbs, the more EZ water the sample contains.

EZ water appears to be quite stable. This means it can hold the structure, even if you leave it sitting around for some time. Water samples from the river Ganges and from the Lourdes in France have been measured, showing spikes in the 270 nanometer region, suggesting these “holy waters” contain high amounts of EZ water. According to Pollack, there’s compelling evidence that EZ water is indeed lifesaving...

**EZ Cellular Water Helps Explain Health Benefits of Light and Heat Therapies**

Heating equates to applying infrared energy, Pollack has found that if you apply infrared, the EZ water builds and doesn’t diminish. The implications of this are profound when you consider the health benefits of sitting in an infrared sauna, for example.

Essentially, one of the reasons why infrared saunas make you feel so good is because your body’s cells are deeply penetrated by infrared energy, which builds and stores EZ water. The same goes for light therapy, spending time in the sun, and laser therapy.

*There are various kinds of light therapy using different wavelengths. We found that all wavelengths – some in particular – of light, even weak light, build EZ. If EZ is critical for the health of your cells, which I think is clear, these therapies have a distinct physical chemical basis.*

Dr. Jerry Pollack

EZ water also provides a mechanism that explains other biological mysteries. For example, Dr. Pollack describes another fascinating finding that further bolsters our understanding of the mechanism of action behind the health benefits of something as simple as exposing your body to the light and heat of the sun:

He found that if we put a simple tube, like a straw, made of hydrophilic material, in water... there’s water flow through the tube at high speed. This happens spontaneously. But it shouldn’t happen spontaneously. The common idea is that if you want to drive fluid through a pipe or tube, you need to apply pressure.

But he found no pressure here. There’s no pressure difference between the input and output. But flow builds up spontaneously, and it keeps going.
Recently, we found that if light is added, the flow goes faster. It means that light has a particular effect; especially ultraviolet light, but other wavelengths as well. It speeds up the flow. He now think that somehow the exclusion zones (EZs) are involved because inside those tubes, there’s a little annular ring of exclusion zone, and inside that is an area full of protons...

*It seems that the exclusion zone and the pressure of these protons are driving the flow.*

Dr. Jerry Pollack

Now, let’s apply these mechanisms to your body. Your capillaries receive radiant energy from outside all the time. Energy is also received from the inside of your body, as metabolic reactions continuously generate heat or infrared.

So the question is, is it possible that the flow of blood occurring through your capillaries is automatically enhanced by exposure to light? It appears the answer may be yes...

This is an important issue because the capillaries are puzzling. They’re so small. Some of the capillaries are smaller in diameter than the red blood cells that pass through them. Any competent engineer would never build a pipe that’s smaller than the junk that’s supposed to go through. But nature, apparently, has done that...

Now, that means there’s a lot of resistance. You need something to push those red blood cells through... One possibility is that the flow in your capillaries is aided by this kind of radiant energy... We’re starting to test this... It’s possible that your cardiovascular system is assisted by radiant energy in the same way that the flow in the tubes is assisted by radiant energy.”

One of the more interesting healing modalities I’ve been exploring lately is the use of a high-powered laser. The K-Laser also has frequencies in the infrared range, which can deeply penetrate tissue. This kind of laser therapy has shown to provide profound healing for many painful injuries in a very short amount of time—sometimes just minutes of treatment. While the benefits of laser therapy are thought to be due to its action on mitochondrial activity, it may very well be that the benefits are also related to “recharging” your damaged cells’ EZ water, as well as promoting increased capillary blood flow.

EZ water in your body also plays a role is in hyperbaric medicine, which is also good for injuries. In that case, your tissues are exposed to high oxygen under pressure.

*The results are in. We think we understand the mechanism as to why hyperbaric oxygen is so effective for wound healing... EZ water has a higher density than bulk water. If you take H2O and you put it under pressure, it should give you*
*H3O2 because the EZ structure is denser than the H2O. We did the experiments and we found, indeed, that’s the case. If you put H2O under pressure, you get more EZ water.*

Dr. Jerry Pollack

The same goes for oxygen. EZ also has more oxygen than H2O, and when you increase oxygen content, you get more EZ water. So, hyperbaric treatment builds EZ water in your body, particularly in injured areas where EZ water is needed.

**Alkalinity and Your Body’s Negative Charge May Be Critical for Health**

I personally drink vortexed water nearly exclusively as I became a big fan of Viktor Schauberger who did much pioneering work on vortexing about a century ago. Dr. Pollack found that by creating a vortex in a glass of water, you’re putting more energy into it, thereby increasing EZ. According to Dr. Pollack, virtually ANY energy put into the water seems to create or build EZ water.

*We have looked at acoustic energy that seems to effect some change in the water. We’re still not sure exactly what. Vortexed water puts enormous energy into the water. There are several groups in Europe studying this phenomenon right now.*

Dr. Jerry Pollack

As mentioned earlier, EZ water is alkaline and carries a negative charge. Maintaining this state of alkalinity and negative charge appears to be important for optimal health. Drinking water can be optimized in a variety of different ways, by injecting light energy or physical energy into the water by vortexing, for example. This is fairly easy using magnets. Reversing the vortex every few seconds may even create more energy.

Clearly, more research needs to be done in this area, but some is already underway. My own R&D team is working on a careful study in which we use vortexed water to grow sprouts, to evaluate the vitality and effectiveness of the water.

As for a natural source of EZ water for drinking, an ideal source is glacial melt. Unfortunately, this is extremely inaccessible for most people. Another good source is water from deep sources, such as deep spring water. The deeper the better, as EZ water is created under pressure. Natural spring water is another excellent way to obtain this type of water and you can use FindaSpring.com to help you find one close to you.

Besides optimizing the water you drink, you can help generate an electron surplus, or support this negative charge within your body, simply by connecting to the Earth, which also has a
negative charge. This is the basis of the earthing or grounding technique, which has been shown to have significant health benefits by allowing the transfer of negatively charged electrons from the ground into the soles of your feet. In a sense, it’s as though your cells are built like batteries that are naturally recharged by spending time outdoors—whether sunny or overcast, and walking barefoot, connecting to the negative charge of the earth!

If you have an organ that’s not functioning well—for example, it’s lacking that negative charge—then the negative charge from the earth and... [drinking] EZ water can help restore that negativity. I’ve become convinced... that this negative charge is critical for healthy function

Dr. Jerry Pollack

Part 5: The Rainbow and the Worm
by Mae-Wan Ho

The Rainbow and the Worm: The importance of alkalinity and your body’s negative charge being “normal” originates from Mae-Wan Ho’s important work, The Rainbow and the Worm: The Physics of Organisms. She is a scientist known for her work dissing GMOs and biotechnology, especially, attacking “neo-Darwinism”, and the modern theory of evolution.

Figure 1: The Rainbow and the Worm: The Physics of Organisms is very original survey of how biology may be linked to physics through the concepts of coherence and of coupled processes
Mae-Wan Ho is also the director of the Institute of Science in Society (ISIS), an interest group that campaigns against what it sees as unethical uses of biotechnology. The group published about climate change, GMOs, homeopathy, traditional Chinese medicine, and the memory systems found in water.

**Epigenetics:** Epigenetics is the study, in the field of genetics, of cellular and physiological phenotypic trait variations that are caused by external or environmental factors that switch genes on and off and affect how cells *read* genes instead of being caused by changes in the DNA sequence.

*Figure 2:* Epigenetics is the study on how environmental factors influence our DNA and health

In modern parlance, “epigenetics” refers to the modification of some DNA bases, usually by the attachment of methyl groups to them (*methylation*). Such modification can be important in evolution: modified DNA can act differently from unmodified DNA, for example in determining whether it produces proteins at all, or when and where that DNA is transcribed.

All of the important epigenetic modification that we know about in evolution, however, is coded for by the DNA itself: that is, there are bits of the DNA code that say “allow other parts of the DNA to be *methylated.*” In that sense, epigenetics is not something that radically revises our view of genetics and evolution, for it’s something that some parts of DNA do to other parts of DNA, and those instructions have evolved by natural selection.

However, some epigenetic modification of DNA comes not from instructions by other DNA, but from the environment itself. Starvation or stress can itself act to *methylate* DNA. In some cases,
environmentally-induced methylation can be passed to the next generation, or even a few further generations.

That observation has led people to speculate that epigenetics can allow a kind of “Lamarckian inheritance,” whereby the environment itself induces an adaptive change in the DNA that can then be passed on to future generation - the inheritance of an acquired characteristic. If this happened often, it would seriously revise our notion of how evolution works.

Epigenetics throw into question just how vertical the transfer of information might become in the process. We know, for instance, that when we eat food, nucleic acids can get into our cells. Also, there is a theory that our cells in the body keep sending out nucleic acids, with one theory suggesting that it seems to correct the mistakes that other cells have suffered from mutations.

This is why the whole genome is a more radical concept than just epigenetics because there is no boundary really between the genetic and epigenetic.

*The Third Way of Evolution* is different from Altenberg in the sense that many scientists on the page are talking about replacing neo-Darwinism. She and Peter Saunders (1970s) wrote a paper: “Beyond neo-Darwinism: The Epigenetic Approach to Evolution.” That brought a lot of controversy, and she was then branded a neo-Lamarckian.

*Figure 3: Dr. Mae-Wan Ho*
We now know that at the molecular level that is precisely what happens. There are these epigenetic changes that respond to the environment.

Mae-Wan Ho

Many now think things have moved on to such an extent in evolutionary science, and that the world beyond neo-Darwinism is so creative and beautiful, that most no longer really care about trying to convince the neo-Darwinists.

The Studies of Mae-Wan Ho - An important highlight in the studies of Mae-Wan Ho is the ideas around propagation speeds of electrical signals through water in microtubules. Many massage therapists and acupuncturist will tell you that there are communication channels in the body that are not nerve, and which have a speed that seems sometimes faster than any accepted communication channel.

Also, within individual cells, almost every macromolecular response happens way too fast for thermodynamics (diffusion) to be the cause. For example, any of the many multi-step pathways,
like converting a single light photon to the nerve cell firing. Basically NONE of the known biological molecular pathways can be explained through diffusion.

A microtubule has a large enough opening inside for basically one water molecule. So you can fill the tube with a line of water molecules. Then, like those desk toys with the swinging stainless steel balls, when you throw an electron at the water molecule at one end, very quickly the water molecule all the way on the other end of the tube shoots out an electron.

The propagation of that signal seems substantially faster than nerve signals. The fascia system of the body is now finally getting some attention. It is an integrated system, right up there with circulatory, immune, endocrine, etc. Biological sciences, however, still have a long way to go to understand this concept.

![Figure 5: The Rainbows found in Worms (metaphor)](image)

But finally a whole class of physical therapists and chiropractors may eventually be vindicated as the sciences begin to explore the physical mechanism for how doing something to a person's feet can instantly trigger a release all the way up to their neck. This is now considered (by some) to be pseudo-sciences.

Another highlight was Mae-Wan Ho’s attempts to bring levels, or scales, into the scientific discussion. Why has contemporary western science been cursed by this inability to recognize higher and lower levels of the resolution of information? This is the foundation on why physics is now using aq holographic model of the universe.
When talking to a Shakespeare scholar, he said that during the reign of Elizabeth this "horizontalization" took place very notably in the trashing and anathematizing of John Dee. So, this is concept is not only the physical sciences, but also found in both philosophy and theater. Mae-Wan Ho introduces various ways to consider higher and lower levels, especially while trying valiantly to keep thermodynamics relevant.

**A Definition of Life:** One definition for life would be to define it as a quantum coherent system. It is a circular thermodynamic system that can reproduce. If you look at water, which has been the subject of research for a number of years, the physics of life depends on water in a very fundamental way.

![Figure 6: Epigenetics influences the Nature of life.](image)

It was Alfred North Whitehead's idea that electrons had consciousness. Whitehead was a really important philosopher. He was also a mathematician. He had the idea that you cannot really understand nature except as an organism and with the sensitivity of the organism. To Whitehead everything in nature was an organism to varying degrees, from electrons, fundamental particles to galaxies.

*Water has all the characteristics of consciousness. It is very sensitive, and it is flexible, as it responds to light (EM fields)*
Figure 7: Epigenetics, as a higher resolution of the Hologram

Microtubules, as another Resolution in the Hologram, Part 1

A Definition for Life:

The “Epigenetics” paradigm is an extension of the older DNA-centered view of evolution, where the DNA was considered to be the “master molecule.” Mae-Wan Ho: view is that this DNA-centered view is really completely mistaken and outmoded, where the DNA in and of itself does not determine our total health (or future).

With this approach, there is no DNA determinism. And, DNA (or RNA) does not equal life. Instead, they are kind of like memory molecules, where memory itself can get rewritten (like the metaphor of time-lines). DNA appears deterministic of many of our traits, in that we will often develop a genetically coded trait no matter what environment we develop in.
However, if we take stem cells or cells in culture, being very careful to clone them - as soon as we put them in culture, we still get chromosomal abnormalities and mutants. This would suggest that the organism, as a whole, is part of keeping everything in us as stable.

*It’s the whole system. It’s almost like a field, a field that keeps both the field and the shape of the organism intact.*

Mae-Wan Ho:

Science has called this organizational process by many different names; developmental biologists have long referred to it as a *morphogenetic* field. It is a holistic influence, best studied using a holographic model of the universe. It can be thought of as a causal field. This is one reason why neo-Darwinism is not equipped to explain such aspects in life.

These “holistic causal” fields are produced by genes, and are almost certainly the result of “natural selection,” that acts to keep development on track, and to suppress those aspects that could throw things out of whack.

**The Science of Electrons having Consciousness:**

Science is now attempting to define this as a quantum coherent system. It is a circular thermodynamic system that can reproduce. If we look at water, the physics of life depends on water in a very fundamental way. Water has all the characteristics of consciousness; it is very sensitive, flexible and responds to light.

![Figure 1: Alfred North Whitehead](image-url)
This concept began with Alfred North Whitehead’s idea that electrons have consciousness. Whitehead was a really important philosopher and mathematician. He had the idea that you cannot really understand nature except as an organism, and with the sensitivity of an organism. To Whitehead everything in nature was an organism to varying degrees, from electrons and fundamental particles to galaxies.

By definition, if an electron responds to something, that would suggest that the electron was “aware” of that thing. For example, an electron shooting through space will move in a straight line. However, if a magnet placed near the electron, the magnetic field will alter the path of the electron causing the electron to move in a different direction.

Was the electron “aware” of the magnetic field? YES because we can observe that the magnet’s field altered the path of the electron’s movement.

However, if some music was played as the electron was moving through that field, the music will not affect the movement of the electron. Therefore, the electron is not responding to the music. We might then say that the electron was not “aware” of the music, which by definition means, the electron may not be “conscious” of the music.

We can measure the “consciousness” of something by how it responds to stimuli. Electrons respond to only a few stimuli while humans respond to millions of stimuli. The electron is only a little “conscious,” whereas a human is millions of times more “conscious” than an electron. But, BOTH are conscious by definition.

**The Nature of Habitat**

Human civilization - a “mere” 7 billion of us - is currently struggling to survive. Meanwhile, the 50 trillion cellular citizens under our skin somehow live in harmony and bliss. There is a misperception in that we are not singular entities, but communities comprised of living units called cells. All of the “characters” that we express as humans are derived from the functioning of our cells.
Where we have organs to carry out a function, a cell has organelles (miniature organs) carrying out the same functions. In fact, there is NO new function in a human body that is not already expressed by cells. Every system we have, e.g., digestive, respiratory, excretory, reproductive, nervous, and immune system, is present in every cell.

Interestingly, the same mechanisms used by a cell to carry out its behaviors are the very same mechanisms at the heart of our human systems that carry out the same behaviors. A simple truth is that we are made in the “image” of our own cells. That is why research on cell mechanisms can apply to us for they are directly related to the same mechanisms used in the human body.
In a sense, our cells created us! Cellular technology is far more sophisticated than anything humans have been able to come up with.

The emerging science of *biomimicry* extrapolates what nature has used to adapt and survive, and applies that mastery to our human world. Biomimicry is a new discipline in biology that uses nature’s best ideas to solve problems. Animals, plants and microbes have found what works, and we can learn from them.

**Microtubules**

Microtubules are a component of the cytoskeleton, found throughout the cytoplasm. These tubular polymers of tubulin can grow as long as 50 micrometres and are highly dynamic. The outer diameter of a microtubule is about 24 nm while the inner diameter is about 12 nm. They
are found in eukaryotic cells, as well as some Bacteria, and are formed by the polymerization of a dimer of two globular proteins, alpha and beta tubulin.

**Figure 4:** Structure of a microtubule. The ring shape depicts a microtubule in cross-section, showing the 13 proto-filaments surrounding a hollow center.

Microtubules are very important in a number of cellular processes. They are involved in maintaining the structure of the cell and, together with microfilaments and intermediate filaments, they form the cytoskeleton. They also make up the internal structure of cilia and flagella.

They provide platforms for intracellular transport and are involved in a variety of cellular processes, including the movement of secretory vesicles, organelles, and intracellular macromolecular assemblies (see entries for dynein and kinesin). They are also involved in chromosome separation (mitosis and meiosis), and are the major constituents of mitotic spindles, which are used to pull apart eukaryotic chromosomes.

Microtubules are nucleated and organized by microtubule organizing centers (MTOCs), such as the centrosome found in the center of many animal cells or the basal bodies found in cilia and flagella, or the spindle pole bodies found in fungi.

There are many proteins that bind to microtubules, including the motor proteins kinesin and dynein, severing proteins like katanin, and other proteins important for regulating microtubule dynamics.
Figure 4: Just as our bodies rely on bones for structural support, our cells rely on a cellular skeleton. In addition to helping cells keep their shape, this cytoskeleton transports material within cells and coordinates cell division. Microtubules are shown here as thin strands.

**Microtubules, as another Resolution in the Hologram, Part 2**

**Orch OR (Orchestrated Objective Reduction)**

A review and update of a controversial 20-year-old theory of consciousness published in *Physics of Life Reviews* claims that consciousness derives from deeper level, finer scale activities inside brain neurons. The recent discovery of quantum vibrations in "microtubules" inside brain neurons corroborates this theory, according to review authors Stuart Hameroff and Sir Roger Penrose.
They suggest that EEG rhythms (brain waves) also derive from deeper level microtubule vibrations, and that from a practical standpoint, treating brain microtubule vibrations could benefit a host of mental, neurological, and cognitive conditions.

The theory, called "orchestrated objective reduction" ('Orch OR'), was first put forward in the mid-1990s by physicist Sir Roger Penrose, FRS, Mathematical Institute and Wadham College, University of Oxford, and prominent anesthesiologist Stuart Hameroff, MD, Anesthesiology, Psychology and Center for Consciousness Studies, The University of Arizona, Tucson.

![Figure 1: The integration of Orch OR Consciousness](image)

They suggested that quantum vibrational computations in microtubules were "orchestrated" ("Orch") by synaptic inputs and memory stored in microtubules, and terminated by Penrose "objective reduction" ('OR'), hence "Orch OR." Microtubules are major components of the cell structural skeleton.

Orch OR was harshly criticized from its inception, as the brain was considered too "warm, wet, and noisy" for seemingly delicate quantum processes. However, evidence has now shown warm
quantum coherence in plant photosynthesis, bird brain navigation, our sense of smell, and brain microtubules.

**Microtubules in Brain Neurons**

The recent discovery of warm temperature quantum vibrations in microtubules inside brain neurons by the research group led by Anirban Bandyopadhyay, PhD, at the National Institute of Material Sciences in Tsukuba, Japan (and now at MIT), corroborates the pair's theory and suggests that EEG rhythms also derive from deeper level microtubule vibrations.

In addition, work from the laboratory of Roderick G. Eckenhoff, MD, at the University of Pennsylvania, suggests that anesthesia, which selectively erases consciousness while sparing non-conscious brain activities, acts via microtubules in brain neurons.

![Figure 2: Stuart Hameroff](image)

_The origin of consciousness reflects our place in the universe, the nature of our existence. Did consciousness evolve from complex computations among brain neurons, as most scientists assert? Or has consciousness, in some sense, been here all along, as spiritual approaches maintain?_  

*Stuart Hameroff*
This opens a potential Pandora's Box, but our theory accommodates both these views, suggesting consciousness derives from quantum vibrations in microtubules, protein polymers inside brain neurons, which both govern neuronal and synaptic function, and connect brain processes to self-organizing processes in the fine scale, 'proto-conscious' quantum structure of reality.

Sir Roger Penrose

Figure 3: Sir Roger Penrose

After 20 years of skeptical criticism, the evidence now clearly supports Orch OR. Their new paper updates the evidence, and clarifies Orch OR quantum bits ("qubits") as helical pathways in microtubule lattices.

An important new facet of the theory is introduced. Microtubule quantum vibrations (MHz) appear to interfere and produce much slower EEG "beat frequencies." Despite a century of clinical use, the underlying origins of EEG rhythms have remained a mystery.

Orch OR is the most rigorous, comprehensive and successfully-tested theory of consciousness ever put forth. From a practical standpoint, treating brain microtubule vibrations could benefit a host of mental, neurological, and cognitive conditions.
Consciousness depends on anharmonic vibrations of microtubules inside neurons, similar to certain kinds of Indian music, but unlike Western music which is harmonic.

People in psychology love Eastern mysticism and culture. Science has no explanation for that.

Stuart Hameroff

A Religious Perspective:

From a religious perspective, Hameroff believes their Orch OR theory could also account for near death experiences, out of body experiences, and even the afterlife.

The connection to space–time geometry also raises the intriguing possibility that Orch OR allows consciousness apart from the brain and body, distributed and entangled in space–time geometry.

It’s possible that the quantum information can exist outside the body, perhaps indefinitely, as a soul.

Stuart Hameroff

Skeptics have long attributed near death experiences to physical phenomena such as the brain being deprived of oxygen, not the human soul or any interaction with God or the afterlife. To put these claims in perspective, last year, even Skeptic magazine’s Michael Shermer wrote about a possible after-death communication from his grandfather-in-law.
Other skeptics also tend to be committed materialists until they have their own experience. One such skeptic was Dr. Eben Alexander, a neurosurgeon, whose neurons in his cerebral cortex were stunned to complete inactivity for seven days during a near-fatal bout of meningitis.

*I had always believed there were good scientific explanations for the heavenly out-of-body journeys described by those who narrowly escaped death.*

*I experienced something so profound that it gave me a scientific reason to believe in consciousness after death.... It exists, and what I saw and learned there has placed me quite literally in a new world: a world where we are much more than our brains and bodies, and where death is not the end of consciousness but rather a chapter in a vast, and incalculably positive, journey.*

**Dr. Eben Alexander**

Many Christians have come forward in recent years claiming to have experienced heaven and met God. Of course, Hameroff’s personal beliefs are very much different from traditional religions in regards to the nature of the human soul.

He believes “consciousness, or its immediate precursor proto-consciousness, has been in the universe all along, perhaps from the Big Bang.

*Do you think science will be able to prove the existence of the human soul?*
Part 8: The Holographic Brain

A Holographic Concept of Reality - I had just graduated from Washington State University (1966), and was working in Newark, Delaware for E. I. du Pont de Nemours and Company (DuPont). At some point (1967), my work took me into his Experimental Research Facility (Philadelphia). As I was walking down the hall, I chanced to look inside one of the labs and saw a working 3-D Television!

This is when I first met Dr. Dennis Gabor, a Hungarian Physicist, most notable for inventing holography, and for which he later received the 1971 Nobel Prize in Physics. This was to have an enormous impact on my later work (1973), when I presented (in Prague) my paper titled A Holographic Concept of Reality.
A Holographic Concept of Reality

Abstract: The organization of any biological system is established by a complex electrodynamic field which is, in part, determined by its atomic physiochemical components and which, in part, determines the behavior and orientation of these components. The holographic model of reality emerging from this principle may provide a scientific explanation of psychoenergetic phenomena.

by Richard Alan Miller, Burt Webb, and Darden Dickson
Department of Paraphysics and Parapsychology,
Experimental College
University of Washington

Historical Record

In this paper we suggested that a hologram is n dimensions of information in n-1 dimensions. In other words, it is the way information folds into, or out of, itself. Think of this in terms of resolution, or detail, of information. Whereas quantum processes are measured in space and time, a holographic process is measured in the resolution of information.

In 1973, what has come to be later known as the Pribram-Bohm Holographic Model was non-existent. But, we were able to put together the work of Northrup and Burr on the electromagnetic nature of the human being, using Gabor's work on holograms, and then came up with a new model for the universe.

At that time (in history), Pribram had only postulated 2-dimensional interference patterns, physical holograms, as underlying all thinking. The holographic component, for him, represented the associative mechanisms and contributed to memory retrieval and storage and problem-solving. Everything still centered on quantum mechanics and a Quantum Universe model.
Embryonic Holography - In a second paper (1973), titled *Embryonic Holography, An Application of the Holographic Concept of Reality*, we then suggest that the DNA is a 3-dimesional hologram of 4-space = normal 3-space, plus time (who you were, are, and will be). This is the foundation concept of the Biohologram,
We are reaching the end of the paradigm in which we can afford to ignore the electromagnetic properties of the macro-system and deal with chemistry as if it were taking place in a neutral system. This new field can be termed "bio-electronic": a term based on biophysics.

Conventional biophysics seems to be centered around very minute detail of things, such as ion exchanges across cell membranes, etc. And very, very little contact is made with the idea that the electromagnetic systems may regulate the whole organism, the whole multi-cellular organism, and not merely function at the level of cells.

by Richard Alan Miller and Burt Webb
Department of Paraphysics and Parapsychology,
Experimental College,
University of Washington

Historical Record

This was the first paper to address the quantum biological properties of human beings--the first illustrations of the sources of quantum mind-body. Dropping a level of observation below quantum biochemistry and conventional biophysics, we proposed that a biohologram determines
the development of the human embryo; that we are a quantum body-mind with consciousness, informing the whole process through the resolution of information.

![Figure 5: The Holographic Brain](image)

We postulated DNA as the possible holographic projector of the biohologram, patterning the three-dimensional electromagnetic standing and moving wave front that constitutes our psychophysical being. While it was originally presented at Sonoma in 1973, this work was reprinted much later in the journal *Psychedelic Monographs and Essays*, Vol. 6, 1993.

I had apparently drawn the attention of the government in a less favorable way. "Spooks" (Feds and Army Intel) came to my bookstore one week later, arrested me, searched through my files, and seized all my work on *Embryonic Holography*. For whatever reasons they never disclosed why this specific paper was now classified Top Secret, but can only conjecture.

Perhaps it had to do with implications of the theory such as physical regeneration of tissue, or the liquid crystal properties of body fluids. Or perhaps it had to do with my research in Allan Frey's work in the 0.3-3.0 GHz regions, a microwave input which allows the brain to directly receive voice transmissions.

This discovery has recently resurfaced as Synthetic Telepathy. We were able to reconstitute the bulk of the *Embryonic Holography* paper from memory, but laid low with our findings for many years after this traumatic experience.

**Interestingly, I have not yet seen a commercial 3-D television, which did exist in 1967.**
Figure 6: Do you think science will be able to prove the existence of the human soul?

The Holographic Brain - Part 2

David Bohm, Implicate Order and Holomovement

David Joseph Bohm (December 20, 1917 – October 27, 1992) was an American scientist who has been described as one of the most significant theoretical physicists of the 20th century and who contributed innovative and unorthodox ideas to quantum theory, neuropsychology and the philosophy of mind.

*Space is not empty. It is full, a plenum as opposed to a vacuum, and is the ground for the existence of everything, including ourselves. The universe is not separate from this cosmic sea of energy.*

David Bohm.

David Bohm was surprised to find that once electrons were in plasma, they stopped behaving like individuals and started behaving as if they were part of a larger and interconnected whole.
He later remarked that he frequently had the impression that the sea of electrons was in some sense alive.

The holomovement is a key concept in David Bohm’s interpretation of quantum mechanics and for his overall worldview. It brings together the holistic principle of “undivided wholeness” with the idea that everything is in a state of process or becoming (or what he calls the “universal flux”)

For Bohm, wholeness is not a static oneness, but a dynamic wholeness-in-motion in which everything moves together in an interconnected process. The concept is presented most fully in Wholeness and the implicate order published in 1980.

Referring to quantum theory, Bohm’s basic assumption is that “elementary particles are actually systems of extremely complicated internal structure, acting essentially as amplifiers of information contained in a quantum wave.” As a consequence, he has evolved a new and controversial theory of the universe. Bohm calls this the “Implicate Order.”

**The Implicate Order**
The theory of the Implicate Order contains an ultra-holistic cosmic view; it connects everything with everything else. In principle, any individual element could reveal “detailed information about every other element in the universe.” The central underlying theme of Bohm’s theory is the “unbroken wholeness of the totality of existence as an undivided flowing movement without borders.”

During the early 1980s Bohm developed his theory of the Implicate Order in order to explain the bizarre behavior of subatomic particles, a behavior that quantum physicists have not been able to explain. Basically, two subatomic particles that have once interacted can instantaneously “respond to each other’s motions thousands of years later when they are light-years apart.”

This sort of particle interconnectedness requires superluminal signaling, which is faster than the speed of light. This odd phenomenon is called the EPR effect, named after the Einstein, Podolsky, and Rosen thought experiment. This has since become known as the Bose-Einstein Condensate, and was later a Nobel Prize in Physics (2001).

Bohm believes that this “hiddeness” may be reflective of a deeper dimension of reality. He maintains that space and time might actually be derived from an even deeper level of objective
reality. This reality he calls the Implicate Order. Within the Implicate Order everything is connected; and, in theory, any individual element could reveal information about every other element in the universe.

Borrowing ideas from holographic photography, the hologram is Bohm’s favorite metaphor for conveying the structure of the Implicate Order. Holography relies upon wave interference. If two wavelengths of light are of differing frequencies, they will interfere with each other and create a pattern.

Because a hologram is recording detail down to the wavelength of light itself, it is also a dense information storage. The hologram clearly reveals how a total content - in principle extending over the whole of space and time - is enfolded in the movement of waves (electromagnetic and other kinds) in any given region.

David Bohm

The hologram illustrates how “information about the entire holographed scene is enfolded into every part of the film.” It resembles the Implicate Order in the sense that every point on the film is “completely determined by the overall configuration of the interference patterns.” Even a tiny chunk of the holographic film will reveal the unfolded form of an entire three-dimensional object.
Proceeding from his holographic analogy, Bohm proposes a new order - the Implicate Order where “everything is enfolded into everything.” This is in contrast to the explicate order where things are unfolded.

*The actual order (the Implicate Order) itself has been recorded in the complex movement of electromagnetic fields, in the form of light waves. Such movement of light waves is present everywhere and in principle enfolds the entire universe of space and time in each region.*

*This enfoldment and unfoldment takes place not only in the movement of the electromagnetic field but also in that of other fields (electronic, prothonic, etc.). These fields obey quantum-mechanical laws, implying the properties of discontinuity and non-locality. The totality of the movement of enfoldment and unfoldment may go immensely beyond what has revealed itself to our observations. We call this totality by the name holomovement.*

David Bohm

Bohm believes that the Implicate Order has to be extended into a multidimensional reality; in other words, the holomovement endlessly enfolds and unfolds into infinite dimensionality. Within this milieu there are independent sub-totalities (such as physical elements and human entities) with relative autonomy.
The layers of the Implicate Order can go deeper and deeper to the ultimately unknown. It is this “unknown and indescribable totality” that Bohm calls the holomovement. The holomovement is the “fundamental ground of all matter.”

![Holomovement through Time and Space](image)

**Figure 5**: Holomovement through Time and Space

This non-locality of information storage within the hologram is crucial, because even if most parts are damaged, the entirety will be contained within even a single remaining part of sufficient size.

Pribram (others) noted the similarities between an optical hologram and memory storage in the human brain. According to the holonomic brain theory, memories are stored within certain general regions, but stored non-locally within those regions. This allows the brain to maintain function and memory even when it is damaged.

It is only when there exist no parts big enough to contain the whole that the memory is lost. This can also explain why some children retain normal intelligence when large portions of their brain in some cases, half are removed. It can also explain why memory is not lost when the brain is sliced in different cross-sections.

A single hologram can store 3D information in a 2D way. Such properties may explain some of the brain’s abilities, including the ability to recognize objects at different angles and sizes than in the original stored memory.
Carl Pribram – Carl Pribram proposed that neural holograms were formed by the diffraction patterns of oscillating electric waves within the cortex. It is important to note the difference between the idea of a holonomic brain and a holographic one.

Pribram does not suggest that the brain functions as a single hologram. Rather, the waves within smaller neural networks create localized holograms within the larger workings of the brain. This patch holography is called holonomy, or windowed Fourier transformations.

*If you have enough information to ask a coherent question, you have enough information to answer it. The answer is always within the structure of the question*

**A Holographic Theory of the Brain - Part 3**

Dr. Karl Pribram's whole brain theory states that the brain stores information throughout the whole brain. There is not a specific location for a specific memory. His book, *Languages Of The Brain* describes these various neurological holographic process.
[Cognition is] the mental action or process of acquiring knowledge and understanding through thought, experience, and the senses.

It encompasses processes such as knowledge, attention, memory and working memory, judgment and evaluation, reasoning and "computation", problem solving and decision making, comprehension and production of language, etc.

![Human Cognition Process](image)

**Figure 1: Human Cognition Process**

Human cognition is conscious and unconscious, concrete or abstract, as well as intuitive (like knowledge of a language) and conceptual (like a model of a language). Cognitive processes use existing knowledge and generate new knowledge.

**Intrapersonal Holograms** - Paul Chivington describes a psychological hologram in his book "Seeing Through Your Illusions". These communication models are based on Chivington's psychological model. Communication takes place when we respond to stimulus.
We store new information based upon our past experiences and what we experience in the present. Our new subconscious record will be projected in the future. Both Pribram and Chivington say that we holographically store and project information through our subconscious mind.

So, what is the so-called subconscious mind, and how might it be best represented as a model for consciousness itself?
In this model the object beam represents our 5 senses, where the lens represents the sharpness of our senses. The lens becomes "clouded" when we lose detail in our sensitivity to stimulus. When we reflect our sensory stimulus attention onto the object, we also record the waves as a reflection of our sensory interaction.

The reference beam is a reflection of the mirror of our past experiences, beliefs, attitudes, and our expectations of the outcome of the future. It is the projection of our past hologram. The diffusion lens needs to be clear to project a clear representation of the past.

The two beams cause the interference pattern to be created in our brains. We project these old images onto future events. Chivington claims that we can change our reactions to present events by changing our attitudes and beliefs about our past experiences. This will be discussed further in the next series of articles on the time travel, and the nature of cavitation (Next Month).

**Projecting Information** - One reference beam is used to project a hologram. A white light can be used to view, or project, most holograms. But, to get the clearest image and the most perspectives, the light source used to project the image should have a coherency similar to the original light source.

The waves of the reference beam will intersect with those on the film and reproduce the information of the image. The more intersections of waves, the clearer the image reproduced.
A hologram projected has an inverse relationship with the hologram recorded. Notice that the black side of the object is closest to the plate in both the real image and the virtual image.

**The Science of Nonduality** - Everything is in metaphor. It was Gregory Bateson who said “What is your metaphor, but to serve your paradigm.” To illustrate the “distortion” of comparing one thing to another, the metaphor could be stated as “What is your meadow for but to serve you pair of ox.”

![Image: "What is your metaphor (meadow for), but to feed your paradox (pair of ox)"

Paul Gregory, 12-13-03
(G. Bateson, "Steps to an Ecology of Mind," Class of 1974-5, Santa Cruz)

**Imagination is Reality** - The more children there are in this world, the more the world is filled with imagination. Whether we have come to discover or whether we have come to endure, it is certain that the free exchange of experience is the central core of being.

Our perception of reality is context dependent. Innocence is the unfiltered perception of reality. All of the variation is in the context. Non locality is the idea that we are connected to every point of space-time in the *Sonoluminous Holofield*. Why do we not perceive this? Our consciousness is filtering out the information. It is the loss of our innocence.
As we pursue understanding, we are branching out into a dark landscape. Just occasionally we are able to put up a street lamp. Some will stay near the lamp because it is brighter there and some will venture further into the darkness stumbling over both the extraordinary and the embarrassing.

![Figure 6: The true nature of Imagination](image)

There is no way to accurately describe a paradox (as a metaphor), so we tend to distort it using words. This is probably why most Bibles discuss the nature of “babble.” The *Sefer Yetzirah*, or *Book of Formation*. This important part of the Bible relates sounds to words (*Gematria* or numerology), and how the pronunciation of words can convey more than just a single concept of communications.

This was the mathematical concept originated by David Bohm, and his Implicate Order of “similar differences,” and “different similarities.”

> Space is not empty. It is full, a plenum as opposed to a vacuum, and is the ground for the existence of everything, including ourselves. The universe is not separate from this cosmic sea of energy.

David Bohm

The same is true with
Be like water (Inspirational) - You must be shapeless, formless, like water. When you pour water in a cup, it becomes the cup. When you pour water in a bottle, it becomes the bottle. When you pour water in a teapot, it becomes the teapot. Water can drip and it can crash. Become like water my friend

Bruce Lee

Figure 7: Bruce Lee

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Theorem: When Intent (what happens at the end of the day) becomes Purpose (why you are actually here), that moment is known as “sacred time.” This is where a cavitation topology is formed in the very fabric of space-time.

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