

The Memory of Water

A Critical Analysis of the Science behind a Homeopathic Theory

Independent Research Project
April 25, 2008

Toronto School of Homeopathic Medicine

Sarah Lyn Hutchinson

“When the observed fact does not correspond to a famous theory, the fact has to be accepted and the theory rejected. A theory must be modified to be adapted to nature and not nature to adapt itself to the theory”.

-Claude Bernard (Introduction à la Médecine Expérimentale).

Table of Contents

<i>Preface</i>		4
Chapter One:	<i>Introduction</i>	5-7
Chapter Two:	<i>Memory of Water Theory Explained</i>	8-13
Chapter Three:	<i>Homeopathic Application of the Theory</i>	14-22
Chapter Four:	<i>How the Body Uptakes the Remedy</i>	23-26
Chapter Five:	<i>Scientific Experimentation</i>	27-32
Chapter Six:	<i>Opposition to the Theory</i>	33-39
Chapter Seven:	<i>Conclusion</i>	40-42
<i>Bibliography</i>		43-46

Preface

One of the greatest questions I have in homeopathy is a question that faces the medical community at large. *"How does it work?"* Hahnemann and Kent have set a precedent that it is not necessary for the practitioner to prove how homeopathy works; that clinical success is support enough of the practice. Unfortunately, in the post-modern world of evidence-based science, homeopathy has yet to secure its place. Although many theories have been researched and proposed, each has failed to be recognized as sound, scientific proof. Homeopathy bears a double edged sword of being subject to controls on our remedies while at the same time, being deemed the medicine of placebo prescribing.

In this paper I will critique the modern theory on the physics of water memory and how this theory can scientifically apply to homeopathic preparation and action. My ultimate goal is to provide a resource that helps bridge the gap between scientific theory and the homeopathic action of remedies. By bringing forward a paper on what is to date, the most comprehensive theory on homeopathic plausibility, I hope to stimulate an interest in professional homeopaths to understand the science behind homeopathic theory; thereby enabling them to educate the public about this system of medicine.

Introduction

The concept of water having a memory is most often referred to as a possible explanation for how homeopathy works. When one first learns about homeopathy, the process of dilution and succussion is explained as a process by which each remedy is diluted over and over again, and at each stage of dilution the remedy gets vigorously (yet methodically) shaken. Common sense tells us that the more something is diluted, the weaker it becomes. Yet in homeopathic practice, we observe the effects of remedies increasing through this process. Even homeopaths would agree that simple dilution would not produce effective remedies.

Hahnemann himself knew that results were soon lost when substances were diluted without succussion as mentioned in the Organon (footnote 269d, p. 237):

“Daily we hear homeopathic medicinal potencies referred to as mere dilutions when they are, in fact, the opposite. There is a true opening up of the natural substances produced by trituration and succussion, bringing to the revelatory light of day the specific medicinal powers that lie hidden in their inner wesen. The non-medicinal dilution medium merely helps as a supervening accessory condition. For example, the simple dilution of a grain of salt in a large amount of water results in just plain water; the grain of salt disappears and never becomes the medicinal salt [natrum muriaticum] that our well-prepared dynamizations have heightened to such admirable strength.”

Hahnemann describes, at length, the exact process that must be followed in dilution and succussion, not only in the Organon but in his Lesser Writings as well. Unfortunately, he often referred to potentization as releasing "*internal, spirit-like medicinal powers*", which led to great criticism from the orthodox medical community. From his time until present, any reference to spirit usually lowers credibility as spirit is not known to be scientifically proven. Even using the term "*dynamization*" implies some kind of etheric nature to the process, which then gets written off as metaphysical and unscientific. Most scientists and physicians dismiss homeopathy as quackery due to this seemingly flawed theory of spirit and invisible powers. However more and more research is being done within physics which is revealing to us a microscopic world that is far more complex than anyone could have imagined.

Some argue that technology is not yet advanced enough to measure the activity of a homeopathic remedy. Others say that the homeopathic paradigm is so outside the realm of scientific protocol that it cannot be confirmed within the medical-science confines, as we know them. Still others think homeopathy is being suppressed from research and the social mainstream due to pharmaceutical corporate control. One thing is certain, Natural Law supersedes any theory humanity can propose. If homeopathy obeys Natural Law, as we study in our homeopathic education to be true, then there is a method of proof waiting for discovery. Quantum physics seems to be the most likely field by which this discovery is waiting.

It is common, acceptable theory that the three dimensional structure of a molecule can play as significant a role in how that substance behaves as does its chemical formula; for example the allotropes of carbon. When carbon is crystallized due to low temperature and high pressure, it becomes a diamond. It is still chemically carbon, but the carbon atoms are tetrahedrally bonded in structure. This different form of bonding fundamentally changes its physical properties. On the opposite spectrum of carbon, we have graphite. Again, chemically still carbon but it is bonded in hexagonal or rhombohedral structure. The memory of water theory suggests that water also has the ability to change its structure, and therefore its properties.

The basic principle of the water memory concept is that water can retain a "memory" of the substances it has been previously exposed to and can therefore maintain the properties of those substances, even after the physical substance is removed. The most common questions that arise are: How does it do this? Why does it seem to have a "selective memory" for only the homeopathic substance? How does the body then interpret this message? And why, if homeopathy seems so convinced of the evidence, is the rest of the world not listening?

Memory of Water Theory Explained

The water molecule is made up of one atom of oxygen and two atoms of hydrogen, which are covalently bonded. Each molecule of water is then joined together by a hydrogen bond. Water behaves in many unique ways due to the hydrogen bonds that hold the molecules together. Hydrogen bonds are a distinctive type of bond in the field of chemistry. The hydrogen bonds in water become quite strong due to the fact that 4 bonds can form on each molecule. In water, electromagnetic coupling of the hydrogen bonds occurs, called cooper pairs. This pairing makes the hydrogen bonds stronger, up to 20 times stronger in water than other substances. The hydrogen bonds of the water molecules are constantly forming and breaking apart, lasting for only fractions of a second but moving in and out of structured formation, termed flickering clusters (Delinick, 2006, p. 124).

Unlike any other substance, water expands when it reaches solid state. Generally, a solid state implies a greater density; therefore it should contract in size. Water reaches a maximum density at 4°C and as it continues to cool, it begins to lose density. The crystalline structure that develops in freezing water, due to hydrogen bonding, results in a lower density. This allows the ice to float in water. Water also defies Newton's law of cooling, as hot water actually freezes faster than cold water. This phenomenon is known as Mpemba effect. The

evaporation of the hot water actually allows for faster cooling. Convection is also a factor in the Mpemba effect as the hot water cools from the surface, causing the cooler water to then sink. This creates a current in the water, furthering evaporation and surface cooling. When compared to cold water, it remains steady in temperature due to the lack of convection/evaporation. Water is known to have at least 64 anomalous properties, including anomalies in thermodynamics, phase, material and physical.

Water has the second highest specific heat capacity of any known chemical compound, as well as a high heat of vaporization, both of which are a result of the extensive hydrogen bonding between its molecules. Water is also known as the universal diluent as it can dissolve almost anything. When a substance is dissolved, it means the solution is at equilibrium and molecularly, every molecule of solute is separated by water molecules. Because of the obtuse angle at which the atoms within each molecule of water are joined, a wide variety of patterns and structures can form in linking the molecules together. To put this into a familiar context, the constant changing of bonds is the reason why no two snowflakes are alike. Although the overall charge of the water molecule is neutral, it is a polar molecule. The oxygen atom has a slight negative charge, while the hydrogen's have a slight positive charge. The effect of these charges results in what is known as a dipole moment. The interactions between the different dipoles of each molecule cause a net attraction force, which contributes to water's high amount of surface tension.

Water has no reproducible pattern at equilibrium, no organization; it is a random disbursement of molecules. However, water has shown the ability to self organize. Meaning that when a stress is put on the system (pressure, heat, matter, etc), it begins to arrange itself in specific patterns, often referred to as spatiotemporal patterns. Every spatiotemporal pattern formed also develops a specific electromagnetic frequency. Water¹ can be in at least two phases, as has been proven since the 1970's (Roy et al 2004, p. 6). One phase is called a crystal lattice which has a great deal of order. The other phase is a complete fluid which has random equilibrium. The change of water to the crystal lattice phase is not always permanent. Most often it lasts only while under stress and once the stress is gone the water returns to a random equilibrium.

Many experiments have shown that the organization of water lasts much longer than researchers had theorized. For permanent self-organization to occur three criteria must be met (Delinick, 2006, p. 122):

1. The presence of one or more external constraints (stressors)
2. Breaking of symmetry
3. The solution must be kept far from equilibrium

The external constraint is important to the process of self organization as it provides the initial stress on the water, which moves it away from equilibrium. The introduction of an external constraint pushes the water towards its critical

¹ Please note water refers only to the liquid phase of H₂O. Its solid phase is ice and its gaseous phase is vapour.

threshold; it is moving from a simple state to a more complex one. When complex behaviour is dominating the water, the molecules change from Brownian motion of random vibration, to a more specific oscillation. You could say the molecules are now watching the behaviour of their neighbour. Correlations start to exist as the water tries to establish a new balance; the system has gone from simple to complex behaviour. This is called symmetry breaking. Symmetry breaking can be described as how it "*changes our static geometric view of space into one where space is shaped by the functions going into the system*" (Delinick, 2006, pp. 99-100). The water is trying to recover the state of equilibrium but is still under the influence of the external constraint. As this continues, the tendency to return to the previous state of equilibrium is lost and a new order develops.

The longer the water is kept away from equilibrium, the greater the chance of it reaching its critical threshold. Critical threshold is a term used in physics, biology, economics and ecology. It is a succession of phases: first building up pressure and then breaking through. When a system is under the value of the critical threshold, a phenomenon tends to abort. Above the threshold, it tends to grow exponentially. In a solution of water, critical threshold is determined by the amount of area within the dilution that is required to be oscillating with a similar spatiotemporal pattern in order for that particular pattern to become dominant. When the critical threshold is reached, we have what is called a fossil object (Delinick, 2006, p. 130). If no other stress is placed on the water, this fossil will remain intact. This fossil acts like a cage or a shell of water molecules, forming the specific spatiotemporal patterns. The shape can be chains, helices, clusters or any

complex three-dimensional shape. They are the foundation of the crystal lattice and can be referred to as clathrate structures. They are more ordered than normal water. They easily interact with neighbouring molecules (allowing for greater proton conductivity) and they may cause an entropy decrease as they dissipate at a remarkably slow rate. The benefit of increased proton conductivity is that protons can now be shared by water molecules that are not in direct contact with each other. This is thought to happen by a solution mechanism, induced by the non-linear interactions of the water (Delinick, 2006, p. 135). This sharing allows for greater stability of the hydrogen bonding as the once independent molecules are now dependant on each other, thus holding formation. Although the initial external constraint on the water is most likely to be a material one, the changes within the structure can be maintained long after any physical remnant of the original substance is gone, due to the high level of stability of the spatiotemporal patterns. This is less often the case if the external constraint is non-material, such as heat or pressure.

A simplified analogy of the memory of water theory was written by Lionel Milgrom, in the article "The Memory of Molecules" originally published by *The Independent* follows:

"It is like a CD which, by itself, cannot produce a sound but has the means to create it etched into its surface. In order for the sound to be heard, it needs to be played back through an electronic amplifier. And just as Pavarotti or Elton John is on the CD only as a "memory", so water can memorise and amplify the signals of molecules that have been dissolved and diluted out of

existence. The molecules do not have to be there, only their "imprint" on the solution in which they are dissolved. Agitation makes the memory.”

At this point in time, the water memory theory is still undergoing research and experimentation in order to prove the theory. If the theory is accepted, it is possible that water, in the crystal lattice phase, could be classified as a “super fluid” or “quantum fluid” (Delinick, 2006, p. 143). In a quantum fluid, all the molecules act collectively; doing the same thing at the same time. This coherence of the molecules is called entanglement as two particles which are not in local contact with one another remain unified in function and information. Quantum fluids form under high pressure and low temperature due to the compression of their electrons. In the quantum fluid state, electrical current can theoretically flow forever with a complete absence of voltage, meaning that its electric potential does not change. It has zero viscosity, zero entropy, and infinite thermal conductivity. Quantum fluids also remain liquid at absolute zero temperature and zero pressure. Homeopathic remedies will have to undergo extensive experimentation before being scientifically proven to fall in the category of quantum fluid, but with the memory of water theory, we can at least begin to establish plausibility. The succussion allows for pressure increase and proton conductivity allows for entanglement.

Even Hahnemann, in his great insight and quizzical mind, wrote about the possibilities of the unseen world of molecules in his article *Remarks on the Extreme Attenuation of Homeopathic Remedies* (Dudgeon, 2004, p. 765):

“Who can say that in the millionth or billionth development the small particles of the medicinal substances have arrived at the state of atoms not susceptible of further division, of whose nature we can form not the slightest conception?”

Homeopathic Application of the Theory

For homeopathic remedies to fit the criteria of water's ability to self organize, it must fit the three criteria discussed in the previous chapter:

1. The presence of one or more external constraints (stressors)
2. Breaking of symmetry
3. The solution must be kept far from equilibrium

For the first criteria of the external constraint, we can consider the crude substance of what is to be potentized. When an external constraint is put into the water, it automatically moves away from equilibrium. We have now met two of the three criterions. If the water were left alone, the system would re-equilibrate and every molecule of solute would be separated by water molecules. Stresses such as temperature and pressure changes easily re-equilibrate as compared to the introduction of a solute. This is because when the solute is first introduced, it forms microscopic groups or clusters, hence slowing equilibrium. Succussion provides another form of external constraint. Even though the solution may be well mixed, it has not re-established equilibrium due to the pressure change within the preparation vial.

The process of succussion also produces nanobubble formation. Nanobubbles are an intriguing result of succussion. They are microscopic pockets of gas formed within the water. Nanobubbles have a high bioactivity and oxygen nanobubbles have been used to raise freshwater and saltwater fish in the same tank (Takahashi, 2003). They have even been used to deliver cancer drugs. The drug is compressed into nanoparticles and then ultrasound waves are introduced to burst them near the tumour site (Rapoport, 2007). Nanobubbles favour self-organization processes due to their charge, long range attraction and slow diffusion. The reason for the slow diffusion is that nanobubbles have a charged interface which opposes the surface tension of the water. The system kept far from equilibrium by the circulation of nanobubbles, while the organization is enhanced.

As energy is introduced via succussion, the hydrogen bonding is disturbed. The molecules that are closest to the sides of the vial are the most susceptible to the oscillating changes. This can be imagined as waves crashing against rocks; there are great opposing forces here therefore greater turbulence. This portion of the water is referred to as *vicinal water*. Even though this area of the potentizing vial is under the greatest stress, it also has the greatest capacity of developing spatiotemporal patterns. The further away equilibrium is kept from the water, the greater the possibility of spatiotemporal patterning to stabilize. The crude substance acts as the external constraint, the action of succussion acts as the symmetry breaking for the water, and the serial dilution allows for the system to be pushed further away from equilibrium. Thus, potentization has achieved all three criteria for self-organization.

When considering the application of the memory of water to homeopathic remedies we must also consider what makes up the remedy. In liquid preparations, we have water, alcohol and the crude material of the remedy. In trituration, we have lactose and the crude material of the remedy as well as the introduction of aqueous alcohol. In the trituration process, the energy impinged on the mixture increases the electromagnetic properties of the material, which increases the capacity for spatiotemporal patterning to develop before the mixture is even introduced to the aqueous alcohol solution. Alcohol was originally used as a preservative for the crude substance in the mother tincture. Alcohol also acts as a surfactant, lowering the surface tension of the water. The lowering of surface tension affects the polarity of the water molecule, which in turn affects hydrogen bonding. The water molecules break apart in their hydrogen bonds as ethanol competes to form its own hydrogen bonds with the other water molecules. This increases the capacity to form new spatiotemporal patterning as the hydrogen bonding activity is enhanced. The addition of alcohol is an interesting feature of the homeopathic preparation, as there are many homeopaths who would agree that remedies made strictly of water are less effective than those prepared as Hahnemann detailed.

Certain compounds, such as water, alcohol and lactose do not produce a distinct, permanent spatiotemporal patterning upon succussion or trituration, making them the optimal diluents for homeopathic remedies (Lessell, 2002, p. 20). In their pure state, the patterns they form upon succussion and trituration are fleeting and fragmented. Dr. Colin Lessell goes into great detail as to the specifics

of the chemical formula of water, alcohol and lactose and why they do not form permanent and distinct patterning. Here is an excerpt from his book (p. 31), "A *New Physics of Homeopathy*":

"Distortions of physical space produced by such *excluded substances* are *chaotic*, and do not contribute to spatial patterning ($T=0$). *Exclusion* would seem dependant on conflicting spatial imagery between one or more $-H$ atoms and one or more $-OH$ groups, but only where the rest of the molecule is either unopposed to this disharmony, or, as is the case with water, completely absent. The *general formula* for molecules which are so excluded appears to be $C_vO_w(CO)_xH_y(OH)_z$, irrespective of isotopic composition, where: either v or w is an integer *or* zero; x must be *zero*; and y and z must both be *integers* and *not zero* [...] Water itself is $C_0O_0(CO)_0H_1(OH)_1$ and *is* excluded [...] as are ethanol (ethyl alcohol) $C_2O_0(CO)_0H_5(OH)_1$ [...] [and] lactose $\{C_{12}O_3(CO)_0H_{14}(OH)_8 + C_0O_0(CO)_0(OH)_1\}$ "

Simply put: water, lactose and ethanol will not form a distinct and lasting pattern unless another physical compound that can form a unique pattern is added. The homeopathic compound as a solute is the next greatest concentration in the solution and it essentially overwrites its own spatiotemporal pattern of organization. The diluent provides the structure required for patterning to develop while the solute provides the information to form the specific structuring. If a diluent was used in homeopathic preparation that was capable of unique spatiotemporal patterning, the ensuing dilutions would be defined by the diluent as it is diluent which constitutes the greatest part of the content.

As the remedy is prepared, it goes through dynamic disruption and disorganization by succussion/trituration. Because the remedy is the next most prevailing substance in the mixture, it is this material that develops the dominant spatiotemporal patterning. The ratio of the diluent to solute is important as the solute must remain the next most dominant substance in the solution. So long as the water is distilled, even a large dilution ratio can be used. However it would take a great amount of succussion to develop any extensive spatiotemporal patterning. As discussed in the previous chapter; when the external stressor is non-material such as heat, pressure, or in this case the act of succussion, it is much easier to re-establish equilibrium. Therefore, the initial amount of solute plus the continued dilution *and* additional succussion is important in order to keep the solution away from equilibrium. When homeopaths have extremely sensitive patients, they can dilute a dose through multiple glasses of water. The spatiotemporal patterning is maintained as the stock bottle is first succussed and any subsequent glass is thoroughly stirred. This provides the conditions required to keep the solution far away from equilibrium; therefore promoting the formation of spatiotemporal patterning.

The higher potencies have a less fogged image of the pattern. The spatiotemporal pattern becomes sharper and crisper and potentially clearer in its biological action as potentization continues. The fact that serial dilution is the process of preparation in homeopathic remedies is very important. A 1 in 10 dilution serially diluted 10 times will have greater efficacy than a 1 in 10 dilution diluted once into a volume 10 times the original volume. Each serial dilution

reaches a maximum amount of spatiotemporal patterning; this is the critical threshold. This amount changes depending on the scale of dilution used. Because the dilution factor is so much larger in the LM scale than the C scale, more succussions can be tolerated at each serial dilution before maximum spatiotemporal patterning is reached. In the centesimal scale, the amount of potentization at each step seems to reach a maximum after about 5 strikes (Lessell, 2002, p. 36). After this point, fresh diluent must be added (by means of serial dilution) in order to elicit any greater potentization, as a new critical threshold level must be reached. Because the LM scale is 1/50,000, the tolerance for succussion is about 100 (Lessell, 2002, p. 36). This is due to the greater dilution factor which allows for 500 times the tolerance of succussion. At a greater dilution ratio, each stage has a greater capacity to clear or develop a sharper image because greater amounts of kinetic or electromagnetic energy can be tolerated before new diluent is required. This would explain why LM's can have such a deep acting effect on people while still remaining gentle in action.

It is often asked why water only remembers the homeopathic remedy and not any other substance to which it was previously exposed. As previously discussed, we can see the importance of the process of potentization in order to produce spatiotemporal patterning. It is in fact true that any minor contaminant in the diluent does actually become potentized. However, as the amount of these contaminants is likely to be so minute, the pattern of the more substantial component (the remedy) easily overrides the influence of a contaminant. We can think of this as if lighting a candle in a room that is already lit by fluorescent

overheads; it makes little difference to the overall effect of light in the room. Once a remedy is diluted and succussed several times, the spatiotemporal pattern that develops is dominant and all the other molecules join in formation (creating the fossil object). The patterns of contaminants are too weak to compete for distinctive patterning. Eventually, the patterns of the contaminants will break away to join formation of the dominant spatiotemporal patterning. There is a chance that the potentization of these contaminants stays intact, but they will be so weak that only the most sensitive people will be affected (ensure hypersensitive patients are only diluting with purified water). In regular tap water where there are ample contaminants and no alcohol content, the various patterns of contaminants not only compete with each other but they have a harder time lasting due to the lack of alcohol (no lowering of surface tension). If the volume of water being processed in city plants is also considered, we can see that the amount of succussion required to reach the critical threshold would be far greater than what it is exposed to in its treatment process. Therefore a fossil object would never be formed.

If a ground state is reached, the critical threshold of the solution has been surpassed. Any new influence will conform to the already well developed spatiotemporal pattern. As the material dose is serially diluted out, the spatiotemporal pattern of the remedy is retained. With each following succussion, the image becomes clearer as the fresh diluent (which has no distinct pattern) assumes the spatiotemporal pattern from the ground state. Further dilutions and succussions act to further clarify the unique spatiotemporal pattern of the remedy. The image becomes more precise and it is proposed that the electromagnetic

frequency becomes amplified. At the very least, the electromagnetic frequency produced is unique to that remedy and its potency. The remedy pattern is defined by its shape not the electromagnetic wave it produces, as this is a by-product of the shape. However, it is not known if it is the spatiotemporal pattern that relays the biologic message to the body or the electromagnetic wave. In either case, the pattern and the wave are inherently dependent on each other.

The homeopathic remedy is in a different degree of organization before and after Avogadro's Limit. Below Avogadro's Limit, material substance is required to start this organization process. Above Avogadro's Limit, the process of serial dilution has reached such strength, or clarity of patterning, that material substance is no longer needed to further increase patterning (Delinick, 2006, p. 131). This is in line with the concept of critical threshold in that, above this limit, a phenomenon tends to grow exponentially. As time passes and a liquid remedy sits, it starts to lose some of its patterning. It is recommended to succuss a liquid stock at least once a month to maintain the potentization, however it may take months or even years to lose all spatiotemporal patterning. However, once the remedy has been absorbed onto sucrose pellets, the pattern is permanent (Lessell, 2002, p. 23). When a homeopathically impregnated sucrose pellet is re-dissolved into water (which is a technique of prescribing used by some homeopaths), the remedy must again be routinely succussed in order to avoid the risk of losing that spatiotemporal pattern.

Without any liquid present to move into or away from equilibrium, the spatiotemporal pattern impregnated on the sucrose² pellet stays fixed. However, extremes of heat can still influence the patterning, requiring proper storage of remedies in a cool, dark environment. Hahnemann also talked about this power of the remedy information to be shared with blank sucrose pellets in the article *Remarks on the Extreme Attenuation of Homeopathic Remedies* (Dudgeon, 2004, p. 765:

“since a single dry globule imbibed with a high medicinal dynamization, communicates to 13,500 unmedicated globules, with which it is shaken for five minutes, medicinal power, fully equal to what it possesses itself, without suffering any diminution of power itself, it seems that this marvellous communication takes place by means of proximity and contact”

² Sucrose is also an excluded substance in Lessell's formula.

How the Body Uptakes the Remedy

There are many schools of thought as to how the body interprets and utilizes the information stored in a homeopathic remedy. Since there is no traceable physical material in any remedy higher than a 12C potency (with some variance depending on the molecular weight of the substance), there is no evidence supporting a biochemical method of response within the body. Homeopathic remedies are unlikely to go through the same mechanisms as their orally administered pharmaceutical counter-parts, where there is absorption through the digestive tract, transport by the blood and metabolism by the liver. According to homeopathic theory, the root of all disease is a derangement of the vital force. Every person has a unique pattern to their vital force and every cell within their body is animated with that energy. The remedy, with its distinct spatiotemporal patterning and resultant electromagnetic frequency, somehow affects that energy; thus creating an environment for change and rehabilitation from within.

One theory about how the body interprets the remedy's information is by the electromagnetic frequency it emits. The sublingual glands are the first site of absorption and it is here that the electromagnetic frequency of the remedy begins to affect the cells around it. Every cell has microtubule structures within it. They

are protein filaments that make up the cytoskeleton of the cell. This matrix of hollow, fibrous tubules not only provides structure to the cell, but they have high water content, are polar structures and are connected from the nucleus to the cellular membrane within the cell. Microtubules are involved in many cellular processes such as: vesicular transportation, mitosis, cytokinesis and the regulation of neural synapses. Due to their high water content, polarity and tubular structure (which allows for vicinal water), microtubular water is able to undergo the same self-organization process as a homeopathic potency (Delinick, 2006, pp. 145-154). When a homeopathic preparation comes in contact with these tubules, the information from the remedy can potentially be delivered directly to the nucleus of the cell. The water within the cells begins to oscillate according to the spatiotemporal patterning of the remedy, adopting the remedy's electromagnetic frequency. This transfer of energy might be the initial shift in action that the body takes in order to begin the process of self-healing. As this new cellular information is taken up by the endocrine system through the glands, the information is quickly transmitted and propagated throughout the body. Due to the dynamicity of the human body with the movement of cells and constant homeostatic tuning, there is provision of just the right environment for the spatiotemporal patterning to be maintained. There is an external constraint, symmetry breaking and the system never reaches equilibrium.

Another hypothesis on the uptake of remedies is that of the auric body. In this theory, it is proposed that the remedy has no direct physical action on the body. The electromagnetic frequency produced by the remedy operates on a 4th

dimensional plane and therefore can only directly affect the 4th dimension of the individual. Since it is thought that these higher dimensions of being are what actually control and facilitate the physical function of our bodies, changes on the auric level will indirectly manifest physical change (Lessell, 2002, pp. 12-13; 23-25). This hypothesis is of the "as above so below" school of thought.

A third and highly controversial theory is that the energy meridian system (referred to in acupuncture and TCM) is an anatomic system within the body that runs very closely to the nervous system and even within the blood vessels themselves. This research was originally performed by Korean scientist, Bong-Han Kim in the early 1960's (Gerber, 1988, p. 185). He injected meridian points in rabbits with a radioactive isotope. He found that the flow of this isotope closely matched the meridian system and that virtually no isotope was found in any other structure. Bong-Han's research was quickly ridiculed by the Japanese and soon after the Russians also rejected his studies (Okmedi, 2000). Both rejections were likely for ethno-political reasons but due to these dismissals, many other countries looked no further into the research. In recent years, studies have resumed in Japan, the USA and France with similar findings to Bong-Han's original research. With technology aiding microanatomy visualization and modern histological staining capabilities, this microtubular system has been photographed and described (Changhoon Lee, *et al* 2006, pp. 181-190), as follows:

“Bonghan threads contain HA [Hyaluronic Acid] abundantly, harbor continuous microchannels, and have characteristic distribution of the rod-shape nuclei. Thus, they are novel anatomical structures with liquid-carrying microchannels.”

Bonghan threads have also been found within glandular structures. Bearing this in mind, one could propose this new anatomic system as the uptake point of the homeopathic remedy. Energy medicine, such as homeopathy and acupuncture may soon be considered practical methods of medical treatment if further research confirms that the body does have an intrinsic transport system specifically designed for the flow of vital energy.

Much like sound frequency, which has an audible range of hearing, homeopathic remedies have a range of engagement in the body and it is only within this range that there can be a response. Stimuli above or below this range will not elicit a response and frequencies near either end of this range can be extremely aggravating upon exposure. It is important to note that the frequency, spatiotemporal pattern and the intensity (or volume) of the remedy all make an impact on the body. Contrary to popular belief, a higher potency remedy does not necessarily mean that it is more intense or “deeper” in action than a lower dilution. Intensity is a more accurate description of the volume of remedy consumed. Unlike pharmaceuticals, taking a greater volume of homeopathics does not compound the action. However, it does affect the intensity of the action, as a much greater number of cells will be exposed to the remedy. Much like the aggravation caused by too high of a potency, too high of intensity can trigger a negative response. This is due to the critical threshold of the system. The critical threshold need only just

be reached to bring forth the response of self-organization. If it is far surpassed in one dose, instead of inducing organization, chaos ensues. Much like a cancer, the growth and changes are too rapid and random, thus creating dysfunction.

Scientific Experimentation

A phenomenon similar to that proposed by homeopathy has been observed in many scientific experiments, whose original intention never had homeopathy in mind. The Arndt-Schultz Law is probably the most well known. It states: weak stimuli slightly accelerate the vital activity; moderate stimuli raise it; strong ones suppress it; and very strong ones halt it. Many experiments in agriculture, as well as medicine, have confirmed this theory (Morrell, 1997, pp. 7-10). However, most of these experiments do not surpass Avogadro's Limit. Even when not directly researching the memory of water or homeopathic applications, these kinds of results make researchers stop and analyse the data in attempt to reconcile the findings. Are they phenomena or flaw?

There have been literally thousands of experiments done on homeopathy, both within the homeopathic community as well as the allopathic. And yet, the debate over the effectiveness of homeopathy as an effective medical therapy has never been settled. It is not unreasonable for the medical-scientific communities to want to hold homeopathy to the high standards they also are expected to adhere. It is also not unreasonable to expect the party who is challenging established

theory to endure the burden of proof. However, it seems no matter what evidence is put forward by homeopathy, the allopathic community says that it is not enough. The bar seems to be rising for homeopathy to produce a "perfect" study which cannot be questioned or critiqued in any way. This is not a realistic standard for any research, as far too many aspects cannot be controlled so long as humans are involved (whether as the experimenter or the experimentee).

No homeopathic paper on the subject of water memory would be complete without the mention of French scientist, Jacques Benveniste. His research with antibodies and the basophil response resulted in a great controversy with the scientific community. Benveniste has been credited (or perhaps more accurately: marred) with the "memory of water" proposal from his research in the 1980's. His research found that basophils created a similar histamine response when exposed to a homeopathically prepared solution of antibodies (aIgE) as they did to a crude form of antibody exposure. His work was published in *Nature* magazine and was then immediately attacked by the scientific community. Much controversy resulted for over a decade and ultimately resulted in Benveniste losing his funding as well as his credibility. The results of his research have been written off as non-reproducible. Yet many argued that the reproductions did not follow the same methodology as the original experiment, they were not performed with competent, qualified staff (a magician was sent in as one member of the team to reproduce the experiments) and that the evidence of his research was "cherry-picked" to bias an unfavourable criticism. In total, Benveniste's researchers performed 345 studies on basophils and high dilutions and the resulting controversy produced another 216

(Schiff, 1995, p. 29). Benveniste's experiments included a wide variety of tests for the basophilic action such as the influence of temperature, current, exposure to different chemicals, inhibiting substances, Apis as well as the aIgE experiments. The resulting experiments outside of Benveniste's group tested far fewer variables, and mainly focussed on the aIgE and Apis experimentation. However, there were 17 independent groups who produced positive results of the experimentation (Schiff, 1995, p. 89). The detail of his research (and the controversy surrounding it) are beyond the scope of this paper but it is worth noting that Benveniste felt his research was valid, well conducted and well hypothesised. Nevertheless, he went from being a highly published scientist, and one of the most frequently cited authors in the field of immunology to being completely ostracized. Simply because he wouldn't recant the evidence his research presented.

Another interesting and controversial researcher is Dr. Masaru Emoto of Japan. He has researched the crystalline structure of water molecules under vast conditions. Emoto has done everything from chemical exposure to prayer exposure in order to study the crystalline properties of water. He has used water from sacred places, from city taps and from highly contaminated sources around the globe. His work has shown a distinct differentiation of crystal formation, depending on the exposure/location of the water. Emoto's methodology is to take photographs of the different crystals water forms as a result of these exposures (Emoto, 2004, pp. xxiii-xxvi). There is only a short timeframe and temperature that the crystals are able to be photographed but the integrity of the structural organization can be maintained for much longer periods. For example water

exposed to infrared radiation takes several days to lose its photoluminescence (Lobyshev, et al, 1999 pp. 73-81) and water into which salt has been added can take several days to stop oscillation (Wiggins, 1995, pp.1121-1163) and up to months before all structural change is lost. The evidence of this research certainly supports the plausibility of water memory theory.

Martin Chaplin is one of the top researchers on water. He has written an incredible amount of papers on the topic, reviewed and refereed hundreds more and has a very comprehensive webpage that contains information on practically every aspect of water one could think of. Chaplin states that even though NMR (nuclear magnetic resonance) studies of homeopathic remedies did not reproduce positive results, hydrogen bonding does not control the lifetime of clusters or patterns. He also confirms that it is the addition of ethanol to the homeopathic solution that keeps the system away from equilibrium, allowing for greater complexity of the system while promoting different phases of water, such as the crystal lattice. Chaplin also brings forth the aspect of the nature of the glass tubes in which homeopathic remedies are prepared and stored. Water actually has the capacity to dissolve small amounts of silica from the vessel wall. This silica is capable to form solid particles with other "imprints" in the water. Since these solid particles can last forever, Chaplin is suggesting that it is the dissolved silica which carries the remedy information, not the water itself. He also discusses the important role of succussion for nanobubble production, the lasting structural and oscillating changes once material substance is removed as well as the structural changes that stabilize in different patterns. Chaplin denies the possibility of

homeopathic action due to water crystals, as the body would just dissolve them. (Chaplin, 2008, p. 4) Perhaps this is a misinterpretation on his part of the water memory theory, as nowhere in the theory does it say that this phenomenon occurs in ice crystal formation. The water memory theory is based on the liquid phase change from fluidic to crystal lattice.

There is always going to be a margin of error in any research methodology, whether homeopathic or allopathic. There are far too many variables in the human condition to be able to absolutely control the experiment. It is interesting that things such as stress and its resolution, dietary changes, physical exercise as well as the biochemical individuality of all beings can impart such significance on a person's health. In medical trials, these changes are hardly ever considered as influencing the results of a study. Whereas in homeopathic studies, these changes are immediately jumped on as to why the improvement may have been observed. The most common source of error in homeopathic clinical trials is not the unreliability of the remedies themselves but in the unreliability of skilled prescription by a homeopath. When a remedy is prescribed correctly, it always has the desired effect. It is interesting, and highly supportive of homeopathic evidence that remedies already considered polycrests (as they have a vast array of symptoms and were so well proven in the 19th century), have been re-proven in the mid 20th century, with the same findings. These newer provings can be found in several articles published in editions of the *Journal of the American Institute of Homeopathy*.

It is also important to mention the censorship and hypocrisy of the scientific community. In a 1941 instance, researcher Erwin Heintz observed a phenomenon similar to memory of water, which caused a disruption in the scientific community. He later published an error in his methodology and his colleagues concluded that the entire experiment was invalidated. He continued with his research on the subject but was not approved for publication again until 1970 (Schiff, 1995, p. 102). Many researchers have had it demanded of them to remove any suggestion of water memory from their papers before being approved for publication. Others have worried about their reputations and job security should they study water memory and so have chosen to avoid the topic all together. (Schiff, 1995, pp. 108-09). The hypocrisy of the scientific community lies in the fact that medical-scientific research projects hardly ever maintain their own standards and integrity. Harris L Coulter, in his book *Homeopathic Science and Modern Medicine*, draws attention to the following inquiries into medical ethics (pp.167-168):

“In 1972 the U.S. Food and Drug Administration reviewed 155 clinical investigations and found that 74% failed to comply with one or more requirements of the laws and regulations, 50% failed to keep accurate records of the amount of drugs received from the sponsoring firm and distributed to test subjects, 28% failed to adhere to the test protocol, 23% failed to maintain records accurately reflecting the patient’s condition before, during and after the study and 12% failed to supervise the study properly. The following year, at the request of the General Accounting Office, the Food and Drug Administration inspected a sample of the work of 35 sponsor/investigators of new drug applications [and found] all 35 sponsor/investigators failed to comply with one or more of the FDA’s regulations...Donald Frederickson, M.D., Director of the National Institutes of Health, observed in 1977 that of the 31,000 clinical trials conducted during

the previous decade in the field of gastroenterology only 1% had been randomized; closer scrutiny of a sample of 100 led to the conclusion that *none* satisfied the requirements for a “convincing” trial.”

Opposition to the Theory

It seems no matter what proof science and homeopathy produce in regard to the phenomena of homeopathic remedial action, the standard of acceptable evidence is then increased. This is often the case for any theory that is seen as radical to conventional knowledge. It is warranted for scientists as well as the lay-population to expect a high standard of research and thorough explanation before new theories are implemented and taught. However, the theory of water memory is rejected as a matter of principle, as the theory is not congruent with other known scientific laws. It is dismissed as some kind of error in methodology or placebo effect.

The most common scientific explanation for the homeopathic phenomena is placebo effect. Medical scientists say that a therapy is not beneficial for the public if it cannot prove itself to be more effective than placebo. Some of the most leading studies done with homeopathy are emerging from veterinary medicine. This research holds more validity as there is no psycho-somatic credit given to animals and there is no practitioner-patient verbal bond which may bring resolution/validation to patient's feelings. Yet some critics still maintain this system relies on subjective interpretation of "improvement".

The theory of water memory has been disputed on the account of hydrogen bonding. Individual hydrogen bonds last for only picoseconds. Scientists claim that if the bond is broken so is the structure and therefore the integrity of any organization, hence "erasing" the memory. Although this may be true on a molecular level, all we have to do is look at a cube of ice to realize this is not the behaviour in a large domain. Ice cubes last far longer than picoseconds and therefore the organization of the grouping of water molecules is still maintained. Because of the complexity of the spatiotemporal patterning, hundreds of water molecules can be involved, so even if several bonds are broken at a time, the reliability of the pattern is maintained. The fact also remains that so long as the system is kept from equilibrium, the tendency of the molecules will be to self-organize. This means that individual breaking of hydrogen bonds can continue to happen but they will be drawn back into formation in their new bonding.

Another argument against the memory of water is that when a physical substance is removed from water, any alteration of the properties of water that the substance had are also removed. For example, when salt is introduced to water, the density of water is increased. Once the salt is removed the density of water returns to normal. Although this is true of the chemical property of water, we know that the homeopathic remedy does not function in a realm strictly of chemical attributes. The spatiotemporal patterning and resultant electromagnetic frequency of the water is what is important, and so this argument cannot rule out the possibility that specific properties of substances can be maintained as long as the

structure of the molecules is maintained, as this would also maintain the electromagnetic frequency.

Another reason the memory of water theory is so widely challenged is because it goes against popular theories of immunologic, hormonal and cellular function. The most widely accepted theory of immune response is the lock and key model. The cells in our bodies are known to have surface antigens which hold a specific shape, "the lock". When an antibody comes along that matches, "the key", it is like unlocking a door and the immune response is triggered. A similar lock and key theory applies to proposed hormonal function, with the hormone having a certain structure and the cells having complimentary receptor sites for entry of the hormone. If the memory of water theory is accepted, it would mean that all cells can receive information based on an energetic imprint, creating a specific structure of organization within the water molecules. If cells in the body are able to respond to the medicinal message of the homeopathic remedy, the whole concept of a *physical* "lock and key" would have to be reconsidered (Milgrom, 1999, p. 2). The specific vibration or wavelength of this energy pattern within the remedy could be enough stimuli for the immunologic/hormone responses. In effect it could be an energetic reverberation which triggers the body to send out white blood cells and other fighter cells or to release hormones into the blood system. The memory of water theory also challenges the Sodium Potassium Pump system of cells. In 1973, Ling et al challenged this theory stating that an absurd amount of energy would actually be required to maintain this system. Ling's hypothesis is that the potassium found inside the cell is bound to proteins whereas the sodium is less

soluble in the highly ordered, polarized vicinal intercellular water. The rest of the extracellular sodium behaves normally but because of the high level of organization of the vicinal water, the potassium is more easily retained within the cell while the vicinal sodium is easily excluded (Bellavite & Signorini, 2002, pp. 248-249).

Avogadro's Limit also poses an obstacle for homeopathy to hurdle. Most scientists say that water diluted beyond this point is "just water" and so there can be no chemical or medicinal activity to the solution. On the chemical point they are correct. Homeopaths have long agreed that the remedies are not a phenomenon of chemistry. Material scientists have used epitaxy as a means of "growing" silicone and fine layers of crystal used in the control panels of most electronics. Epitaxy could prove to be useful in the study of water memory as the process of it involves transferring the atomic structure of a compound to a liquid without any material transfer (Roy, et al, 2004, pp. 18-19). The new epitaxial layer has been found to extend from hundreds of angstroms to hundreds of microns by NMR. Although I am unaware of any direct research of epitaxy and homeopathic remedies, it seems to be a field that more homeopathic researchers are investigating.

Some of the trouble homeopathy has in validating itself is the system used to evaluate remedy potential for treatment. The method of developing information on the homeopathic applications of remedies is through provings, as described by Hahnemann in the Organon. If we evaluate this system, we can see it is a valid methodology. A remedy, with little or no known medical application is trialed in a randomized group of healthy individuals. If no information is available on the

medicinal action of a remedy, it is difficult to bias results and since the prescriber is not told what the remedy is to start with, they can have no idea what response to expect in their patients. The patient's also do not know what the remedy is and are told to monitor any changes in their wellbeing. These changes in a patient's condition are later evaluated individually and within the group to see what kind of similar and striking changes occurred. This information then becomes what is considered the symptom picture of a remedy and that remedy can then be used clinically in attempt to heal those already suffering from the same symptoms. If no one is clinically healed or cured by this remedy thereafter, the remedy is not recorded in the repertory or material medica for that complaint. There is no way for a homeopath to fake the clinical results of their patients, either the symptoms stay or they go away. However, scientists criticize this system as they say all the information is subjective as the process is dependent on observation of both the patient and the homeopath as well as the honesty/insight of the patient to report symptoms.

Another difficulty homeopathy faces with clinical trials is the scientific methodology posed against the homeopathic philosophy. In order to fit into a scientific mould, one substance has to be tested in a randomized group of patients, all of whom suffer with a similar ailment. This substance is then deemed effective or not effective as a method of treatment for that particular ailment. This goes against homeopathy's most fundamental philosophy of individualization. Many scientists say that if research cannot fit this mould than homeopathy is not scientific and therefore not acceptable medicine to practice. Many homeopathic

organizations have tried to fit within this mould in order to prove effectiveness, but as any homeopathic clinician can confirm, this therapeutic approach to homeopathy is far less effective than classical prescribing. It is not surprising then that these studies come out as little more effective than placebo or non-reproducible. Many scientists have also said that homeopaths themselves who analyse the data of a study are biased to give more favourable interpretations, thereby replacing homeopaths with physicians in many studies. This reasoning is fundamentally flawed to begin with as the professional homeopaths are the experts in their field. This would be the equivalent of replacing a biologist for a physicist or a ballerina with a flygirl; the field they practice in may have a basic similarity but the differences in education and skill is vast.

Research done on homeopathic remedies with classical prescription also has trouble fitting another aspect of the scientific mould; blind studies. The homeopath must consult with the patient and then analyse the case to determine which remedy is best suited to ameliorate the complaints of the patient. The scientific model says that if the prescriber knows which remedy the patient is getting, results are less valid as the prescriber knows what effects that remedy is supposed to have; thereby potentially leading the patient a certain way on follow-ups or biasing the prescriber in the evaluation of results. In order to avoid this, some studies are now being done where a clinician evaluates which remedy is best indicated, but then does not know if the patient receives remedy or placebo. Again, problems arise here in that the homeopath will have difficulty assessing if a failure to respond is

due to an inappropriate prescription of remedy, therefore needing a change in remedy or if it is simply due to a placebo having been given.

Any energy theory is difficult to prove as it operates outside of our three-dimensional awareness but in the true spirit of science (if science has a spirit), it should be expected that all significant results should be further researched in hopes of a new scientific discovery which would contribute to the scientific body of knowledge. It is often difficult for scientists to accept new concepts as it then alters all previous knowledge. Hahnemann, who was also subject to intense scrutiny from the allopathic community, stated the following in *The Chronic Diseases*:

“This is the grand problem that can only be solved by thousandfold experiments and trials, but not settled by the sophistical dogmatism of the schools with its guessing, its assertions and its conjectures. No rational physician can acknowledge any such limitation to this treatment as would be dictated to him by the rusty routine of the schools, which is never guided by pure experiment combined with reflection.”

Conclusion

Throughout history, scientists with radical ideas have been ridiculed, threatened and seriously persecuted. For some, such as Galileo Galilei, they are later revered and praised for their insight. For others, such as Hungarian doctor Ignazius Semmelweis who argued for over 20 years that women on the delivery table could avoid puerperal fever simply by the doctor washing his hands prior to patient contact. His idea was rejected simply because he could not explain why this would make a difference (he argued this theory decades before Pasteur identified microbes). Much like Galileo and Hahnemann, Semmelweis was ridiculed and he became increasingly frustrated, aggressive and arrogant towards the system he was fighting.

Before modern science, even the most well educated person thought the Earth was flat, that the Sun revolved around the Earth and that Gods guided the planets along their axis. From Benveniste all the way back to Hahnemann, the homeopathic paradigm has been considered so misaligned with popular medical philosophy that it is simply written off. Presently, with minimal funding to homeopathic research coupled with powerful lobbying within the medical associations as well as scientific censorship, we should not expect great strides of advancement in the field of research on the memory of water.

When the research that has already been conducted is stripped away of the politics and ego surrounding the topic; we can see, without question that the memory of water is not only a plausible theory it is fairly well proven. There has been various, independent and reproducible research that has shown the self-organization process of water as well as the positive effectiveness of homeopathic remedies. The arguments against it are erroneous in their knowledge of homeopathy, over-simplified in concept, biased or based on scientific dogma. They are therefore inadmissible. Although the theory of water memory is fairly well proven, its homeopathic application is still only to be considered plausible. The evidence of self-organization is firm, but the individuality of patterning (as a reproducible phenomenon) as well as the biologic uptake of this information is yet to be established. It is possible that with further research into the homeopathic application of water memory, it will be found to be invalid. It is also possible that the theory will be confirmed. It should be kept in mind that this is only one of the modern theories of the physics of homeopathy. Even if this theory is discounted, there are other theories which can be analysed. Although medical researchers largely consider homeopathic evidence as anecdotal and not scientific, professional homeopaths should not feel discouraged from continuing in clinical practice and in research.

One advancement that homeopathy has over allopathy is that homeopathy has developed a system which defines its principles, philosophy and practice; and those have not wavered in over 200 years. Allopathic medicine has changed theories and concepts with every generation that has practiced it. It is an

interesting contradiction that this is considered medical advancement and yet other complimentary treatments, which could radically advance the field of medicine, are frowned upon or told that research into them takes away from "real" medical funding. Homeopathy does not seem to be going away as many medical professionals predicted it would. With 200 years of clinical success in the practice of homeopathy, the grassroots success has kept its practice going. It is also important for homeopaths not to lose faith that science will perceive with continued research into physics, quantum mechanics and material science. Whether this research is directly into homeopathy, the theory of the memory of water, or even in new and exciting concepts; as long as theories are explored, their information will be able to be applied to homeopathy and hopefully warrant further enquiry on the usefulness of homeopathy as an efficient, safe and practical medical system.

Bibliography

BOOKS:

1. Bellavite, Paulo, MD and Signorini, Andrea, MD. *The Emerging Science of Homeopathy: Complexity, Biodynamics and Nanopharmacology*. Berkeley: North Atlantic Books, 2002.
2. Coulter, Harris L., Ph.D. *Homeopathic Science and Modern Medicine: The Physics of Healing with Microdoses*. Berkeley: North Atlantic Books, 1980.
3. Delinick, Alexandra N., MD. *Homeotherapeutics: A Scientific handbook of Homeopathic Medicine*. New Delhi: B. Jain Publishers, 2006.
4. Dudgeon, R.E., MD. *The Lesser Writings of Samuel Hahnemann*. New Delhi: B. Jain Publishers, 2004.
5. Emoto, Masaru. *The Hidden Messages in Water*. New York: Beyond Words Publishing, 2004.
6. Gerber, Richard, M.D. *Vibrational Medicine: New Choices for Healing Ourselves*. Santa Fe: Bear & Company, 1988.
7. Hahnemann, Samuel, MD. *The Chronic Diseases: Their Peculiar Nature and Their Homeopathic Cure*. New Delhi: B. Jain Publishers, 2005.
8. Hahnemann, Samuel, MD. *Organon of the Medical Art*. Palo Alto: Birdcage Books, 1996.
9. Lessell, Colin B. *A New Physics of Homeopathy*. Leigh-on-Sea: Alliance of Registered Homeopaths, 2002.
10. Schiff, Michel. *The Memory of Water: Homeopathy and the Battle of Ideas in the New Science*. London: Thorsons, 1994.

Audio tapes:

1. Benveniste, Jaques, MD. (1989) National Center for Homeopathy Annual Conference: "Metamolecular biology: Mirage or Emergence of a New Paradigm"
2. Elia, Vittorio, PhD. (2000). The Science, Art and Mystery of Homeopathic Medicine

Conference: "Homeopathy and the Influence of Electromagnetic Fields on Water Structure"

Journals:

1. Boericke, Garth. (1946). *Journal of the American Institute of Homeopathy* "A Repeating of Cactus Grandiflorus with Laboratory Data" *Volume 39*, 212.
2. Gutman, William. (1956). *Journal of the American Institute of Homeopathy* "Taraxacum Officinale – A New Proving" *Volume 49*, 105.
3. Lobyshev, V.I, et al. (1999). *Journal of Molecular Liquids* "Experimental Evidence for Intrinsic Luminescence of Water" *Volume 82*, Issues 1-2, 73-81.
4. MacFarlan, Donald. (1947). *Journal of the American Institute of Homeopathy* "A Repeating of Peruvian Bark" *Volume 40*, 1-3.
5. MacFarlan, Donald. (1956). *Journal of the American Institute of Homeopathy* "Repeatings of Medicines" *Volume 49*, 135.
6. MacFarlan, Donald, (1962). *Journal of the American Institute of Homeopathy* "A Repeating of Thuja" *Volume 55*, 12-13.
7. Shupis, Anthony, (1963). *Journal of the American Institute of Homeopathy* "Cinchona Officinalis" *Volume 56*, 395.
8. Wiggins, P.M. (1999). *Progress in Polymer Science* "High and Low Density Water in Gels" *Volume 20*, Issue 6, 1121-1163.

Web articles:

1. Advanced Industrial Science and Technology. www.aist.go.jp (March 2008). AIST Research.
http://www.aist.go.jp/aist_e/annual/2005/highlight_p13/highlight_p13.html
2. Bad Science. www.badsience.net (October 2007). Word Press.
<http://www.badsience.net/?p=491>

3. Committee for Skeptical Inquiry. www.csicop.org (November 2007). Robert L. Park.
<http://www.csicop.org/si/9709/park.html>
4. Cornell University Library. www.arxiv.org (February 2008). Cornell University.
http://arxiv.org/PS_cache/physics/pdf/0211/0211085v2.pdf
5. Homeopathy International. www.homeoint.org/english (October 2007). Peter Morrell.
http://www.homeoint.org/morrell/articles/pm_prima.htm
6. Institute of Heartmath. www.heartmath.org (November 2007, March 2008). Universe of Heartmath.
 - http://www.heartmath.org/research/research-intuition/Water_research_report.pdf
 - <http://homepages.ihug.co.nz/~sai/water.html>
7. Liebert Online. www.liebertonline.com (January 2008). Mary Anne Liebert Inc.
<http://www.liebertonline.com/doi/abs/10.1089/lrb.2006.4402?cookieSet=1&journalCode=lrb>
8. London Southbank University, Applied Science. www.lsbu.ac.uk (September 2007- April 2008). Martin Chaplin.
 - <http://www.lsbu.ac.uk/water/anmlies.html>
 - <http://www.lsbu.ac.uk/water/chaplin.html>
 - <http://www.lsbu.ac.uk/water/homeop.html>
 - <http://www.lsbu.ac.uk/water/memory.html>
 - <http://www.lsbu.ac.uk/water/nanobubble.html>
9. New Scientist. www.newscientist.com (October 2007). Reed Business Information Ltd.
<http://www.newscientist.com/article/dn3817.html>
10. Oriental Broadcasting Meida. www.okmedi.net/English/edefault.asp (January 2008). Okmedi HanMedi.
<http://www.okmedi.net/English/ebody01/meridians01.asp>
11. Rustum Roy. www.rustumroy.com (March 2008). Rustum Roy.
http://www.rustumroy.com/Roy_Structure%20of%20Water.pdf

12. Science Daily. www.sciencedaily.com (March 2008). Science Daily LLC.
<http://www.sciencedaily.com/releases/2007/07/070711143204.htm>
13. Skeptics Canada: Society for Critical Inquiry. www.skeptics.ca (November 2007).
Skeptics Canada Group.
<http://www.skeptics.ca/articles/scrimgeour-watermemory.html>
14. TGD diary: Matti Pitkanen. www.matpitka.blogspot.com (December 2007). Matti
Pitkanen.
<http://matpitka.blogspot.com/2006/01/homeopathy-in-many-sheeted-space-time.html>
15. University of Cambridge, Cavendish Laboratory. www.tcm.phy.cam.ac.uk
(October 2007). Lionel Milgrom.
<http://www.tcm.phy.cam.ac.uk/~bdj10/water.memory/milgrom.html>
16. University of Colorado, Philosophy. www.colorado.edu/philosophy (February 2008).
Regents of the University of Colorado.
<http://www.colorado.edu/philosophy/vstenger/Medicine/Homeop.html>
17. VHAN. www.vhan.nl (February 2008). Giriweb.
<http://www.vhan.nl/documents/ScientificReportECHNov04.pdf>