TENSEGRITY #11 EXOTIC ATOMS IN THE MATRIX

READERS SUMMARY

1. WHAT IS A MAGNETIC MONOPOLE?

2. WHAT IS AN EXOTIC ATOM?

3. WHAT IS A "PROTON DISORDER"?

4. HOW DOES ELECTRIC CHARGE LINK TO MASS AND SLEEP QUALITY?

5. HOW DO YOU DEFINE SCIENTIFIC TRUTH?

I mentioned in Tensegrity 10 the term "magnetic monopoles" brought forth by Paul Dirac. A magnetic monopole could change its magnetic field and create electricity basically for free at very low thermodynamic cost. Why? Changing magnetic field has the potential of creating huge amounts of electricity. A moving magnetic charge or magnetic monopole, will have the ability to create electricity in the medium in which it is moving. If the magnetic charge is large enough from the monopole it will create electric arcs at various points in this field and a stream of plasma may become available for us to transform into other forms of energy to use. Now this might be dangerous if left up to human ingenuity to weaponize it. However, if we are wise, and somehow are able to channel and control the flow of this plasma, we might wind up with a source of unlimited energy. Paul Dirac was no ordinary genius. Aside from formulating relativistic electron theory and predicting the existence of antimatter, Dirac launched the *quantum theory of magnetic monopoles* in a famous 1931 paper. Dirac envisioned a magnetic monopole as a semi-infinitely long, infinitesimally thin string of magnetic flux, such that

the end of the string, where the flux spills out, seems to emit a magnetic charge. For this picture to make sense, the string should be invisible to us. Paul Dirac showed us using mathematics, that the existence of magnetic monopoles was consistent with James Maxwell's equations on electromagnetism only if electric charges are quantized. Magnetic monopoles are either a combination of wave forms and/or particles that behave as isolated north or south magnetic poles. They have been the subject of speculation since the first detailed observations of magnetism several hundred years ago. In the lab in 2014, we have seen the production of artificial monopoles in Bose Einstein condensates (BEC). These are the forms of matter I have mention in several blogs (EE6) describing how life organized. I believe life has to use BEC in some fashion to take full advantage of the second law of thermodynamics statistics to do the things it does. In my opinion, the *spark that life is* requires both magnetic monopoles and three-dimensional bosonic topological insulators to interact. In my opinion, all life forms are confined to the two-dimensional surface of the Earth. This simulates the physics of a topological insulator. I believe the observations we make in life, is that three dimension exist, therefore, have to be explained. The presence of a magnetic monopole can explain that a third dimension; it is likely to exist naturally even though we may not see it. Dirac concluded his 1931 paper by remarking, "One would be surprised if Nature had made no use of it." I am in full agreement with his intuition.

I have also taught you about Maxwell demons on the blog. Maxwell's Demon is an imaginary creature that the mathematician James Clerk Maxwell created to contradict the second law of thermodynamics. Life does not cheat the second law, it uses the fact it is purely statisitical and takes full advantage of it. Cells construction are a manifestation of the idea he created in describing these demon's. Maxwell also mathematized all of Michael Faraday's observations from

his experiments about electric and magnetic fields. In 1864, Maxwell himself banished isolated magnetic charges from his 20 equations *because no isolated magnetic pole* had ever been observed. When Maxwell did remove the magnetic charges from his equations, they unbalanced them. This made the math asymmetric. Nature, however, is very symmetric. 30 years later Paul Curie, Madame Curie's husband felt this was an error, because he saw no reason they could not exist naturally. He reasoned, *maybe we just had not found them yet because we lacked the expertise to do so?* Paul Dirac agreed, and gave us the mathematics to support the belief. Man's observation, however, still have not found them. In 2009, CERN has commissioned the 7th experiment for CERN called the MOEDAL Experiment. Its prime motivation is to search for direct production of magnetic monopoles at the Large Hadron Collider.

Magnetic monopole is also an important fundamental particle whose existence is postulated based on the duality symmetry. In 1931, Paul Dirac realized that adding back the monopole to Maxwell equations would make them symmetric. Mathematics like nature, is based upon symmetry. He went on to postulated the existence of "a fundamental particle" to explain why electrons and protons carry electrical charges of the same size. This is surprising because the elements of the protons and electrons are completely different fundamental particles. Dirac, however, argued that the existence of a single magnetic monopole would be enough to explain that the charges of all fundamental particles have to be quantized. **So where might this elusive monopole be?**

I think that true monopole *might exist* in our *mitochondrial matrix and cytochromes* and within *our sun*. The first hint I got that magnetic monopoles might be found in a natural state of liquid metal of hydrogen or of helium was from Linus Pauling's papers on ice water. Pauling was the first chemist who linked quantum physics to molecular binding of elements. He was close to discovering DNA because of his work but

failed to do so only because he was missing some molecular photo's that Watson and Crick got first from Rosalind Franklin. In those papers on ice water, Pauling made some shrewd points about ***hydrogen protons*** in water's hydrogen bonding's network. I have written about the "queerness" of water before. This 'queerness' is all tied to the hydrogen proton. It's weirdness has been recognized since the discovery of the hydrogen bond in chemistry. Hydrogen causes other elements to do things that are extraordinary when it is bonded to them because of the massive amount of energy protons contain. Hydrogen bonding networks give water and ice the unusual properties of a high melting point, boiling point, low density, and a high dielectric constant. Water seems to affect electrons. Pauling correctly surmised, this property is a manifestation of the fact that electrons in water obey the bizarre laws of quantum mechanics, the modern theory of matter and energy at the atomic scale. A true natural magnetic monopole would effect protons whereas the artificial ones don't. The mitochondria matrix is filled with hydrogen protons, but they are not in the form of ice.

For many years, many scientists dismissed Pauling's ideas (called him a quack) that the possibility that hydrogen bonds in water had significant covalent properties. This fact can no longer be dismissed. It has been proven now by Martin Chaplin. Many experiments have now provided highly coveted details on water's microscopic quantum properties. It should allow researchers in many areas to improve theories of water and the many biological structures such as DNA which possess hydrogen bonds, but so far no one is using it in their experiments. Improved information on the h-bond may also help us to assume better control of our material world. For example, it may allow nano-technologists to design more advanced self-assembling materials, many of which, life already uses. DNA and RNA rely heavily on hydrogen bonds to put themselves together properly.

Pauling showed in ice, each single oxygen atom is tetrahedrally surrounded by four other oxygen atoms. There is only one hydrogen atom located between each oxygen atom in this arrangement. Pauling was the first person to make note of *how protons did* "unusual things in chemicals". He pointed this out in the mechanism if Vitamin C's action as well. He wondered whether a given hydrogen atom in ice is midway between the two oxygen atoms it connects to in ice, or was it closer to one than to the other? This was the first time I heard the idea of like likes like that was mentioned in Pollack's recent book. Anything that brings protons closer together makes quantum proton tunneling more likely. Pauling believed that hydrogen proton was closer atomically to one oxygen in ice.

<u>He then made some assumptions:</u>
A. In ice each oxygen atom has attached to it two hydrogen atoms affixed at distances of about 0.95 Å. These atoms form a water molecule, with the H-O-H angle measured at about 105º, as in the gas molecule.
B. Each water molecule is oriented such that its two hydrogen atoms are directed approximately toward two of the four oxygen atoms which surround it tetrahedrally, forming hydrogen bonds.
C. The orientations of adjacent water molecules are arranged such that only one hydrogen atom lies approximately along each oxygen-oxygen axis.
D. Under ordinary conditions the interaction of non-adjacent molecules would not appreciably stabilize any one of the many configurations satisfying the preceding conditions with reference to the others.

This brings up the other thing about protons: Why is the proton so heavy? The proton mass and the electron mass "almost" add up to the hydrogen-atom mass. Likewise, masses of two protons and two neutrons "almost" add up to the alpha-particle mass. So this begs the question, do masses of two up quarks and a down quark add up to the proton mass? The answer

is, they do not at all summate. Adding all the quark masses (≈5 MeV/c2) fall very short of the proton mass, which is 938 MeV/c2. Why is this? It is a key part to the mitochondrial ability to harness energy. It appears that via a strong electric charge and a magnetic monopole life has figured out a way to harvest the massive kinetic energy in a proton for its use. All the elements are in the mitochondria, we just have not yet observed the mechanism. The mass that is missing is all in the form of energy. This means protons are fully capable of creating **"proton disorder"** in certain circumstances when they are really close together and they can scale the energy barrier inside of them.

Adhering to these assumptions, Pauling theorized that the water molecules in ice crystals can orient themselves in a number of different ways, and that the crystal can likewise change from one orientation to another, provided that it adheres to the four assumptions in its structure. Today we know that ice has over 15 different molecular forms, yet most people think all ice is the same. That would be their error of assumption. Pauling proved that water was queer because it suffered from a "**proton disorder**". Water has been shown to act like a Bose Einstein condensate by theoretical physicists Giuliano Preparata in Milan Italy, by experiment at normal temperatures. You might be wondering why I am going to so much detail about ice and its structure here. *The key is that because of water's "proton disorder," it causes water not to achieve its minimal energy state.* ***It appears this proton disorder is what allows water to become a Bose Einstein condensate at much higher temperatures than we expect.***

This means it can assume anomalous energy states when its environment is altered. In other words, it has other avenues available to it when the chance presents. *This explains why life's design is to structure the environment of the cell.* It is designed to control how we can use protons and electrons. This is how epigenetic alterations first begin in my opinion.

Epigenetic alterations cause proton disorders, which alter epigenetic expressions of our nucleic acids. I think protons inside a mitochondria also take advantage of this "**proton disordered state"**. This state, under the influence of strong electric and magnetic fields in mitochondria, *may actually allow protons to act like magnetic monopoles* when they are confined in the mitochondria matrix. A monopole magnet is believed to be capable of maintaining a constant state of subatomic flux in atoms, creating interactions *that keep atoms from moving a lot.* Why is this critical? When we limit motion we are more likely to invoke quantum processes. We know in ice and in the sun, hydrogen atoms are contained by some force. The fact that ice and the sun are radically different in temperature gradients, point out that temperature is not the "key holding factor". Mitochondria and the sun, however, both have strong electric and magnetic fields associated with them. They both retain photons when they need too. This ability has been observed and proved.

These two fields likely interact in a complex way with free protons, to create a state of perpetual randomness of proton exchanges. This randomness gives the protons in the matrix a unique properties similar to magnetic monopoles. Magnetic monopoles, according to Paul Dirac math, are isolated magnetic charges that have only one magnetic pole. In other words, here we can create magnetic electricity called "**magnetricity"**. We now know that a magnetic charge can behave and interact just like an electric charge in some materials. What we don't know yet is what characteristics those material have to have for this magnetricity to emerge. I have mentioned **"protonicity"** before in several blogs. I was careful not to give you the synonym magnetricity because I would have had to explain to you how a magnetic monopole could exist to allow for this without laying out more physics you need to understand the process. Without a lot of quantum foundations built in to the blogs this would have been an error. I believe in mitochondria there exists a slew of small exotic atom-sized 'magnetic charges' in the form of H+, that behave and interact

just like more familiar electric charges. These protons can be ejected via cytochromes into the hydrogen bonding networks of water inside a cell to transfer huge amounts of energy and information magnetically.
In order to prove experimentally the existence of magnetic current for the first time, researchers mapped Onsager's 1934 theory of the movement of ions in water onto magnetic currents in a material called spin ice. I have introduced you to Onsager reciprocity relationship before in the blog. It describes how ions flow naturally below their molecular order.
It describes how ions flow in relations to other things around it. In the lab scientist tested the theory by applying a magnetic field to a spin ice sample at very low temperature and observed the process using muons. I believe this process can also use pions. Muons and pions are parts that can make electrons and protons when they are in a place where a rogue element is present under extraordinary electric and magnetic fields. They can create other possible quantum possibilities for protons and electrons within a mitochondria by creating something called an **"exotic atom"**. *This atom would be a transitional state atom to enable changes in information and energy to occur without much thermodynamic cost.* Pions and muons allow for atoms to remain the same but get lighter atomically in their mass. An exotic atom is an otherwise normal atom in which one or more sub-atomic particles have been replaced by other particles of the same charge. For example, electrons may be replaced by other negatively charged particles such as muons (muonic atoms) or pions (pionic atoms). Because these substitute particles are usually unstable, exotic atoms typically have very short lifetimes. Because they are charged, they are controlled with infinite range and power by the electromagnetic force. This is the force we see acting within the mitochondria and the sun.

A pionic atom is formed when a negative pion *is stopped* in matter and is captured by an atom. The pion can be thought of as one of the particles that mediate the interaction between a

pair of protons or neutrons in the matrix. Pions also have no spin. Each pion consists of a quark and an antiquark and is therefore they can affect protons of atoms. Inside mitochondria, we have lots of H+ running around. *Pions are very light and this would make tunneling and entanglement more likely to happen thermodynamically.* **What makes the pion interesting to me is that not only is lighter, its interaction is attractive.** This means it can bring protons close together to entangle and tunnel.

So how does a pion slow down? Both fields in electromagnetic force can do it easily. If you added a magnetic monopole to the mix, you would have the perfect storm for all these quantum processes to manifest in both the sun and mitochondria.

PHYSICS GEEKS: The incident pion slows down by successive electromagnetic interactions with the electrons and nuclei inside the mitochondria. When it reaches the typical velocity of atomic electrons in its neighboring atoms, the pion is captured by ejecting a bound electron from its corresponding Bohr orbit set by its energy.
So how does the muon exotic atom work? In a muonic atom (also called a mu-mesic atom in the Russian literature), an electron is replaced by a muon, which, like the electron, is a lepton. It has the same negative charge but it has a much larger mass. And this larger mass changes its thermodynamics and its ability to tunnel and entangle. Since leptons are only sensitive to weak, electromagnetic and gravitational forces, muonic atoms are governed to very high precision by the electromagnetic interaction. The description of these atoms is not complicated by the strong nuclear forces between the lepton and the nucleus. This makes them ideal to exists inside the mitochondria matrix with a sea of H+ protons.
BIOLOGY GEEKS: 'Magnetricity' can be a positive current effect or a negative one depending upon its polarity. It should be reversible in a system to be most beneficial. Becker's work

was key in finding the DC current's use in life. He realized the DC current was used for regeneration of tissues. He also knew it was critically important in the brain during the induction of anesthesia, but he had no idea where it came from. He knew it was centered in the head because of how the DC current worked in the neuroepithelial junction in repair. He also knew that DC currents flow from positive to negative poles. Biology knows that mitochondria are most dense in the brain and are filled with positively charged protons. This might imply that mitochondria are the original source of the DC current in plants and mammals. We now know plants use reaction centers to as quantum heat engines. They use quantum tunneling and entanglement to make sugar from CO_2 and sunlight. I bet both photo-reaction centers do the same thing in plants to generate its DC current using protons from water.

There are a number of examples in condensed-matter physics where collective behavior leads to emergent phenomena that resemble magnetic monopoles in certain respects, including most prominently the spin ice materials, I mentioned above. While these should not be confused with hypothetical elementary monopoles existing in the vacuum, they nonetheless have similar properties and can be probed using similar techniques in experiments. These biophysical experiments have already been done in plants. They need to be done in intact mitochondria.

All matter is energy, according to $E=mc^2$. Food is a source of mass for us when we are disconnected from the sun or the Earth. The more disconnected you live from the sun or earth the lower the electric current your cells and mitochondria contain. Laws of electrolysis confirmed what Michael Faraday found that electric current in all things are proportional to mass in question. This becomes very interesting when you realize that the mass of a proton is mostly tied up in energy and not matter. Protons are used as the signaling molecule in mitochondria where food is utilized by cells. This means the

food macronutrients you should be shooting for is based upon your cellular redox potential (**NAD+**) inside your cell. How much of this energy we can harness is tied to the surrounding environment that allow all these proton disordered states to exist. Until you know those variables and understand how they can create exotic H+ protons, you know nothing about what foods are optimal for your mitochondria's current condition.
They key parts of this experiments is watching how your mitochondria handle your current food sources. This is what I did in my latest bio hack I detailed in Tensegrity 5 blog post. Circadian biology always trumps your diet. This is why no diet has ever been shown to be critically important in science. Today we have many studies showing us that circadian biology is very important. Very few people understand the magnitude of these recent papers in changing our perceptions of fact or fiction in biology.

It is hard to measure what you cannot perceive

PHYSICS GEEKS KEY POINT: Faraday's 1st Law of Electrolysis – The mass of a substance altered at an electrode during electrolysis is directly proportional to the quantity of electricity transferred at that electrode. Quantity of electricity refers to the quantity of electrical charge, typically measured in coulomb.

Faraday's 2nd Law of Electrolysis – For a given quantity of DC electricity (electric charge), the mass of an elemental material altered at an electrode is directly proportional to the element's equivalent weight. The equivalent weight of a substance is equal to its molar mass divided by the change in oxidation state it undergoes upon electrolysis

$M = (Q/F)(M/z)$

where:

m is the mass of the substance liberated at an electrode in grams
Q is the total electric charge passed through the substance
F = 96485 C mol−1 is the Faraday constant
M is the molar mass of the substance
z is the valency number of ions of the substance (electrons transferred per ion)

For Faraday's first law, *M, F, and z are constants*, so that the larger the value of Q (current) the larger m (mass) will be.

Since Becker clearly found regenerative currents are used in animals, I went to other sciences that use DC currents to gain more insight on how things work at small scales. Electrolysis is a method of using a direct electric current (DC) to drive an otherwise non-spontaneous chemical reaction. Burge and Becker have both shown us the DC current is used during sunlight hours in both animals and plants. **Plants use chlorophyll to change light to electric currents and animals use DHA to do the same thing**. Both use NAD+ to signal what is going on in these pathways for energy generation. The DC current helps explain electric polarity changes seen in neurons in animals and humans. This is why neurons in humans show an electric polarity during wakefulness and sleep. Humans lose their DC current in sleep and under anesthesia. Mass increases during wakefulness because it unfold or uncondenses and it re-condenses in sleep lowering mass. In 1939, W. E. Burge did experiments in animals that showed the peripheral DC current's drops to zero in sleep and deep anesthesia. These were re confirmed by Dr. Robert O. Becker in the 1960's and written up in his papers and published in his books.

In this blog, anytime we speak of mass, it invokes mass equivalence and thermodynamics. **As DC electric charge drops**

during sleep, mass also decreases during sleep. *Mass is always proportional to the electric charge within a substance, and that substance can be your body, your cells, or a pot of boiling chemicals.* ***This fundamental process is true in chemical reactions and in the human body which is made up of a myriad of them.***

*With energy loss, it causes more entropy (randomness) in a system. Entropy is a QED code word for inflammation in the biologic system, just like molecular chaos is. As energies are lost, cell signaling is also lost (**because NAD+ drops**) and becomes the primordial event that clinicians should be looking for in this model. The most critical point for a clinician and person to understand is that chemical signaling processes that we call hormonal regulation is synonymous with DC electrical signals with the cell. This is why circadian signaling becomes so critical in understanding where a person is in wellness or in illness. It is also why **NAD+** is intimately linked to circadian signaling.*

For example compare, Ben Greenfield and Jimmy Moore for a moment. Both represent a 'vat' of differing chemicals. One is a fit endurance athlete who uses all macronutrients to fuel his mitochondria and the other is a podcast/author who believes he needs nutritional ketosis 24/7. The belief, that nutritional ketosis is needed, occurs because of the inability to tunnel and entangle electrons and protons in his mitochondria due to a poor redox potential in and around his mitochondria. Ben has a different redox state in his mitochondria, so his ideas of what he can do is radically different than Mr. Moore. Are both wrong? No. They are partially correct because they are missing data and things they don't know are at play in their mitochondria. They have only half of the story correctly laid out, as a result of having one oar in the water, they have 180 degree opposite beliefs. **This is how the scale of your science can radically alter your understanding of biochemistry.** This is how

paradoxes are created when the scale of science is wrong. No one wants to do the hard work to understand the forces behind the real science here, instead they want to share their beliefs of their truths. Their truth is often not indicative of your truth because their personal thunderstorm surrounding their mitochondria is not the same as yours. It is your job to realize why they believe they do and then decide for yourself who's idea is closer to nature's recipe or to yours and innovate from there.

When we introduce circadian mismatches to our life, energy flows slows down, and energy stored in protons can become tangible matter. In other words, pure energy in protons has the capability to converting to become things with mass. It becomes the substances we think we know best because we can observe it and sense it. The problem is we are fooled by what we think we now know, because we have no idea what we are missing in nature's recipes.

What we see is not the truth, it is an opinion of the truth. What happens during day time and night time is radically different and hides nature's recipes. Science is ever changing, and incomplete, but it always maintains its own resistance to new and better ideas.
Metaphors reign large in modern biochemistry, where quantum mysteries lurk just below our perception.

Today's biologic science has nothing to do with subjective "truth" which can only be verified via the subjective sensory system. Biophysics says otherwise. It appears how we are built, is to read and react the current conditions our mitochondria face. Modern science epistemology is entirely cognitive and conceptual. Science is about explaining phenomena rationally. There is no truth in science, things are

only “possible” or “not possible” but it always evolves, the more we learn about things we could not fathom yesterday.

Most of today’s “ancestral internet experts” want to just tell you optimal health and wellness is all about food, when the physics and observations point out it’s not close to correct. That makes me the bad guy in many places, because I am shining a light on what they might be missing. This is how we learn. We learn from miscalculations, not ultimate successes. How your mitochondria work is tied to the programing it receives from circadian cycles. Food and circadian cycles set the redox potential (**NAD+ levels**) in a mitochondria in a very complex dance. When you know how these variables interact and depend upon each other, then you begin to see how nature is fundamentally organized biologically. Then, and only then can you begin to learn how to bio hack your diet considering the variables at play below your perceptual ability. If you don’t consider these variables, you effectively have only one oar in the water, and when you use it unopposed, you go in circles and you wonder why your labs are altered and you have to do things others do not. When you go in circles, you start to form beliefs that are not true, they are *your opinions* of the truth. It becomes dangerous for an audience to listen to those beliefs when they do not understand the context from which they arose. You need both oars in the water to move forward in your understanding so that it develops into wisdom. Mother Nature’s wisdom is the recipe we all need to be shooting for.

CITES:

“The Structure and Entropy of Ice and of Other Crystals with Some Randomness of Atomic Arrangement,” which appeared in the Journal of the American Chemical Society in December 1935.
http://www.nature.com/ncomms/2014/140312/ncomms4439/full/ncomms4439.html
http://moedal.web.cern.ch/sites/moedal.web.cern.ch/files/publications/Dirac’s%20Dream–the%20Search%20for%20the%20Magnetic%20

Monopole.pdf
http://www.isis.stfc.ac.uk/science/physics/magnetism/magnetricity-measured-for-the-first-time-at-isis8728.html
http://iopscience.iop.org/0305-4616/8/9/006
http://nucl.phys.s.u-tokyo.ac.jp/hayano/en/pionic-atoms.html
http://www.symmetrymagazine.org/breaking/2009/01/29/making-magnetic-monopoles-and-other-exotica-in-the-lab
http://www.sciencemag.org/content/302/5642/92
http://www.sciencedaily.com/releases/2013/05/130531103910.htm

http://www.cell.com/cell-metabolism/abstract/S1550-4131(14)00498-7