**THE STRUCTURE OF WATER**

**and**

**HOW PSYCHE ENTERS MATTER**

**6: Microtubules, as another Resolution in the Hologram, Part 1**

***by***

***Dr. Richard Alan Miller, c2015***

[***www.richardalanmiller.com***](http://www.richardalanmiller.com/)

[***www.docram.com***](http://www.docram.com)

**Microtubules, as another Resolution in the Hologram, Part 1**

**A Definition for Life:**

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

With this approach, there is no DNA determinism. And, DNA (or RNA) does not equal life. Instead, they are kind of like memory molecules, where memory itself can get rewritten (like the metaphor of *time-lines*). DNA appears deterministic of many of our traits, in that we will often develop a genetically coded trait no matter what environment we develop in.

However, if we take stem cells or cells in culture, being very careful to clone them - as soon as we put them in culture, we still get chromosomal abnormalities and mutants. This would suggest that the organism, as a whole, is part of keeping everything in us as stable.

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

Mae-Wan Ho:

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

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

**The Science of Electrons having Consciousness:**

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



**Figure 1:** Alfred North Whitehead

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

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

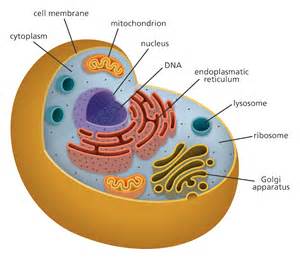
Was the electron “aware” of the magnetic field? YES because we can observe that the magnet’s field altered the path of the electron’s movement.

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

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

**The Nature of Habitat**

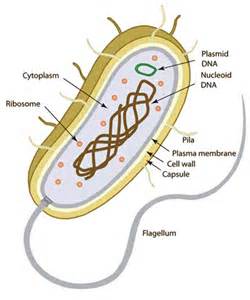
Human civilization - a “mere” 7 billion of us - is currently struggling to survive. Meanwhile, the 50 trillion cellular citizens under our skin somehow live in harmony and bliss. There is a misperception in that we are not singular entities, but communities comprised of living units called cells. All of the “characters” that we express as humans are derived from the functioning of our cells.



**Figure 2:** Components in a typical animal cell

Where we have organs to carry out a function, a cell has organelles (miniature organs) carrying out the same functions. In fact, there is NO new function in a human body that is not already expressed by cells. Every system we have, e.g., digestive, respiratory, excretory, reproductive, nervous, and immune system, is present in every cell.

Interestingly, the same mechanisms used by a cell to carry out its behaviors are the very same mechanisms at the heart of our human systems that carry out the same behaviors. A simple truth is that we are made in the “image” of our own cells. That is why research on cell mechanisms can apply to us for they are directly related to the same mechanisms used in the human body.



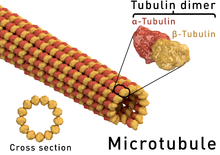
**Figure 3**: A single-celled organism

In a sense, our cells created us! Cellular technology is far more sophisticated than anything humans have been able to come up with.

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

**Microtubules**

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



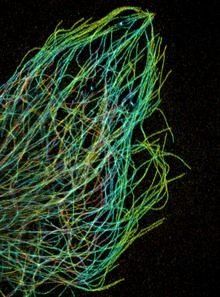
**Figure 4:** Structure of a microtubule. The ring shape depicts a microtubule in cross-section, showing the 13 proto-filaments surrounding a hollow center.

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

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

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

There are many proteins that bind to microtubules, including the motor proteins kinesin and dynein, severing proteins like katanin, and other proteins important for regulating microtubule dynamics.



**Figure 4:** Just as our bodies rely on bones for structural support, our cells rely on a cellular skeleton. In addition to helping cells keep their shape, this cytoskeleton transports material within cells and coordinates cell division. Microtubules are shown here as thin strands

**Next Month:**

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

Dr. Richard Alan Miller

Physicist and Writer

[www.richardalanmiller.com/ram/](http://www.richardalanmiller.com/ram/)

[www.docram.com](http://www.docram.com)

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