The Middle Scale: Biological Systems: primarily as a description of a quantum system; quantum biology; holographic

Fritz -Albert Popp showed that all living things emit a permanent current of photons. The higher on the evolutionary scale, the more complex the organism, the fewer photons are emitted. [i] Bernhard Ruth, working in conjunction with Popp, developed a machine that could count photons. [ii]

In quantum physics, coherence means that subatomic particles are linked by bands of common electromagnetic fields, so they can 'communicate'. They are like a multitude of tuning forks that all begin resonating together. As they get into phase, they begin acting like one giant wave. Usually this level of coherence , called a Bose-Einstein condensate, is only observed in superfluids and superconductors, a few degrees above absolute zero.

Perfect coherence corresponds to an optimal state between total randomness and total order. In total randomness cells become disordered. Cancer patients were found to lack biophoton coherence. Too much order prevents flexibility. Multiple sclerosis patients were found to have too much order, and too many biophotons. This led Popp to think of biophotons emissions as a sort of correction by a living system to the fluctuations of the Zero Point Field. Photon emission may be a compensatory measure to maintain equilibrium.

Popp found that molecules in the cells would respond to certain frequencies and that a range of vibrations from the photons would cause a variety of frequencies in other molecules of the body. From experiment, Popp showed that one of the most essential sources of biophoton emission was DNA.

The conventional theory of how molecules communicate in the body requires some direct contact. This theory is too dependent on chance, and also requires a long time duration, and can't account for rapid emotional changes. According to Jacques Benveniste's theory, which has been supported by experiment, molecules rely on electromagnetic signaling at low frequencies (between 20hz and 20 Khz) Each molecule has its own signature frequency, and can resonate with other molecules.

Robert O. Becker and Cyril Smith had conducted extensive experiments on EM frequencies in living things. Jacques Benveniste's contribution was to show that molecules and atoms had their own unique frequencies by using modern technology both to record this frequency and to use this recording itself for cellular communication. [iii]

Herbert Frohlich was among the first researchers to suggest that waves or vibration allow proteins to cooperate with one another and carry out instructions from DNA. He predicted certain frequencies, now called "Frohlich frequencies" could be excited in the cell by vibrations in the proteins. He showed that once energy reaches a certain level, molecules begin to vibrate in unison, until they reach a high level of coherence, when they may take on certain properties of quantum mechanics, including non-locality. [iv] One might wonder how the de Broglie frequency, discussed above, might be related to Frohlich frequencies.

Benveniste and Frohlich's work has been ignored or attacked by the status quo.

Just as some scientists see quantum effects in the behavior of biophotons, other scientists see Quantum Mechanics at work in the biology of living tissue, and see it as a key in unraveling the mysteries of the human mind and consciousness. The Japanese physicist Kunio Yasue, the American physicist Gordon Globus and others claim that brain substrates uphold second-order quantum fields. [v]

Use file: holographic brain.doc

Phil Anderson, a Nobel Prize winner in condensed matter physics, disagrees strongly with the reductionistic science of the Four Force Particle school, which asserts that "fundamental" particles hold all the secrets and are the most important. He supports the Emergent Properties school, which says that the whole is greater than the sum of the parts; i.e. unexpected behaviors "emerge" from large numbers of component parts. [vi]

Biological systems are the supreme example of self organizing structures, and provide many examples of emergent properties, such as metabolism, blood and oxygen circulation, nerve stimulation and transmission. Although mathematics may be applied to the emerged structures, it has little to say about their emergence. It is conceivable that quantum fields may exhibit emergent properties related to the generation of biological systems.

---

[i] Lynn McTaggart, *The Field* p. 42 f.

[ii] The photomultiplier detected coherent photons of high intensity from cucumber seedlings and potato sprouts grown in the dark.

[iii] Lynn McTaggart, *The Field* p. 60f.

[iv] http://en.wikipedia.org/wiki/Herbert_Fr%C3%B6hlich http://nonlocal.com/hbar/frohlich.html Lynn McTaggart *The Field*. p. 67f

[v] http://www.qo.phy.auckland.ac.nz/superradiance.html;
http://www.scaruffi.com/mind/yasue.html : book review
Globus, Gordon *Quantum Consciousness is Cybernetic* [not random]:
http://www.neuroquantology.com/repository/index.php?option=com_sobi2&sobi2Task=sobi2Details&catid=23&sobi2Id=203&Itemid=66

[vi] Mitchell Waldrop *Complexity.* George Cowan was administrator at Los Almos during the development of the atomic bomb under the Manhattan Project. He became director of the Santa Fe Institute, which was dedicated to the study of non-linear science. Cowan observed that science in the 20th century has typically been reductionistic: to do science, you must dissect the world into smaller and smaller pieces. This leads to fragmentation of science and the overlooking of opportunities. Real world problems demand a more holistic approach.