ABSTRACTED FROM:

The Philosopher's Stone: Chaos, Synchronicity, and the Hidden World Order
F. David Peat, Bantam Books, 1991

The Biological Quantum System

Certain observable (macroscopic) phenomena are explained by atomic quantum effects. For example, superconductivity and superfluidity are quantum effects in which large numbers of individual atoms are coordinated by a phenomena which is expressed mathamatically by a "wave function".

In physics, a plasma is defined as a gas composed of charged particles. In plasma, the motions of individual atoms is more complex than in a superfluid or superconductor, because the motion of the gas particles is determined not only by the quantum (globally organizing) wave function, but also by local effects. David Bohm, who formulated the wave function for plasma, said at the time that he had the sense that the plasma was "alive".

Living systems, although highly complex, are also highly organized. In 1968, physicist Herbert Frohlich, who had helped science to understand superconductors, proposed that coherent vibrations of energy are a key feature of the organization of living systems. While these vibrations have a quantum mechanical origin, they can, as in the case of superconductors and superfluids, in Frohlich's view, extend over regions of centimeters, and are the basis of all life.

Research on the millimeter -wave spectroscopy of many biological systems was published by Devyatkov in 1974. This data showed effects that were stongly frequency dependent, little dependent on power, but very dependent on the duration of radiation. All of these factors are consistent with coherent excitations.

Although according to conventional biophysics there should be no significant magnetic field interactions with biological dialectrics or water, a large anomolous magnetic effect was found in enzyme systems. Frolich concluded that this magnetic effect could only arise from the equavalent of a superconducting ring present in biological systems, and that this implied long range correlations and order.

One of the popular new ideas in theoretical biology is that the brain is a coherent quantum system. Indeed, some physicists are now persuing the analogy between the brain and a superfluid or superconductor.