News & Views

The Electromagnetic Nature of Life - The Contribution of W. Sedlak to the Understanding of the Essence of Life

Marian J. Wnuk, Ph.D.

(Chair of Theoretical Biology, the Catholic University of Lublin, Al. Raclawickie 14, 20-950 Lublin, Poland; e-mail: mjwnuk@kul.lublin.pl)

&

Casimir D. Bernard, B.S.

(4533 Atwood Rd., Stone Ridge, NY 128484-5212, USA; e-mail: Kaz1Shirl2@aol.com)

Abstract

In this article we have attempted to present the more important ideas regarding Sedlak's concepts on the electromagnetic nature of life. "Life" he described as a process, quantum in nature, expressing an electromagnetic coupling of chemical reactions with electronic processes on a protein-nucleic semiconducting substrate. As he grasped it, "Life," as well as "Consciousness," is electromagnetic in nature. We must emphasize here that this is the first exposure of Sedlak's thoughts to a larger English-speaking audience.

1. Introductory Remarks

Wlodzimierz Sedlak (1911-1993) was a Roman Catholic priest and a professor of theoretical biology at the Catholic University of Lublin (Poland). He was seen as an unconventional scientist, lecturer, tutor, and an original writer. In the domain of science he formulated the electromagnetic theory of life, the concepts of bioplasma, Homo electronicus, etc. He contributed significantly to bioelectronics, a new branch of science, and initiated paleobiophysics – a new discipline in paleobiology. He also contributed to paleobiochemistry of silicon, the paleontology of the Cambrian period, anthropology, the philosophy of animated nature, etc. Being a clergyman, he was very popular as an inspiring preacher and confessor. In his private life, however, he was an ascetic. All the research, which he had to carry out under very difficult conditions, he devoted to the Highest Good and Truth.[1] In this article, we would like to introduce his concepts pertaining to the nature of life. According to Sedlak, at their quantum foundation, both life and consciousness are the same.

The more important ideas of Sedlak that we present here, pertaining to the nature of life, constitute only a sample of his thoughts but we are convinced it is representative. Although these ideas originated several decades ago (based on the then-available empirical data), they may however continue to fulfill a heuristic function and be subject to confirmation. It appears that these ideas make possible a perception, in the vast jungle of empirical data from the realm of studies on life, these facts and hypotheses, which are so-called margin of science, and then their reinterpretation and binding them into new, integrated reconstruction.

2. Sedlak's Concept of the Electromagnetic Nature of Life

In the search for a factor that coordinates the processes of biological development and creates a structural whole, one of the most important physical concepts was being reached for, namely the concept of a "field."[2] Within the framework of this research trend in the philosophy of nature one should situate the concept of the electromagnetic nature of life. This concept is not yet widely known and accepted in science. Not counting the precursors of this concept, one can count barely a few authors (e.g., W. Sedlak,[3-6] J. I. Jacobson,[7] D. H. Bulkley[8-9]) who presented hypotheses on the electromagnetic nature of life, sometimes calling them theories.

Sedlak, the synthesist, confronted facts from many technical and scientific disciplines, and in particular from the field of electrophysiology and studies of the electrical proper-

ties of biological material in vitro (e.g., semiconductivity of proteins, piezoelectricity of tissue), while on the other hand he studied facts from the field of electronics, physics of semiconductors and cybernetics. He achieved an integration of the experimental data, taking into account two issues that were not directly tied to the topic of biology:—"semiconductors" and "field" (i.e., physical fields).[3] The aim of this was the reinterpretation of facts in such a manner that it converts our "chemical" imagination into an "electronic" one, which is alien to the current biology.

Taking the above into consideration, Sedlak emerged from a description of the so-called field environment of life, then accepted the assumption that life "chose" the semiconductor as a substrate and concluded that the electromagnetic field is a function of life[3] that is, the field emitted by organisms, such as bioluminescence. Life probably would be a result of the action of the environmental electromagnetic field.

When it comes to life's field environment, he directed attention to such factors as the following:

- electromagnetic, in biology usually taken into account in connection with photosynthesis and processes of vision,
- geomagnetic field, whose intensity and direction changed constantly with the continuous meandering of the geomagnetic poles,
- electrical fields of the soil and the atmosphere,
- gravitational field,
- temperature fields, which influence the rate of chemical reactions and the electrical state of semiconductors.

He assumed that the nature of the field environment has not changed, beyond changes in quantitative proportions. On the other hand the chemical environment of life he "reduced" to the electrochemical aspect, namely the redox potential. Next, he also accepted that the fundamental determinant of life is the environment as a "planetary complex of field information," on the other hand the developing life had to rest on a system giving the possibility of a subtle reception of minimal field impulses and optimal information reception, that is, rest on a semiconductor system.[3] In this case, the physical model of the foundation of life is the amphoteric colloid, in which the system "colloidal particle/water" is treated as the p-n junction, known from electronics. This junction is a redox electromagnetic oscillator, where the length of the emitted wave is smaller, as the frequency of changes in the system increases. This model system, which manifests electromagnetic functions, is considered by Sedlak as a "minimum" of life.[4] Analogous functions are manifested on higher levels of biosystem organization, including the electromagnetic activity of the brain. Variability of the electrical state of such an amphoteric colloidal particle in water is great due to the generation, as a result of the radiolysis of water: of radicals, hydrated protons and electrons, etc. Amphotericity enables an easy polarizability of this semiconductor in the presence of a heterogeneous field, and at the same time is a requisite for electrical, magnetic, mechanical, and thermal anisotropy. As a consequence, there is a possibility of existence of a system that is more complex functionally than materially, richer in "action" than "content." Considering that a complicated function does not require the complexity of the chemical substrate, Sedlak accepts that "the function of life could have developed on a simple material substrate," while the chemical content in the course of the evolution was catching up with the function, modulating and making it more efficient.[4]

Even the most complicated life function can, according to Sedlak, be taken apart into a simple functioning of semiconductor configurations. For this reason then, one ought to look for inorganic relicts in present biostructures and discover semiconducting prototypes of living systems. Also in this cognitive aspect, Sedlak attempts to reconstruct the directions of evolution of the protoliving system as an electronic system, at the same time drawing analogies primarily from laser physics. According to the author, the living system is a low power semiconductor laser, which is using all types of pumping possible under natural conditions, be they electrical, magnetic, optical, chemical, etc.[4,10] Briefly speaking-"Life is a forced quantum process."[11]

If one accepts that the living system is a laser, then one can postulate that the fundamental line of development in organizing life as an electronic system was the minimaliza-

tion of the effective pumping energy, which could be accomplished through both evolution of the so-called substrate, as well as of the way of pumping.[3]

Evolution of substrate took in the following: (a) the development of semiconductors of various types (also with piezoelectric properties and optical activity), primarily heterocyclic with a reserve of delocalized electrons, which present optimal possibilities for the creation of the *p-n* type junction, and (b) development of donor-acceptor compounds having lower activation energy for the particle of the product rather than of the individual substrates.

On the other hand, the evolution of pumping involved the engagement of various types of energy. This caused a rise of selectivity and sensitivity in collection of exogenous and autogenous energy, and also additional creation of attributes of present-day biosemiconductors, such as high utilization of the effectiveness of accessible energy sources, high-energy volume, minimal internal noises, etc. Thus then, as a result of evolution, organic compounds became more involved in life processes, with an ever greater number of delocalized electrons, multiple bonds and couplings, which enabled reception and conversion of various types of energy from the environment – electromagnetic, mechanical, thermal, gravitational, etc.

What is extremely important in the discussed concept of the electromagnetic nature of life is not so much the material/energetic aspect as the informational one, although only faintly sketched there. In this regard, Sedlak also reaches for the analogy with the laser. In accord with this analogy the biological laser is of the type that the forced radiation in truth depends not only on chemical and structural properties of the biosemiconductor substrate, but can also act in a moderating and modeling way on the material foundation of the laser.[4] In the biolaser, biofeedbacks are the foundation of internal control, which regulates the oscillation of donor-acceptor macromolecules as well as the tempo and character of metabolism. The widening of the band, which was mentioned, may be the result of integration and coordination of complex biological systems of ever-higher order. Two main developmental directions of life, namely differentiation and integration, have their radiational equivalents in the form of widening their band toward ultraviolet and equivalently toward infrared.[12] In connection with this, Sedlak postulated the course of information evolution in the direction of magnetohydrodynamic signalling being created, assuming also that the bandwidth of the biological field expresses the complexity of the vibrating system and its integration into a differentiated whole. The biological system operates as an electromagnetic sum, thanks to the so-called electrostasis (electromagnetic homeostasis), while electrostasis represents the electrical limit of the system in the reception of information. This being so, integration would take place electromagnetically.

The ability of electronic biosystems to receive and transform all types of energetic impulses has been extrapolated by Sedlak to a concept of consciousness, whose nature and evolution he also attempted to sketch, not avoiding distant extrapolations in the direction of anthropology, including anthropogenesis.

Summing it up, the main theses of W.Sedlak's concept of the electromagnetic nature of life, are as follows:

(1) The function of life is copied from the inorganic semiconductor systems (silicon dioxide, aluminosilicates, hydroxides of aluminum and iron);

(2) Inorganic substance became filled and, in the end, replaced by organic, which had as its purpose raising the working efficiency of the system;

(3) Antagonistic life phenomena are conditioned by bilaterality of amphoter and "playing out the function" on both sides of the isoelectric point;

(4) Internal coordination, which is based on a signalling system, electromagnetic in nature, and more efficient than the remaining ones;

(5) Self-duplication of function which is characteristic of semiconductors and no less a necessary trait of life than biological self-reproduction;

(6) The living system is an electromagnetic "pump" working on a semiconductor substrate, which is mainly organic. The biological system is a cybernetic team, which stores electromagnetic information in structures of organic compounds

and physicochemical processes, developing itself in the way of reception and storage of such information; and

(7) Life's fundamental lines of development are the following: (a) enlarging the efficiency of the system, (b) increasing autonomy with regard to the environment, (c) shifting to one's own energy production, in great measure independent of surroundings, and (d) making the system inextinguishable.

In accord with Sedlak's proposed conception, life is not only a mass of organic compounds, because its dynamic and fundamental "constants" are primarily all electromagnetic processes that take place in the environment protein semiconductors.[6] To the reality of life belongs the "quantum life junction"[13] or coupling between chemical reactions and electronic processes. According to one of the characteristic designations in this regard: "Life is an electron-photon-phonon diffraction grating, which vibrates in the medium of a piezoelectric protein semiconductor, and which is powered by chemical energy of metabolic processes."[14] The organism on the other hand "Is a protein system of piezoelectric semiconductors having chemical and electronic functions coupled with a wave-type internal coordination, surrounded by an electromagnetic wave, which is externally emitted."[14] The biosphere, by the same token, is a system of organisms as oscillators interacting electromagnetically.

3. Concluding Remarks

M. Wnuk suggested [15] such formulation of the nature of life processes, in which it is presented as a form of existence, transformation and generation of electromagnetic information, electromagnetic information plays a fundamental role in the existence of a living organism as an integrated whole.

References

1. Sedlak, W. (1985). Life is light. (in Polish). Warszawa: IW PAX.

2. Sheldrake, R. (1981). A new science of life. The hypothesis of formative causation. Los Angeles: J. P. Tarcher, Inc.

3. Sedlak, W. (1969). Fundamentals of the electromagnetic life theory. (in Polish). Kosmos, Seria A: Biologia, 18(2), 165-174.

4. Sedlak, W. (1970). Introduction to the electromagnetic life theory. (in Polish). Roczniki Filozoficzne, 18 (z. 3: Filozofia Przyrody), 101-126.

5. Sedlak, W. (1975). The electromagnetic nature of life. In: Second International Congress of Psychotronic Research; Monte Carlo. Monaco: The International Association for Psychotronic Research, pp. 77-83.

6. Sedlak, W. (1976). Is life an electromagnetic phenomenon? In: Bioplazma. materiał³y z I konferencji poswiêconej bioplazmie; W. Sedlak (Ed.). Katolicki Uniwersytet Lubelski. Lublin: RW KUL; (2nd edition 1977).

7. Jacobson, J. I. (1989). On the electromagnetic nature of life. Panminerva Medica, 31(4), 151-165.

8. Bulkley, D. H. (1989). An electromagnetic theory of life. Medical Hypotheses, 30(4), 281-285.

9. Bulkley, D. H. (1992). An electromagnetic theory of life - II: Testing. Medical Hypotheses, 38(4), 305-310.

10. Sedlak, W. (1970). Physical plasma and laser effects in biological systems. (in Polish). Kosmos, Seria A: Biologia, 19(2), 143-154.

11. Sedlak, W. (1972). Biological laser processes. (in Polish). Kosmos, Seria A: Biologia, 21(5), 533-545.

12. Sedlak, W. (1972). Physical plasma as the base of bioenergetics. (in Polish). Roczniki Filozoficzne, 20 (z. 3: Filozofia Przyrody), 125-148.

13. Sedlak, W. (1988). Introduction to bioelectronics. (in Polish). Wroclaw Warszawa: Zaklad Narodowy im. Ossolinskich – Wydawnictwo.

14. Sedlak, W. (1979). Bioelectronics 1967-1977. (in Polish). Warszawa: IW PAX.

15. Wnuk, M. (1996). The essence of life processes in the light of the concept of electromagnetic nature of life: bioelectromagnetic model of enzymatic catalysis in view of the problems connected with biosystemogenesis. (in Polish). Lublin: RW KUL.

"Science when well digested is nothing but good sense and reason."

– Stanislaus I of Poland