

Electromagnetic Radiation And The Afterlife

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ABSTRACT: The question of survival of bodily death is often considered to be beyond contemporary scientific methods and conceptual categories. However, recent research into spontaneous radiations from living systems suggests a scientific foundation for the ancient association between light and life, and a biophysical hypothesis of the conscious self that could survive death of the body. All living organisms emit low-intensity light; at the time of death, that radiation is ten to 1,000 times stronger than that emitted under normal conditions. This "deathflash" is independent of the cause of death, and reflects in intensity and duration the rate of dying. The vision of intense light reported in near-death experiences may be related to this deathflash, which may hold an immense amount of information. The electromagnetic field produced by necrotic radiation, containing energy, internal structure, and information, may permit continuation of consciousness beyond the death of the body.

"But man dies, and is laid low; man breathes his last, and where is he?" (Job 14:10). Contemporary science has yet to deal with this question, as the subject has been considered to be beyond scientific methods and conceptual categories. In this century, however, science has made colossal strides in many different areas. For example, we are witnessing a gradual synthesis of such previously divergent disciplines as biology, physics, and psychology. Emerging new synthetic disciplines such as psychobiophysics may offer a more holistic picture of the

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phenomena of life and the human mind as major components of universal process and the matrix of reality (Ferguson, 1980).

That combination of scientific disciplines promises to advance the science of humanity by better understanding the "something about us" that might exist independently of the body and might survive physical death. At this time, the concept of a conscious ego or "soul" could emerge from the current realm of theological dogma to become a scientific hypothesis. We should employ the techniques of science—to the best of its ability and whenever possible—in examining this ancient question. The answer must be sought because it reflects the deepest and most persistent need of human nature, and because personal and social transformations, induced by the consideration of the probability of an afterlife and the responsibility of our present deeds, might have a beneficial influence on humankind.

I would like to sketch the frame of a biophysical hypothesis claiming that the real and essential part of us—conscious self—might survive the death of the body and exist in another dimension. That idea stems from the biophysical interpretation of the recent findings of spontaneous radiation from living systems. It leads to a hypothetical model connecting ancient religions with modern science. *Light* has from man's earliest records and Biblical times been intimately associated with the creation of the world, life, and afterlife. It has been considered to be an imminent and transcendent principle that both pervades the universe and dwells in the consciousness of every man. In particular, the ancient philosophies of Hinduism, Buddhism, Chinese Taoism, and Judeo-Christianity have provided an inspiration for this hypothesis, as well as an interface with newly emerging scientific ideas. Biophysical aspects of life are best explained today by electromagnetic forces. Light itself is an electromagnetic field, and the association of both seems to be amply justified.

Low-Intensity Electromagnetic Radiation Of Living Systems

All living matter from cell organelles to man creates electromagnetic fields. These fields are associated with fundamental biological processes and structures such as the division of the nucleus, the respiration of mitochondria, the electrical activity of the brain, and the death of an organism (Barenboim, Domanski, & Turoverov, 1969). Some part of the field extends beyond the material boundaries of the organism, creating the so-called *electromagnetic aura*. That part of the field

spreads at the velocity of light, $c = 300,000$ kilometers/second (in the vacuum), and can be detected either as elementary particles (i.e., quantized packets) of ultraviolet and/or visible light—photons—or as electromagnetic waves, e.g., radio-frequency waves.

The photon contains a packet of energy ($E = h\nu$) intimately associated with the unit of *action* (equal to Planck's constant, $h = 6.06 \times 10^{-34}$ joules/second) and with a *frequency* ν or *wavelength* λ , where $h\nu = hc/\lambda$. The photon itself has no rest mass, no time, and no space, and is perhaps the most indeterminate unit in the manifest physical universe, truly a primordial entity of nature. Modern opto-electronic devices, e.g., single photon counters, are now increasingly used to detect and analyze photon emission (Seliger, 1980). That photon emission, also called low-level luminescence, biochemiluminescence, or biological chemiluminescence, covers a broad spectral region from ultraviolet to near infrared, i.e., from 200 to 900 nanometers. The photon-flux intensity of stationary luminescence averages $10\text{--}1,000$ $h\nu/\text{second}\text{-centimeter}^2$ and strongly depends on the physiological state of an organism.

Under a stressful situation, the cell population of an organism emits more intensive radiation than during homeostasis, i.e., in a steady-state or a dynamic equilibrium between an organism and its environment. Any irreversible damage to the biological structure or function of living cells brings about an increase of the emission that usually reaches the maximum—a "light flash." Such maxima reflect the boundaries of homeostasis and provide rapid information about the resistance and adaptive capacity of the organism to environmental parameters such as temperature, radiation, osmotic pressure, and humidity. For those reasons, low-intensity luminescence has found a wide application as a diagnostic tool in medicine, agriculture, environmental protection, food technology, etc. (Seliger, 1980; Quickenden & Que Hee, 1981; Kaznacheiev & Mikhailova, 1981; Slawinski, Grabikowski, & Ciesla, 1981; Slawinski, 1982; Slawinska & Slawinski, 1983; Slawinska & Slawinski, 1985).

Living systems also emit electromagnetic radiation in a longer part of the spectrum, e.g., infrared or thermal radiation and radio-frequency waves. Brain and heart and muscle activity give rise to changes of electrical potential of about 0.1 volt with frequencies in the range of 0.5–3.0 hertz and 20–5,000 hertz respectively. Those potentials extend their influence beyond the body to form the low-frequency electromagnetic aura. Particularly, the brain can be regarded as consisting of electromagnetic activity both in the internal network of neurons and in the external aura. Therefore, the "mind" may also be

extended in space as far as its aura and may reinforce its action by means of, for example, an "intentionality field" (Taylor, 1975). The distribution of force lines of external fields around organisms can be measured and mapped with electographic imaging (Dumitrescu & Kenyon, 1983), modern vector auratrons (Burr, 1972), and voltmeters (Gulyaev, Zabotin, Shlippenbach, & Egorov, 1981).

An important finding is that all *dying* cell populations and organisms emit a radiation ten to 1,000 times stronger than their stationary emission during homeostasis. That phenomenon of "degradation" or "necrotic" radiation, picturesquely called "light shout," "light S.O.S.," or "death flash," is *universal* and independent of the cause of death. Its intensity and time course reflect the rate of dying. Of particular significance are reports on electromagnetic radiation from the human brain during the agony (and/or ecstasy) of contemporary near-death experiences, which center on ineffable light (Moody, 1975; Kübler-Ross, 1969). Measurements of the number of photons emitted and the number of dying cells, N_{dc} , give the ratio $N_{hv}/N_{dc} \approx 1$. That suggests the involvement of *one center* critical both for the *life* of the cell and for *light* emission (Popp, 1979; Quickenden & Que Hee, 1981; Kaznacheiev & Mikhailova, 1981; Rattemeyer, Popp, & Nagl, 1981; Li, Popp, Nagl, & Klima, 1983). The phenomenon of the "death flash" constitutes a cornerstone of this hypothesis and I will enlarge on it in the following sections.

From the biochemical point of view, low-intensity luminescence can be explained as a way to lose excess energy by electronically excited molecules being produced in exergonic (energy-liberating) pathways of oxidative metabolism associated with biological membranes. In those circumstances, low-intensity luminescence might be a fortuitous epiphenomenon without any biological role (Barenboim, Domanski, & Turoverov, 1969; Seliger, 1980). However, an increasing number of recent findings suggests another interpretation of that effect. Broad emission spectra offer an incredibly high potential of information capacity.

For instance, if such light signals are only frequency modulated (FM), the information capacity of the luminescence channel would be equivalent to about 10^8 television stations! Values of spectral intensity reflect a high chemical potential of the excited molecular system generating photons. Such a system, being far from thermal equilibrium, forms a *dissipative structure* on the *laser* threshold. The ratio of excited/ground state molecules (occupation number), which does not depend on the λ of emission, facilitates the laser action. Therefore, the system can activate certain biochemical reactions critical for the or-

ganism (Popp, 1979; Rattemeyer, Popp, & Nagl, 1981; Li, Popp, Nagl, & Klima, 1983).

For example, recent experiments indicate that changes of the conformational state of deoxyribonucleic acid (DNA) macromolecules in the cell nucleus are associated with photon emission. According to Popp and coworkers (Popp, 1979; Rattemeyer, Popp, & Nagl, 1981; Li, Popp, Nagl, & Klima, 1983), DNA might "store" virtual photons. In certain critical events of the cell's life, such as cell division or cell death, virtual photons would be transformed into real photons. A long, spiral-shaped DNA macromolecule might also act as an efficient antenna, receiving or emitting electromagnetic radiation within a very broad spectral range.

Three groups of experiments and theoretical considerations indicate a high degree of *coherence*, i.e., a temporal order, of photon emission from living organisms (Rattemeyer, 1979; Li & Popp, 1983). In that aspect the emission resembles a laser light and is in line with certain implications of the electromagnetic theory of life postulated by Burr (1972) and Sedlak (1969, 1972, 1979, 1980).

There is an extra "dimension" related to that information transfer: the rotational "timing" of fluctuations within the quadrature phase. Quantum fluctuations in a coherent state are randomly distributed in phase and they impose the standard quantum limit to the reduction of noise in a signal. Other minimum uncertainty states are possible that have fewer fluctuations in one quadrature phase (π rd) than a coherent state, at the expense of increased fluctuations in the other quadrature phase. Those states, called squeeze states or two-photon coherent states, using subpoissonian photon counting statistics (photon antibunching), enable preferential addition of noise to the quadrature not carrying information, thus improving the transfer of information (Walls, 1983).

The electrical activity of the brain associated with psychophysiological phenomena may also produce coherent fields. Electroencephalographic (EEG) measurements of brain waves from the left and right hemispheres have shown spatial and temporal coherence, representing long-range ordering related to neurophysiological structures, i.e., the cooperative electrical oscillations among millions of neuronal membranes or synapses (Banquet, 1973; Banquet & Sailhan, 1974; Fröhlich, 1980). The above data and references reveal that electromagnetic force-fields mold and control the internal biological milieu within and outside of which life manifests itself.

Electromagnetic Consciousness?

In the light of the foregoing discussion, it seems reasonable to ask whether the electromagnetic (EM) field, by coordinating energy, internal structure, and information, is a supreme factor in organizing life, i.e., forming the essence of a living being. Might it be that the EM field structures matter, imposing an organizational pattern upon molecular associations? Perhaps the pattern of a living system may be compared to a hologram, in which the spatio-temporal information about the whole is contained in each part of the hologram, where, by means of coherent feedback and resonance, the combination of corpuscular and wave relations creates a self-regulating, self-reproducing, and self-conscious synergetic system called "living being."

A specific "carrying electromagnetic field," capable of organizing the inanimate matter within a living system, might be a simple model of the "life force," "spark of life," "elan vital," the fundamental carrier/essence of all living forms. Modulation of that field by genetic structural information (DNA), by brain-processed information from the external world, etc., would correspond to information accumulation, attaining the contents of information. The superposition of those "carrying" and "attained" fields, creating one integrated entity, might be a model of the conscious self, the essence and contents of life.

In order to comprehend that model and the limits of its applicability better, let us analyze a television picture of an actress playing a role. The actress is illuminated with a visible, chaotic (incoherent) external light from lamps. Light, reflected from her surface, is transformed by electronic devices into electric signals (oscillations). The superposition of those oscillations with the carrying wave (modulation) results in a complex electromagnetic field that is emitted in space at the speed of light. In a television receiver, oscillations of the EM field are transformed into the spatio-temporal pattern of two-dimensional illumination on the screen, reproducing the actress's play. If a coherent (phase-correlated) light is used, such as from lasers, one gets a three-dimensional holographic picture of the actress. However, the picture corresponds to the exterior of the actress, for it contains information, superficial reflections, from her surface only. Higher order abstract sensations and associations that we perceive while watching the television picture are the subjective products of our minds.

Now let us imagine that the internal (endogenous), coherent, broad-spectral-range radiation associated with the psychophysiological states of the actress modulates the carrying waves. The electromagnetic field now contains a vast amount of information pertinent to the

internal properties of the actress and her personality, including such higher order abstract values as emotions, motivations, and memories, all objectively coded in the structure of the field. Such a procedure is beyond present technical possibilities, but it cannot be excluded theoretically if consciousness has an electromagnetic nature. No doubt that procedure would recreate only a multidimensional replica and not the living actress herself.

A different situation might occur at the moment of death or in certain psychic states such as out-of-body experiences. In that situation, the whole entity—a “carrying” field with its “attained” information field—would be separated from the body. In further considerations we will use the above-described presumptive model of the electromagnetic nature of consciousness.

Necrotic Radiation And Its Interpretation

What happens to a living organism in the process of dying? Let us return to the laboratory and the well-established phenomenon of necrotic radiation, the “death flash.” What would constitute a satisfactory biophysical interpretation of that extra radiation expenditure? There are three possibilities.

First, the increased emission may simply reflect the degradation of the molecular order of chaos, information to noise, and thus the increase of entropy of the whole system. Second, the radiation of light may be an insignificant side effect, an epiphenomenon, accompanying the transformation of the electromagnetic energy of the dying organism into other forms of energy (fields, particles). Third, the electromagnetic essence of life, including the conscious ego, may be radiated into space at the speed of light. I will briefly discuss each of those interpretations.

Entropic Degradation

According to the first interpretation, in a dying organism regulatory mechanisms stop, and a chaotic production of energy prevails over its biological utilization. The energy surplus produces excited, light-emitting molecules. Therefore the “death flash” is the enhanced emission of a chaotic electromagnetic field that does not carry intrinsic information; it is noise. From a thermodynamic point of view, such a situation is the decrease of order and the increase of entropy (S), i.e., the degradation of information to noise.

However, there are at least two arguments against the information-to-noise degradation interpretation. First, according to the negentropic principle of information, there is the energy equivalent, ΔE , of the information amount, ΔI , that can compensate the increase of entropy: $\Delta E = \Delta S \times T \geq \Delta I \times T$. The term ΔS is the sum total that has to be positive ($\Delta S \geq 0$), but some terms may be negative. The negative terms are entropy reducing and create order via the positive, dissipative terms. A high enough ΔE might prevent degradation of the subtle internal structure of the field that codes all the information of a dying organism. Thus the conservation of I is allowed within the framework of the second law of thermodynamics, if an entropy increasing process is coupled to the entropy reducing process.

The second argument for the conservation of I comes from von Laue considerations (von Laue, 1906, 1907). Briefly, the recombination of a coherent radiation is an adiabatic process without the increase of S ($\Delta S \leq 0$). Therefore the structural pattern of all parameters of the coherent part of the electromagnetic field, equivalent to the information contents, might be preserved at the moment of death.

It is worth emphasizing that the increase of S determines the direction of stochastic processes in molecular systems, i.e., "time's arrow" and time flow. When $\Delta S \leq 0$, the arrow of time vanishes, at least in coherent negentropic terms.

Epiphenomenon of Electromagnetic Transformation

Let us now consider the second interpretation of necrotic radiation. Electromagnetic radiation is always associated with transformations of elementary particles (the annihilation of an electron and positron, the atomic absorption/emission of photons, molecular rearrangements/chemical reactions, etc.). Transformations may be regarded as "deaths" of the previous states or forms. According to that interpretation, the "death flash" is a nonsignificant epiphenomenon in the sense that the radiation emitted does not carry intrinsic information about a dying object.

A potentially more fundamental process, perhaps involving forces of nature other than electromagnetism, might be hidden behind that flash. The most attractive of the various candidates for the "consciousness field" could be the hypothetical gravitons, elementary particles of the gravitational field with the rest mass $m_0 = 0$ moving at the speed of light. Still more conjectural is the tachyon, a particle delocalized over a complex plane and supposedly moving faster than light, thus

enabling travel into the past and the future. According to Roger Penrose, the fundamental fabric of space and time is woven by the interactions of twistors, massless torus-like mathematical rather than physical entities (Hawking & Penrose, 1970; Forward, 1980). A hypothetical nonphysical "psi" field, supposedly underlying extrasensory perception, might also be subject to such speculations.

It hardly seems possible to reduce the problem of consciousness and its survival of bodily death to the level of elementary particles, or even further, to the elementary quantum phenomenon. The quantum theory reassures us that the concept of space-time and determinism invariably falls down when we get to distances smaller than 10^{-33} centimeters, Planck's length. At that point, the very ideas of before and after, cause and effect, and distinguishability lose all significance. Spontaneous fluctuations in the chromodynamic field and in geometry at small distances may cancel out in order to maintain an internal structure of the field, necessary for information conservation (that is, "conscious memory"). At that level, where according to the "austerity hypothesis" almost everything comes from almost nothing (Capra, 1976, 1982; Taylor & Wheeler, 1966; Conniff, 1982), there may be no place for such complex phenomena as consciousness, memory, or the hierarchically advanced status of evolved entities, such as "souls."

Of course, we cannot at this stage exclude forces and fields of which we have at present no knowledge. However, the crucial problem is whether those fields might be able to store information, including such higher order abstractions as the intentions, memories, and feelings of a dying entity, and to exist as an open, synergetic system in a dimension to which we have no obvious direct physical access. Since this problem is of considerable importance, we will enlarge on it in the next section, analyzing the third interpretation of the "death flash."

Radiation of the Electromagnetic Essence of Life

Arguments presented above in the discussion of the interpretation of necrotic radiation as entropic degradation point toward a more favorable model: that the "death flash" corresponds to the separation of "electromagnetic consciousness," a wholeness of the "carrying" and "attained information" fields, from a dying object and to the emission of those fields in space at the speed of light. Assuming that model as a working hypothesis, we can now ask whether that emission is a necessary process underlying all state transitions, or deaths of organisms.

Inevitable Emission Of Information

Let us begin with the realization that all fundamental atomic and molecular closed structures, when transformed, emit a quantum of energy, $h\nu$. We will consider three examples of those emissions.

First, in the atomic system electrons can be described as "closed circuits" of the de Broglie electron waves with the length λ :

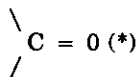
$$2\pi r = n\lambda = nh/m_e v,$$

where r is the radius of the electron orbit, m_e and v are electron mass and velocity, and $n = 1, 2, 3 \dots$. When an atom emits or absorbs energy, the closed circuit of electron wave cracks and a new wave configuration and value of angular momentum obtain:

$$2\pi r' = m\lambda = mh/m_e v,$$

where $m = n \pm 1$. The frequency of the photon emitted carries information about the energy state of the atom.

Second, in the case of molecular closed structures, such as certain regions of the molecular photon-sink melanin, the most dramatic analogy to the "death flash" is the rupture of a thermodynamically unstable ring such as the dioxetane ring. The process of the ring rearrangement produces an electronically excited state of a carbonyl product



the radiative deactivation of which generates a photon, $h\nu$. The new open configuration acts like an antenna: it emits a photon, a concentrated quantum of energy corresponding to the change of energy states. That process presents a classical example of chemiluminescence.

Third, let us compare oscillations in the electric RLC circuit, where R = resistance, L = inductance, and C = capacity, with processes within a living organism. A closed circuit supplied with electric energy (\oint) generates electric oscillations, that is, a continual interchange of the energy of a magnetic field into an electric one, and vice versa. The *closed* circuit loses or radiates out only a very small amount of its energy in the form of electromagnetic waves due to the small R value

(or high Q factor, where Q = quality). Thus the closed circuit can *dynamically store* energy. When free vibrations, or resonant oscillations, are modulated, the circuit also stores information. The disclosure of the circuit transforms it into a new open configuration that is not able to maintain periodic transformation of energy and to store information. The open circuit has to emit radiation carrying energy and information.

A functional correlate of a living organism may be a representative oscillator composed of basic biological structures: the resonating rings of melanin, the helical coils of proteins, the double helix of nucleic acids (inductance, L), the lipid bilayer membrane (capacity, C), and the neuroglial circuitry of the central nervous system (resistance, R , and capacity, C). Such a biological oscillator forms a closed integrated structure that is fed by metabolic energy (M) to support its steady state oscillations, or homeostasis. When those "carrier" oscillations are modulated by genetic information stored in the structure of DNA, and/or by information derived from environmental interactions and mediated by the neuroglial network, then they contain and store that information. Such a circuit emits only a small portion of its internal energy in the form of low-intensity luminescence and radio waves in a manner analagous to technical LC-oscillators, with a high Q value of the circuit and a long storage time of virtual photons. A disintegration of the biological circuit transforms it to an open configuration with concomitant loss of its ability to support periodic resonant vibrations, to maintain homeostasis, and to store energy and information. Therefore a disintegrating or dying organism has to *emit* its electromagnetic energy-information.

A similar analogy is depicted by a complex superposition of standing electromagnetic waves stored within resonant cavities or biological structures, as the essence of life. The irreversible liberation of those waves from biological cavities as a coherent, integrated field that spreads out in space simulates death. That model parallels the "big bang" theory of the origin of the universe.

Electromagnetic Consciousness And The Relativity Of Time And Space

We now approach the most crucial point of the hypothesis of electromagnetic consciousness: the association of the EM consciousness field with Einstein's special theory of relativity. The revolutionary idea of special relativity is that *light* is more basic than space and time. The

speed of light, c , is an absolute, invariant factor, space and time being subordinated to c . Therefore the scales of space and time coordinates depend on frame of reference, on the relative velocity of systems. If an event occurring in a frame of reference moving at velocity v has a duration time t' as measured by an observer in a stationary or resting frame of reference, then that same event has a shorter duration t as measured by an observer in the moving frame. According to the Lorentz transformation, the relationship between t and t' is

$$t = \frac{t' + vx'/c^2}{\sqrt{1 - \beta^2}}$$

where $\beta = v/c$ and x' is the space coordinate parallel to the vector v . If we imagine a clock in a stationary frame, for example resting in someone's brain on Earth, and another clock attached to the electromagnetic consciousness field moving at the speed $v \leq c$, we will notice that the moving clock runs slower than the resting one. From the Lorentz transformation, it follows that the time duration becomes infinitely great ($t' \rightarrow t/0 \rightarrow \infty$), or the time flows infinitely slowly (the clock stops at the speed of light) as the relative velocity v approaches the speed of light ($v \rightarrow c$). That is what is meant by time dilation, the stretching out of time. Being the resting observers, we would say that time stops for the electromagnetic consciousness field, or that that field is timeless (in the sense of metrical, but not topological, time) and inhabits the atemporal level of reality.

Time dilation is coupled with the Lorentz-Fitzgerald length contraction by the equation

$$l' = l - \frac{vt}{\sqrt{1 - \beta^2}}$$

where l' is the length in a moving frame as measured by a resting observer, or vice versa. Thus, time dilates and length contracts exponentially as functions of velocity v .

Does that mean that the electromagnetic consciousness field enters another "dimension" where space and time are fused into one reality, where the distance equal to zero means a sphere expanding or contracting at the speed of light? Is that immortality? Immortality does not mean "life everlasting," for it does not last at all; it just *is*. From the mathematical point of view, solutions giving infinity (∞) have no physical meaning. (Perhaps, in consonance with the ancient religions,

consciousness is nonphysical yet nevertheless a real "something.") The Lorenz transformations are valid only for $v < c$, but no material object can reach $v = c$. From that point of view, consciousness is not material or substantial, although it possesses information, energy, and momentum, energy being equivalent to, but not identical with, mass. In the above sense, "consciousness field" is a continuous synergetic wholeness, a gestalt beyond and outside space/time. Each point in that seamless continuum is topologically associated with every other point, obtains instant information about changes in all other points, and so reacts or is "conscious" about events in those points.

One of the implications of the proposed model is that a living being, that is, a body-bound consciousness, and a free consciousness belong to the same reality, yet in different dimensions or aspects. We have an analogous situation at the quantum level where we speak about real and virtual particles, and about particle and field (never both at the same time), although they are one reality. Those two dimensions or aspects of reality are separated by that impenetrable barrier, the speed of light. Therefore it should be impossible to penetrate into that light-bound continuum by means of any material object or device for which $v < c$. That would explain the failure to communicate through electronic devices, such as a recording voice phenomena, with those who have left this spatiotemporal "dimension."

Moreover, contemporary electronic devices utilize only one coding/decoding/retrieval mode of electromagnetic information at a given time. For example, in the case of a signal modulation (FM), only one frequency/receiver is used at a time. In that way we get only slices or one-dimensional sections from the entire complex multidimensional information field. Perhaps such communication would require the intermediacy of the mind, for instance, the psychic ability to project and radiate efficaciously one's own consciousness out of the body to reach $v = c$ and to enter the space/time (actually, no-space/no-time) continuum. Could a reversible or symmetrical situation occur? Yes, if a coherent, noncorporeal consciousness field, with the innate creative action of light, can create its substantial replica (apparition?) or move objects (psychokinetic effects?). There are some current experiments with coherent laser light suggesting the possibility of performing mechanical work in gases at the expense of thermal environmental energy (Garbuny, 1978). Many questions related to the fate of the electromagnetic consciousness field in space/time have arisen, but previous attempts to answer them appear to be mere speculations. The whole problem should be analyzed by interdisciplinary specialists.

Conclusion

At the present stage of the development of science, electromagnetism is the best candidate for the explanation of the phenomenon of life and also the possible continuation of life beyond the death of the physical body. Accordingly, the outset of the framework of this hypothesis is the experimentally well-established phenomenon of necrotic radiation or "death flash." Assumptions about the electromagnetic nature of consciousness and conservation of its information content during the dying process are conjectures based on preliminary experiments and theoretical considerations. The interpretation of those assumptions in terms of the specific theory of relativity leads to the idea that electromagnetic consciousness might exist in a space-time continuum on the nonspatial, nontemporal level, due to relativistic effects of time dilation and length contraction.

A topological "arrow of time" may perhaps be imposed by the evolution of space-time in the expanding universe or by comprehension or enlightenment of the cosmic reality. However, it is possible that the problem of an afterlife involves nonphysical categories (that is, non-physical but real entities) that will never be resolved in terms of any force or field that we already know (I. Walker, 1972; E. H. Walker, 1970; Walker & Herbert, 1977). Perhaps our ability to comprehend absolute truth has an asymptotic character and our mind cannot understand it in its entirety.

It becomes evident from the brief considerations above that research on low-level luminescence and other radiations of living systems provides both ample information on fundamental life processes and a realistic basis for dealing with the problems of an afterlife. In particular, cybernetic, nonlinear optic and statistical aspects of necrotic radiation from differentiated organisms at different evolutionary levels should become a major focus of extensive research and international cooperation. No other discipline justifies so firmly the ancient and persistent intuitive association between *light* and *life*, and so tenaciously promises to reconcile old religious beliefs with modern science and human desires. Moreover, that pursuit leads to pragmatic consequences. It extends the horizons of our thinking, inspiring more diversified and scientific approaches to eschatological problems. It may also stimulate personal and social transformations towards a more creative and benevolent life.

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