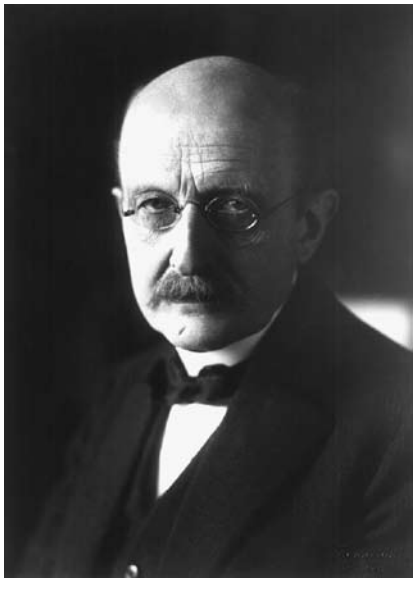
Toward a New Periodic Table Of Cosmic Radiation

by Peter Martinson

Max Planck began his series of lectures on thermodynamics in 1909 by asserting that science is the systematic investigation of sense perceptions. Our concepts of basic principles, like force, come from those senses. The task of science "consists only in the relating of sense perceptions, in accordance with experience, to fixed laws." Those laws were, themselves, always brought closer and closer into line with experience.

But, this description was only a trap for the unsuspecting, for Planck then made an about-face, and asserted that, "ladies and gentlemen, this view has never contributed to any advance in physics." Relating the sense perceptions to one another with mathematics, and pulling logical derivations out of those relations, can be quite interesting, but this could never, in itself, derive a new discovery of principle. The generation of new knowledge about the universe comes from a world different from that of sense perception, but one which the human mind has access to.



Max Planck (1858-1947)

Planck's target in these speeches was the so-called Positivist movement. Since the time he hypothesized the existence of the quantum of action, these anti-reason "brownshirts" asserted that all knowledge must come only from that which is measurable. Further, if some process weren't proven to be measurable, then that process couldn't even exist. Therefore, that world Planck referenced, as the domain of human creativity, could not exist.

The debate about the existence of such principles which guide physical phenomena, and their knowability, has raged until the present day, with the positivists seemingly gaining the upper hand.[1] However, there is now brewing a revolution in science, led by Lyndon H. LaRouche, Jr., which will sweep this mental infection away.

This revolution is classed under the broad name of Cosmic Radiation, which is the investigation of the relationship between what Russian Academician Vladimir I. Vernadsky called "living matter," and that energetic cosmic phenomenon today known under the broad name of cosmic radiation. If our national travesty, the British agent called President Obama, is removed from office before he and his controllers can dismantle America's last foothold on true, immortal science, the American manned space program, we will soon be presented with the challenges of a manned mission to Mars, embarking from the surface of a soon-to-be-industrialized Moon.

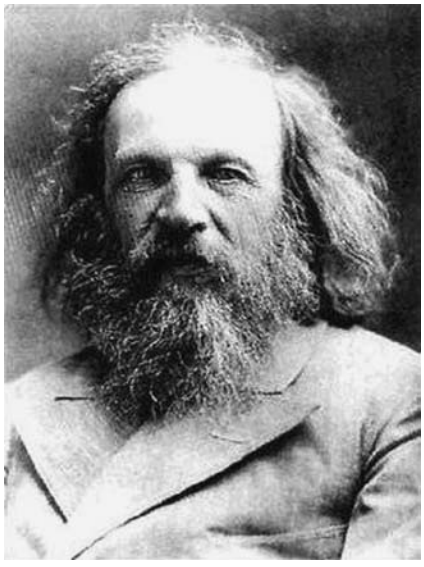
As LaRouche has emphasized, along with others who know what they're talking about, this requires the consideration of accelerated paths between these two bodies, within Solar space. The senses of the positivists say that this intervening space is empty. The travelers on that fusion-powered, accelerating flotilla will say that

1. For example, although the experiments that can now be performed with CERN's Large Hadron Collider will produce extremely valuable data, the scientists analyzing it will be crippled if they assume a positivist viewpoint.

that space is, indeed, anything but empty. It is as empty as the open ocean, upon which human navigators have mapped out shipping routes outside of which it is either dangerous, or even impossible, to travel. What makes up this open ocean of interplanetary space, and how will it manifest itself to our accelerating descendants?

Positivists, and kindred opponents of reason, beware! The study of cosmic radiation will soon render you an historic kidney stone, passed, on humanity's mission to the stars!

In this brief report, I will define cosmic radiation in terms of the problems posed by Planck, Einstein, and their collaborators, and then describe

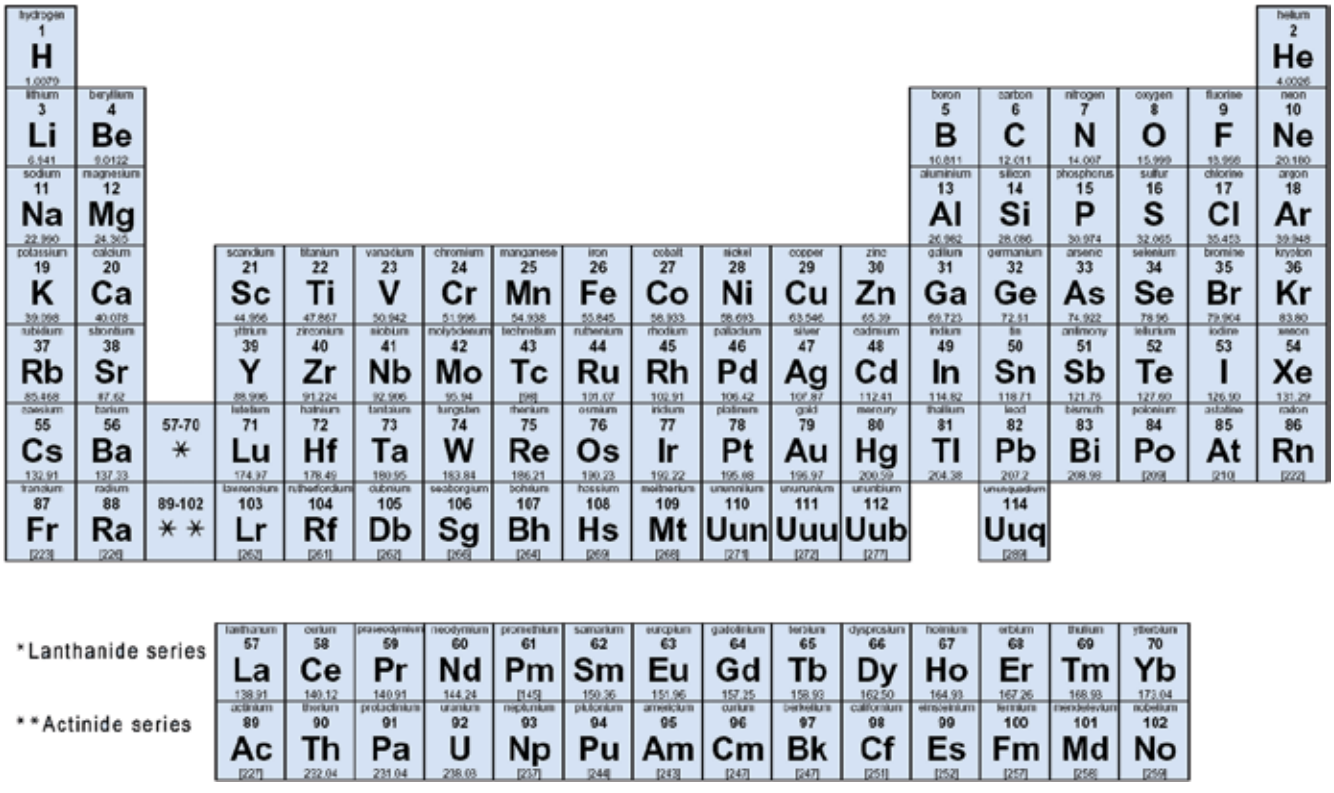


Dmitri Mendeleyev (1834-1907)

some of the areas of clear research opportunities, and some potential experiments to be carried out.

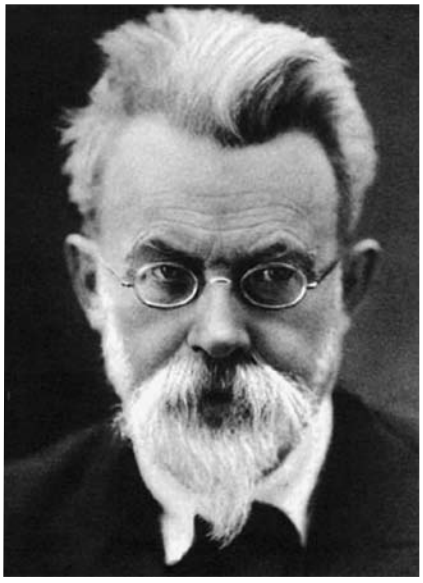
A milestone reached in this new field of research, will be the enhancement and elaboration of a new periodic system of the universe. At the end of the 19th Century, Dmitri Mendeleyev applied his genius to the construction of a Periodic Table, which allowed him to forecast the existence of then undiscovered, but potential elements. Since his death, that table has been expanded, but has always remained valid. In the same way, Johann Sebastian Bach's well-tempered system of counterpoint has remained the standard, up through the compositions of Jo-

FIGURE 1
The Modern Periodic Table of the Elements



Each column contains elements whose chemical properties are very similar. This amazingly insightful construction will be subsumed, soon, by a more comprehensive table, which includes the living and cognitive domains.

hannes Brahms and Robert Schumann, in a way that opened up a whole world of possible modes of communication in music. Instead of throwing Mendeleyev's Periodic Table away, it is now time to see it as being subsumed by a larger system, called Cosmic Radiation, with which the present state of human understanding is pregnant.



Vladimir Vernadsky (1863-1945)

What Is Cosmic Radiation?

But, first, let's just get a summary of what we mean by "cosmic radiation."

As a starting point, Vernadsky divides the universe into material phenomena and energetic phenomena. Energetic phenomena, themselves, are generally invisible to the senses, though their effects are very sensible. They include the various fields—the electric, magnetic, and gravitational fields found in the Solar System and elsewhere—and also the electromagnetic radiations, covering the entire spectrum of frequencies. Material phenomena include what happens when you run into a tree. Also, the elaboration of crystal structure, and the chemical properties of the general phases of matter, constitute material phenomena. Thus, the cosmic rays discovered by Victor Hess, being the high-velocity nuclei of all the atoms on the Periodic Table, would be classed as material phenomena.

Our own biological sense apparatus is designed to be sensitive to the interaction between the material and energetic. For example, as you read this page, which is a material body, light is reflecting off of the page into your eyes. Your eyes do not, themselves, perceive light, but perceive a page with words written on it. The light transmits a signal from the page, to receptors in your eyes, which then convert the signal into a different form which can then be transported to your brain. There, your mind has the opportunity to interpret the signal—which itself probably bears little optical resemblance to what you think this page looks like! But, the energetic light signal, which cannot itself be seen, registers the existence of the material object before you, to the material object of your biological senses.

The concepts "material" and "energetic" are thus well defined. Material is the stuff you can sense, and energetic is why you can sense it. Energetic phenomena are generally continuous, while material phenomena are generally discrete. Who would mistake the light emitted from a light bulb, for the light bulb itself?

But, are these two concepts really so well defined?

The fundamental, and most studied, of the so-called energetic phenomena, is light. Such scientists as Christiaan Huyghens, Thomas Young, and Augustin-Jean Fresnel established that light is not composed of particles shooting in straight lines, but represents a wave motion. This was profoundly demonstrated in experiments on the interference of the light waves (see box, p. 33). This concept required (and still does, in this author's opinion) a material substrate in which the waves can become manifest, in much the way that water waves necessitate the existence of water. Without the water, what would be waving? Hence, light spreads as a space-filling wave structure, and is thus continuous in space, never having a specific location. Any "points" of light represent an event of constructive interference among waves.

But, when Max Planck decided to work out the laws governing the types of radiation that are emitted by a heated body, the frequency of which depends upon its temperature, he had to give this supposedly continuous phenomenon of light a discrete form. He showed that, in the transformation of the action of material oscillation into that of electromagnetic radiation, there was a smallest amount of action that could be thus transformed, which he called the quantum. It is as if, when you press the accelerator of your car, you have to press down until you're giving enough gas to go 1 mile per hour, and your car instantaneously achieves that speed, never having gone a half mile per hour! The smallest amount of energy that could be transferred by the radiation was proportional to its frequency. Hence, at very small scales, light, and all other energetic phenomena, had the properties of a discrete part—the continuity of this supposed wave phenomenon had broken down.

Though there was an attempt to ignore Planck's hypothesis, experiments around the world began to result in paradoxes of exactly the form he forecast. Finally, Einstein broke the stand-off in 1905, when he demonstrated that the photoelectric effect could be efficiently explained, if it were assumed that light transfered energy to the ejected electrons in the form of quantum packets. As the intensity of the light was increased, no increase in the kinetic energy of the ejected electrons was observed. Hence, each electron was given a specific amount of kick, which coincided with an individual quantum transfer. That amount of kick would only change if the frequency of the light were changed.

So, here was one example of an energetic phenomenon, acting as a discrete object.

What about matter? A similar category of paradox was popping up all over the study of atomic phenomena, specifically in the spectra of the elements and their isotopes and ions. Louis de Broglie took from Planck the hypothesis that the universe is harmonically organized, and determined a wave structure for

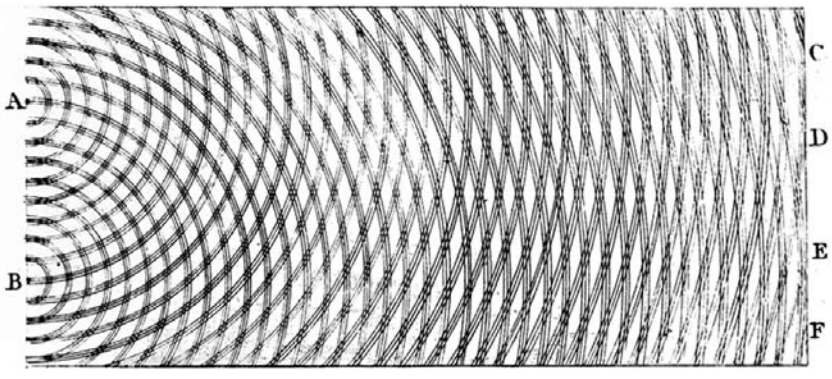
Two-Slit Interference

Wave phenomena are characterized by what is called "interference." Transverse waves, such as those produced on the surface of water, are composed of both peaks and troughs. If two waves cross each other, the heights of the waves "add" to each other, in such a way that two peaks crossing will produce a wave whose height is enhanced, while a peak crossing a trough will produce one whose height is diminished. If one wave encounters a barrier with two holes, each hole will become the source of a new set of waves, and thus two wave sets will propagate on the other side of the barrier. If a screen is set up further on that side, the waves will produce an interference pattern.

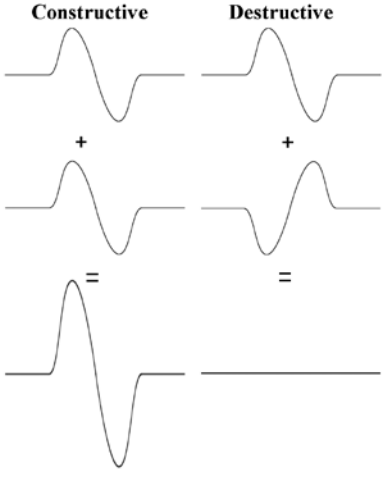
In the image shown here, drawn by Thomas Young, two sets of water waves emanate from the slits at A and B. Each of the circles drawn represent a peak of a circular wave. At the far end is a screen. Between points D and E is the tallest wave, between C-D and E-F are shorter tall waves, and so forth. But, at C, D, E, and F the waves completely cancel each other.

A beam of light passed through two thin slits will also produce such a pattern on a screen. Thus, it was hypothesized that the light must have the same wave characteristics as water. This opened up the question, though, as to what, exactly, was waving?

—Peter Martinson



Thomas Young's sketch of wave interference. Each series of curves represents a wave peak, and where wave peaks cross is a high point of constructive interference.



Constructive interference: *The two waves add to produce a larger wave.*
Destructive interference: *The two waves are each other's negative, and thus add up to zero wave.*

Louis de Broglie
(1892-1987

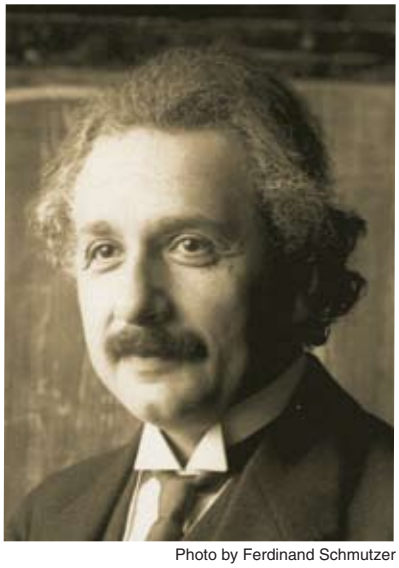


Photo by Ferdinand Schmutzer
Albert Einstein
(1879-1955)

elementary particles, such as the electron. He forecast that a beam of electrons focused on a thin crystal—the distance between whose atom-points was comparable to the "wavelength" of the electron beam—would produce an interference pattern on the other side, analogous to light interference, and then calculated the characteristics of that pattern. The experiment was performed with such a beam of electrons, and exactly the result forecast by de Broglie was obtained. Thus, all matter, including the lowly electron, has wave characteristics, just like light and all other energetic phenomena.

If electrons, supposedly tiny particles, can be induced to act like non-localized wave phenomena, then what exactly are they? Indeed, what is matter itself, and how is it different than energetic phenomena? If both material and energetic phenomena have the characteristics of both corpuscles and space-filling wave functions, then how can it be said that the space between planets, which is filled with an enormous variety of radiation, is empty? It is as empty as your typical university physics professor's head!

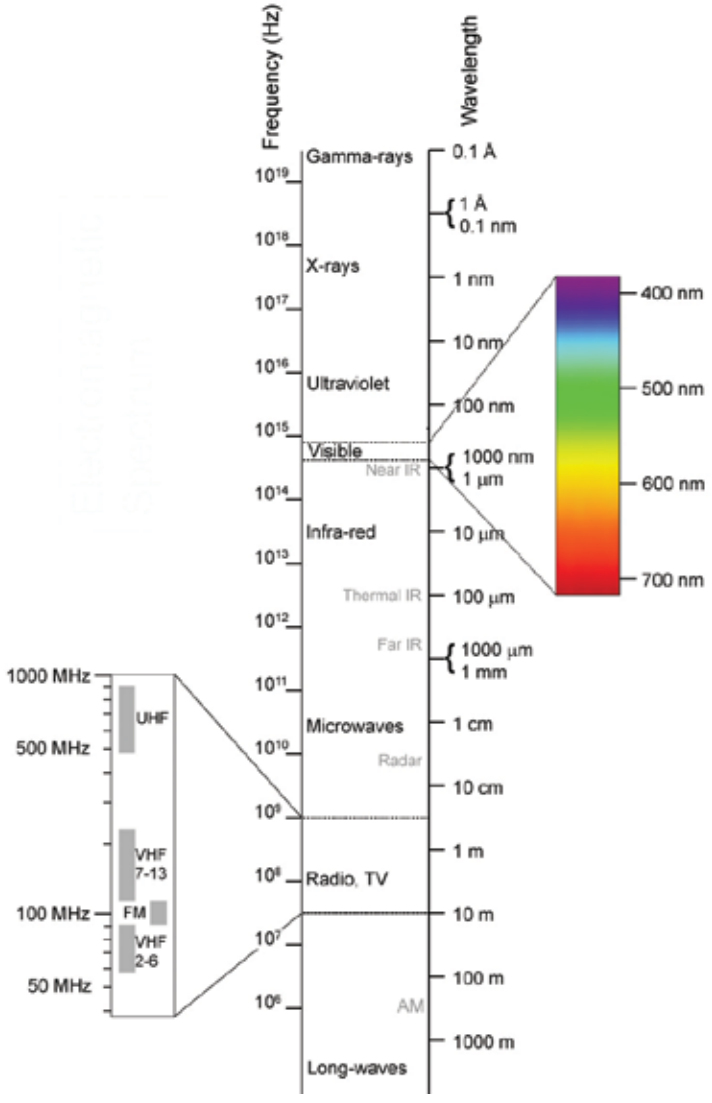
The New Periodic Table

This consideration must take the form of a central theme in the investigation of cosmic radiation, and its interaction with life. Organisms on our Earth are not opportunistic, hyperactive combinations of dead chemicals. They represent the organized expression of a universal phase of physical space-time, within which matter functions differently than in the abiotic phase. Does such living matter also have an opportunity to manifest both field and corpuscular characteristics? Or must living matter take a back seat to the quantum paradoxes that have tortured the positivists for the past hundred years? I think that would be very insulting to an entire phase of the Creator's universe!

At the same time, the process of photosynthesis is only one, albeit a very important one, of many aspects of the interaction between living matter and cosmic radiation. Areas of investigation will be described below, which demonstrate that this interaction is perhaps the dominant expression of life in the universe. Indeed, it may turn out to be incorrect to discuss "the interaction of life and cosmic radiation," instead of, simply, "cosmic life processes." Instead of viewing the Biosphere as some separate entity which interacts with cosmic phenomena, it very well might be more accurate to view cosmic radiation, generally and universally, as an aspect of life in the universe, and thus that life on Earth is itself inseparable from these radiations. As a collaborator recently expressed it, investigating life by shielding it from various radiations, could be like investigating a whirlpool by shielding it from water.

Cosmic radiation can be divided into categories, such as the various fields (electric, magnetic, gravitational, morphogenetic, etc.), the domains of the electromagnetic spectrum (radio, microwave, infrared, visible, ultraviolet, X-ray, gamma ray, etc.), and so-called energetic particles (cosmic rays, radioactive decay products, etc.). It is also necessary to subsume each of these categories by the domain of action, in terms of Vernadsky's three phase spaces: the abiotic, the Biosphere, and the Noösphere. For example, ultraviolet light is active on a purely chemical basis, in the breaking of chemical bonds; but it is also active in living processes, such as in the vision of many insects; and it is also used by man in his study of various organic systems, like chlorophyll, through UV fluorescence experiments. These three types of events must

FIGURE 2
The Electromagnetic Spectrum



Life responds to all wavelengths of the electromagnetic spectrum.

be classed as different phases, although of the same wavelength ranges.

Starting from here, we can begin to build up harmonies among sets of elements. In the tradition of Mendeleyev's notecard method, we can begin amassing properties of the catalog of radiations, including their relations to both living and cognitive phases of space-time. Mendeleyev created a table of elements, arranging their ascending masses according to the characteristic properties they exhibit in chemistry.

His table was incomplete, as Mendeleyev himself would readily point out were he alive today. For example, there is no convenient way to represent the expanding armada of isotopes in this table; much less is there a way of showing how each element or isotope came into being. William Draper Harkins took issue with this in 1917, by noting that the cosmic abundances of the elements vary in such a way that the even-numbered elements are far more abundant than the odd. He concluded, rightly, that the abundances are not determined by mass, but by "factors involved in the formation and disintegration of the atoms." Thus, there is no representation in Mendeleyev's table yet, of the evolution of isotopes, through the stages of sundry radioactive decay series.

Mendeleyev's student, Vernadsky, hypothesized that a new system of organizing the elements could be developed, if the distribution of minerals in the Earth's crust by living processes were taken as a crucial property. Vernadsky criticized Frank Wigglesworth Clarke's wonderful tables of geochemistry for exactly this omission, and for assuming that the distributions were merely geochemical, instead of biogeochemical.[2] This strategy was enhanced by the recognition that organisms in the Biosphere actively select specific isotopes of the elements, which implies the ability of life to select on the basis of some criteria other than simply chemical. A new table must thus reflect the dominant role that living processes play in the motions and transformations of all matter.

We go a step further. All living processes depend, fundamentally, on the catalog of cosmic radiation, as demonstrated profoundly by photosynthesis. Therefore, the Periodic Table itself can and will be reorganized into a new system, which takes as crucial elements those effects of the transformation of cosmic radiation within the three phase spaces of the universe—the abiotic, living, and willful cognition. Mendeleyev's work was extremely impor-

2. Vernadsky also hypothesized that the granite bedrock of continents, which floats atop the denser basalt layers forming ocean bedrock, was generated by living processes. A manned mission to Mars, beginning with industrialization of the Moon, will be necessary to determine whether or not granite even exists on other planetary bodies. As yet, none has been found. See, for example, Rosing, et al. (2006).

tant, but was necessarily bounded by the contemporary state of experimental work. Over one century later, we are now poised to include what seems like the rest of the universe. In this way, as LaRouche has described it, we can now begin to get this universe organized.

The Shape of Life

To conclude, let us look at one example of "Cosmic Life Processes," with the promise that there will be a lot more to come in the advancing weeks and months.

Alexander Gurwitsch (1874-1954)

Russian molecular biologist Alexander Gurwitsch demonstrated that mitosis in cells, during the developmental stage of the organism, can be induced through interaction with other cells in active mitosis phases. He discovered that this effect is caused by the emission of radiation from one cell to another, the wavelength of which he found to be that of ultraviolet light. He named this phenomenon mitogenetic radiation ("M-rays"). Later, he went on to demonstrate that the mitosis of cells was affected, spatially, by the other mitosing cells in the environment. He carried out these experiments under the hypothesis that there existed a morphogenetic field, which was analogous to the fields found in physics, but was not any one of them. He proposed that the study of this field, which was uniquely biological, would enlarge our understanding of fields in general.

Gurwitsch's M-rays are bound to very specific wavelengths. Outside that range, there is clear evidence of a more-or-less behavioral influence on living organisms from other categories of cosmic radiation, under the topic of Circadian Rhythms. Frank Brown's experiments did not necessarily reveal morphological changes, but these rhythms apparently registered all energetic phenomena, including electric and magnetic fields, cosmic rays, and extremes in the electromagnetic spectrum (such as gamma rays). Besides simple behavioral effects, reproductive cycles are also driven by lunar, annual, and other cosmic cycles.

One clear hint at a mode of direct action comes from a description by Russian biologist Vladimir Voeikov of A.A. Kozlov's work, which demonstrated that ionizing radiation could be necessary for the division of cells. Gurwitsch's M-rays are in the ultraviolet range, between about 3 and 100 eV. Kozlov pointed out that, if a beta particle exceeds 263,000 eV in water, it will produce Cerenkov radiation, which is about 4-5 eV—right at the low end, and thus the sweet spot, of mitosis-driving M-rays. Hence, if a gamma ray could enter the cell and trigger a beta decay from one of the atoms there, this would generate potential M-rays, and thus drive a mitosis. The experiment has not yet been carried out, to my knowledge, but it presents a clear avenue down which the development of the Biosphere could be driven, were the Creator of the universe so inclined.

These M-rays could be induced in another way—by cosmic rays. The Pierre Auger Observatory in Argentina detects the air showers caused by cosmic rays in two ways. First, barrels of water provide an environment in which the secondary particles of the air shower can move faster than light, which produces Cerenkov radiation. There is every reason to assume that, inside a cell, these secondaries produce a Cerenkov event, and thus M-rays. Second, the primaries cause nitrogen in the atmosphere to produce sub-ozone layer ultraviolet radiation, which can reach up to 4 watts on the ground. This could also be a potential source of M-rays.[3]

While this is not proof that morphogenesis is driven from outer space, it provides a very important mode of connection between the processes in distant systems, such as the Crab Nebula, with life here on Earth. Here we have a rich territory of experiment to fill out part of our new Periodic Table, under the category of Ultraviolet Radiation in the Biosphere.

3. This process, specifically, draws again into consideration the importance of the creation and maintenance of the Earth's atmosphere, which has the ability to convert high-energy cosmic rays into forms that are usable by organisms in morphogenesis.

Conclusion

Human civilization is on the brink of a new understanding of its universe. The effects of cosmic radiation will soon be recognized to impact virtually all aspects of scientific work. But, the recognition of this truth requires the overthrow of the now-dominant position that the positivist outlook has held over science. We must return to Planck's polemic against the positivists, that human reason does not lie in the world of sense perceptions, but in a higher, unsensed world.

This concept today sees its most developed state in the ideas of Lyndon LaRouche, who has asserted the primacy of a science of physical economy, over all other physical sciences. It is in the domain of that science, that the properties of human cognition are studied as a willful, causal representation of what can be called cosmic creation. A core of the budding physical economist's curriculum, is the study of the creative processes of a human mind, as represented in specific cases of scientific discovery. It is those processes, which the physical economist must seek to provoke, promote, and defend in the design of public policy.

As such, the earliest lesson in a course of physical economics, is that absolutely no knowledge is derived from sense perceptions, but those perceptions must rather be assumed to be fraudulent—in a very lawful way. True knowledge comes from the human mind, which uses those senses as what LaRouche terms "instrumentation," the paradoxical juxtaposition of which must be deciphered by the creative mind. In the same way, a skillful lawyer will pit two obviously lying witnesses into argument against each other, in order to make obvious where the truth doesn't reside. But, those lying sense perceptions, taken by themselves, can never be used to mathematically predict an as-yet-unknown, causal phenomenon. Only an hypothesis, generated by the creative individual worker, informed through the errors inherent in several sense perceptions, has that predictive quality.

This is the way all future scientists must think, in order to make sense of our growing universe.

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References

LaRouche, Lyndon, "The Escape from Hilbert's 'Zeta' 'X': Mapping the Cosmos," *EIR*, March 19, 2010

Planck, Max, *Eight Lectures on Theoretical Physics*, translated by A.P. Wills (New York:1915).

Vernadsky, Vladimir, "On Some Fundamental Problems of Biogeochemistry," *21st Century Science & Technology*, Winter 2005-2006, p. 39. http://www.21stcenturysciencetech.com/2006_articles/Biogeochemistry.pdf

Vernadsky, Vladimir, "Problems of Biogeochemistry II: On the Fundamental Material-Energetic Distinction Between Living and Nonliving Natural Bodies of the Biosphere," *21st Century Science & Technology*, Winter 2000-01, p. 20. http://www.21stcenturysciencetech.com/translations/ProblemsBiogeochemistry.pdf

Vernadsky, Vladimir, "On the States of Physical Space," *21st Century Science & Technology*, Winter 2007-08, p. 10. http://www.21stcenturysciencetech.com/Articles%202008/States_of_Space.pdf

Interview with Prof. Vladimir Voeikov, *21st Century Science & Technology*, Spring 2000, p. 58.

Gurwitsch, Alexander and Gurwitsch, Lydia, "Twenty Years of Mitogenetic Radiation: Emergence, Development, and Perspectives," translated by Vladimir Voeikov and Lev Beloussov, *21st Century Science & Technology*, Fall 1999, p. 41.

Harkins, William Draper, "The Structure of Atoms," *Science*, Vol. 46, No. 1192, p. 419 (1917).

Harkins, William Draper, "The Structure of Atoms II," *Science*, Vol. 46, No. 1193, p. 443 (1917).

Brown, F., "Living Clocks," *Science*, Vol. 130 (1959)

Rosing, M., Bird, D., Sleep, N., Glassley, W., Albarede, F. "The Rise of Continents—an Essay on the Geological Consequences of Photosynthesis," *Palaeogeography, Palaeoclimatology, Palaeoecology*; Vol. 232, p. 99, 2006.

On the fight around the quantum:

de Broglie, Louis, "Wave Nature of the Electron," Nobel Prize Lecture, 1929 http://nobelprize.org/nobel_prizes/physics/laureates/1929/index.html

Planck, Max, "On the Law of Distribution of Energy in the Normal Spectrum," *Annalen der Physik*, Vol. 4, p. 553 (1901).

Einstein, Albert, "On a Heuristic Point of View about the Creation and Conversion of Light," *Annalen der Physik*, Vol. 17, p. 132 (1905).

Bacciagaluppi, Guido and Valentini, Antony, *Quantum Theory at the Crossroads: Reconsidering the 1927 Solvay Conference* (Cambridge: Cambridge University Press, 2009).