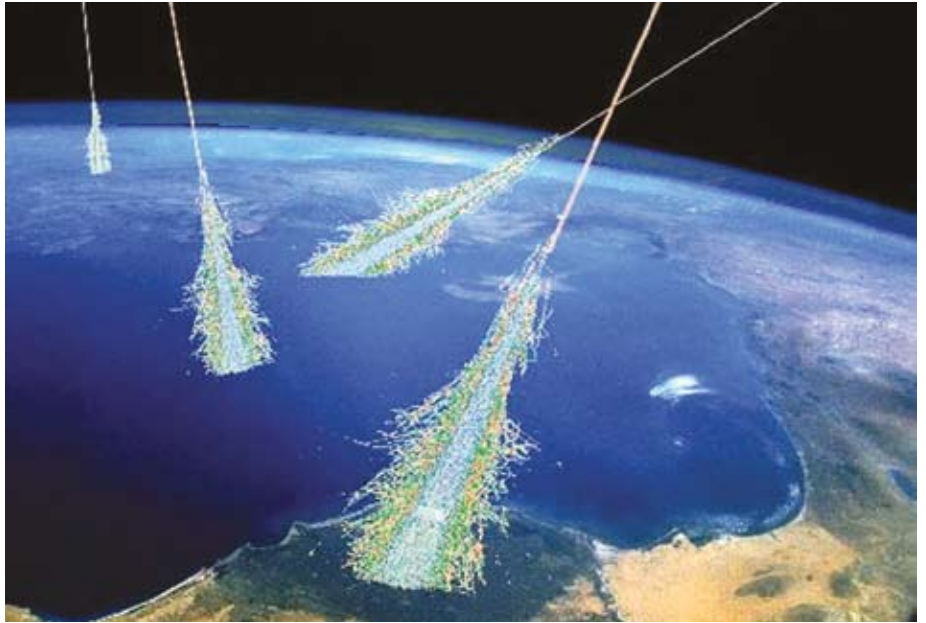


An artist's depiction of showers of high energy particles, which occur when energetic cosmic rays strike the top of the Earth's atmosphere. Understanding the biological role of this cosmic ray flow is crucial for the Moon-Mars colonization project, and also for our ability to grasp the truly intergalactic nature of the development of life on Earth, as well as its future in Man's hands, beyond the bounds of that same Earth.



Simon Swordy (University of Chicago)/NASA

# Kesha Rogers's Victory Signals Rebirth of a Mars Colonization Policy!

by Sky Shields

March 11, 2010

The election victory of Kesha Rogers March 2 in the Texas 22nd Congressional District represents a turning point in world history. The voters have demonstrated their refusal to accept the policy of physical-economic austerity which President Obama and his controllers have sought to impose through

*LaRouche Democrat Kesha Rogers won the Democratic Congressional primary March 2 in Texas (22nd district) with the campaign slogan "Save NASA, Impeach Obama, Vote Kesha." Kesha, who received more votes than both her opponents combined, campaigned on a platform of reorganizing the global economy to replace the current gambling casino of free trade with a policy of physical economic science, to ensure a future for our children and grandchildren. For more on her campaign, see <http://keshaforcongress.com/>*



EIRNS

unconstitutional bank bailouts, a murderous health-care policy, and general inaction on the crucial issues of the existential crisis which now faces the American population and the world. Most notably, they have refused to accept Obama's recent, treasonous decision to scrap the last vestiges of our nation's manned presence in space. They have voted, instead, for a future—a future organized around the intensive physical economic progress that can only be brought about by the scientific advancements connected with an expansion of Man's presence in space.

Rogers's victory provides the oppor-

*What will continuous 1-g acceleration of manned spacecraft to Mars tell us of the hidden link of life on Earth to the broader cosmos?*



*Symbiosis in motion: A scene from a video of Elysia chlorotica, a sea slug, in a three-way symbiosis with a virus and an algae. The virus contains material that allows chloroplasts, stolen from digested algae, to continue working while inside the body of the slug, so that the slug has to eat only once in its lifetime. This is an illustration in the small of the evolution of entire systems, rather than individual organisms, with organic “particles,” such as viruses, playing a crucial role. The video, made by scientist M.E. Rumphro, is featured in New Scientist.*

tunity to address the urgent question of accomplishing the economic development of the Solar System: the first steps of lunar industrialization, and the undertaking of a successful manned mission to Mars. Connected with this mission, is the task of finally establishing a very different conception of the organization of the Solar System and beyond. Specifically, the planned presence of human beings in locations very far from the surface of our Earth will require the development of a much more in-depth understanding of the action of cosmic and other forms of radiation on and within living systems. Not only will this expanded view of the role of energetic phenomena in living matter make extended stays off-planet possible, it also promises to revolutionize medical technology here on Earth, as well as provide a deeper understanding of the nature of living processes, evolution, and morphogenesis than would ever be possible under the existing policy of atomization and under-funding of such scientific investigations.

We will now have the opportunity to tackle the challenge of producing the types of artificial environment required for mankind to leave its “womb” here on Earth. What, from the Biosphere, will we need to carry with us? What will be the role of electromagnetic phenomena and cosmic radiation in that environment? It will perhaps be advisable to simulate Earth’s gravitational environment by accelerating ships through interplanetary space at 1 Earth gravity (1g), but this will be the first time that such a willful act of constant acceleration has occurred anywhere in the universe. It will represent the first artificial creation of a sustained gravitational field which, if maintained for long periods, will quickly result in relativistic velocities. What will be the effect of this sort of travel on a crew? What will be its effect on the physical universe more generally? These questions lead us to further unexplored aspects of the Biosphere immediately surrounding us, before

leading us deep into Man’s future in interstellar space.

### What Is Life?

Lyndon LaRouche recently posed a provocative question for our research team: How do you determine to which of V.I. Vernadsky’s three phase spaces—the non-living, the living, or the cognitive—a given process belongs? The answer is: *resonance*. No object exists independently as an object. All objects are defined by dynamics—by the process in which they exist. Vernadsky states that therefore biology, qua biology, is an abstract science, like geometry, because it artificially seeks to separate the study of the individual organism from the study of the entire process in which it participates.<sup>1</sup> In reality, there are no distinct organisms; there is only the organism in its context in the entire Biosphere. This is evidenced by the pervasive role of symbiosis in every aspect of the function and evolutionary development of the Biosphere. The evolution of the Biosphere is an evolution of relationships, not of individual organisms. Therefore, it is more advantageous to consider the Biosphere and its evolution as a single system, in which the individual organism exists as a singularity.

This nature of the individual organism as singularity and not as object is described in vivid terms by Vernadsky in his concept of the biogenic migration of atoms.<sup>2</sup>

1. Vladimir I. Vernadsky, *The Biosphere* (New York: Springer, 1998).

2. Vernadsky, “Scientific Thought as a Planetary Phenomenon,” Nongovernmental Ecological V.I. Vernadsky Foundation, 1997.



Wikipedia Commons

*Bog iron: an example of Vernadsky’s concept of the biogenic migration of atoms. Bog iron is produced in several stages by the action of the Biosphere, culminating with the creation of iron oxides by the oxidizing action of iron bacteria. In this way, life in the universe acts as an organizing force: the Biosphere, which is in turn organized to higher and higher degrees by the action of Man, in developing the Noösphere.*



Ren Wicks/NASA

An orientation toward a successful mission to Mars, using an industrialized Moon as a launch pad, will form the basis for exiting the current world economic crisis. This is mankind's expansion of what Vernadsky called the Noösphere—aiding the Universe in its continuing anti-entropic development. Here, an artist's concept of a Mars landing with the Martian moons of Phobos and Deimos visible in the twilight.

Specifically, organisms do not have permanent structures, like machines. Every portion of a living organism is in a constant state of flux, which is expressed as a continuous exchange of matter and energy, such that the distinction between the organism and its outside environment is not a material one. The same material participates in both processes, much as the same water flows into and out of a whirlpool. The difference lies in the process, not in the material. The obvious difference in the two cases, the living organism and the whirlpool, is that, upon completing its migration through the processes defined as the organism, the processed matter produced in the form of fossil material exists at a higher state of physical organization than before its participation in the organism.

Thus, viewed as a whole, the envelope of life on Earth, the Biosphere, can be viewed as a process of constant organization of the formerly abiotic physical substrate to higher and higher states of organization. In this way, we see the steady development of concentrations of various types of ores and other mineral deposits on Earth. These represent a more concentrated form of organization than that which existed in the previously dispersed state of materials, as initially derived from stellar matter; a state which is still visible in the relatively homogenous distribution of elements as found in, say, lunar regolith.

This biogenic migration represents a continuous process extending well outside of the atmosphere of the Earth itself. For instance: The beginning of the most important material cycles within the Biosphere is marked by the action of photosynthesis. In this process, dispersed, low-energy-flux-density radiation from the Sun is captured across large land areas by the action of photosynthetic plants, and organized into the carbohydrate-dense structure of those plants. They literally compose themselves from the incident sunlight which reaches the Earth.

These energy-dense carbohydrates are then consumed by more complex animal life and, via the process of digestion, are incorporated into the structure of these higher organisms, ultimately passing back out into the environment in the form of residual biological fossil materials such as soils, mineral deposits, and even Earth's atmosphere.<sup>3</sup> These fossil materials are then again processed by the geological force of human economic activity—becoming noetic fossils.<sup>4</sup> Thus, the Biosphere and Noösphere can be viewed, in terms of both the scale of the space occupied and the nature of their activity, as a singularity in an otherwise continuous process, marking the shift of matter and energy to qualitatively higher states of organization and concentration.

This continuous process extends to the Sun, in the form of solar energy absorbed by plants (and animals, in the case of vitamin D synthesis), but also

much farther, as is evidenced by the steady flow of *cosmic radiation* into and out of the Biosphere. This is a steady flux,

3. Vernadsky, *The Biosphere*. See note 1.

4. Lyndon H. LaRouche, Jr., "The Astrophysics of Gurwitsch Radiation," *21st Century Science & Technology* (Fall 1998); *The Economics of the Noösphere*, (Washington, D.C.: EIR News Service, 2001); "Vernadsky and Dirichlet's Principle," *EIR*, June, 3, 2005; and Vernadsky, "Some Words About the Noösphere," *21st Century Science & Technology*, Spring 2005).



Fermi National Laboratory

Victor Hess, the father of cosmic ray research, in the balloon in 1912 in which at 5,000 feet, he discovered "penetrating radiation" coming from space, what later became known as cosmic rays.



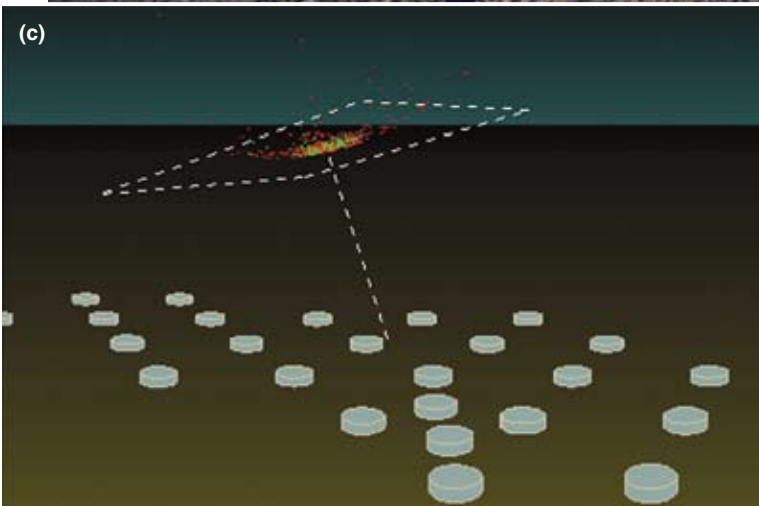
a) A single cosmic ray detector in a Utah field.

b) An aerial view of the CASA air shower array (composed of detectors like the one above) in Utah.

c) Animation of the development and detection of an extensive air shower in the Pierre Auger Cosmic Ray Observatory Engineering Array. The moving rectangle is the "shower plane" that is tangent to the shower front at the shower axis. The green dots represent electrons and positrons. Red dots represent muons. The light detected in a water tank station depends on its distance from the shower axis. The tank closest to the core gets a much stronger signal than those that are far from the axis. The arrival direction is calculated from the shower front arrival times at the different water tank detectors.



Courtesy of Pierre Auger Observatory



much like the flow of solar energy into the Biosphere, though its role in biological processes is largely unexplored. Understanding the biological role of this steady flow of cosmic material has a crucial significance for an expanded Moon-Mars colonization project.

### The Biogenic Migration of Cosmic Rays

This is a complete cycle, like the other biogenic migratory cycles such as food consumption and photosynthesis. There is a steady flow of ionized particles in and out of Earth and its atmosphere. Those among them of the highest energy pass directly through all matter, biological and otherwise, seemingly unaffected by that passage. But it is also these particles, capable of bypassing all types of shielding, which are potentially implicated in regulating the circadian

rhythms of various organisms maintained in otherwise shielded environments.<sup>5</sup> Other, lower energy particles are involved in col-

5. Frank Brown, "Living Clocks," *Science*, No. 130 (1959).

lisions at different levels of the Earth's atmosphere, producing cascades of secondary particles which are involved in changing isotope ratios at the Earth's surface, and likely effecting radical changes in Earth's climate. It is these particles, for instance, which likely play the dominant role in cycles of glaciation, global warming, and the cyclical passage through ice ages.<sup>6</sup>

This interaction of cosmic rays with the atmosphere, creating cloud cover and shifting Earth's climate in and out of ice ages, is to be considered a very specific type of interaction with the Earth's Biosphere, because, as Vernadsky points out,<sup>7</sup> the Earth's atmosphere is entirely a creation of living matter on the planet. Thus, the cascades produced by cosmic radiation upon entering the atmosphere, as well as the highly energetic activity occurring in the ionosphere, interacting with the solar wind, and producing phenomena such as the aurora, are all properly recognized as products of the Biosphere. The role of cosmic rays on an abiotic environment, such as the Moon, is entirely different, as the peculiar composition of lunar soil attests.

Also, on the level of the individual organism: Shielding living creatures from radiation produces a change in metabolic rate similar to the changes in metabolism which result from removing nutrients, warmth, oxygen (in the case of organisms possessing mitochondria), or sunlight (in the case of organisms possessing chloroplasts). This is a further indication that cosmic rays play a crucial role in the biogenic migration of material through the Biosphere.

### The Role of Cosmic Radiation In Evolutionary Processes

*What We Know from the Fossil Record.* British science writer Nigel Calder and Danish scientist Henrik Svensmark describe a creative role for cosmic rays in the early development of the Solar System, fueling chemical reactions, and promoting the formation of complex molecules.<sup>8</sup> The role of cosmic rays in the evolution of matter does not stop with development of the abiotic material in the Solar System, however. The most telling example of the role of cosmic radiation in biological processes is in long-term evolutionary cycles. The very fact of the role they

6. Nir Shaviv, "Cosmic ray diffusion from the galactic spiral arms, iron meteorites, and a possible climatic connection," *Phys. Rev. Lett.*, Vol. 89 (2002); Henrik Svensmark, "Cosmoclimatology: A New Theory Emerges," *Astronomy and Geophysics*, No. 48 (2007).

7. Vernadsky, *The Biosphere*, see Note 1.

8. Henrik Svensmark and Nigel Calder, *The Chilling Stars: A New Theory of Climate Change*, (New York: Totem Books, 2008).

*Glacial Grooves State Memorial on an island in Lake Erie is a source of hundreds of fossils. Inset is a closeup of fossils under examination by students on a field trip. There are clear cycles of fossil biodiversity corresponding to variations in cosmic ray influx as the Earth passes through the spiral arms of the galaxy.*



Centers for Ocean Sciences Education Excellence

play in global warming and glaciation is enough to have a significant effect on biological life on Earth, but there is much evidence for a much more direct role for cosmic ray radiation in evolutionary processes. Most of this connection is recognized only in the form of observed resonances between various cycles in the Biosphere, and related cycles elsewhere in interstellar space. Causal connections, and the processes of mediation have not yet been established, although potential candidates will be hypothesized below, starting from the work of the Russian biologist Alexander Gurwitsch.

Outside of what we will discuss here, no attempt has yet been made to account for the anti-entropic, creative nature of this entire process, which links life on Earth to the broader cosmos. A comparison of the cycles, which indicates a clear resonance among astronomical, biological, and geological cycles, is, however, of great interest for beginning the correct investigation.

Clear cycles of increase and decrease in fossil biodiversity (the number of distinct species living on the planet at any given moment) have been discovered, of 62 and 140 million years.<sup>9</sup>

9. Robert A. Rohde and Richard A. Muller, "Cycles in fossil diversity," *Nature*, No. 434 (2005).



Wikipedia Commons

*Characteristic sandstone layers inside Lower Antelope Canyon, the most-visited canyon in the American Southwest, located on Navajo land near Page, Arizona. The sandstone layering is formed by water flow and erosion.*

*Chalk Badlands in the Smoky Hills of western Kansas, with outcroppings of several types of stone. The region is mostly relatively flat, making the scattered locations, where Niobrara Chalk and Dakota Sandstone are exposed, more dramatic.*



John Charlton/Kansas Geological Survey

The 140-million-year cycle corresponds to the variations in cosmic ray influx predicted to occur from the Earth's passage through our galaxy's spiral arms. This predicted, periodic change in incident cosmic radiation has also been verified in examining the changing potassium 40/41 isotope ratios observed in iron meteorites, and thus, to the frosty "snowball Earth" periods, which correspond to the quantity of incident cosmic radiation.<sup>10</sup>

Examining the age of deposits of igneous rock shows that volcanic activity is on the same, roughly 60-million-year cycle, showing an as yet unexplained connection to geological/tec-

10. Shaviv, "Cosmic ray diffusion," Note 6; Svensmark, "Cosmoclimatology," See Note 8.

tonic phenomena.<sup>11</sup> But, more to our point here, this cycle is also of the same period as that predicted for the regular passage of our Solar System in and out of the plane of the galaxy, if we take into account the likelihood that the density of cosmic radiation differs from one side of the galactic plane to the other.<sup>12</sup> A component of the sea-level fluctuation measured by Exxon researchers is consistent in period and phase with the shorter fossil biodiversity cycle. The ratio of the strontium 87/86 isotopes, which is related to the amount of dry land left unexposed as water levels change, also matches the period and (inverted) phase of the 62-million-year period,<sup>13</sup> which again points to a relationship between tectonic changes and astronomical cycles (cf. the cycle in volcanic activity identified by Rohde and Muller in footnote 9).

Thus, in general, we see much evidence for a sort of astrobiogeochemical resonance, which leads us to begin to conceive of the idea of the Biosphere as a participant in an

organized system whose scale extends to the farthest known sources of cosmic radiation. The impression that astronomical processes are separated by vast reaches of empty space is shown to be incorrect; the Biosphere is connected functionally to the farthest reaches of the physical universe by an incredibly active process, invisible to the naked eye. Space is far from empty, but rather full, dynamic, and complex—organizable, like Earth itself, into the interacting phase-spaces of the

abiogenic, the Biosphere, and the Noösphere, where the last indicates the potential for mankind's active economic development and reorganization of this complex system. This is the proper context in which to understand discussions of lunar industrialization, Solar System colonization, and the economic organization of interplanetary, interstellar, and intergalactic space.

This leads us to the major problem with all of these cyclical

11. Rohde, See Note 9.

12. Mikhail V. Medvedev and Adrian L. Melott, "Do Extragalactic Cosmic Rays Induce Cycles in Fossil Diversity?" *The Astrophysical Journal*, Vol. 664 (2007).

13. Medvedev and Melott, Note 12.

comparisons, but also potentially the source of the greatest possible number of new lines of research: the fact that the actual “chart” of evolutionary development, particularly after the emergence of Man and the Noösphere, is not cyclical. It is a continuous upward development to ever higher levels of organization and energy-flux-density, as measured and defined by the physical economist LaRouche.

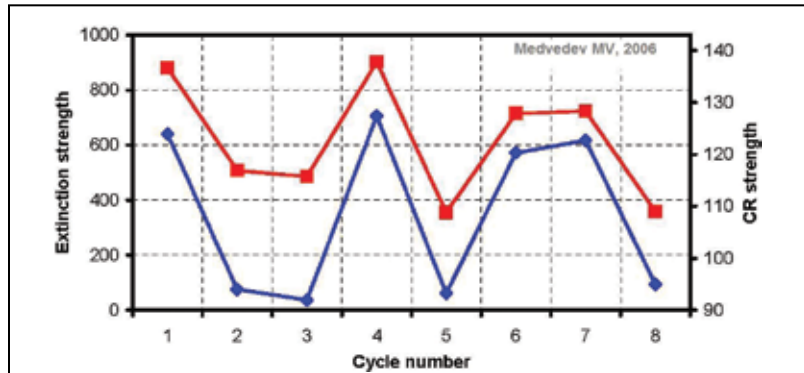
So now we return to the question posed by LaRouche at the outset: To which of Vernadsky’s three phase spaces does this flow of cosmic rays belong? If they and the cycles with which they resonate, are part of the development of the Biosphere, then, the Biosphere’s anti-entropic development must be a character of the entire system of material-energetic flows which participate in the development of that Biosphere. Connected to this, is the necessity of developing means to recognize more qualitative, and not merely quantitative differences in cosmic ray interaction with the Biosphere. Life, as we will see below from the work of Gurwitsch, is sensitive to such qualitative differences in electromagnetic and other radiation, as the above-mentioned studies have not yet taken into account.

### Possible Modes of Activity Within the Living Organism

*What Are the Natural Processes of the Living Organism that Utilize These Types of Radiation?* Regarding quantity versus quality of radiation, and the sensitivity of life to these qualitative differences (where the current generation of measuring instruments lacks equal precision; cf. the work of Gurwitsch),<sup>14</sup> life’s interaction with, and usage of, coherent electromagnetic radiation is far superior to the types of abiotic phenomena which are frequently attributed to it in theoretical, rather than experimental, considerations. Knowledge of the complexity of this normal functioning of different types of radiation within living organisms will shed light on what effects are to be expected from exposure to atypical forms of radiation.

Currently, lack of precision in our knowledge of the role of different types of radiation in living phenomena limits us to describing the destructive effects of large amounts of relatively disorganized radiation, such as that which is utilized with varied results in the treatment of various types of cancers. What sort of precise medical applications of radiation could we de-

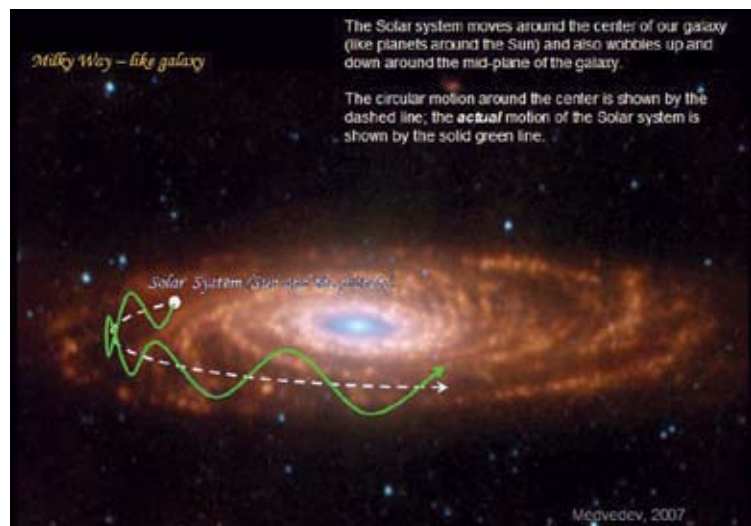
14. M. Lipkind, “Alexander Gurwitsch and the Concept of the Biological Field,” [Part 1](#); *21st Century Science & Technology* (Summer 1998); and [Part 2](#), *21st Century Science & Technology* (Fall 1998).



**Figure 1**  
**THE MEDVEDEV MODEL OF SPECIES EXTINCTION**

*The near-perfect agreement between so-called “extinction strength” (blue, lower line) and the intensity of cosmic rays (red, upper line) as predicted from Medvedev’s model. Extinction strength here means the amount of change in fossil biodiversity during each 62-million-year cycle of the Solar System in and out of the galactic plane. The cosmic ray (CR) strength predicted by Medvedev’s model differs at each bob, because of the irregular distribution of matter throughout our galaxy.*

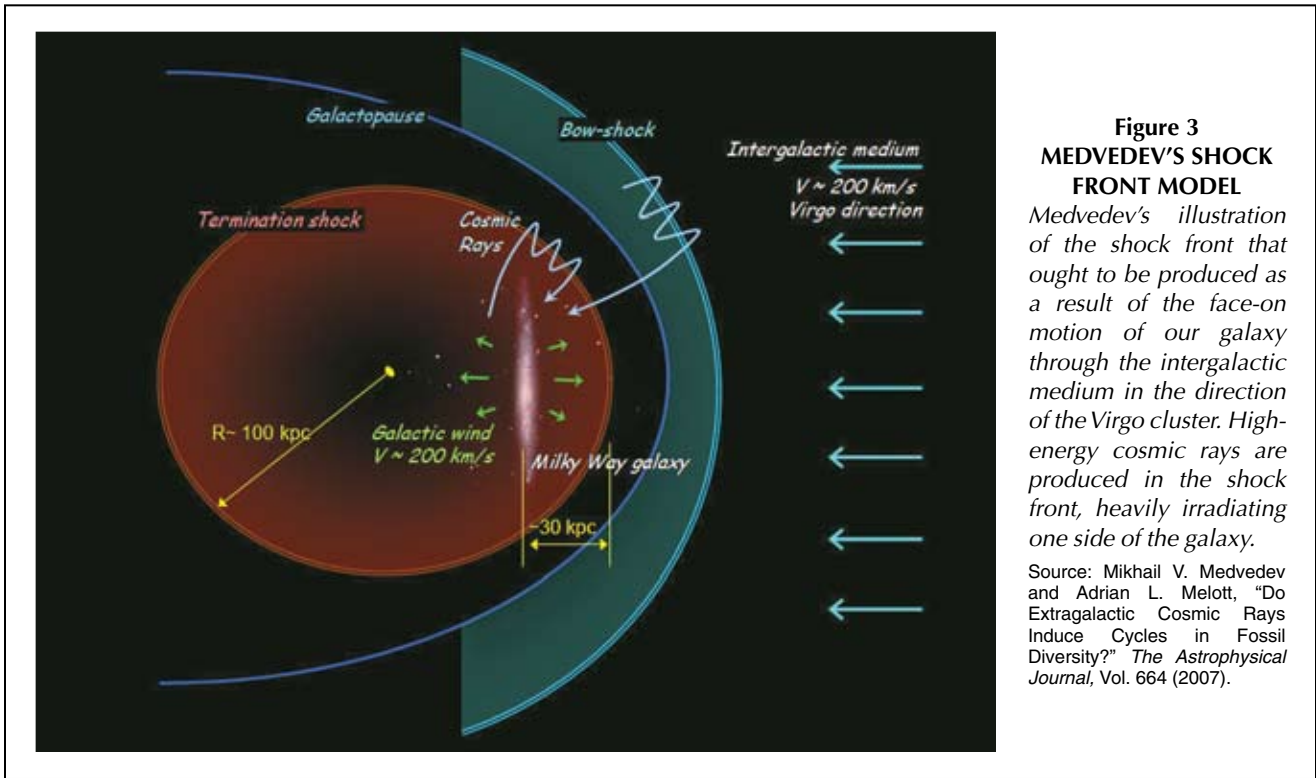
Source: Mikhail V. Medvedev and Adrian L. Melott, “Do Extragalactic Cosmic Rays Induce Cycles in Fossil Diversity?” *The Astrophysical Journal*, Vol. 664 (2007).



**Figure 2**  
**IMAGE OF SOLAR SYSTEM MOTION AROUND OUR GALAXY**

*Cosmic radiation is more intense as we pass through the bright areas of the spiral arms, because the matter which produced them is denser there. This correlates to a 140-million-year cycle of “icehouse” events on Earth, as cosmic radiation interacts with the Earth’s atmosphere to increase cloud cover. As the Solar System orbits the galaxy’s center, however, it also bobs up and down on a cycle of about 60 million years (the green wavy line). By Medvedev’s model of shock-front cosmic-ray production (see Figure 3), the intensity of cosmic-ray production is greater on one side of the galactic disk than on the other.*

Source: Mikhail V. Medvedev and Adrian L. Melott, “Do Extragalactic Cosmic Rays Induce Cycles in Fossil Diversity?” *The Astrophysical Journal*, Vol. 664 (2007).



**Figure 3  
MEDVEDEV'S SHOCK  
FRONT MODEL**

Medvedev's illustration of the shock front that ought to be produced as a result of the face-on motion of our galaxy through the intergalactic medium in the direction of the Virgo cluster. High-energy cosmic rays are produced in the shock front, heavily irradiating one side of the galaxy.

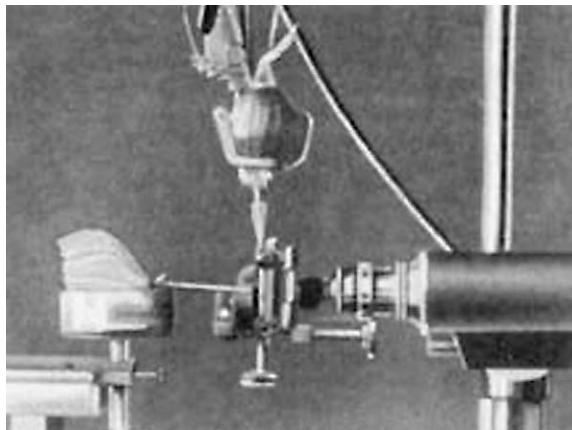
Source: Mikhail V. Medvedev and Adrian L. Melott, "Do Extragalactic Cosmic Rays Induce Cycles in Fossil Diversity?" *The Astrophysical Journal*, Vol. 664 (2007).

velop with a more detailed knowledge of the role of radiation in the normal functioning of living processes?

We know of photosynthesis as one clear interaction of living organisms with the electromagnetic spectrum. Likewise, in mammals, we have the sunlight-mediated synthesis of cholecalciferol. Also, however, Gurwitsch and his followers have demonstrated that coherent ultraviolet radiation plays a very important regulatory role in processes of cell mitosis, the most important function in the gestalt properties of the organism: morphogenesis and regulation.<sup>15</sup> Incorrect functioning of this ultraviolet "mitogenic" radiation has been connected to the development of cancers. The radiation which occurs in these organic processes differs qualitatively from that produced by artificial sources. One notable factor in the biological case is its coherence.

The work of Wood's Hole Marine Biological Laboratory comparative physiologist Frank Brown implies that cosmic rays may play an important role in the regulation of

animal metabolisms: The metabolic functions of various organisms are related to various astronomical cycles which tend to be roughly on the order of a day or month. These cycles are reflected in the metabolism of the organism, even when the organism is removed from direct visual cues such as the Sun and Moon. Brown has shown that this regulation continues when the only influences that have not been isolated are cosmic rays, and the various penetrating electric, magnetic, and gravitational field effects produced by the Earth itself. Many animals are known to possess the ability to orient to the Earth's



*Alexander Gurwitsch's famous onion stem experiment, where he demonstrated that processes of cell mitosis, which govern the growth and morphogenesis of the organism, depend on low-intensity ultraviolet radiation, which he called mitogenetic radiation.*



*Alexander Gavrilovich Gurwitsch (1874-1954).*

15. See Note 14.



Dr. Frank A. Brown's research showed that some sort of exogenous cycle (cosmic rays, or electric, magnetic, and gravitational field effects produced by the Earth) influenced the metabolism of organisms. For example, oysters that had been transported by train in a light-sealed box from New Haven harbor to Evanston, Illinois, after a two-week adjustment period, began to open again at the time of "high tide" over Evanston. They were maintained in a pressure and temperature-controlled aquarium, sealed from any visual cues from the Sun or Moon.



Chesapeake-Bay.org

magnetic field. Birds have recently been demonstrated to navigate by actually visually perceiving the magnetic field of the Earth.

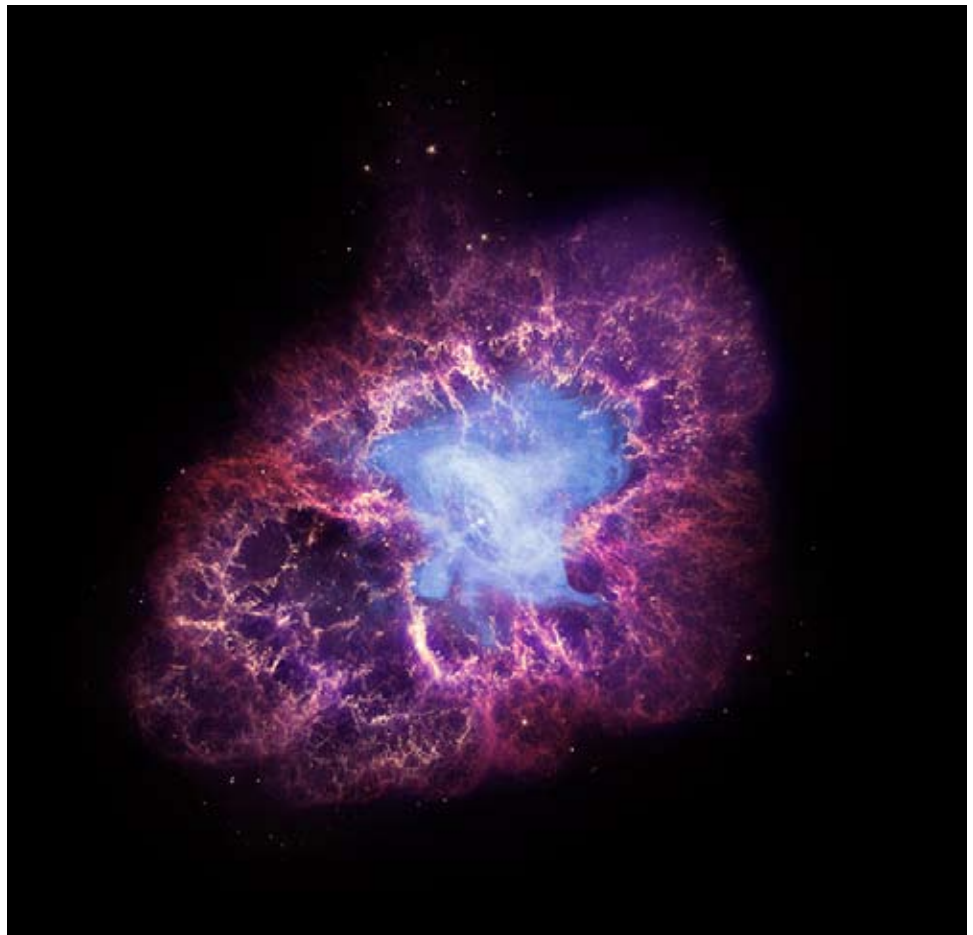
As a final point, connected to the work of Gurwitsch, we know that nucleic acids are extremely sensitive to (resonant with) ultraviolet radiation, to the extent that certain viruses are "turned on/off" (enter and exit their lytic or cancer-inducing phase), based on interaction with ultraviolet radiation in laboratory conditions.

### What We Know About The Sources of These Fluxes

*Crab Nebula, Pulsars, Super/Hypernovae.* Our first indication of the fundamentally creative nature of even the "abiotic" universe, is to be found in our recognition of its character as a dynamic, developing system, constantly coming into creation. Relevant to our topic of discussion here, is the constant creation of new sources of cosmic radiation in the form of supernovae, hypernovae, pulsar stars, and the like. While most of what is claimed about them at present is pure speculation, simply extrapolated from existing physical knowledge here on Earth, what is clear is that their constant rate of creation gives us a sense of a moving, directed, rather than cyclical, process which more closely resembles that which characterizes the development of the Biosphere and the Noösphere, each in their respective degree. Therefore, understand-

ing their resonance with life on Earth will give us more insight into their as-yet-unexplored creative characteristics.

A 1-g trip to Mars will represent Man's creation of new relativistic phenomena. It is significant that the known, major sources of cosmic radiation here on Earth, such as the Crab Nebula, are all connected to phenomena which seem paradoxical from the standpoint of relativity theory. This points to a type of causality which lies outside of the simple, kinematic chains of cause and effect, and leads us towards a more gestalt-like, systems approach to causality: *dynamics*. A more certain assessment of the nature of these processes demands a closer inspection,



X-ray: NASA/CXC/SAO/F.Seward; Optical: NASA/ESA/ASU/J. Hester and A. Loll; Infrared: NASA/JPL-Caltech/R. Gehrz/University of Minnesota

*The Crab Nebula: A composite image using data from three of NASA's Great Observatories. The Chandra X-ray image is shown in blue, the Hubble Space Telescope optical images are in yellow and red, and the Spitzer Space Telescope's infrared image is in purple. The X-ray image is thought to be smaller than the others because extremely energetic electrons emitting X-rays radiate away their energy more quickly than the lower-energy electrons emitting optical and infrared light.*

and begs the question: What physical boundaries do we begin to push, at the moment we institute trips at an acceleration of 1 Earth gravity over long distances?

### Experimental Proposals

The first experimental investigations will obviously require a more detailed study of the environment to be faced by our interplanetary travellers. Probes carrying several different types of instrumentation will need to be accelerated at 1-g for an extended period of time, in order to gauge what unexpected physical effects might result from this process.

The economic questions



Pat Rawlings/NASA

Artist's depiction of exploring fossils on Mars—and continuing the expansion of Man and the Noösphere into interstellar space.

## Vernadsky on Cosmic Radiation

Radiation from the cosmos throws an eternally and continually powerful stream of energy onto the face of the Earth, conferring quite a peculiar and novel character on the parts of the planet bordering cosmic space. Due to cosmic radiation, the biosphere acquires characteristics that are novel, unusual, and unfamiliar to the Earth's matter—the face of the Earth reflected in its cosmic environment shows a new picture of the Earth's surface as it is transformed by cosmic forces.

As a result of these radiations the substance of the biosphere is penetrated by energy—it becomes active, it gathers and distributes the energy received in the form of radiation and eventually turns it in terrestrial organisms into free energy capable of performing work. . . . The external envelope of the Earth formed from this living substance can therefore not be regarded as a domain of sheer substance—it is the domain of energy, the site of transformation of the planet by external cosmic forces.

The face of the Earth is transformed by these forces and to a great extent molded by them. Not only is it a reflection of our planet, a feature characteristic of its substance and energy, but at the same time it is a creation of the external forces of the cosmos. The history of the biosphere is therefore sharply distinguished from that of the rest of the planet, and the role it plays in the planetary mechanism is quite exceptional. It is as much, or even more, the creation of the Sun as it is a manifestation of terrestrial processes.

—from *V.I. Vernadsky, Geochemistry and the Biosphere*, Ed., Frank Salisbury (Santa Fe, N.M.: Synergetic Press, 2006)



Vladimir Ivanovich Vernadsky  
(1863-1945)

connected to this expanded investigation is more than a question of “local jobs.” What this type of political orientation means, and what Kesha Rogers and LaRouche represent, is an orientation towards the future of the human species as a whole. Ensuring mankind's future in this form is the only way to ensure the existence of health care, meaningful employment, and a cultural sense of mission not only for this nation, but for the world. Real patriots, policymakers, scientists, engineers, and average citizens will rally around the vision that this mission represents, defeat the financial controllers of the current Obama Administration, and help make this policy a reality. In a world desperate for real leadership, the future, and our survival, is in our hands.

*Sky Shields* is a member of the LaRouche Youth Movement's “base-ment” research team. [sky.jason.shields@gmail.com](mailto:sky.jason.shields@gmail.com)

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