

SCIENCE FOR A NEW PARADIGM

Time for a Solar Noösphere

by Benjamin Deniston

Oct. 29—*This article is dedicated to the successful Oct. 18-19, 2014 international conference held in Frankfurt, Germany, in honor of the 30th anniversary of the founding of the Schiller Institute, “The New Silk Road and China’s Lunar Program: Mankind Is the Only Creative Species.” The purpose of the conference was stated in the [Resolution](#) adopted by the participants: “to establish an inclusive peace order, with the participation of every nation on the planet, a peace order for the 21st Century, worthy of mankind as the only known creative species in the universe.”¹*

The three mortal dangers to civilization highlighted in the conference Resolution are expressions of the false view of the nature of mankind which underlies the current, failing paradigm. The deep issue is the oligarchical conception of mankind as an animal, as a beast to be herded and culled, as the British Empire’s Prince Philip has expressed such desires so openly. With the rise of a new strategic alliance on the planet centered around the BRICS nations, comes the potential for a scientifically valid conception of the creative nature of mankind to govern the planet, and beyond.

The proceedings of the [conference](#) provide the most comprehensive picture of this developing new paradigm.

Here we investigate some of the scientific aspects of this prospective new stage for mankind, starting from the recent emphasis by Lyndon LaRouche that the animal conception of mankind must be eliminated, and

replaced with a scientific understanding of the creative powers of the human mind. The specific subject here is an initial investigation of animal vs. human time.

Relative Space-Time

In an earlier research report, working from the thesis of Russian-Ukrainian scientist Vladimir Vernadsky on the variable space-time characteristics of living matter,² an hypothesis was developed regarding a relative space-time of living organisms. Here we compare this relativistic domain of animal time with the qualitatively different, self-determined time created by mankind. Mankind is not, and cannot be measured by, nor confined in, animal time, as will be elaborated below, but increasingly occupies and creates new domains of time in the very short and the very long.

The initial animal study of the relative space-time of the living organism was prompted by examinations of what appeared to be paradoxical differences in the energy-flux density of different species. For example, an initial analysis seemed to indicate that the energy-flux density of mice was much higher than that of elephants. From the perspective of the work the Basement [the LaRouchePAC Science Team—ed.] has done on the anti-entropic development of life on Earth, this seemed a bit strange, because they are both expressions of the mammalian evolutionary class, and would be expected to

1. See Helga Zepp-LaRouche’s video presentation of the [Resolution](#).

2. See Vernadsky’s *Problems of Biogeochemistry I, Problems of Biogeochemistry II*, and *On the States of Physical Space*.

express the same level of energy-flux density.

We developed the hypothesis that the energy-flux densities of mice and elephants approximate the same value, *but with respect to relative time*, instead of clock time.³ Time, itself, would change as a function of the space-time characteristics of a living organism, allowing the intrinsic time of the mouse and the elephant to be the same (like the experience of time for the twins of Einstein's Twin Paradox), even though they appear to outside observers to be different.⁴ Thus, all mammals are defined by the same energy-flux density, which defines a relative, "intrinsic" time for the organism, a mammalian time unit.

While the same energy-flux density and mammalian time unit are approximated by all mammalian species, they change for animals outside the mammalian class (amphibians, reptiles, etc.). Thus, the energy-flux density of animal species increases over the course of evolutionary time, in conformity with Vernadsky's second biogeochemical principle (corresponding to the anti-



Vernadsky's identification of a new geological epoch, created by the biogeochemical expressions of human intelligence, is a testament to the powers of the creative human mind.

3. For example, all mammal species approximate the same energy use per mass per physical time cycle (such as heartbeat, time to reach reproductive maturity, time for population doubling, etc.). This is elaborated in the unpublished research report, "On LaRouche's Call for a Vernadskian Physical Time: Energy-Flux Density and the Physical Space-Time of the Living Organism," Benjamin Deniston, May 29, 2014.

4. For example, by the mouse's experience, the elephant operates very slowly, while by the elephant's experience, the mouse operates very quickly. Yet, they each, individually, experience the same amount of time (as measured by various physical, biological metrics, for example). It is as if the elephant exists on the traveling rocket ship of Einstein's Twin Paradox (where time moves more slowly, relative to the twin who never left the Earth); however, for the elephant, the time-dilation effect is not due to relative motion or acceleration, but to the intrinsic space-time of the living organism (along the lines that Vernadsky was raising). In Einstein's Theory of Relativity, the action of light is the physical consideration (principle) which provides the relative constant, while space and time yield and give way to the principle of light. For the space-time of a living organism, it appears that energy-flux density (as defined in the cited research report) provides the principled physical process, by which the space-time of the living organism is determined. In relativity, differences in relative speed or acceleration determine the level of time-dilation effects. In the space-time of living matter, time dilation is associated with the average adult mass of the species.

entropic evolutionary development of the biosphere).

This relative animal time was treated in more detail earlier, and now provides an interesting basis to illustrate something even more interesting: the *supra-animal characteristics of the human species*. Mankind partakes in a mammalian biology, and thus, it would seem, would be bound by this mammalian time unit. If that were the case, then time for the human individual would be subsumed and defined by this mammalian characteristic, and would be similar to that of a primate (or any mammal) of a similar size. For example, this would result in an average human lifespan of

about 20 years.

However, this is clearly not the case. The average human lifespan in Medieval England (ca. 1300) was about 30 years; by 1850 in America, it was 43 years, and in America today it is 78. *Time, for mankind, isn't just a relative space-time of a living organism, it is relative and self-defined by the creative powers of the human mind.* What is unique about mankind is not simply the different time value, but the active process of continuously re-defining time as mankind willfully self-evolves. This stretches far beyond changes in the lifespan of the individual, into temporal domains of the very large and very small, beyond the biological limits of the body.

A View from the Noösphere

From the standpoint of Vernadsky's second biogeochemical principle, examine mankind's time from the larger perspective of the historical development of society. In his *The Evolution of Species and Living Matter* (1926), Vernadsky states, "This biogeochemical principle, which I will call the second biogeochemical principle, can be formulated thus: 'The evolution of species, leading to the creation of new stable, living forms, must move in the direction of an increase of the biogenic migration of atoms in the biosphere.'" Later, in his *The Study of Life Phenomena and the New Physics* (1931), Vernadsky examines the emergence of mankind from this standpoint:

With the appearance of man in the biosphere, conforming to the second biogeochemical principle, the action of life on our planet develops and changes by the effect of his intelligence, to such an extent, that it becomes possible to speak of a special psychozoic epoch in the history of our planet, analogous to other geological epochs in the change effected in living nature on Earth, as during the Cambrian or Oligocene, for example. With the appearance of a living being on our planet gifted with intelligence, we pass into another stage of its history.

Vernadsky's identification of a new geological epoch, created by the biogeochemical expressions of human intelligence, is a testament to the powers of the creative human mind. But perhaps most important to emphasize here is the speed at which mankind has done this. In the geological timescale, "ages" and "epochs" are measured in millions and tens of millions of years—yet for the history of mankind, we identify a series of ages (Stone, Bronze, Iron, etc.) lasting only thousands or hundreds of years. These particular divisions might not correspond to the equivalent of geological ages, but they hint at a profound truth: Mankind's actions, even over generations, can express the power of geological change, and at a more rapid, different rate (**Figure 1**).

When did this new psychozoic epoch begin? Some have pointed to the large-scale development of agriculture and irrigation as marking the time when mankind began to have a biospheric and geological effect that created a new geological epoch (starting in the range of 10,000 years ago). Others look more recently, to the Industrial Revolution (ca. 1760-1840).

However, LaRouche's physical economics provides a scientific approach to assessing such questions. By his metric of potential relative population density, we can use population growth as a proxy for a measure of mankind's effect on the biogeochemical cycles of the biosphere. Biologically (without the intervention of the creative powers of the human mind), a higher ape (biologically similar to man) might be able to achieve a "natural" global population in the hundreds of thousands (or maybe a few million). Yet, 5,000 years ago,

FIGURE 1

A Diagram of the Geological Timescale



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mankind was already far beyond this biological-ecological limit, with a global population in the tens of millions. By 2,000 years ago, the population was in the hundreds of millions.

Over the past few hundred years we began to count in the billions. This might give the best available indication of not only the rate of change, but the *increasing rate of change* of mankind's power as a geological force, as determined by mankind's unique ability to willfully determine and change its potential relative population density. These leaps in global potential relative population density have required increases in the energy-flux density of the noosphere-biosphere system, as Vernadsky would measure biogeochemically in the increasing biogenic migration of atoms. Thus, human population growth can be a useful proxy for the power of mankind as a geological force.⁵

As expressed in the increasing rate of population

5. The prospect for developing a geological timescale based on biogeochemical change consistent with Vernadsky's notions is being treated in a draft in process, "Developing Geological-Biogeochemical Time," and the associated biogeochemical analysis of human economic activity is discussed in another draft in process, "Potential Relative Population Density and the Biogeochemistry of the Noosphere."

growth, for mankind's actions we are initially speaking in metrics of thousands of years, more recently, hundreds of years, and now, in generations. By the action of the biosphere, without human intervention, the rate has also been increasing, but measured in *millions* of years (if not tens or hundreds of millions of years). The changing biogeochemical power of mankind over centuries or generations, expresses biogeochemical changes only otherwise seen over multi-million-year geological timescales. Said otherwise, *human society wields the power of geological time*.

Before going on, it must be re-emphasized that the significance is not in any particular value, but in the increasing rate of change. Shorter and shorter periods for mankind, measured in generations, encompass larger and larger geological timescales of biogeochemical action. *Mankind now wields the geological time of ages and epochs at will.*⁶ Scales of change associated with millions of years of evolutionary change of animal life are surpassed by generations of human creative (not biological) action.

Scientific-Cultural Time Unit

In this larger context, return to the opening point: Time, for the individual animal member of the mammalian class, appears to be defined by the energy-flux density and relative time of a mammalian time unit, but for the individual member of the human species, time is defined by the self-determined scientific-cultural level of society. Changes in the biological time unit of an animal species require evolutionary change around the taxonomic level of class or order (far outside the capabilities of any individual species), occurring over geological timescales of millions of years. To change the scientific-cultural time unit of a human society requires no biological change, but a scientific-cultural change, which is created by the actions of individual human minds over generations.

This is expressed in interesting ways in the changing experience and domain of actions of the individual person. Strictly speaking of animal biology, the average individual should experience, and be bound by, one mammalian time unit, which, for the size of the human species, maps onto Earth orbital time as about 20 orbits (years). By animal biology, this is associated with a

6. We can even look to the future prospects of developing synthetic biospheres and terraforming other planetary bodies in our Solar System—at which point generations of mankind will be acting with the power of eons, geologically measured in the billions of years.

limit to the speed of processes that a mammal of human size could react to and interact with. For example, key biological functions are measured in thousandths of seconds (milliseconds)—it takes 1 millisecond for a neuron in the human brain to fire an impulse and return to rest, and about 80 milliseconds for the brain to receive and integrate signals from the body. Regarding perception, the human reflex to visual stimuli is between 20 and 300 milliseconds.⁷

These are some of the biological time boundaries, limiting the potential effective actions of an organism to respond to and interact with the surrounding environment. *But the actions of mankind are not limited to this animal-time domain.*

For example, consider mankind's increasing understanding of, precision in utilizing, and control over chemical reactions. This takes us into a domain of the very small, characterized by timescales far, far beyond what is perceptible by a living organism bound by the mammalian time unit. While the limiting times of biological activity were counted in milliseconds, and perception in hundreds of milliseconds, the timescale of microscopic chemical reactions is measured in *quadrillionths* of a second (millionths of a billionth), known as femtoseconds.⁸

Yet, mankind is increasingly developing capabili-

7. Another interesting perceptual phenomenon is known as “beta movement,” an optical illusion in which a series of still images can appear as a fluid, continuous motion (despite the fact that there is no actual motion, just a series of still images). For this to occur, the sequence must achieve a number of images per second known as the “critical flicker frequency.” For humans, this is about 10 to 15 frames per second (60 to 100 milliseconds per frame). A frequency higher than this (in which each individual image is displayed for a shorter period of time), is beyond the capabilities of the human sense-perceptual system to distinguish as individual frames, and is perceived as a smooth motion. Recent experiments have shown that the value of the critical flicker frequency for different animal species is tied to their energy-flux density (metabolic rates), and is thus a function of the relative space-time of that species (supporting the notion that all mammal species experience the same amount of time in an average physical time unit).

8. For example, average individual chemical reactions can occur in the range of 200 femtoseconds, and the quickest at around 15. There is an incredible amount of space between this domain and that of the living organism. Going from milliseconds to femtoseconds passes over 12 orders of magnitude, through the time domains of micro-, nano-, and picoseconds. For comparison, 1 femtosecond is to 1 second, as 1 second is to 30 million years! In that comparison, we are leaping from the immediate experience of a living organism (measured in seconds) to geological epochs (measured in tens of millions of years), passing over orbital time, generational time, evolutionary time, etc. That is the proportional amount of space between animal time and chemical time.

ties to understand the fundamental nature of these sense-perceptible, supra-temporal processes, and to actively utilize that understanding to change mankind's biogeochemical relation to the planet—in effect, noetically occupying and utilizing this biologically supra-perceptual time, *12 orders of magnitude—a trillion times—beyond the capabilities for experience and action of the strictly biological aspects of human experience.*

Even more interesting, there is a direct relation between our ability to increasingly inhabit this ultra-small temporal domain of chemical reactions, and the ultra-large geological time metric required to measure the cumulative biogeochemical effects of our actions on the planet. If we take Vernadsky's reference to the creation of a new psychozoic epoch, and if we associate that with the Industrial Revolution, which was intimately tied to the initial maturation of a science of physical chemistry (bounded by these ultra-short timescales), we can play with some interesting comparisons.

In the small: By the mammalian time unit, minimal actions and reactions of the living organism are measured in milliseconds; but by the scientific-cultural time unit initiated by the Industrial Revolution, the work of Dmitri Mendeleev, and associated developments, the noetic experience and action is moving to a convergence upon the temporal domain of femtoseconds.

In the large: This initial phase of the psychozoic epoch (as measured since the Industrial Revolution) was a few hundred years in length—while geological epochs are generally measured in tens of millions of years.

Thus, noetically inhabiting a temporal domain bounded 12 orders of magnitude beyond the domain of animal time, enables mankind to inhabit timescales 5 orders of magnitude longer than would be possible for an individual animal species—indicating that mankind's occupation of new supra-mammalian timescales expands in two directions simultaneously (into the very short and the very long).

Ultimately, the spatial and clock conceptions of very large and very small are determined by advances in energy-flux density and physical chemistry⁹—i.e., time (as

9. Perhaps another interesting reflection of this is that the power sources supporting this stage of mankind are the chemical hydrocarbon formations of coal, petroleum, and natural gas. As these were formed and developed (by living matter) over geological timescales, measuring in the millions of years, we again see an expression of man encompassing and

FIGURE 2

Femtosecond Laser and Pulse Compressor—Optics Lab INRIM (Istituto Nazionale di Ricerca Metrologica)



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well as space) is a shadow of human creative action, as measured by energy-flux density and physical chemistry: a scientific-cultural stage defining the noetic time unit.

The Stellar-Atomic Eon and the Solar System

We have already entered into the beginning of a more powerful domain—that of controlled nuclear reactions. On one end, this domain is characterized by supra-chemical timescales. Mankind is now developing laser systems which, utilizing femtosecond pulses (**Figure 2**), can interact with matter faster than thermal reactions, and even laser pulses measured in attoseconds (a thousand times smaller than femtoseconds), used to observe the process of individual chemical reactions, and approaching the “atomic unit of time” (24 attoseconds),¹⁰ which is used as the standard time unit for work in nuclear physics, the domain of the creation and transmutation of elements, and the source of nuclear power.

On the other end, the nuclear age can support a

wielding the power of geological time over a few hundred years (in the rate of utilization of these hydrocarbon fuels) to power this geological force of mankind.

10. The 24 attosecond value is determined by the equation h/E_h , with E_h being the atomic unit of energy, equal to: $m_e 4/(4\pi\epsilon_0 h)^2 = a^2 m_e c^2$. Here we should stress that we have no understanding of the true nature of matter, energy, space, and time in these scales. The work of Dr. Robert Moon, on a Keplerian harmonic approach, might prove to be one of the better avenues to pursue (examining harmonics of interaction, rather than particles in space).

major increase in the potential relative population density, increasing the scale of mankind's biogeochemical power as a geological force. What geological timescale will this correspond to? Perhaps to a new period, or a new era, subsuming the scale of the epoch referenced by Vernadsky?

A clue may come from recognizing that the organized structures of the atoms utilized by nuclear reactions were not formed on the Earth, or in the Earth's geological timescales. They are not associated with the terrestrial biosphere in the same way that many of the chemical structures utilized by society are. According to standard textbook presentations, the heavy elements that are split apart in nuclear fission power systems were formed by successive generations of large stars burning through their life-cycle and then exploding in novae or supernovae.

While any one large star may do this over a few hundred million years, the distribution of heavy elements throughout the Milky Way was built up over generations of stars, over billions of years. (If we take the Milky Way's current age estimate of 13 billion years, then there were 8.5 billion years of stellar generations producing the raw material from which the Solar System formed 4.5 billion years ago.) Regarding the lightest elements, such as those used in controlled thermonuclear fusion, they were either produced in stars, or trace their origins farther back.¹¹

Thus, whereas the utilization of chemical fuels, and the associated stage of physical chemistry (to support an associated level of potential relative population density), are mankind's expression of the power of multi-million-year geological time, the utilization of atomic power, to support a higher level of potential relative population density and the associated greater geological power expressed by mankind, may be ultimately bounded by the conscious control and wielding of billions of years of stellar time.

Today, in experimental investigations of controlled thermonuclear fusion reactions, mankind can already create temperatures, densities, specific luminosities, and energy-flux densities greater than those of the Sun itself



NASA/ESA/HEIC and The Hubble Heritage Team (STScI/AURA)

A Hubble Space Telescope image of the nearby supernova remnant Menager, part of a star-forming region in the Large Magellanic Cloud, an irregular galaxy 160,000 light-years from the Milky Way galaxy, visible from the Southern Hemisphere.

(although only for brief intervals, for now). Through transmutation, mankind can create new elements and isotopes, which don't otherwise exist in the natural world around us, and the controlled use of specific isotopes opens up completely new domains of chemistry.

The temporal aspect of this noetic expanse is expressed in another interesting way. With the understanding of atomic processes, radioactive dating enables mankind to understand geological, planetary, and Solar System processes, and to use this understanding to inform his actions, consciously applying the power of geological timescales to the day-to-day lives of individuals. It is mankind acquiring the temporal powers of stellar-planetary processes in the large, and atomic processes in the very small, both alien to biological time, and actively applying their bounded interconnection to self-define a higher order for mankind's relation to the Universe (a higher potential relative population density), in seeming violation of a vast sense perceptual separation.

Here, we are approaching the *time of principle*, rather than sense-perception. I believe Nicholas of Cusa, the founder of the Golden Renaissance, would agree that the notions of "the large" and "the small," per se, are secondary to the power of creative action¹²—that power is the primary, determining consideration, while

11. To "Big Bang nucleosynthesis," by the popular theory today, or perhaps to some more scientific paradigm-shaking ideas implied in some of the evidence presented by the late astronomer Halton Arp.

12. *De Docta Ignorantia*, Nicholas of Cusa, 1440.

sense-perceptual conceptions of large and small are mere shadows.¹³

In this way, mankind is clearly supra-biological, with the noösphere inhabiting and wielding the action of the planetary-chemical domain, and entering into the principle of the stellar-atomic. Mankind, when as principle, creates and defines time.

A Needed Inversion

To better understand this, we have to recognize that the language in which these measures has been discussed up till now has been largely backwards. In measuring mankind against animal life, measuring mankind against the planet, against the Solar System, etc., we have approached the truthful, but only as shadows. We are measuring the *effects* of mankind, by measuring mankind's actions *as seen against various other processes of development in the universe*. These can be useful pedagogical measures to a certain degree, but they never can be truthful measures for mankind.

Much of the language here should be inverted. From serious reflection upon the evidence presented above, we are left to conclude that we have to look to mankind as setting the measure of any system inhabited (not being measured by it). For example, the emergence of the noösphere as a more powerful force than the biosphere can be seen in shadows, by measuring what the noösphere does, relative to the actions of the biosphere, as by the biogenic migration of atoms and biogeochemistry.

However, the scientific reality is that that demarcates the point at which *the biosphere must be measured by the criteria and requirements of the noösphere*. They are not separate systems. Mankind and the noösphere exist in the medium of the biosphere, but now, that medium is governed by the principle of mankind. Once the noösphere had truly encompassed the biosphere, the actions of mankind are inseparable from the development of the biosphere, and the metrics of the noösphere (mankind) take over.

As Lyndon LaRouche wrote in the concluding section of his 2014 policy memorandum, “The [Four New Laws](#) To Save the U.S.A. Now! Not an Option: An Immediate Necessity”:

Man is mankind's only true measure of the history of our Solar System, and what reposes within it. That is the same thing as the most honored meaning and endless achievement of the



Beijing Institute of System Engineering

“The biosphere and the Earth’s crust exist in the medium of the Solar System process, and we are poised to bring a new principle to reign over that medium.” Here, the Chinese Chang’e 3 lander and rover on the Moon (artist’s rendering), December 2013.

human species, now within nearby Solar space, heading upward to mastery over the Sun and its Solar System, the one discovered (uniquely, as a matter of fact), by Johannes Kepler.

As LaRouche stated, today we are looking at a new stage: the entry of mankind into the Solar System. Not in terms of placing some people or objects in certain locations, but in terms of the process of the noösphere overtaking and subsuming the process of the Solar System. The biosphere and the Earth’s crust exist in the medium of the Solar System process, and we are poised to bring a new principle to reign over that medium.

We can already look to short-term prospects for management and control of the Earth’s global water system, and controlled thermonuclear fusion reactions, as provocative precursors. Looking farther, the prospects of China developing the Moon; the U.S.A. and Russia managing the system of the near-Earth asteroid population; continuous acceleration-deceleration fusion space propulsion; and the development of other planetary bodies, provide further clues to a new stage of mankind.

Still, these will be shadows cast in the medium, dancing to the process of principle, which is mankind in the Solar System—just as Kepler taught us. It is only the supra-biological time of human creative mental action which defines these boundaries in potential, waiting to be realized in actions. Today, although very humble, and shaky in its beginnings, we can begin to look beyond a terrestrial noösphere, to a solar noösphere.

benjamin.deniston@gmail.com

13. A more accurate measure is energy-flux density.