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The Extended Sensorium

Following the Beat of a Different Drummer

by Peter Martinson

Part 1 of 2

Involuntary rhythmic activity in biology is a phenomenon common to every organism studied, and covers virtually every vital process in those organisms. Such processes cannot be ascribed simply to an internal clock-mechanism within the organisms, nor to purely external geophysical or cosmic influences. There is a deeper process at work, which can be approximated by assuming a combination of both causes. This consideration leads directly to not only a broader definition of sense perception, but to implications about the long-term anti-entropic development of life on the Earth, and into the manned exploration of other planets within the Solar System.

Lyndon LaRouche has demanded explicitly that fundamental science must proceed with the understanding that the universe is composed of three interacting, but hierarchically arranged phase spaces: the abiotic, the biotic, and the noetic. These phase spaces were established no later than 1938 by Russian academician Vladimir I. Vernadsky, who had already demonstrated that the world of abiotic physics did not have a monopoly on such deep issues as the construction of physical spacetime [1] No form of fundamental science in the biotic phase (or either of the other phases, for that matter) should ever be allowed to be reduced to abiotic physical explanations. This should be extended to imply that further discoveries in what can be imagined as "abiotic physics," can only be made by coming down from discoveries in biology. The assumption that any investigation into biological phenomenon can be explained in terms of what is already known in physics, is as insane as saying that your mom is no more than a very complicated spatula.

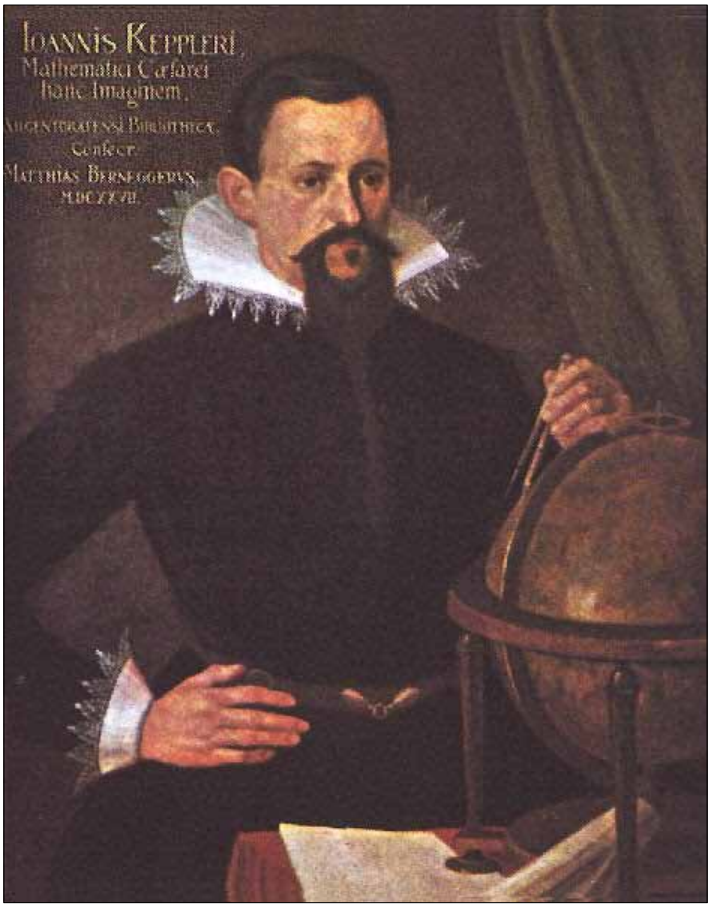
With this in mind, the responsible scientist will recognize that something like the phenomenon of biological rhythms has the potential to reveal not only as-yet unknown domains of cosmic radiation, but also unknown aspects of radiations that have hitherto been barely contained by their mathematical formulations. For example, what will be seen is that organisms tend to respond to incredibly weak fields, which are apt to be missed by conventional instruments. And, those organisms have been responding to those weak fields for billions of years, much longer than humans have known they existed. This also opens up the possibility that organisms respond not only to weak fields, but also to extremely long cycle radiations, on the temporal scale of geological time, which correspond with evolutionary changes in life on the Earth.

Are individual organisms really individual organisms, struggling for individual existence against external waves and particles, or are they better understood as within the category of cosmic radiation itself? Even better, perhaps cosmic radiation must be studied as the prime expression of that higher phase than the abiotic—life—the organisms thus understood as contractions within the field. Hence, the term "sense organ" refers to something fashioned by cosmic radiation itself, in order to mediate an intergalactic system.

Before embarking on a survey of crucial experiments regarding biological rhythms, let us first review the notion of senses, from the perspective of none other than astrophysicist Johannes Kepler.

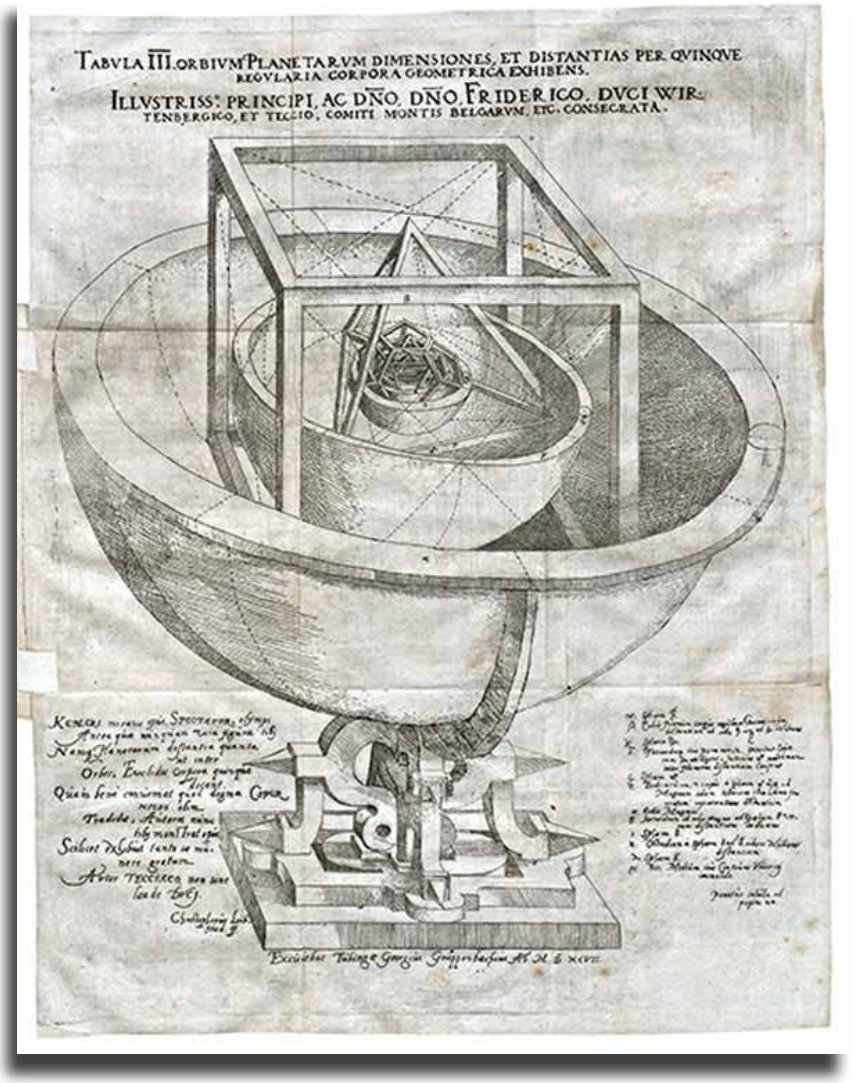
Kepler

An object that is sensed by somebody, must be able to act in some way on the sense instruments of his body. Thus, the retina of the eye must be able to respond to some disturbance caused by a seen object. The disturbance is caused, in this case, by what we call light, although the light itself is not seen - light is what's generated by the seen object, which can act on the eye's retina. By some unknown path, the soul of the viewing person must be able to judge whether or not his retina is being affected by an outside object. In this way, the person is not watching the external object, but his own retina. LaRouche has described this paradox as that of the space traveler, within a spacecraft which has no windows, only instrument readings. [2] He witnesses the instrument readings, not what causes those readings. Hence, there is no window between external physical reality, and the soul of the observer, through which the emanations from the observed object pass from out to in. Those emanations essentially stop at the instrument. It is your mind, which creates the image of a viewed external, extended world—this



perceived world is *not* what the "real external world," "looks like."

Humans and other organisms are cabable of acting proportionally to what is sensed. In other words, they can judge how long they should do certain activities, how far to travel, how far to turn, etc. Johannes Kepler assembled an exhaustive study of all the constructible visual and auditory proportions in his *World Harmonics* of 1618. [3] He put this work together after having followed up his initial study of the Solar System (presented in his *Mysterium Cosmographicum* [4]) with the identification of the key parameters of planetary orbits, by focusing on Mars and the Earth. [5] Kepler's goal right from the start, which he most fully expressed in the *World Harmonics*, was to show that the Universe functions on the basis of a pre-established harmony, and that it was composed with the mind of Man, in mind. In other words, Man's mind can comprehend how and why the Creator created the Universe in the way that it was, because the Universe was designed to be thus comprehended.



A page from Johannes Kepler's *Mysterium Cosmographicum* 1596 Tübingen, Germany.

Kepler places the motive faculty within the powers of reason, which he doesn't bestow within any organism other than Man and God. Man recognizes the proportionality, and then decides on appropriate action. Since the other organisms also act according to reason, yet do not posess the faculty of reason in themselves, Kepler hypothesised an agent to mediate between them and God, which he called "Sublunary Nature"—a soul for the Earth. [6] Specifically, Sublunary Nature can perceive the apparent angles between the lines of sight to the other planets in the system, including the Moon and Sun, and determine how to react to them. Kepler is careful to make clear, that the perception itself is not what causes such reactions. In no way is the emanation from the sense object the direct cause of any action of any organism, including Man. That action is on account of the perceived proportionality, which itself bears no motive force.

Kepler discovered, based on knowable and constructible congruences between the plane figures, which angles, or "aspects," should be more or less influential on Sublunary Nature. For example, opposition and conjunction (both equal two right angles, or 180°) are the most influential, while one right angle between lines-of-sight will be somewhat less influential. Most of the apparent angles between any two bodies will not coincide with any influential aspects, which is why Sublunary Nature will ignore them. But, when it perceives the passing of influential aspects, Sublunary Nature acts accordingly through its organs, including weather systems, volcanic and seismic activity, the tides - and living organisms. [7] What must be added to this, is that complete cycles exist for each aspect, such as from one conjunction to the next, which are the temporal representation of such influences. This will figure in to the regular biological cycles.

Let's apply Vernadsky's three-phase-space criteria. What should be the difference between the response of humans versus the other organisms on Earth? The responses of organisms should appear novel and creative overall, but should show relatively little variation over members of one species. Humans, on the other hand, should be able to individually change their responses to the aspects, within certain limits. For example, although it exacts a toll on the biological system, humans are capable of performing shift-work. No fruit fly can independently decide to go on night shift while the others still work days, and vice versa, although the insect can be trained, by humans, to shift its sleep cycle. Humans can decide to act contrary to any of their sense perceptions, although many do not.

In addition, as Lyndon LaRouche has been trying to tell you, over and over [8] humans have the ability to recognize that what they think they are perceiving represents shadows of what they are not seeing, and then can respond to the causes of the shadows instead, again, through their own volition.

As will become clear in the examples that follow, organisms typically function in rhythmic cycles which correspond to periods determined by the relative angular positions of the planets in the Solar System, and other relations outside of the system on galactic and intergalactic scales. Thus, it should be reasonable to hunt for sense faculties within organisms that can respond to appropriate signals from the Earth, which are generated in response to those larger and deeper systems. But, it should not be assumed that those sense functions work the way a physics textbook would imply.

Biological Rhythms

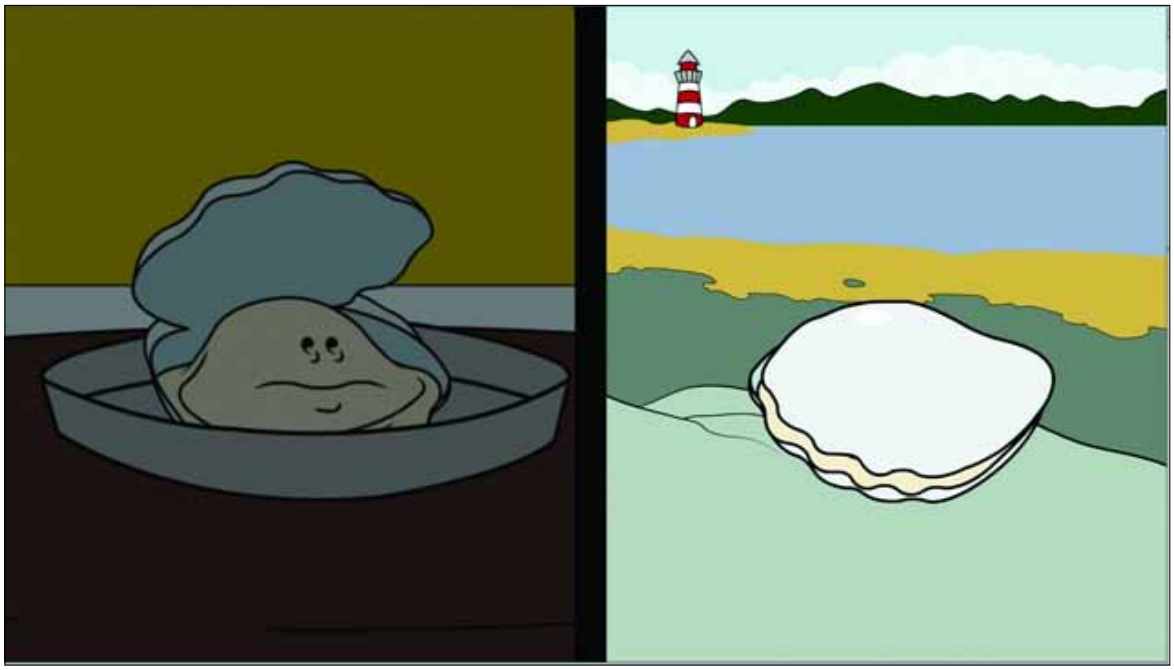
First, let us survey the phenomena of biological rhythms, and then examine how they work in relation to the cosmic sensorium.

Most of the biological cycles studied are about 24 hours in length, and are thus called circadian (*circa*—around, *dian*—a day). This includes wake-sleep cycles, sometimes measured as "locomotor activity" in animals. A rhythm found typically in shore creatures, is a twice-daily cycle associated with the daily tides, and thus half the lunar day. Longer cycles on the order of a lunar month also exist, such as the average human female menstrual cycle. [9] Even longer cycles, on the order of a solar year, are seen in hibernation activities of many organisms ("diapause"), the de-greening and loss of leaves on deciduous trees, plant blooming, seasonal flu, etc. Cycles of longer period also exist, which coincide with other cosmic cycles like the solar sunspot cycle, etc.

The big question in the study of these cycles has been whether they are caused by some clock mechanism within the organism, or whether the cycles are caused by the external, typically cosmic motions with which they seem to coincide. Evidence has been found on both sides of the fence, and the question becomes somewhat paradoxical. [10] It's been found that organisms, when held in environments that block out the external cycles they appear to coincide with, go into what is called "free-run," where the period begins to deviate from the external cue. For example, many people have worked with variants of the bean plant, which opens and closes its leaves on a 24 hour cycle (12:12 - 12 hours up:12 hours down). When placed in an environment of constant light intensity, it can be seen that the period will migrate to slightly longer than 24 hours. Early on in these investigations, Wilhelm Pfeffer demonstrated that bean plants reared in complete darkness do not display any cycles - the leaves just stay open. Upon shining light on the plants, though, they immediately begin to cycle with their roughly 24 hour cycle. The cycles would begin and continue, even if only one short period of light were given to the plant, which then lived the rest of its life in darkness. [11] Hence, the plant has the internal capacity to cycle, but responds to cues from the outside.

One problem with experiments performed in so-called constant conditions, is that the only conditions held constant are those that the experimenter assumes are acting on the organism. By definition, it does not block out unknown influences. Thus, the circadian locomotor activity of the fruit fly, for example, which runs over 24 hours in constant light or constant dark, could be attributed to some other unaccounted for external cycle, a bit longer than 24 hours, but which has a weaker influence than the cycle of light and dark. An experiment was proposed to test this. If an organism's cycle is driven by some other external stimulus, then the phase of the cycle should be shifted if the organism is transported, within an environment of constant conditions, to another longitude. The results on this were contradictory. Frank Brown showed that an oyster, which responds to the twice-daily tides, if transported from the New England coast to Chicago (where there are no tides), will shift its tide-cycle to match what the tides would be in Chicago, if it had tides. [12] This would imply an external agent. On the other hand, another scientist, Max Renner, trained bees in constant conditions to get food at a specific time of day in Paris. If the time-sense were given by external cues, then transporting the bees (holding all other conditions constant) to New York should shift the time at which they hunt for food. Exactly the contrary was shown - they kept coming out exactly 24 hours after their feeding time in Paris, day after day. When the same experiment was done, but where the bees could see the daily motions of the Sun, though, they responded to both their 24-hour "internal clock," but also to the local time. [13] Hence, Renner's experiments showed that there is some combination of internal and external timings.

One wrench thrown into the gears of all studies, is the fact that the cycles appear, across all organisms, to be independent of temperature. In other words, if an organism whose temperature is not internally regulated is cooled down, all of its vital functions tend to slow down, and vice versa if it is warmed up. If the clock were an internal organ or mechanism, then it, too, should speed up or slow down with temperature. Brown, [14] Colin Pittendrigh, [15] and others demonstrated that all organisms were virtually immune, with respect to their rhythms, to changes of temperature. Brown went so far as to take little fiddler crabs, whose skin colour changes on a daily cycle, and lower their body temperature to freezing, to demonstrate that the cycle remained circadian, although the intensity of colour change became fainter and fainter up to death. Thus, either there is still some external driver, or the internal mechanism



Frank Brown's experiment showed an oyster transported away from its environment will adjust its rhythm to the tide-cycle of its new environment.

has a miraculous way to regulate speed with temperature.

As will be explored in more detail below, one factor in biological rhythms that became obvious, is that organisms respond to very weak magnetic and electric fields. For example, Jürgen Aschoff and Rütger Wever converted two wartime fallout shelters into apartments with absolutely no cues as to the time of day. They even went so far as to deliver food and messages via a type of air-lock, to prevent the subjects from having any contact with people from the outside. One of the apartments was shielded from all outside electromagnetic fields, and was equipped to supply artificial oscillating electric fields of low intensity, while the other had no EM shielding. In all cases, the basal temperature oscillations of the experimental subjects free-ran to about 25 hour intervals, as did the sleep schedule. In some of the subjects, though, the sleep schedule became massively decoupled from the temperature oscillations, heading upwards of 50 hour sleep-wake cycles, while the temperature remained on the same circadian clock. All of the subjects in which decoupling was observed lived in the apartment sheilded from all EM fields. [16] Once an electric field was supplied at low intensity (2.5 V/m - the subjects could not feel it consciously), but oscillating at 10 Hz, the sleep schedules immediately snapped back in line with the circadian temperature cycles. None of the test subjects sensed any difference. [17]

These represent just a sampling of experiments that have been done, to give some flavour of the problem. The wrong question would be, "well, are the cycles driven by an internal clock, or by the cosmos?!" Kepler already demonstrated that there must be some close interconnection between distant, cosmic processes and those of life here on Earth. Review of the paradoxes of the inherent cycles of biology confirms this, that there is something within the organism that can respond according to the cyclic aspects, which means that there must be a cyclic-potential within the organism. Both the "external cues" and the supposed internal clock system should be seen as, essentially, external, in that neither is the cause of the cycles. Both cyclic systems (geophysical/cosmic vs. biological) are connected, but not necessarily in a causal relationship. While the cause itself remains unknown, it should be sought for through the method that Kepler used in his life's work, the method of harmonics.

For another clue in the puzzle, we will now see that the response to cosmic cyclic variations is inherently tied also to the spatial orientation of organisms. In other words, we are, yet again, tapping into the study of physical spacetime, which Vernadsky emphasized held the secret of the distinction between life and non-life.

Let's dig deeper into this aspect.

To be continued...

Footnotes

[1] Vernadsky V. I., ***Problems of Biogeochemistry II: On the Fundamental Material-Energetic Distinction Between Living and Nonliving Natural Bodies of the Biosphere.*** First published in 1938 in Russian. First English translation *21st Century Science and Technology*, Winter 2000-2001, pp. 20-39

[2] LaRouche L. H., ***An Election's Terrible After-Taste: The Global Crisis Now at Hand***. (2010) www.larouchepac.com/node/16929

[3] Kepler, Johannes. ***Harmonices Mundi***, 1619

[4] *Kepler, Johannes.* ***Mysterium Cosmographicum***, 1595. Translated by A. M. Duncan (Abaris Books: 1981)

[5] Kepler, Johannes. ***Nova Astronomica***, 1609

[6] It should be noted, that Bernhard Riemann addressed this same issue when he was still a student. In his writings on ***Geistesmassen***, he referred to what he called the ***Earth Soul***, which uses plants as a form of sense-perception, and can act on the basis of such perceptions

[7] Riemann thought that the ***Earth Soul*** had, as sense organs, each species of plant in a given region. Based on what was sensed, through these plants, as the conditions of the atmosphere and land, the Earth Soul could decide what to do next, regarding the evolution of life on its surface.

[8] LaRouche, Lyndon. **A Wedding Anniversary: The Sixth Sense**, (unpublished: 2011)

[9] In order to clear some things up: the human female menstrual cycle has a period which varies between women, from several days to several months. The average span of the cycle, though, is about 29 days—approximately one lunar month. Whether or not this cycle has a connection with the Moon is complicated by the widespread evidence that women who live and work together tend to begin "cycling" together. The cycle itself can also be heavily modified through hormone supplements. Overall, this should be viewed as another case where cycling is inherent in the organism, while being sensitive to external factors.

[10] Brown, Frank A. **Living Clocks**, *Science*, New Series, Vol. 130, No. 3388, pp. 1535-1544 (1959)

[11] Pfeffer found that he could also use light to force the plants into periods longer or shorter than 24 hours, by alternating light and dark. Antonia Kleinhoonte went further with this experiment, and demonstrated that, if the periods go outside the bounds of 8:8 or 15:15, then the plant would "rebel" and snap back into a roughly 12:12 cycle again.

[12] ibid

[13] Renner, Max. **The Contribution of the Honey Bee to the Study of Time-sense and Astronomical Orientation**, *Cold Spring Harbor symposia on quantitative biology* [proceedings], Vol. 25, pp. 361-367 (1960)

[14] Brown, F., and Webb, M.. **Temperature Relations of an Endogenous Daily Rhytmicity in the Fiddler Crab, Uca**, *Physiological Zoology*, Vol. 21, No. 4, pp. 371-381 (1948)

[15] Pittendrigh, Colin. **On Temperature Independence in the Clock System Controlling Emergence Time in Drosophila**, *Proceedings of the National Academy of Sciences*, Vol. 40, No. 10, pp. 1018-1029 (1954)

[16] Wever, Rütger. **Human Circadian Rhythms under the Influence of Weak Electric Fields and the Different Aspects of These Studies**, *International Journal of Biometeorology*, Vol. 17, No. 3, pp. 227-232 (1973)

[17] All of the test subjects, including the ones who experienced the 50 hour "days," ate regular meals, three times during their subjective days. It is apparently a common misconception that you get hungry around lunchtime, simply because you've "worked off" your breakfast. It is a circadian timing! The 50-hour subjects spaced their meals proportionally throughout their subjective day, which meant they would have breakfast around the same time as you would, but would start feeling lunch-pangs around the time after you had already completed your dinner!