

On the Missing Link between Cosmology and Biology

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Abstract – The present short letter provides some rational speculative arguments based on mathematical facts linking cosmology with biology in a relevant new way, shedding light on the beginnings of life.

Keywords – Cosmological biology, Fractal universe, Cellular automata, Golden mean universal computer, Origin of life on earth, The cosmos as a living organism, E-infinity Cantorian spacetime.

There are several motivations for the present work but the most immediate is the current scientific evidence that a sponge organism is the most likely origin of all forms of life on earth [1-4]. This involves recurrent and vividly debated themes spanning cosmology and biology, namely whether the cosmos is also basically a gigantic living organism [4-6]. We think we can offer some arguments in support of this admittedly speculative idea. Our evidence and arguments for this rather daring hypothesis is by no means conclusive. All the same, the subject is of such immense importance, that it would be wrong not to air our thoughts on this important matter. In this respect, we are clearly taking the view of Lord Bertrand Russell [7] that philosophical speculation encompasses all the important things which are not yet proven scientifically. However, they are important in so far as we must continue thinking and speculating because this road leads to the advancement of science and a healthy human spirit. This rational speculation is the first natural step towards exact science.

The present chain of thoughts leading to the idea that the cosmos is ‘a living’ form of mega-dimensions suggesting the possibility of immense consequences, could be summarized as follows:

There is a robust model that serves well for material science as well as cosmology, namely the effective quasicrystal of Sir Roger Penrose’s fractal tiling [8]. This model was discussed extensively by Alain Connes in his *Noncommutative Geometry*, Academic Press; 1 edition (December 6, 1994), [8-16] as well as by Leila Marek-Crnjac and Ji-Huan He in the context of E-infinity Cantorian-fractal spacetime theory [10-25] [31-37]. This work brings together, at a minimum, the large scale structure of the universe and the micro-quantum aspects of the cosmos and ties them together with the most irrational number of all, namely the golden mean. It necessarily brings to the forefront the central role of the golden mean number system as an infinite capacity transfinite Turing-like computer or cellular automata [26] at the very foundation of Nature, whether quantum, relativistic or classical [14-26].

Furthermore we could approximate the very essence of the topology and geometry of the spongy organism declared here to be the origin of life [1-3] with the well-known Menger sponge [16] which is a three-dimensional version of the Sierpinski triangle which in turn is deeply linked to the Penrose fractal tiling universe. It is well known that the Hausdorff dimension of the Menger sponge is given by $\ln 20 / \ln 3$ [3, 16, 22] which is not expressed in terms of the golden mean since it is deterministic. However, it is interesting at least mathematically to see how randomness would change the value. For instance, a deterministic Sierpinski gasket has a Hausdorff dimension equal to the inverse of the deterministic triadic Cantor set $\ln 20 / \ln 3$, which means $\ln 3 / \ln 2 \cong 1.584962501$ [13, 21, 22]. By analogy the random case is the inverse of the Mauldin-Williams famous Cantor set $\phi = (\sqrt{5} - 1) / 2$ which means the Hausdorff dimension is the inverse of the golden mean, i.e. $1 / \phi = 1 + \phi = 1.618033989$ [21, 22]. Now we recall what Wolfgang Pauli once said and what is well known to all applied physics researchers, namely that “God made the bulk; surfaces were invented by the devil.” Leaving this provocative but deep thought aside, the surface of the Cantor set ϕ would be given by its complement, namely $1 - \phi = \phi^2$ which is the empty set modelling the Maxwell-Einstein Aether and similarly the “surface” of the Menger sponge would be its complement [13, 16, 22], namely

$$D(CMS) = D^{(3)} - (\ln 20 / \ln 3) = 3 - 2.726833028 = 0.273166971 \quad (1)$$

Now let us keep this result in our minds for the moment and proceed to another aspect of our argument, namely the fundamental role of the theoretical value of the inverse electromagnetic fine structure constant in relation to the standard model of elementary particles [23] at the ordinary room temperature and energy scales [13, 21], i.e.

$$\bar{\alpha}_o = (20)(1/\phi)^4 = 137 + k_o \quad (2)$$

where $\phi = (\sqrt{5} - 1) / 2$, $k_o = \phi^5 (1 - \phi^5)$ and ϕ^5 is Hardy’s probability of quantum entanglement of two quantum particles which was verified experimentally using highly accurate measurements on the quantum scale. One should note that the reconstruction of $\bar{\alpha}_o$ is an exact transfinite renormalization equation [14, 18] given by

$$\begin{aligned} \bar{\alpha}_o &= (\bar{\alpha}_1)(1/\phi) + (\bar{\alpha}_2 = \bar{\alpha}_1/2) + \bar{\alpha}_3 + \bar{\alpha}_4 \\ &= (60)(1/\phi) + 30 + (8+1) + 1 \end{aligned} \quad (3)$$

where $\bar{\alpha}_3 = 9$ is the ideal inverse coupling constant of the strong force, $\bar{\alpha}_2 = 30$ is the ideal inverse coupling of the weak force, and $\bar{\alpha}_4 = 1$ is the quantum gravity maximal inverse coupling constant. The sum of $\bar{\alpha}_i$ was proven elsewhere to be the normed and limiting value of the dimensions of the universe (for $1/\phi \rightarrow 1$) [10-22], namely

$$\begin{aligned} \sum_{i=1}^4 \bar{\alpha}_i &= 60 + 30 + 9 + 1 \\ &= 100 \end{aligned} \quad (4)$$

and gives the percentage of the three types of cosmic energy densities of the cosmos relative to our scale of measurements [12-22], namely

$$\begin{aligned} \gamma &= 4 + 22 + 74 \\ &= \text{ordinary energy} + \text{dark matter energy} + \text{pure dark energy} \end{aligned} \quad (5)$$

Again these results were verified beyond a reasonable doubt by accurate cosmic measurements and observations [27]. In particular, for the ordinary measurable cosmic energy density, the exact transfinite value approximated to 4% was found to be $(\phi^5/2) \square 4.5\%$ which is half of Hardy's probability [17] which as we said, was also found experimentally so that all the preceding results are not only anchored in a fundamental theory but also in a deeply verified "reality".

Now let us dwell more on $\bar{\alpha}_o$ which was found to be equal to the degrees of freedom of a complete standard model [23] and therefore $2\bar{\alpha}_o$ is the corresponding super symmetric value. Even more profound is the cancellation of all anomalies in the fundamental super string theory [18-23] depending on the condition

$$2\bar{\alpha}_o - 1 = 273.1640787 \quad (6)$$

Relative to a three dimensional intersection of a superstring space time with $D = 10$, we find

$$(2\bar{\alpha}_o - 1)/1000 = 0.2731640787 \quad (7)$$

The first five digits of equation (1), modelling our pre-modal organism, agree with the first five digits of equation (6), modelling the de facto "surface" of the "Aether." This appears to be more real than any ordinary speculation, though it is a less than proven scientific fact. In any event, it is worth communicating this to the-vanguard of scientific research who are willing to risk error. How else can we know anything at the end of the day without sticking our necks out for it [34, 37].

For a very informative reading in the spirit of the present work about how biology, mathematics, physics, cosmology and philosophy are infused with the golden mean, the reader may look at the eminent work of Alexey Stakhov and Scott Olsen [24, 25] [34]. In fact the result or modern science shows in general an intricate relationship between the physical universe and computation in a way that never ceases to intrigue and amaze as reflected in the pioneering work of S. Wolfram [28] and some earl work of the present first author [29, 30]. For an in depth study of the present

subject for future research, we recommend the reader gets some familiarity with Refs. [1] to [7] and [28] to [37].

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moved to the UK where he enlisted as a post graduate student in the stability research group of the late Lord Henry Chilver and obtained his Ph.D. degree in structural mechanics under the supervision of Professor J.M.T. Thompson, FRS. After his promotions up to the rank of full professor, he held various positions in the UK, Saudi Arabia and USA and was a visiting professor, senior scholar or adjunct professor in Surrey University, UK, Cornell, USA, Cambridge University, UK, Cairo University, Egypt and is presently a Distinguished Professor at the Dept. of Physics, Faculty of Science of the University of Alexandria, Egypt.

Professor El Naschie is well known for his research in structural stability in engineering as well as for his work on high energy physics and more recently for his work is cosmology and elucidation of the secret of dark energy and dark matter as well as for proposing a dark energy Casimir nanoreactor.

Professor El Naschie is the single or joint author of about one thousand publications in engineering, physics, mathematics, cosmology and political science. His current h-index is 74 and his i-10 index is 754 according to Google Scholar Citation.

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Professor **M.S. El Naschie** was born in Cairo, Egypt on 10th October 1943. He received his elementary education in Egypt. He then moved to Germany where he received his college education and then his undergraduate education at the Technical University of Hannover where he earned his (Dipl-Ing) diploma, equivalent to a Master's degree and Chartered Structural Engineer. After that he