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Convergence to a Lamarckian Model of Cosmic Biology

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Abstract

This paper is our evaluation of the astrobiological significance of recent findings secured using the James Webb Telescope on the "biomarker" composition in the atmosphere of the Earth-like exoplanet, K2 18b. Thus, to put this finding in perspective, we briefly review a wide range of recent studies these past 45 - 50 years from astronomy, space research and biology that converge towards the validity of a cosmic model for the origin and evolution of life—involving biological processes more akin to acquired Lamarckian rapid adaptation genetic processes. These also include Horizontal Gene Transfers rather than the traditionally understood (and ponderous) Darwinian natural selection processes. Indeed, there is extensive evidence for extant rapid Lamarckian and Lamarckian-like acquired inheritance processes in the biosphere of our planet Earth. Further, an important astronomical and astrobiological finding that puts the K2 18b discovery in context is the early 1980s discovery that the extinction spectrum of intact living bacterial cells in the large interstellar dust clouds detected from an emitting electromagnetic source near the centre of our galaxy (GC-IRS7, 23 K light years) over the mid infrared wavelength range 3 - 4 u. That key finding and many others combined to put in perspective the recent discoveries of life-associated products dimethyl sulphide and dimethyl disulphide in the atmosphere of K2-18b (120 light-years). These data add to the body of work of the new perspectives on a cosmos likely to be teeming with life in many cosmic niches.

Keywords

Comets, Asteroids, Cosmic Life, Exoplanet K2 18b, Origins of Life, Lamarckian Evolution, Horizontal Gene Transfer

1. Introduction

In two recent papers we marshalled a wide range of evidence from astronomy, biology, and geology that pointed to the validity of the Hoyle-Wickramasinghe model of cosmic biological origin and its subsequent evolution [1] [2]. The overwhelming rationale for the model was first described by Hoyle and Wickramasinghe in their 1981 book *Evolution from Space* [3] the technical details of which had been developed in a long series of journal publications beginning in the mid-1970s. The critical arguments and assumptions in that book, viz. the clear limitations of the Darwinian natural selection model of biological evolution are now modified and updated by the large body of evidence consistent with a Lamarckian gene feedback rapid evolution model which is more consistent with the biological evidence published since 1980 [2]. Some of this key evidence is detailed further below (sections 3, 4, 5).

A crucial aspect of the theory begins with the emphasis on the minuscule probability of a *de novo* origin ('abiogenesis') not just on Earth but at any one planetary-type location in the Universe; these improbabilities are reviewed in detail in [2]. In present-day biology the information contained in enzymes—the precise arrangements of amino acids into folded chains—is crucial for life and this information is transmitted by way of the triplet-coded ordering of nucleotides in DNA. In a hypothetical RNA world that may have predated the DNA-protein world, in some origin of life models, RNA is posited to serve a dual role as both enzyme and replicating genetic transmitter. If a few ribozymes are regarded as essential precursors to all life, one could attempt to estimate the probability of the assembly of a simple ribozyme which is composed of some 300 bases. This probability turns out to be 1 in 4^{300}, which is equivalent to 1 in 10^{180}—which already defines an event that can hardly be supposed to happen even once in the entire history of an expanding Big Bang universe. A similar calculation for the ordering of amino acids in a plausible minimal set of 256 bacterial enzymes for the emergence of a free living replicating bacterial cell gives an even more unlikely probability −1 in 10^{5000} with plausible assumptions see Hoyle and Wickramasinghe, [4] and recently reviewed in Steele *et al.* [2]. It is such numerical arguments that drove us to the conclusion that the emergence of life was of necessity to be a unique event in the cosmos.

In this context it is worth noting that the standard theory of a Big-Bang Universe with an age and size of 13.7 billion light-years (~ 3 times the age of the Earth) is itself coming under sharp scrutiny with recent data on "high-redshift galaxies" obtained with the James Webb Space Telescope. Carniani *et al.* [5] have recently published confirmation of two luminous galaxies existing at a redshift of z = 14 giving an age that is uncomfortably close to the Big-Bang event. The most straightforward interpretation is that this data is not consistent with the Big-Bang model of the universe originating 13.7 billion years ago. The implication is that the Universe as well as life within it may well turn out to have been ever present however controversial that implication may be viz. infinite steady state models first con-

ceived by Hermann Bondi, Thomas Gold and Fred Hoyle in 1948 [6] [7].

2. Tests of a Theory

In the Popperian sense any valid plausible scientific theory must in principle at least be testable and thus be potentially falsifiable. The cosmic theory of biology has indeed satisfied this criterion and survived the strictures of many explicitly formulated predictions for half a century, including now, over the same time period, the evidence for Lamarckian inheritance phenomena here on Earth [2]. One such prediction is that if life started on Earth by the importation of space-hardy cosmic microbes, micro-organisms, bacteria and viruses, it should even now be arriving from space. Such an explicit prediction could be put to rigorous tests, and these results have been reviewed, and implications have been outlined [1] [2].

Serious attempts to verify the theory and prediction of a continuing microbial ingress to Earth started effectively in 2001. The sampling of stratospheric material at a height of 41 km was conducted by a team of scientists linked to ISRO (The Indian Space Research Organisation) using balloons and modern biological techniques including epifluorescence microscopy and electron microscopy and yielded dramatic results that are still largely being ignored [8]. Reporting on the result of the 2001 experiment the investigators of the 2001 experiment wrote thus:

"The electron microscopy could be equivocal in regard to the detection of viable cells, but the epifluorescence microscopy deployed leaves little doubt that clumps of viable cells with sizes appropriate to bacteria are present at all heights ranging from 24 to 41 km. Since the local troposphere over the launch site was estimated at 16 km, the isolates are all above the level at which any terrestrial contamination can be expected, particularly so at the 41 km altitude. With an average falling speed for 3 micron sized clumps at 40 km of about 0.3 cm/s the in-fall rate of clumps (assuming a number density of 0.068 per litre) over the entire Earth, area 5×10^{18} cm^2 would be $(068 \times 10^{-3}) \times (0.3) \times (5 \times 10^{18})$ per second.

Assuming an average of 100 individual bacterial cells each of mass 3×10^{-14} g in a clump we obtain a daily mass input of about a third of a tonne of biomaterial. A *prima facie* case for a space incidence of bacteria onto the Earth may have been established…"

This estimated in-fall rate of 0.3 tonnes per day over the entire Earth, translates to −20 - 200 million bacteria per square metre per day at every location on the planet. Such a flux, which is astoundingly high, will of course be swamped by microbes that can be regarded as indigenous to Earth by factors of billions. Nevertheless, to neglect the importance of such an ongoing incidence is irresponsible in the extreme. Also, all the arguments advanced so far to assert that surface microbes can be lofted to the stratosphere by electrical fields are also likely to be flawed [9]. These physical limitations have been reviewed [1] for the detection of microorganisms on the external surface cosmic dust of the International Space Station (ISS) first reported in 2018 by Grebennikova *et al.* [10] and further dis-

cussed by us and the Grebennikova group [11].

3. Direct Spectroscopic Proof Independently Confirmed

By the early 1980s Hoyle, Wickramasinghe and their colleagues had accumulated enough evidence from astronomy to claim that the chemical make-up of cosmic dust judged by the way they absorbed light was uncannily similar if not identical to bacteria and viruses [12].

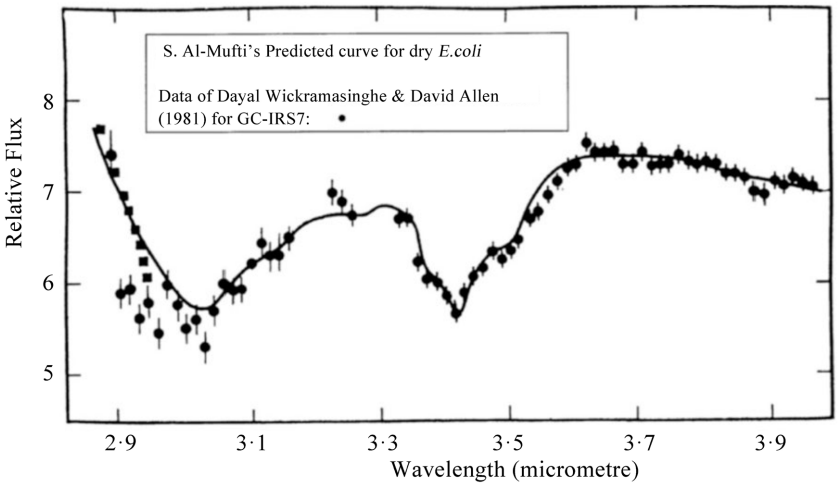

Figure 1. Comparison of the normalized infrared flux from GC-IRS7 with the laboratory spectrum of *E coli* reported in Hoyle *et al.* 1982 [12]. This particular data plot reproduced from Open Access articles in *Prog. Biophys. Mol. Biol* Steele *et al.* [1] [2].

Today, a wide range of astronomical observations of a similar kind all point to the widespread existence of cosmic dust with a composition resembling that of mature living cellular material [1] [2]. It needs to be pointed out in this connection that the interstellar dust extinction data (expressed as normalised Relative Flux) shown in **Figure 1** has been confirmed independently by the Japanese team of Okuda *et al.* [13], also see Fig. 4.3b in the 1993 book by Hoyle and Wickramasinghe [14]. As discussed [2], the paired correlation coefficient of these data gives r as 0.9324 for N = 77 pairs. For Okuda *et al.* [13] the r value is 0.9275 for N = 35 pairs. The P values for both are least of the order of 10^9. That is, we would expect to see such an exact spectral match by chance alone in more than one billion similar trials (DT Wickramasinghe, G Briggs, NC Wickramasinghe, EJ Steele unpublished calculations) (Steele *et al.* 2019). We consider this as strong objectively confirmed astronomical, and astrobiological, evidence and not simply speculation.

To re-quote our summary of these striking data in **Figure 1** from a biological perspective [2]:

"These data, following age-old standard procedures in Astronomy, were predicted by Hoyle and Wickramasinghe in advance of the interstellar dust observations by DT Wickramasinghe and DA Allen, is shown in Figure 5 (from Steele *et*

al., 2018 Figure 1 insert). This figure shows the normalised IR extinction (absorption) flux for two independent data sets. The IR absorption spectrum in the wavelength range 2.9 - 4.0 (mm) for desiccated (freeze dried) *E. coli* bacterial cells (solid line). This is an intricate and complex IR absorption spectrum of living, albeit dried and dormant, living cells. The observational data points were secured at each wavelength indicated for IR electromagnetic radiation emitted 23,000 light years away near the centre of the Milky Way. As this IR light traverses through clouds of the dust grains it is absorbed in a similar fashion to the IR absorption by dry *E. coli* cells in the laboratory experiment on Earth."

The prevailing reluctance by the mainstream, however, is to admit that that the distribution of interstellar organic molecules reflected in **Figure 1** are really the products of biology, e.g. see [15]. The fashionable and conventional point of view nowadays is to assert, without any proof, that organic chemistry is occurring everywhere, and the resulting chemicals happen perchance to match exactly the spectral behaviour of desiccated bacteria as shown in **Figure 1**. To us such a conclusion by our scientific colleagues is at odds with age old logical deduction and scientific inference. Furthermore, it is maintained against all the odds that terrestrial life originated in a geological instant *in situ* on the Earth, after organic molecules from space came to be delivered possibly by the agency of comets.

More recent studies of the corona and tails of comets have yielded generally similar results as shown in **Figure 1**. The European Space Agency's Rosetta Mission to comet 67P/C-G has provided the most detailed observations that satisfy all the consistency checks for biology and the theory of cometary panspermia [16]-[18].

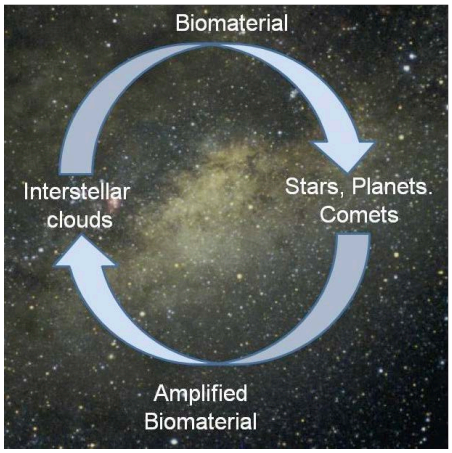

Figure 2. Amplification cycle of cosmic life. Within our galaxy alone about 100 billion.

The weight of evidence favours the survival of bacteria under interstellar conditions at any rate to the extent that makes viable interstellar transfers of microbial life between star systems inevitable. We do not require more than one in -10^{24} iterant microorganisms to survive, until it becomes incorporated (in about a billion years) in a planet/comet forming event by which a new cycle of exponential

amplification occurs; a few viable microbes then turning into trillions.

Circuits have been completed, one for every sun-like star. See the same figure in the recent review in Open Access in *Prog. Biophys. Mol. Biol.* article by Steele *et al.* 2019 [2].

These critical arguments have been reinforced and advanced by our recent review of all the extant Lamarckian and Lamarckian-like rapid genetic adaptation and genetic back loops *known to exist here on earth* [2]. Thus, by inference we can plausibly assert also to exist in many congenial 'Life friendly' niches and water-world habitats throughout the cosmos, and see a putative cosmic biodistribution and numbers in Table 2 in Steele *et al.* 2019 [2]. In our view these genetic mechanisms will thus facilitate the "Efficient Spread of Living Systems Throughout the Cosmos". The strong feedback loop of cosmic biology depicted in **Figure 2** can account for all the astronomical data that relates to organic molecules in space. And in a type of conceptual meld with Lamarckian mechanisms with more traditional Darwinian notions of evolution of 'the survival of the fittest' ensures such a cosmic spreading and cycle process. Thus, we state [2]:

"Our aim (here) is to outline the conceptual links between rapid Lamarckian-based evolutionary hypermutation processes dependent on reverse transcription-coupled mechanisms among others and the effective cosmic spread of living systems. For example, a viable, or cryo-preserved, living system travelling through space in a protective matrix will need of necessity to rapidly adapt and proliferate on landing in a new cosmic niche. Lamarckian mechanisms thus come to the fore and supersede the slow (blind and random) genetic processes expected under a traditional neo-Darwinian evolutionary paradigm."

This exceedingly modest requirement of microbial survival would be impossible to violate particularly for freeze-dried microorganisms that are embedded within clumps of interstellar dust. This expectation has been borne out in a long series of investigations that have been conducted both in the laboratory and in space from the 1970's to the present day.

4. Further Astronomical Tests

The Kepler Telescope launched in 2009 has surveyed a sample of the Milky Way galaxy and found over 1000 planets like the Earth. Extrapolating to the whole of our Milky Way galaxy (the system of stars to which the sun belongs) it is estimated that the total of habitable planets exceed 100 billion.

Most recently a "habitable" exoplanet orbiting the red dwarf star K2-18b about 120 light-years away in the constellation Leo was found by a Cambridge led team to have evidence of a small biomolecule dimethyl sulphide in its atmosphere pointing to the possibility of microbial life in its oceans [19]. On Earth, dimethyl sulphide and dimethyl disulphide are produced by photosynthesizing marine bacteria and phytoplankton, so a tentative claim of biology outside our planet seems to have been made. This new data should be added to a formidable body of other of scientific information that has accumulated over the past few decades to reaf-

firm the cosmic connection with life, and particularly the interstellar dust infrared extinction data discussed above, the interstellar dust extinction data first secured by DA Allen and DT Wickramasinghe in 1981 [20]. However, in developments incomprehensible to us, all such objective evidence pointing to biological signatures in extraterrestrial material—interstellar dust, corona tails of comets and carbonaceous meteorites as well as exoplanets—have been systematically ignored, and worse the data in our peer reviewed journal papers has not been cited which is a standard requirement in the maintenance of the integrity of the prior published scientific record. The apparent deliberate degradation of such data amounts to maintaining that all the evidence relating to biology outside the Earth merely points to the operation of 'spontaneous generation of life' or *abiogenesis* (the transition from non-life to life) occurring on a Universal-wide scale, as it is also claimed to have happened on the Earth some 4 billion years ago. Yet over the past 5 decades the most expensive and elaborate experiments that have been carried out to prove the operation of abiogenesis *anywhere* as a viable process have proved a dismal failure, and those supposed positive claims on natural emerging RNA replicators in the laboratory test tube have had to be retracted [2]. This, however, is no surprise considering the improbability hurdle we have already discussed.

5. Microbes and Microfossils in Recovered Samples of Asteroids

Recently recovered fragments of extinct cometary-type bodies in the form of carbonaceous meteorites that fell to Earth, or pieces of such bodies recovered directly from space, could well contain tell-tale signs of a bio-friendly past history of our solar system. Such data can be considered key 'Demarcation Phenomena' only interpreted logically in a Panspermic Universe already teeming with mature cell-based life [2] [15]. This seems to have been clearly evident in the case of the Polonnaruwa meteorite stones [21] [22] that fell in Sri Lanka in 2012, with clear evidence of microfossils of hard-shelled eukaryotic organisms, such as diatoms as also reviewed in Steele *et al.* [2] [15]. Such microfossils internal to such meteorites dating to an age ≥ 4.5 billion years have been found in other well characterised carbonaceous meteorites by scanning electron microscope (SEM) methods: Murchison meteorite, fell into Victoria, Australia in 1969 [23]-[26], and the Orgueil (France in 1864) and Mighei (Ukraine in 1889) meteorites [26]. Richard Hoover a key collaborative expert in such SEM methods, and who has independently cross-checked such meteorites, unmistakeably explains why the observed microfossils *are not contaminants*, but indigenous to the mineralising embedding matrix of the microfossil within the meteorite [27]. Similar findings may be apparent in the highly porous fragments recently recovered from the two asteroids Ryugu and Bennu.

In the case of the recovered fragment of Ryugu a wide range of microorganisms were discovered within its porous matrix, but all these have been declared as having *most likely* to have arisen from terrestrial contamination [28] [29].

Although we cannot absolutely rule out such a claim, the strong possibility of microbial spores that survived cleaning processes in preparing the samples having pre-existed within a loosely aggregated fragment of a once "living" comet or asteroid remains, in our view, the far more likely option.

6. New Evidence from within Biology

Meanwhile a great deal of evidence from within biology itself is pointing inexorably to the conclusion that fully-fledged biological components of external origin—bacteria and viruses—are intimately involved in the origins and evolution of terrestrial life. The prevailing dogma of biology is that genetic information (DNA programmes) needed for all innovations in the evolutionary history of life is derived from random copying errors (corruptions) of pre-existing genetic programmes. That this proposition makes no sense whatsoever can be seen in an obvious computer science analogue. Consider a single subroutine in a complex computer programme written in some form of digital code. The accumulation of randomly generated errors in multiple copies of such a subroutine would scarcely be expected to yield brand new innovations in the form of novel or useful subroutines.

The transition from a first bacterium on Earth to the magnificent panorama of life that we find around us required, in our view, the multiple insertion of "subroutines" in the form of viruses and bacteria, and possibly even genomic sequences of more complex eukaryotic animals via the agency of arrival of intact small (micro or ≤ mm) space animals (tardigrades, nematodes) or already fertilised and space-hardy embryos that grow to much larger animals e.g., octopus [1] [2]—carrying new genetic programmes from the Universe at large. This leads in turn to a necessary rapid process of adaptive "Lamarckian" inheritance against which Darwinian evolution is superposed [1] [2]. The biosphere within which evolution actually occurs is not the utterly minuscule Earth environment with which we are familiar but one that is on the scale of the entire universe. It is the Cosmos at large that is simply awash with fully-fledged biological components—bacteria, their spores and viruses, including living eukaryotic organisms, plant seeds etc—subroutines for every contingency – available for rapid accommodation in a new yet congenial cosmic niche through rapid Lamarckian adaptation processes on every planet upon which life evolves, including Horizontal Gene Transfer (**Figure 3**). Thus, Darwinian evolution truly is then relegated to a secondary fine-tuning process in the upper twigs of the evolutional branches in the various trees of life [30].

Horizontal Gene Transfer (HGT) is now well recognised to take place in a terrestrial context. But the grandest scale on which this same process occurs is one that embraces the Cosmos (**Figure 3**). The feasibility of HGT operating naturally on a galactic or even cosmological scale has been amply demonstrated over many years [2] [3].

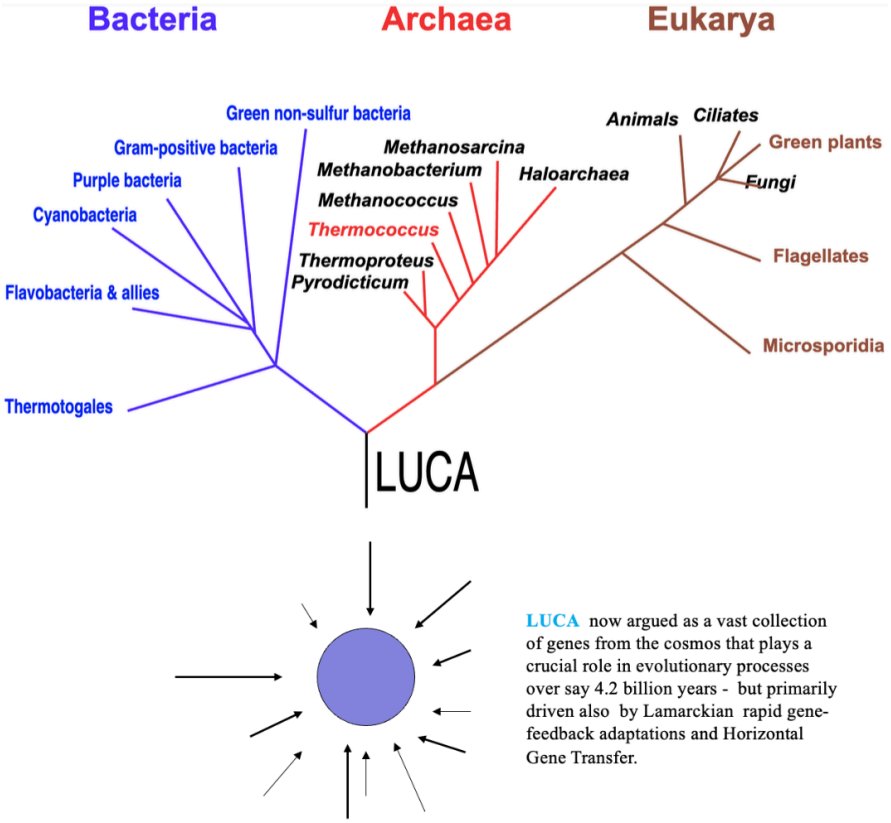

Figure 3. Schematic evolution of life into 3 domains of life branches converging on a Last Universal Common Ancestor, now thought to be an ensemble of microorganisms although modified by multiple additions of living systems from the cosmos as indicated in Steele *et al.* 2018, 2019 [1] [2]. Top element from Woese *et al.* 1990 [30], tree taken from Wikipedia. This Figure attributed to "Chiswick Chap"—Own Work CC BY-SA 4.0 Created 23 September 2023, Uploaded Wikipedia 18 May 2025 https://en.wikipedia.org/wiki/Three-domain_system#cite_note-w1990-1.

Following the deployment of whole genome sequencing that became routinely available from the dawn of this millennium we have acquired a detailed knowledge of how our own primitive primate lineage of evolution branched out into hominids and other primates [31] [32]. Every branching point in this evolutionary tree (**Figure 3**) has been characterised by the appearance of a viral footprint in the form endogenous retroviral—elements (ERVs) and human endogenous retroviruses (HERVs) (e.g. see [33]). The unavoidable interpretation is that our emergence as *Homo sapiens* was itself contingent upon a long sequence of devastating episodes of viral invasions that left a small surviving immune fraction terrestrial life, at each stage, carrying the "subroutines" that would be critical for future change and evolution [34]. Such sequences would for the major part be transmitted from generation to generation in the form of "nonsense genes" that are now well documented in present-day genomes. These nonsense genes, however, would have a utility as may have happened during the last phases of human evolution when the brain volume doubled over the last 2 million years.

7. Concluding Remarks

To summarise—an ever-growing body of astronomical studies combined with biological data on the wide range of newly discovered Lamarckian mechanisms and Horizontal Gene Transfers (these past 45 - 50 years) point decisively to our cosmic origins and cosmic ancestry [1]-[3] [32]. Admitting this conclusion is fraught with difficulties that are to a large extent sociological in nature. Such an admission would inevitably change the way we think about ourselves and about the Universe in which we find ourselves. If we can finally admit the emerging facts for what they are, a great deal of what is now taught in science is wrong. More significantly we would have to recognise that vast sums of money are currently being spent (or committed to be spent) on utterly futile projects. The only way out of the present dilemma is to confront facts squarely and to recognise that by adopting the emerging worldview without prejudice, brand new vistas for scientific progress will lie open which it will be the privilege of future generations to explore.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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