

*"Genetics Indicates Extra-Terrestrial Origin of Life: The First Gene"* by R. Joseph and Chandra Wickramasinghe). *Journal of Cosmology*, October 2011. In press

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Two pioneers in astrobiological research, review in a brief and perfectly comprehensive manner, the biological, chemical, and genetic data that indicate life may be present on Earth between 4.4 bya to 3.5 bya. Initially, they discuss the main major views on the origins of Earthly eukaryotes: A) The genetic **"merger models"** as embraced by Hedges (2004, 2009) and others, claiming that different species of bacteria joined together thereby creating compartmentalization within the cell, and thus a nucleus around 2.7 bya, and then later, a mitochondrion around 2 bya to 2.4 bya (Joseph, 2010). B) The **"deep roots"** models holding that eukaryotes appeared at the same time prokaryotes began to diverge (Hartman, & Fedorov, 2002; Kurland, Collins, & Penny, 2007; Poole, & Penny, 2007). If the deep roots model is correct, this would mean that eukaryotes and prokaryotes were present, on Earth, between 4.4 bya to 3.8 bya. C) The **"horizontal gene transfer"** (Woese, 2004), according to which Life began with proto cells and the initial proto cells may have lived together and repeatedly swapped and shared genes. "Eventually this collection of eclectic and changeable cells coalesced into the three basic domains known today (bacteria, archaea & eukaryotes)". But the main question still exists: "if proto-cells possessed genes, and were essentially life-like and capable of biological activity 4.2 to 4.4 bya, then where did they obtain their genes, and how did their genes acquire the ability to replicate? "

Two more parameters should be taken under consideration. A confluence of evidence suggesting that life was present on this planet during a period known as the "Late Heavy Bombardment" (Schoenberg et al., 2002) when Earth was pummelled with massive extra-terrestrial debris causing the surface to melt and form new rocky layers. Moreover, since Earth is believed to have been formed 4.6 billion years ago, the genomic and biological evidence indicates life was present on Earth nearly from the very beginning of this planet's formation. In parallel, it is widely accepted that the eukaryotic genome has increased in size over the course of evolution; a function of gene and whole genome duplication (**WGD**) as well as horizontal gene transfer (**HGT**). Duplication rates, therefore, can provide us with an approximate date for the creation of the first gene. However, duplicative events in prokaryotes appear to occur over a span of billions of years, whereas whole genome duplicative events occur in the eukaryote genome perhaps once every 100 million (Lynch et al., 2001; Lynch and Conery, 2000) to 250 million years (McLysaght et al., 2002; Dehal and Boore, 2005). Beginning with these dates, and based on analyses of eukaryotic genomic evolution, the authors conclude the first gene was formed prior to the creation of Earth and perhaps over 10 billion years ago (**extra-terrestrial abiogenesis**). A genetic birthdate of between 10.5 to 14.5 billion years, supports the likelihood that the evolution of the entire ensemble of organisms or genes (viruses RNA, genes/ DNA, proto-cells, prokaryotes, archaea, bacteria, eukaryotes) at the base of Woese's tree of life is

derived from sources external to Earth and which originated at about the time of the formation of this galaxy. The Earthly-life forms, and most certainly their prokaryotic and/or proto-cellular ancestors, must have possessed a minimal gene set, which made life possible. This minimal gene set must have been established following the same genetic processes of **duplication, replication, and gene deletion**, as is characteristic of life on this planet.

Modern research has shown that organic compounds are relatively common in space, especially in the outer solar system where volatiles are not evaporated by solar heating (Chang, 2009). Comets are encrusted by outer layers of dark material, thought to be a tar-like substance composed of complex organic material formed from simple carbon compounds after reactions initiated mostly by irradiation by ultraviolet light. It is supposed that a rain of material from comets could have repeatedly brought significant quantities of such complex organic molecules to Earth. Other sources of complex molecules have also been postulated, including extraterrestrial **stellar or interstellar origin**. For example, from spectral analyses, organic molecules are known to be present in **comets and meteorites**. In 2004, a team detected traces of polycyclic aromatic hydrocarbons (PAHs) in **nebula** (Witt et al, 2003). More recently, in 2010, another team also detected PAHs, along with fullerenes, in nebulae (García-Hernández, et al., 2010). AHs are the most complex molecules so far found in space. The use of PAHs has also been proposed as a precursor to the RNA world in the PAH world hypothesis (Battersby, 2004). The Spitzer Space Telescope has recently detected a star, HH 46-IR, which is forming by a process similar to that by which the sun formed. In the disk of **material surrounding the star**, there is a very large range of molecules, including cyanide compounds, hydrocarbons, and carbon monoxide. PAHs have also been found all **over the surface of galaxy M81**, which is 12 million light years away from the Earth, confirming their widespread distribution in space (2008). The link between Comets and Panspermia was investigated further with a NASA Launch performed by NASA beginning in 2004, entitled "The Stardust Mission". Ion Propulsion spacecraft was loaded with machinery to bring back lab samples from the tail of a comet. The published document from NASA entitled "NASA Researchers Make First Discovery of Life's Building Blocks in Comet" (<http://www.jpl.nasa.gov/news/news.cfm?release=2009-126>).

As the worldwide scientific community always welcomes any contribution that enhances a thought provoking interdisciplinary discussion, Disaster Archaeology (an autonomous scientific field in 2005 by Dr. Amanda Laoupi, available online at <http://archaeodisasters.blogspot.com/>) supports the afore-mentioned research results and embraces the concept of Panspermia, that is widely found in the belief systems of ancient civilizations. In recent years, physicists Fred Hoyle & Chandra Wickramasinghe (1986) have proposed not only that life originated from outer space in the distant past, but also that terrestrial evolution continues to be driven by the input of extraterrestrial genetic material (see <http://www.astrobiocymru.com/>). They also suggest that various historical pandemics were caused by bacteria or virii delivered by comets. In addition, many other scientists examine seriously the likelihood that various plagues of the past times have been started when bacteria & viruses from outer space invaders (plasma, g-rays, comets, meteors) reached the earthen atmosphere (i.e. Mike Baillie, Gunnar Karlsson, Graham Twigg). On the other hand inspired researchers such as Immanuel Velikovsky (<http://www.varchive.org/>), Alfred de Grazia (

[archive.com/quantavolution/QuantaSeries.htm](http://archive.com/quantavolution/QuantaSeries.htm)) & Paul La Violette (<http://www.etheric.com/>) have already pointed out the interrelation of similar past events with the formation of myths in ancient societies. Such mega-events are unknown to modern experience but are indicated by ancient lore and traditions from many places worldwide and by various geological & biological phenomena detected via geoarchaeological and bioarchaeological studies. Similarly, a growing number of scientists assert that catastrophic encounters of Earth with such phenomena, have played a major role on Earth's shaping and equilibrium (geology, climate). Especially, Impact lore and mythology seems to be of huge importance among ancient cultures. Gods' divine flames, rare planetary conjunctions, the wrath of celestial gods, falling stones, arrows that bring devastation, malignant signs & disturbance of the hydroclimatic balance, deathly epidemics along with other natural phenomena, elimination of humans and new generations arisen, all these symbolic features disclose the powerful truths behind the legendary narrations and local traditions of the past. Furthermore, the symbolic language that reveals plagues, upheaval & natural bio-disasters reminds modern scientists of neglected or hidden parameters of environmental, socio-economic and cultural changes. The chaotic violent forces of Space phenomena and their mechanisms with their primordial impetus (burning heat, the phenomenon of 'nuclear winter', darkness, catastrophic accompanying phenomena like earthquakes or landslides and tsunamis) gave birth to deities, creatures and heroes who formed famous mythological cycles, narrations and traditions all over the world. They all interconnect the devastating impacts of such phenomena to the 'gifts of life' (birth of gods, of arts, of skills & technologies as metallurgy etc).

Since 2005, Dr. Laoupi has also started an attempt to highlight the dual role of Space phenomena (simultaneously bringers of building blocks of life or even life, and destructors) and the interrelations between astrobiological processes and past epidemics by providing new evidence through famous mythical cycles and various archaeodata (cosmologies, religious beliefs, texts) in human history.. Apart from being examined, analyzed and interpreted through the new perspective of Disaster Archaeology's methodology, they are correlated with contemporary facts and trends in Paleo / Bio- anthropology (gene mutations caused by exposure to extraterrestrial 'material', that led to changes in human physiology, brain size & structure, metabolic functions, cognition, etc). You are welcome to join the e-project Human Evolution from Space (<http://cosmosandhumans.blogspot.com/>), where we promote interdisciplinary international cooperation on such topics. Instinctively, but not surprisingly, humans always conceived the skies as their primordial 'home', feeling like 'stardust children'. It is written in our DNA, human life and Universe, we are one..

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