Commentary on article by R. Joseph and C. Wickramasinghe. 2011. Genetics indicates extra-terrestrial origins for genetic life and the first gene. J. Cosmology in press.

J. T. Trevors
School of Environmental Sciences
University of Guelph
50 Stone Rd., East
Guelph, Ontario
Canada, N1G 2W1
E-mail: jtrevors@uoguelph.ca
Tel: 519-824-4120 x 53367
Fax: 519-837-0442

The hypothesis presented in this interesting and stimulating article is that the first gene was present about 10 billion years ago, and therefore about 6 billion years before the formation of the Earth. Therefore, the first gene(s) was assembled at some extraterrestrial location other than the Earth and arrived at the Earth *via* some impact event or still unknown event.

The authors proposed that over the course of biological evolution the genome has been repeatedly duplicated in size. Therefore, the first minimal gene set must have originated from a smaller gene set, which had its source from an even smaller set of genes. The process of duplication can therefore be used to estimate the origin date of the first gene. The authors presented several sets of analyses to support their proposed conclusion- the first gene was established at least a billion years before the Earth was formed, and more likely estimated at about 10 billion years ago. The exponential analysis provides an approach to estimating the past origin of gene(s) event.

It is known that knowledge is always in a state of evolution as inferior ideas and knowledge are replaced by superior ideas and knowledge that is correct or approaches a better estimate of the actual phenomena. These steps forward may be incremental or sometimes transformative, and become quantum leaps in knowledge. The renaissance is an example of a collective transformative leap forward. In the present article the authors hypothesize that the first gene was assembled by some unknown mechanism at an unknown non-Earth location, and may have been delivered to the Earth by an unknown mechanism.

One of the most profound enigmas in science has been the origin of organic genetic instructions and their capacity to instruct the assembly of the first cell(s), growth and division. Once you have cell division, Darwinian evolution is possible. Not only do the genes carry the genetic instructions for functional life, they must be replicated to allow a copy to be present in each cell at division.

Another profound enigma has been- how did the organizing life (prebiotic and then living cells capable of growth and division) know which genes were necessary for functional living organisms, or what we define as living today. Therefore, one gene would be as useless as another if the requirements for what constitutes life were not known. The first cells could not possibly have known anything, as they had no conscious means to know anything. Since what constituted life could not have been known, many genetic

coding systems may have been experimented with a still unknown selection mechanism that was operating to select the best or functional organic genetic code that continued to organize, and lead to the emergence of life. Alternatively, only one genetic coding system was present. At some time in the distant past the code would need to be frozen, thus allowing evolution to proceed using duplications, gene deletions, gene transfer events and mutations. The basic organic genetic code was in place and allowed evolution to proceed because of the immense number of combinations available in the code for diverse life forms.

Joseph and C. Wickramasinghe have presented a hypothesis for the time period at which the first gene originated. Their evidence and reasoning should be examined using whatever scientific approaches are possible to fit the pieces of this profound puzzle together. The mechanism for the origin of the first gene(s) remains an enigma. The authors have also acknowledged that it was highly unlikely that the entire minimal genome was delivered to the Earth in one event, from which life emerged.

Joseph and Wickramasinghe made the assumption that the first genes must have began to evolve prior to the establishment of life and through gene and genome duplication, a minimal gene set was organized. An immense unknown is-in what type of microenvironment with all the necessary molecules, ions and thermodynamically favourable conditions, would those events occur under and what mechanism(s) was present to enable genome organization, if the correct enzymes were not present. If enzymes were not

necessary, a mechanism must have been present that may have molecular relics of it still present in some cells, or the mechanism was lost once the basic genetic code was frozen, and enzymes now control the rates and directions of the biochemical reactions.

The organization of the first gene and subsequent genes would also be more plausible if these events occurred in a stable microscopic molecular location (on the Earth or extraterrestrial) such as hydrogel (Trevors and Pollack, 2005) as opposed to a harsh, unprotected and unstable environment where the required molecules (and enzymes if necessary) may have been both absent and limiting or unstable.

The international science community can view this interesting and thought-provoking article from one perspective as the starting point for more scientific debates, transformative ideas and scholarship. Some cautions that should be mentioned are that the gene duplication/expansion rates used in their analysis need to be correct or accurate estimates to support their hypothesis. The authors also recognized that gene duplication/ expansion can be followed by accelerated evolution. Secondly, anything can be hypothesized, but it is often better if the hypothesis is plausible and can be supported or found to not be supported by data from other researchers who also bring their knowledge and skills to the debate and research. If the first gene(s) was organized at a non-Earth location, it needs to be examined what are plausible locations and what time period would be required for the genes to arrive on the Earth.

If Mars is about the same age as the Earth, then other locations about 5-6 billion years older than the Earth and within distances that could accommodate this time period for travel of the gene(s) or even a life form to the Earth, need to be determined. This is also not the first hypothesis on abiogenesis at a non-Earth location. This simply moves the question of the origin of life to another location. The question still remains as to the origin of genetic instructions that have specific functions for life forms. However, the authors have used an approach that provides an estimate of the time in the past for the origin of the genetic instructions. Future research by the international science community will assist in determining if the estimate of about 10 billion years ago is accurate and supported by additional information and analyses. Once again, more questions have been raised. This is the way of science. The authors should be commended for this article as raising profound questions about our human origins as the search for ourselves is part of our humanity and our exploration of the universe.

References:

Trevors, J.T. and G. H. Pollack. 2005. Hypothesis: the origin of life in a hydrogel environment. Prog. Biophys. Mol. Biol.89:1-8.