

Evolution and Organismic Communication

by Jason Ross

According to the neo-Darwinists, the tree of evolution splits and develops in a single manner: Genetic changes conferring a competitive advantage are preferentially passed on to the next generation, leading to different kinds of specialization and a development towards more competitive forms of life (**Figure 1**). I intend to show that this idea is so completely absurd, that it may no longer even be considered as a basis from which to posit “alternative” theories.

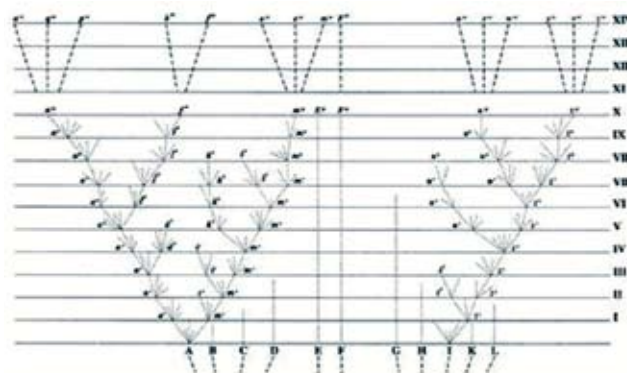
This will occur on several counts: the failure of an evolutionary “tree” to correspond to the organismic differences and development actually observed, the great variety of hereditary mechanisms beyond genomic transformations, and, most importantly, the fraud of attempting a mechanical explanation, where each state comes to exist because of previous states.

Additionally, mechanisms of embryological and cellular development and communication will be considered from the standpoint of dynamics and cosmic radiation.

The Trouble with Trees

There are many ways of conceptualizing and organizing groups of phenomena. The characteristic of a tree as the scheme is that each element or branch has one unique immediate ancestor. On a structural (or physical) tree, each leaf has one twig that it springs from, which has only one limb it grows out of, coming

FIGURE 1
Darwin’s ‘Tree of Life’



The “Tree of Life” included in Charles Darwin’s Origin of Species (1859) represents all evolutionary development as vertical differentiation, excluding any horizontal connections. This caricature of Darwin appeared on the cover of a Parisian satirical magazine of the 1880s.

from one branch, which, like all branches, comes from a trunk. Under this organizational scheme, there is no possibility of branches having joint children, of limbs combining into a new trunk, or of leaves connecting with each other. When a tree structure is imposed on the evolutionary development of life, it is pre-supposed that there is no horizontal development or connection, but only vertical changes,

i.e., changes from organisms to their direct descendants.¹

An evolutionary tree is particularly ill-suited for understanding the development of single-celled life (e.g., bacteria). An ancestral, generational approach to development is familiar to us in the sexual reproduction of animals and plants, but unicellular organisms do not engage in sexual reproduction in this familiar form. Instead (following the typical, but inappropriate, language), “mother” cells split asexually into identical “daughter” cells, without the need for a “father.” Unicellular organisms do, however, engage in behavior that seems to resemble the sexual reproduction of higher species. This takes two forms: one of which appears to be characteristic of the organisms themselves (plasmid transfer), while the other takes place in a larger context (viruses).

In the case of plasmid transfer, one bacterium transfers a piece of its genome to another, by excising a segment and copying it, then physically passing it off to another bacterium which incorporates it into its genome. In this world of what is known as horizontal gene transfer, the application of a tree is questionable. It would only be through the development of different species,² incapable of engaging in such plasmid transfer, that the distinct branches of a tree could be formed. However, the not-infrequent transfer of plasmids among what are classified as different bacterial species, forces the characterization of links between species as a net: It is said to be reticulate.³

While most viruses only add their own genetic material to their hosts, it is also possible for viruses to pick up parts of their hosts’ genomes, and transfer them to others. This introduces a factor beyond direct plasmid transfer between bacteria: viruses are a new vector. The numerous cases of viruses that infect across species lines, indicate again that it is impossible to have branches on a tree that are unable to interact.

Tantalizingly, because their functional cycle lies

outside any particular species as such, viruses must be considered as potentially a major factor in the evolution of life as a whole.

Your Father’s Eyes; Your Mother’s Sweet Tooth

While the genome indisputably plays an essential role in known forms of life, allowing for the easy production of proteins, including those not currently existing in a cell, there is much more to heredity than an organism’s DNA sequence. Four examples will be discussed here: introns, gene expression, genomic tagging and conformation, and other biological non-genetic inheritance.

An organism’s genome codes for the production of proteins, which perform many functions in a cell (e.g., as enzymes). It is now known that codons, triplets of the base pairs making up DNA, code for specific amino acids, and that strings of DNA are decoded (transcribed) into amino acids, which are then strung together into proteins. While the process by which this occurs is by no means completely understood, enough is known to be able to point out some anomalies. Introns are one example.

In all higher forms of life (plants and animals), a large portion of DNA is not used: In the transcription process, segments of the DNA seem to be thrown away while the remaining pieces are stitched together, and then form the appropriate protein. These non-expressed segments are called introns, while the segments that are then transcribed into their products are called exons. There is as yet no clear understanding of how the transcription process “knows” whether a certain segment of DNA is an intron or an exon. Furthermore, under certain conditions, a portion of DNA may change its role from intron to exon. What would be the immediate competitive advantage in developing a repertoire of potentially expressible introns that are not yet being used?

While the genome can be thought of as a gigantic recipe-book, it cannot itself explain which dishes an organism decides to cook at a given moment. For example, there is no difference between the DNA in the cells that produce your hair and the cells that produce your toenails, but it certainly is a good thing that each cell remembers its proper role! The field of embryology takes up the question of progressive cell differentiation in single organisms, typically with the same DNA in all cells. As the embryo develops and tissues form, the genome is selectively expressed to correspond to the cell’s role in the entire organism.

1. As an example, there are many efforts to represent the Indo-European languages with an image of a tree, which, while it has many merits, makes it difficult to graphically represent such linguistic phenomena as the Norman Conquest of England, and the introduction of French words. An example tree: <http://bit.ly/bzgDwP>

2. I use this word with concern. A species is defined for higher, sexually reproducing life, as a group of organisms that are able to mate and produce fertile offspring. This definition does not apply to bacteria; there is no universally accepted definition of species for bacteria.

3. As with so many English nouns, scientists are fond of using the longer, Latin-based adjectival form, *reticulate*, instead of the perfectly good English *net* or *net-like*.

Several other factors are at play in determining expression. DNA can itself be “marked” by replacing a hydrogen on a base pair (cytosine) with a methyl (CH₃) group, in a process known as methylation. Methylated DNA is less likely to be transcribed. The histones around which the DNA wraps itself play a role in determining its conformation (shape), which can also be a factor in determining which genes are to be expressed.

Additionally, it is possible to inherit behaviors in a non-chemical-biological way. Behaviors can, by the internal biological environmental differences they engender,⁴ alter gene expression. This different behavior, and the resulting change in expressed phenotype, is heritable, without being a change in the genome itself.

Changes in gene expression are also determined by environmental factors outside the organism. In fact, there are plenty of heritable changes that are not genetic in character at all.⁵ Changes in cell membranes are passed directly to daughter cells, as are mitochondria.

It is thus possible for evolutionary changes to take place very rapidly, by changes in the set of genes that are expressed, and not simply changes in the composition of the genes themselves. A recent article has demonstrated that higher apes contain a number of genes in common with humans, but the apes do not express them, while human beings do.⁶ What role may cosmic phenomena play in triggering such changes in gene expression? What potential exists, waiting to be tapped into?

Returning to viruses, it is remarkable that, in human beings, not only is the majority of our DNA composed of introns, but most of it is viral DNA. The basis for that statement is the lysogenic behavior of viruses. While viruses can “commandeer” a host cell, and use its machinery to reproduce themselves, eventually causing the cell to pop open (lyse) and release copies of itself, they can also hop into the host cell’s genome. This process, called lysogeny, allows a virus to remain incorporated into a host’s genome, and offer new genetic mate-

rial. Although it is integrated into the host genome, viral DNA maintains characteristic code sequences revealing its origin.

In a remarkable example of the role of viruses in evolution, the human placenta’s syncytium (the region across which nutrients from the mother and waste products from the child transfuse) requires a protein for a singular behavior. The cells of the syncytium lose their cell membranes and merge into a gigantic, multi-nucleated cell. The protein allowing for this transformation is coded for in viral DNA!⁷ Viruses could be serving as vectors to set up the dynamic for the expression of revolutionarily new phenotypic characteristics, just waiting for the appropriate cue to come into play.

The response of viruses to very specific electromagnetic radiation, particularly in the ultraviolet range, and the many unanswered questions of the determination of which parts of the genome are to be expressed, give the opportunity for extraterrestrial factors to play a role in the evolution of life on Earth.

Evolutionary Leaps and Direction

Here, we reach the epistemological kernel of the error of neo-Darwinism: mechanism. Under a mechanical view, each state of a system can be understood as resulting from the previous state. This rules out teleological considerations and the opportunity for functional dynamic wholes and directions. Several topics will be briefly considered here: the correlation between cosmic radiation and biodiversity, the phenomenon of punctuated equilibrium, and dynamics.

Compelling evidence exists that there is a strong correlation, statistically impossible to ignore, between cosmic radiation incident upon the Earth and cycles of biodiversity, measured as the number of genera alive at a given time period.⁸ Such a correlation demands that evolution not be considered as a terrestrial phenomenon, and implicitly forces the entire universe to be the context for any scientific study. The means by which

4. Dietary preferences, for example. Experiments with human mothers fed carrot juice, and pregnant rabbits fed juniper berries, have shown that their young develop preferences for these foods.

5. Jablonka and Lamb cite M.M. Clark et al.’s work on Mongolian gerbils. Female gerbils, in a male-dominated uterine environment, develop different behavioral characteristics, including territorial aggressiveness, and male-biased litters. Their female children will then be more likely to have male-biased litters, etc. See Jablonka and Lamb, p. 146, and M.M. Clark et al., 1993, “Hormonally mediated inheritance of acquired characteristics in Mongolian gerbils,” *Nature*, vol. 364, no. 6439; Aug. 19, 1993, p. 712.

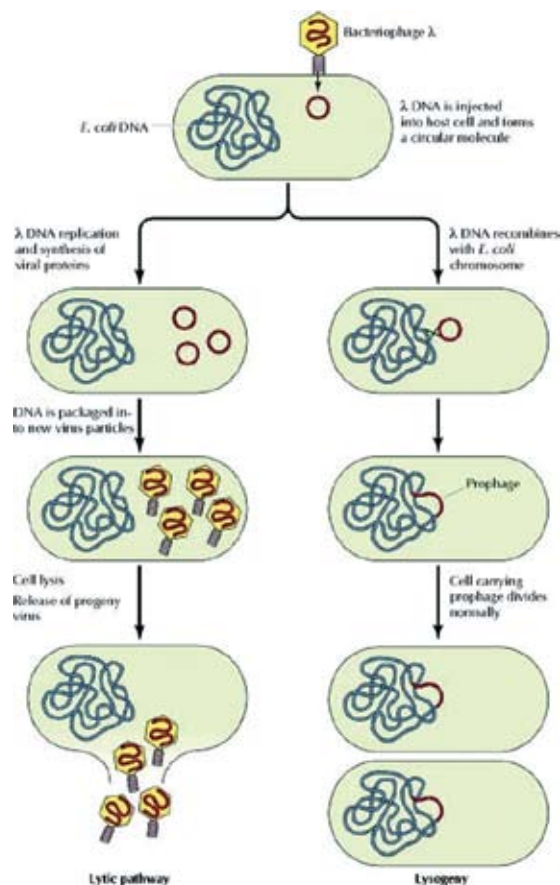
6. For a similar article: <http://tiny.cc/gq12v>

7. I owe this example to Frank Ryan’s *Violution* (see References). The required protein is coded by the envelope gene of a human endogenous retrovirus, known as HERV-W. The characteristic “long terminal repeat” bookends of viral genomes allow their identification in host genomes. See *Violution*, and Sha Mi, Xinhua Lee, Xiang-ping, et al., “Syncytin is a captive retroviral envelope protein involved in human placental morphogenesis,” *Nature*, vol. 403, no. 6771; Feb. 17, 2000, pp. 785-89.

8. Sky Shields, “Kesha Rogers’ Victory Launches the Rebirth of a Mars Colonization Policy”: <http://larouchepac.com/node/13802>

FIGURE 2

Lytic and Lysogenic Pathways of Bacteriophage



www.cbu.edu/~seisen/Viruses.htm

A virus behaving in a lysogenic state integrates itself into its host DNA, whereas one in the lytic state reproduces rapidly without integrating, eventually popping (lysing) the cell. Ultraviolet light can trigger some viruses to switch their role.

the intention, given expression through cosmic radiation, acts on life, have yet to be studied to the degree they warrant. One obvious initial possibility, is the role of viruses. Since some viruses can be triggered to go from lysogenic (dormant) to lytic (active) states by ultraviolet radiation, the possibility confronts us that the role of viruses as evolutionary mediators is orchestrated on a galactic level (**Figure 2**).⁹ More will be said on the potential for radiation to direct the development of life in the next section.

9. Not only does cosmic radiation originate from distant locations, the entire galactic electromagnetic field can play a role in which radiations are directed towards the Solar System at any given time.

Those studying evolutionary history face the emergence of punctuated equilibria of whole-Earth evolutionary stages. Single-celled organisms existed on the planet for more than a billion years before multicellular life finally began to form. In another example, the process known as the Cambrian Explosion (about 570 million years ago), a tremendously yeasty period of evolutionary development, took only 5-9 million years. In general, while different species exist in the fossil record, “halfway-species” are hardly to be found, and many evolutionary technological upshifts (e.g., flying birds) seem hard to imagine as having been driven by intermediate competitive advantages.¹⁰

Some neo-Darwinists hold that stressful environments lead to more mutations, an hypothesis for which there is some evidence, but even seemingly “close” genes require a large number of changes, which would seem difficult, if they proceeded randomly.¹¹ Again, if the potential for new phenotypic expressions is being developed, without being expressed along the way, we need not worry about competitive advantages of life along the path of development—life may simply leap.

To truly consider these phenomena with fresh eyes, the mechanistic approach inherited from Descartes, Newton, Darwin, Bertrand Russell, and their ilk, must be rejected. While great success has been made in physics and engineering by the consideration of efficient causes, this cannot be projected upon life processes. (Indeed, point-by-point mechanism is not even true on the abiotic level—see “The Matter of Mind.”¹²)

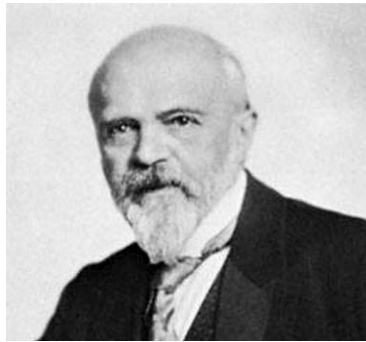
Unlike the so-called laws of physics, which describe abiotic goings-on with formulations that are independent of the direction of time, almost all empirical generalizations about living processes have a clear direction to them. But, this direction is not a vector! On the scale of evolutionary time, these processes are not directed as an arrow, from one possible state to another, but are, instead, the development of greater domains of possibility. A new potential may appear to come from the past, temporally, but it is not generated from it, causally. Time is drawn forward, not pushed.

We will continue this theme as we consider organization across cells.

10. What use is the development of a wing that is completely non-functional for flight? How would a useless appendage repeatedly be selected for, until it is able to serve a purpose?

11. See Brig Klyce’s discussion of the supposed random mutation creating antifreeze protein genes at panspermia.org/neodarm.htm

12. <http://tiny.cc/lmbb7>



Since the late-19th-Century experiments of the German biologists Hans Driesch (above) and Hans Spemann (left) revealed that the differentiation of cells as the embryo develops was not determined by the physical composition of the cells, it has been necessary to consider the developing embryo as a whole, and not as a growing collection of cells.



Russian biologist Alexander Gurwitsch hypothesized a biological field to guide the development of cells, and performed studies on one possible means of organization of the field: what he called mitogenic radiation.

Cellular Communication and Poetry

Embryology is a fascinating discipline. Nineteenth-Century experiments revealed that the differentiation of cells as the embryo develops was not determined by the physical composition of the cells. If it were, it would be impossible to switch cells around in a 16-celled embryo, and have the organism, as a whole, develop properly, compensating for the change. Since experiments such as this had been successfully performed by German biologists Hans Driesch (1867-1941) and Hans Spemann (1869-1941), it has been necessary to consider the developing embryo as a whole, and not as a growing collection of cells. Russian biologist Alexander Gurwitsch (1874-1954) hypothesized a biological field to guide the development, and performed studies on one possible means of organization of the field: what he called mitogenic radiation.

In a famous experiment, Gurwitsch oriented two onions, such that the root tip of one pointed perpendicularly at a location on the axis of the other. He discovered that the region pointed to by the first tip had a greater rate of mitotic division than neighboring regions. Experiments with different shielding materials led him to conclude that this mitogenic radiation, as he called it, expressed itself in the ultraviolet range.¹³

Continued work on this subject, with the great advantage of sensitive photomultipliers, has indicated

that seemingly all biological processes emit various sorts of electromagnetic radiation. Examples, such as the coordinated development of groups of fish eggs, sympathetic symptoms of disease expressed by cells in optical communication with infected ones, and variations in organized cell behavior, that is induced by the spectra permitted to pass between cell groupings, indicate a great responsiveness of life to such radiation.¹⁴

In evolutionary terms, it stands to reason that the cosmic radiation environment can play a major role in regulating cellular activity, both directly, as triggering radiation, and potentially, through inducing Cerenkov radiations of appropriate frequencies in organisms. The previous discussion of viruses, and the turning genetic expression on or off by environmental factors, offer no shortage of fields of study to explore the means by which the environment of the galaxy as a whole shapes the development of life here on our current home planet.

It must be emphasized that while factors such as cellular emissions, virus operation, and genome transcription may serve as mechanisms for such development, they are not the cause. As an example of a disposition to move towards a different state, I offer the simple example of a mixture of hydrogen and oxygen gas. Such a mixture in a vessel is not at a thermodynamic optimum: The combination of the gases to form water would be

13. Lipkind, *Op. cit.*

14. See Jonathan Tennenbaum, "The Biophoton Revolution," *21st Century Science & Technology*, Winter 1998-99.

preferred. Yet, such a transformation cannot occur without a catalyst, such as a spark in the chamber.

Although higher apes may have human genes which they are not expressing, and the Cambrian Explosion may have been the letting loose of a great evolutionary potential, such triggered releases are not the same as the process that set up the disposition for such changes.¹⁵ Here we must join with Percy Bysshe Shelley, who lauded the role of the poet in crafting a dynamic, along which thoughts could then run.

No matter what the British biologist Richard Dawkins might claim, there is no proximally advantageous mechanistic cause for the development of such genomic potentials. Indeed, the cause of evolutionary development is just that: a cause. Not being able to find it in the realm of mechanism does not mean it does not exist, but rather, that we are seeking in the wrong place.

We find a process rigorously analogous to this devel-

15. The development of the genome, creating new evolutionary potentials, does not require competitive advantage along the way. The problem of the utility of middle stages of development would not be an issue, to the extent that changes in expressed characteristics actually occur with surprising rapidity.

opment of the universe as a whole, in the creative advancement of human society. At this point in human and planetary history, it is essential to organize culture around the goal of manned colonization of the Moon and Mars. Without a personal commitment to such a shift—without such a political-cultural goal—it were impossible to make the “scientific” breakthroughs required to piece this matter together. A faulty view of the fertile potential of human nature will, necessarily, analogously, lay barriers to what may seem to be discoveries of “scientific” matters.

To truly be a scientist, one must also be a legislator of mankind.

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