In Search of "Evolution 3.0"

There are eight contenders for the next incarnation of the theory of evolution.

I have heard and read that the theory of evolution is a "theory in crisis." But the research path I've been on has led me to flip-flop on that notion depending on what I was reading at the time. However, very recently, I think I have come to settle on the "theory in crisis" side of the fence. It has always been my contention that, by far, the best refutations against the theory come from evolutionists themselves. By "best" I mean ones likely to be taken seriously by those who adhere to the tenets of evolutionary theory. This is because no matter how scientifically sound an argument is, if it comes from a source with the slightest religious or Intelligent Design affiliation, it is automatically discredited on that basis.

The fact that all of these new theories are surfacing is a testament to the critical condition of neo-Darwinism.

In addition to all the books like What Darwin Got Wrong, 1 there is yet another book scheduled for release on March 4, 2014, called A New History of Life: The Radical New Discoveries about the Origins and Evolution of Life on Earth. The description on Amazon.com is:

Charles Darwin’s theories, first published more than 150 years ago, form the backbone of how we understand the history of the Earth. In reality, the currently accepted history of life on Earth is so flawed, so out of date, that it's past time we need a “New History of Life.”

In their latest book, Joe Kirschvink and Peter Ward will show that many of our most cherished beliefs about the evolution of life are wrong. Gathering and analyzing years of discoveries and research not yet widely known to the public, A New History of Life proposes a different origin of species than the one Darwin proposed, one which includes eight-foot-long centipedes, a frozen “snowball Earth”, and the seeds for life originating on Mars.

Drawing on their years of experience in paleontology, biology, chemistry, and astrobiology, experts Ward and Kirschvink paint a picture of the origins life on Earth that are at once too fabulous to imagine and too familiar to dismiss—and looking forward, A New History of Life brilliantly assembles insights from some of the latest scientific

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research to understand how life on Earth can and might evolve far into the future. 2

Amazon says about these authors,

Peter Ward is a Professor of Biology and Professor of Earth and Space Sciences at the University of Washington. He has authored seventeen books, among them the prizewinning Rare Earth: Why Complex Life Is Uncommon in the Universe, with Donald Brownlee, and his writing has earned varied honors, earning multiple nominations for awards ranging from the Keck Science Writing Award to the Los Angeles Times Book Award. He has been a main speaker at TED and has received the Jim Shea Award for popular science writing, joining recipients such as Stephen Jay Gould and John McPhee. He lives in Washington.

Joe Kirschvink is the Nico and Marilyn Van Wingen Professor of Geobiology at the California Institute of Technology, as well as a Fellow of the American Society for the Advancement of Science, the American Geophysical Union, and the American Academy of Arts and Sciences. His pioneering work in earth science includes formulating and naming the "Snowball Earth" hypothesis. Asteroid 27711 is named after him. He lives in Pasadena, California.

These authors have credentials evolutionists should respect.

In addition, in a recently published article in Nature, science journalist Philip Ball states that it is time to stop hiding all of the unknowns in the theory of evolution. He says,

There may also be anxiety that admitting any uncertainty about the mechanisms of evolution will be exploited by those who seek to undermine it. Certainly, popular accounts of epigenetics and the ENCODE results have been much more coy about the evolutionary implications than the developmental ones. But we are grown-up enough to be told about the doubts, debates and discussions that are leaving the putative "age of the genome" with more questions than answers. Tidying up the story bowdlerizes the science and creates straw men for its detractors. Simplistic portrayals of evolution encourage equally simplistic demolitions. 4

I was also intrigued by one of the on-line comments posted by a reader of the article. Brig Klyce said:

Thanks, Philip Ball, for a timely article. You wrote, "There may also be anxiety that admitting any uncertainty about the mechanisms of evolution will be exploited by those who seek to undermine it." In science, if a paradigm shift is needed, the existing theory is, after all, undermined, isn't it? So, guarding the theory from undermining exemplifies the stifling conservatism that Thomas Kuhn described. Yes, the most numerous opponents of standard evolutionary theory would like to insert non-science into the process. But others would just like to know how it works

Genetic programs, usually believed to reside in DNA, somehow control development. New programs contribute to evolutionary advances. Where new programs come from is not answered by the standard theory. Regulatory changes can toggle or rearrange existing programs, not compose new ones. Meanwhile, research shows that many genes have no obvious predecessors. Many of these appear to arise "de novo" from previously silent strands. Other programs are acquired whole, by various transfer mechanisms. These surprises have implications which we should actively explore.

With that background, let's examine eight of the theories that have been proposed as replacements to neo-Darwinian evolution.

1. CAP

Context-driven Actualization of Potential (CAP), at least as far as the information I found on it, is very broad, abstract, and theoretical. The authors state that they didn't pursue this theory, but that it “rather landed on our doorstep.” Their proposal sets out to define a framework which will encompass not just biological evolution, but the evolution of pretty much anything else as well. They define evolution very broadly so that they can accomplish this. They use a different view of physics than "classical" physics for their proposal. They state that on a microscopic level, quantum mechanics is a more appropriate model for biological evolution as it accounts for behavior of matter at a microscopic level and takes states of potentiality into account. This approach provides much more in terms of evolutionary pathways to take than the current view. They do not get into any specific biological details. They say,
Darwin’s theory of natural selection threw light on the perplexing question of why some traits thrive at the expense of others. With what has come to be called the neo-Darwinian paradigm, the basic idea of random variation and natural selection has been vastly extended by knowledge of the underlying genetic mechanisms, and mathematical formalization by population biologists. However, it is becoming increasingly evident that neo-Darwinism, powerful though it is, cannot account for all, or perhaps even most, biological change. The concept of natural selection offers little in the way of explanation for biological forms and phenotypes arise in the first place. (Natural selection may be a powerful tool for describing biological change, but it can tell you little about the fitness of the offspring you would have with one healthy mate as opposed to another.) Moreover, non-Darwinian processes—such as autopoiesis, emergence, symbiosis, punctuated equilibrium, and epigenetic mechanisms—play a vital role. Moreover, the generation of variation is not completely random; convergent pressures are already at work prior to the physical realization of organisms. First, mating is often assortative—mates are chosen on the basis of traits they possess or lack, rather than at random, in not just humans but other species as well including plants—and relatives are avoided as mates. Second, since Cairns' initial report, there is increasing evidence of directed mutation, where the frequency of beneficial mutations is much higher than chance, particularly in environments to which an organism is not well adapted. Furthermore, the concept of fitness, a cornerstone of the neo-Darwinian enterprise, is problematic. In sum, there is more going on in evolution than random variation and natural selection.\footnote{Liane Gabora and Diederik Aerts, 2005, “Evolution as context-driven actualization of potential: Toward an interdisciplinary theory of change of state”, http://www.vub.ac.be/CLEA/liane/papers/cap.htm#_edn48}

In an article co-authored with five other scientists, Aerts and Gabora wrote,

More specifically, at a microscopic level, matter and energy are no longer retained within their simple form, and quantum mechanical models are proposed wherein potential form is considered in addition to actual form...

We therefore develop a formalism, referred to as Context driven Actualization of Potential (CAP), which handles potentiality and describes the evolution of entities as an actualization of potential through a reiterated interaction with the context.

... If we take notice of the fact that the physics underlying Neodarwinian evolution theory has entirely changed, it is no surprise that evolution theory will have to change.

... This paper proposes a different critique of Neodarwinian theory, which derives instead from a nonclassical and nondeterminist view of physics, as developed recently in quantum mechanics. If the notion of variation is examined carefully, one realizes that what is naturally selected for in the Neodarwinian view are essentially forms of concrete and actual matter. We present a more general view in which forms of potentiality coexist with forms of actuality. We will see that the presence of potentiality states points to a non-Kolmogorovian probability structure at the basis of the context–entity interaction in evolution, which makes possible different pathways of evolution than were allowed for before.\footnote{Diederik Aerts, et al., 1 December 2012, “On the Foundations of the Theory of Evolution”, http://arxiv.org/pdf/1212.0107v1.pdf} 7

### 2. Self-organization

The Self-organization theory has been attributed to Stuart Kauffman in 1993, and Stuart Newman in 2008. In this theory, order of biological structures is governed by a self-ordering much like that of crystals, vortices, and convection currents which occur as a result of the natural forces acting on them. In the case of biology, there are two steps: the production of differing cell types; and the spatial arrangement of the cells. The development regulatory network determines the path that cell division follows in generating the differing cell types—bone cells, skin cells, etc. In other words, the process starts with a single cell—the fertilized egg—which then begins dividing and producing the different cell types in a certain predictable order. These pathways are said to be the products of self-organizational forces.

The second step concerns the physical placement of these cells into their three-dimensional structures to form a body. This is determined by the spatial arrangement of epigenetic information and physical forces of attraction of molecules. In Newman's model, the system assumes a highly conserved toolkit that all organisms have. Self-organizational processes work dynamically in coordination with a genetic toolkit. The toolkit is the set of genes that includes regulatory genes that help to direct the...
development of animal body plans. Cells are combined—like LEGO blocks to form various shapes and structures. These are caused by self-organizing forces—differing forces of attraction between molecules called "dynamical patterning modules" (DPMs). They include adhesion, lateral inhibition, differential adhesion, polarity, and chemical oscillation.

This theory doesn't explain the origin of the regulatory networks or the toolkit it assumes. Although it explains how groups of cells are clustered together, it doesn't explain how these clusters themselves are arranged into a body plan. The blueprint for the whole body is not accounted for.

There is a difference between order, complexity, and specified complexity. Salt crystals exhibit order; a random string of characters is complex; and a sentence has specified complexity. As Stephen Meyers puts it,

The law-like, self-organizing processes that generate the kind of order present in a crystal or a vortex do not also generate complex sequences or structures; still less do they generate specified complexity, the kind of “order” present in a gene or functionally complex organ... these sequences [DNA, RNA molecules] can neither be described nor explained by reference to a natural law or law-like “self-organizational” process.  

He further goes on to explain that,

… because forces of attraction do not determine the sequence of nucleotide bases in DNA and RNA, the origin of the specific arrangement of the bases—the information in the DNA and RNA—cannot be attributed to self organizing forces of attraction either.  

3. NATURAL GENETIC ENGINEERING

In Natural Genetic Engineering (NGE), genetic mutations are not random. Instead, they are self-directed changes as a response to environmental pressures or stresses. This theory is based on empirical observations of organisms reacting to just such pressures. The immune system reacting to invaders and the SOS response system in bacteria are two examples. NGE describes evolutionary change as the result of the purposeful (non-random) yet non-deterministic engineering that occurs in biological systems via a toolbox of mechanisms available to the cells that are used to manipulate the genome. It attempts to explain changes to the genome, the rise of de novo genes, and rapid change in response to external influences. In other words, biological systems have built-in smarts and can affect their own evolution with the tools they have available. Dr. James Shapiro recognizes that the processes used in NGE represent sophisticated programming and are not random. He says,

The continued insistence on the random nature of genetic change by evolutionists should be surprising for one simple reason: empirical studies of the mutational process have inevitably discovered patterns, environmental influences, and specific biological activities at the roots of novel genetic structures and altered DNA sequences.  

In one of the examples mentioned earlier, bacteria activate the “SOS response” system when faced with threats from the environment such as UV rays or antibiotics. Under normal conditions, mechanisms in the cells repair damage to DNA during replication which Shapiro likened to quality control measures that people use which are “cognitive processes, rather than mechanical precision."  

But, as a result of the SOS response, normally repressed polymerases that introduce errors are activated. One result of this self defense mechanism is that DNA is allowed to replicate while still carrying unrepaired damage.

It is also noted that in response to environmental stresses, cells may also express genes that were previously not expressed while suppressing others that were previously expressed. They may also rearrange sections of the genome thereby creating new proteins that the cell would need in order to survive. On his blog about the topic, Shapiro summarizes NGE this way:

For me, NGE is shorthand to summarize all the biochemical mechanisms cells have to cut, splice, copy, polymerize and otherwise manipulate the structure of internal DNA molecules, transport DNA from one cell to another, or acquire DNA from the environment. Totally novel sequences can result from de novo untemplated polymerization or reverse transcription of processed RNA molecules. NGE describes a toolbox of cell processes capable of generating a virtually endless set of DNA sequence structures in a way that can be compared to erector sets, LEGOs, carpentry, 

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9 ibid. page 308


11 ibid., page 14
architecture or computer programming.  

At the same time, Shapiro points out that these processes are not deterministic. He uses the example of the immune system response to invaders as a process with a goal – to eliminate the threat – but with an undermined actualization. He says,

In biology, the alternative to randomness is not necessarily strict determinism. If the cells of the immune system can use well-defined natural genetic engineering processes to make change when change is needed, there is a scientific basis for saying that germ-line cells might do the same in the course of evolution.  

Concerning NGE, Stephen Meyers makes this statement,

During the last fifteen years, Shapiro has published a series of fascinating papers about the newly discovered capacities of cells to direct or “engineer” the genetic changes they need to remain viable in a range of environmental conditions. His work represents a promising avenue of new biological research, bringing insight into how the cell’s information-processing system modifies and directs the expression of its genetic information in real time in response to different signals.

NGE does not answer how changes become useful or explain the origin of its engineering programs. Shapiro states,

NGE is not an explanatory principle. In this, it differs from the use many evolutionary biologists have made of the descriptive phrase, Natural Selection, to cover gaps in their accounts of adaptive novelties. NGE is only a set of well-documented DNA change operators.

While NGE can help in understanding the molecular details of rapid and widespread genome change, it does not tell us what makes genomic novelties come out to be useful. How natural genetic engineering leads to major new inventions of adaptive use remains a central problem in evolution science. To address this problem experimentally, we need to do more ambitious laboratory evolution research looking for complex coordinated changes in the genome.

In addition, NGE does not have an answer as to the origin of its systems. In an online chat with William Dembski, Shapiro answers the question about the origin of NGE systems this way,

I am not sure how to answer your question. All existing living organisms possess natural genetic engineering capabilities. So they must be pretty fundamental. Any self-organizing evolving system has to have the capacity to alter its information store. That's what they do. Where they come from in the first place is not a question we can realistically answer now, any more than we can explain the origin of the first cells.

4. Neo-Lamarckism

As the name suggests, the main idea of this theory is epigenetic inheritance, which is inheritance of traits acquired outside of the genes. In addition to environmentally induced changes, cellular (cytoplasmic) information and traits that are non-genomic or epigenetic are also heritable. Eva Jablonka of Tel Aviv University showed that some organisms such as yeast and E. Coli were able to transfer changes acquired from the environment to subsequent generations. She also pointed out that the processes of DNA methylation and RNA-mediated epigenetic inheritance cause gene-independent heritable changes. She claims,

[These ideas] allow evolutionary possibilities denied by the “Modern synthesis” [neo-Darwinian] version of evolutionary theory, which states that variations are blind, are genetic (nucleic acid-based), and that saltational events do not significantly contribute to evolutionary change.

There is a lecture that Dr. Denis Noble of Oxford University, who is also the president of the International Union of Physiological Sciences, gave in China in which he openly refutes neo-
Darwinism, and specifically targets Richard Dawkins’ promotion of the gene-centric view. He even explains how the gene-centric idea of neo-Darwinism is not falsifiable and also posits that the famous tree of life is not really a tree, but a network. (Incidentally, other scientists doing gene studies/comparisons have made this same conclusion about the tree being the wrong tool for showing evolutionary relationships.)

One of Noble’s main points is that in this “correct version” of a non gene-centric view, the genome is influenced by, and told what to do by, things external to it. Another point of the lecture is to discuss experiments that show there are epigenetic heritable changes. Dr. Noble discusses stroking of rats inducing behavioral changes, gene knockout experiments, Barbara McClintock’s experiments showing gene hopping in plants, transgenerational transfer of disease, cloning experiments, etc. In conclusion, he uses the phrase “towards a new synthesis” and makes the point that physiology is “highly relevant to evolution” but admits that it is still an open topic.

On a side note, Noble points out in this lecture that one of the reasons the experiments he discussed are so few in number is that

[Scientists] thought that the experiments weren’t worth doing. If you’ve become so convinced that a particular theory is right, then you don’t do the experiments to prove that it might be wrong.19

This same point was also made by Dr. Ralph Seelke in an interview in which he discussed his ongoing experiment with bacteria similar to the E. Coli long term evolution experiment. 20

Finally, the epigenetic heritable changes in Jablonka’s experiments were shown not to be permanent. They only persisted for a finite number of generations. Macroevolution would necessitate permanently heritable traits.

Four More Theories

These are just four of the theories that have been spawned because neo-Darwinian evolution is a “theory in crisis.” There are four more evolutionary theories that I will tell you about next month.

19 ibid.
20 Ralph Seelke, Discovery Institute, “Dissenting Scientist”, http://www.discovery.org/v/341

Evolution in the News

The Virus From Mars

Irresponsible news outlets misreport the discovery of the Pandoravirus.

On July 19, several usually unreliable news sources erroneously reported that scientists had discovered a virus that came from Mars. The Daily Mail headline said, “Scientists Discover Unique Giant Virus That Could be From Space.” 21 The International Business Times headline was, “Scientists find GIANT Pandoravirus that could have come from an alien planet.” 22 According to both Eureka! Science News and Fast Company, “Scientists Say Giant ‘Pandoraviruses’ Could Have Come From Mars.” 23 24 MSN News was the least inaccurate. Their headline was “Scientists discover world’s biggest virus – has ancient DNA.” It was subtitled, “The Pandoravirus does not look like anything else, and could be an alien life form – but it’s not going to make us sick.” 25 At least MSN didn’t mention Mars in the headline.

Here’s the truth. Scientists did publish a report about the largest virus ever discovered. There is no evidence that it came from Mars, or anyplace else in space. It was found underwater in two places, neither of which was next to a wrecked spacecraft or meteorite. The space program has not found any viruses existing on Mars now, and no evidence that there ever were

21 http://www.dailymail.co.uk/sciencetech/article-2370100/Scientists-GIANT-Pandoravirus-come-alien-planet.html
22 http://www.ibtimes.co.uk/articles/492676/20130720/scientists-giant-biggest-pandoravirus-alien-planet-mars.htm
23 http://esciencenews.com/sources/newsvine/2013/07/20/scientists.find.giant.pandoravirus.could.have.come.aliens.planet.mail.online
any viruses on Mars, so there is no reason to believe that these viruses came from Mars. There is no evidence that it has “ancient DNA,” (whatever that means). It’s just a newly discovered big virus. It isn’t a terrifying new virus from Mars that is going to wipe out civilization as we know it. (But who wants to read an article about a benign virus? That kind of article won’t increase readership and justify higher advertising rates.)

The name the scientists gave it is, in our opinion, overly frightening. Younger readers probably think Pandora is just a place to get music. In Greek mythology, Pandora unwittingly opened a box that released all kinds of evils onto the Earth. So, the name “Pandoravirus” suggests that it is a virus that could spread throughout the world, causing all kinds of evil. That fear is unwarranted because it isn’t a new mutant virus about to take over the world. It is just an old virus that had never been described in the technical literature before. According to the study authors,

We report the isolation of two giant viruses, one off the coast of central Chile, the other from a freshwater pond near Melbourne (Australia), without morphological or genomic resemblance to any previously defined virus families. Their micrometer-sized ovoid particles contain DNA genomes of at least 2.5 and 1.9 megabases, respectively. These viruses are the first members of the proposed “Pandoravirus” genus, a term reflecting their lack of similarity with previously described microorganisms and the surprises expected from their future study.

Bear in mind that “giant” is a relative term. These “giant viruses” are so big that they can barely be seen by an ordinary microscope—but they are much bigger than normal viruses which can’t be seen by an optical microscope.

One of the editors of the journal summarizes

... the amazed reactions to the discovery, reported on page 281, of two new viruses with by far the largest genomes ever seen in a virus, including one that's bigger than the genomes of some parasitic eukaryotes. The virologists in France who unearthed the massive viruses ... suggest that their finds challenge the longstanding view that viruses don't qualify as life.

"It is clear that the paradigm that viruses have small genomes and are relatively simple in comparison to cellular life has been overturned," says Curtis Suttle, a virologist at the University of British Columbia in

Vancouver. 28

In a nutshell, the Pandoravirus has opened Pandora’s Box for evolutionists because it just doesn’t fit into the conventional view of evolution.

Because of their size, the pandoraviruses appeared bacterialike at first. But using light and electron microscopy, the French group followed the newfound entities through a replication cycle, which proved viruslike. Instead of dividing in two like a typical bacterium or cell, they generated hundreds or more new viral particles, Claverie’s team reports. Both pandoraviruses lack genes for energy production and can't actually produce a protein on their own, fulfilling the definition of virus. “The authors seem to have gone the proverbial extra mile to show that these agents are actually viruses rather than some sort of unusual bacteria," says Eugene Koonin, a computational evolutionary biologist at the National Center for Biotechnology Information in Bethesda, Maryland.

But unlike other viruses, the pandoraviruses lack the gene for the capsid protein that typically forms a capsule around a virus's genes and are missing some key genes found in all other giant viruses and their relatives, including ones for replication. "They seem to be a new family unto themselves," Ghedin says.

Indeed, most of the pandoravirus genes don't look like any in known databases. "The lack of similarity might be an indication that they originated from a totally different primitive cellular lineage than bacteria, archaea, and eukarya," Claverie says. Add in other giant viruses, he says, and "these viruses might indicate that not only a fourth domain existed but also a fifth, a sixth, etc." Raoult goes so far as to suggest lumping all complex microbes—the various giant viruses plus archaea, bacteria, and microbial eukaryotes—into a new grouping he would call TRUC, an acronym for Things Resisting Uncomplete Classification—and the French word for stuff.

It's too soon to redraw the tree of life, several researchers caution. But some revision is already warranted, Suttle argues.

The way this discovery was reported is just another example of how the popular press distorts the truth to make it appear there is evidence for the theory of evolution; but the truth is that the discovery provides evidence against the theory.


29 ibid.
Creationism vs. Evolution

http://www.sntp.net/darwin/evolution_creationism.htm

Battle Over Beliefs

This month’s web site review looks at an article found on a site under the headings of “Say NO to Psychiatry!” and “FTR Foundation for Truth in Reality”. After a brief statement describing Creationism and Theory of Evolution in the context of “how everything came to be” the author presents his main premise where he states that “In both cases what is actually involved here, at the most basic level, is beliefs. The proponents of evolution and the Big Bang Theory would each like to think what they say is ‘true’, ‘scientific’ and ‘factual’, but the real bottom line truth is that, when it comes right down to it, they ‘believe’ in it just as much as the religious folks ‘believe’ in theirs. Neither belief corresponds to any perceivable, observable, or verifiable tangible thing or occurrences(s).”

The author points out that he is not arguing for Creationism or Evolution. He believes “both are incorrect, at least from the viewpoint of verifiable events, reason, honest intelligence, and tangible experience.” The author then provides a lengthy discourse and tries to apply REASON to the concepts evolutionists use to describe the creation of the universe, i.e. the Big Bang Theory. Here he stresses that it requires a lot of faith to believe that the “entirety of the universe, appeared out of nothing.”

Interesting material is presented under the titles of 1) The Problem with the Scientific Explanation of the Universe and 2) Belief and Faith Parading as Science.

Near the end of the article, the author observes that “‘Science’ has functionally replaced ‘religion’ as the object of modern faith. Psychologically, the mechanics are exactly the same. This is not a cute concept or theory, like so many of their notions. This is exactly how the adherent of modern ‘science’ functions. ‘Science’ serves the same purpose ‘religion’ served in past centuries – to give reasons for, explain, and make sense of the world we each find ourselves surrounded by. But sadly, it also demands strict adherence as did past religions and states. It devolves into dogma, rote ideology and strict orthodoxy – or else.”

The web site reader may not agree with all the concepts presented in this article, but I am sure the material is food for thought when trying to understand the nature of the continuing battle over beliefs involving “how everything came to be.”

You are permitted (even encouraged) to copy and distribute this newsletter.

Disclosure, the Science Against Evolution newsletter, is edited by R. David Pogge.

All back issues are on-line at ScienceAgainstEvolution.info.