

A "Dying Theory" Fails Again

Analysis: The Discovery Institute's Efforts to Smear PBS's EVOLUTION Series Misfire Badly



Darwin

The Seattle-based "Discovery Institute" (DI) has minced few words in its efforts to discredit PBS's new *Evolution* series, which premiered during the week of September 24, 2001. According to a DI press release, "*Evolution* distorts the scientific evidence and promotes a biased religious agenda, thereby betraying our expectations and violating PBS's own official policies."

How strong are the DI's objections to the evolution series? Is there a problem with evolution and a strong case to be made for the DI's favorite anti-evolution theory, which they call "Intelligent Design?"

These questions were answered when they released their very first "scientific" salvo against the series on September 14, 2001. Here's what they wrote:

SEATTLE--Viewers of PBS's upcoming series EVOLUTION [Sept. 24-27] will be told of the "fact" that all living things share the same genetic code. They also will be assured that the universality of the genetic code provides "powerful evidence" that all living things "evolved on a single tree of life."

What viewers won't be told is that this so-called "fact" is not true.

"The supposed 'fact' of the universal genetic code is based on outdated science that has been invalidated by more recent research," says biochemist Michael Behe a Professor of Biological Sciences at Lehigh University in Pennsylvania and a Discovery Institute Senior Fellow. He is also author of "Darwin's Black Box".

"Back in the early 1970s, evolutionary biologists did think that a given piece of DNA specified the same protein subunit in every living thing, and that the genetic code was thus universal," explains biologist Jonathan Wells, another Discovery Institute Senior Fellow. "This was unlikely to have happened by chance, so it was interpreted as evidence that every organism had inherited its genetic code from a single common ancestor. In 1979, however, exceptions to the code were found in mitochondria, the tiny energy factories inside cells. Biologists subsequently found exceptions in bacteria and in the nuclei of algae and single-celled animals."

"It is now clear that the genetic code is not the same in all living things, and that it does not provide 'powerful evidence' that all living things 'evolved on a single tree of life,'" concludes Dr. Wells, who holds a Ph.D. in molecular and cell biology from the University of California at Berkeley.

Pouncing upon this supposed error, the Institute's "Viewer's Guide" to EVOLUTION crowed triumphantly:

So the first hard evidence that we are given for Darwin's tree of life turns out to be false.

Trying to drive this point home, DI created a website with the deceptive address of **pbsevolution.org**, including a bold graphic heading announcing that the *Evolution* series was, in fact, "The Magnum Opus of a Dying Theory."

I certainly agree that a close examination of the scientific evidence regarding the genetic code does indeed foretell the last gasp of a "dying theory." But theory in trouble isn't evolution.



(Above): The first show of the *Evolution* series, "Darwin's Dangerous Idea," made the point that Darwin's idea of a single tree of life had been supported by the modern discovery, made almost a century after his work, that all organisms share a universal genetic code. The Discovery Institute has charged that this claim is false.

Despite the DI rhetoric, living organisms do indeed share a common mechanism that copies and translates heritable genetic information. All living organisms translate the genetic code using ribosomes, tiny protein-building factories, they all translate it with the aid of small molecules called transfer RNA, they all read it in the same direction, and they all read it in the same way, translating the code 3 letters at a time into sequences of amino acids, the building blocks of proteins. It is indeed true that in some organisms, a handful of these 3-letter "words" have different meanings. Our own cells, for example, contain little structures known as mitochondria in which 4 of the 64 words have different meanings from the "standard" code. In most organisms, these differences are so slight as to be trivial. In common molds, for example, the sequence "UGA" is translated into the amino acid tryptophan. In the standard code, it's a "stop" signal. The other 63 words, however, are *identical* between humans, elephants, daisies, and molds.

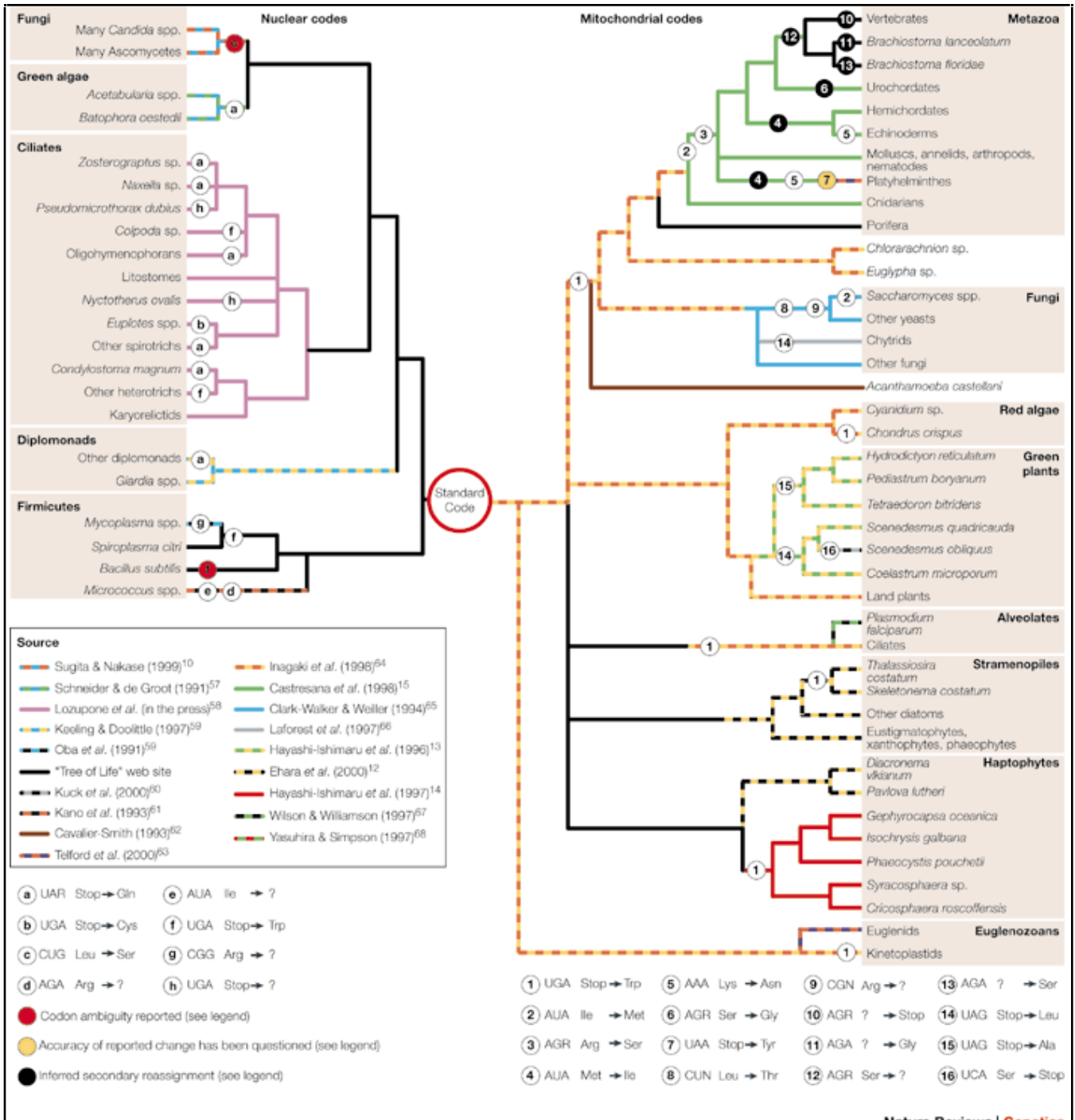
What does all this mean? As evolutionary biologists were quick to realize, slight differences in the genetic code are similar to differences between the dialects of a single spoken language. The differences in spelling and word meanings between the American, Canadian, and British dialects of English reflect a common origin. Exactly the same is true for the universal language of DNA. 48 of the 64 words are identical in all living organisms, and only 16 are known to vary across the enormous diversity of living things.

In fact, the entire biotechnology industry is built upon the universality of the genetic code. Genetically-modified organisms are routinely created in the lab by swapping genes between bacteria, plants, animals, and viruses. If the coded instructions in those genes were truly as different as the critics of evolution would have you believe, none of these manipulations would work. For better or for worse, they do work, and they work brilliantly.

Ironically, one of the sources cited by the DI Viewer's Guide was a 2001 paper in *Nature Reviews (Genetics)* from the laboratory of Professor Laura Landweber at Princeton University. When she noticed that the Institute had claimed that the genetic code *does not* provide 'powerful evidence' that all living things evolved on a single tree of life, she responded:

That is indeed a horrible misinterpretation, because it is clear, particularly in the tree in our paper and in others, that each nonstandard code is a subtle derivative of the standard genetic code and that all codes are derived from it.

Dr. Landweber's comments refer to the phylogenetic "tree" shown in Figure 2 of her paper, which is reproduced below. As she noted, rather than falsifying Darwin's idea of descent from a common ancestor, these "subtle derivatives" of the "standard" code actually provide powerful evidence for the common descent of all organisms from a single ancestor.



Nature Reviews | Genetics

Above: Composite Phylogeny of Variant Codes. (From Knight, Freeland, and Landweber, 2001, used with permission) The slight variations of the "standard" genetic code are related to each other in a way that can only be explained by common descent from a single ancestor possessing the standard code.

Look closely at the figure from this paper, and you'll see something remarkable. The variations from the standard code occur in regular patterns that can be traced directly back to the standard code, which sits at the center of the diagram. What this means is that

these slight variations of the code provide powerful — and unexpected — confirmation of the evolution of the code from a single common ancestor.

Clearly, the scholars at the Discovery Institute have seen this figure and read this analysis of the genetic code, since they went to the trouble to cite this exact paper. Do they tell their readers, however, that the very discoveries they cite provide elegant and unexpected support for Darwin's theories? Of course not. Rather, they are content to tell readers that these slight differences in the genetic code represent an "awkward—and potentially falsifying—fact," that PBS ignores.

The reality, as any scientist working from the original literature should know, is exactly the opposite of the DI's conclusion. As Landweber has pointed out, these slight variations document the evolution of the code itself from a single common ancestor, a process that Charles Darwin elegantly called "descent with modification."

There is indeed a theory that cannot account for the nature of the genetic code. It is called "Intelligent Design," and is routinely advanced by DI "scholars" who claim that it represents a valid, scientific alternative to evolution. They gloss over the fact that not a single scientific paper has appeared in a peer-reviewed journal to explain what "Intelligent Design" might be, and concentrate instead upon the supposed errors and misrepresentations of the scientific community. Such tactics, clearly, represent the last gasp of the dying theory of Intelligent Design.

If the DI really did have a legitimate scientific case against evolution, one would have thought that their very first press release, their first volley of scientific fact against the evolution series would have hit the mark. Instead, their weapon of choice has backfired in a most telling way. The DI critique is based upon a "horrible misinterpretation" of scientific fact, and a close examination of the actual facts provides dramatic support for one of the linchpins of evolutionary theory, the notion of common descent.

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References:

- The Discovery Institute Press Release charging the *Evolution* series with false statements concerning the genetic code can be found on the web:
http://www.reviewevolution.com/press/pressRelease_FalseClaim.php
- The second Figure in this paper is taken from: Robin D. Knight, Stephen J. Freeland and Laura F. Landweber (2001) "REWIRING THE KEYBOARD: EVOLVABILITY OF THE GENETIC CODE," *Nature Reviews - Genetics*. 2: 49-58.