On-Line Debate

Round 2A (2nd round of 3)

"Comparisons of molecules (proteins, DNA) of various species provide independent and compelling support for the hypothesis of biological macro-evolution"

For the Affirmative, David E. Thomas

Round 2, Posted November 8th, 2002

INTRODUCTION

In his Round 1 response of Sept. 27th, Mr. ReMine chose to discuss many topics far beyond the subject of molecular support for biological macro-evolution. In this essay, I will retain my focus on molecular comparisons and their support for biological macro-evolution, and how these relate to Message Theory.

In my first (Round 1) essay, I presented six cases where molecular comparisons provide independent and compelling support of macro-evolution. What makes them *independent*? Well, in Darwin's day, no one had a clue about DNA and proteins. But, long before molecular comparisons were possible, scientists had developed detailed branching trees showing the progress of evolution over time, culminating in diverse living species. These histories were based on morphological comparisons and fossils, and were quite specific in content, with (for example) humans and chimps very closely related (recent common ancestry).

Molecular comparisons didn't become routine until the 1960's. That's when comparisons of biomolecules were used to develop branching trees - histories of evolution - simply by comparing proteins and genes of dogs, bears, chimps, humans, and many other organisms. These methods have been extensively refined and improved since then. Thus, molecular methods are *independent* because they came *after* the morphological/fossil trees were already established, and are based on a completely *different* set of observations.

What makes them *compelling* is the *repeated concordance of the results*. When trees were developed from cytochrome c comparisons of creatures from yeasts to humans (see my Round 1 essay, "Protein Comparisons"), they largely *matched* the old trees of the morphological and fossil analysts. ReMine's Message Theory claims that Life was designed to resist all natural explanations, including Darwin's. In

this case, however, Life *supports* Darwin's explanation - the molecular trees match evolutionary expectations. Message Theory's description of these protein comparisons as "resisting Darwin's explanation" is clearly incorrect.

When the DNA of the genes for cytochrome c sequences for man and mouse are compared ("DNA Comparisons" in my essay), many of the actual DNA codons are identical, even though there exist trillions upon trillions of different DNA sequences that could produce the exact same protein. The evolutionary expectation was that the DNA sequences, like the protein's amino acids, would show much commonality between man and mouse. That is exactly what was observed, supporting (not resisting) Darwin's explanation.

Because Life can be messy, not all trees developed from comparisons of *single* genes will be identical. But, from studies of *hundreds* of genes, a clear signal emerges ("Multigene Comparisons" in my essay; see also Kumar and Hedges 1998). This signal is in strong agreement with other, independent versions of branching histories, so once again, independent and compelling evidence is provided for macro-evolution. (And once again, Darwin's explanation is not "resisted.") Interestingly, this section of my Round 1 essay already provided the rebuttal to ReMine's only specific response to my essay, that regarding cytochrome c of lampreys, tuna, and man.

And so it was for the other subjects I presented: "Genetic Code Comparisons," "Non-Functional DNA Comparisons," and "New Species from Simple Mutations." In each case, there existed the potential for observations that would simply defy Darwin's explanation. And in each case, the evidence turned out to *support* this explanation, contrary to Message Theory.

Molecular comparisons are novel and recent, and are thus *independent* of older methods; they provide strong concordance with existing models of evolution, and are thus *compelling*. And, there is even a *mechanism* behind this concordance: the well-known linkage between morphology and genetics (Mendel 1866).

The support for *macro*-evolution comes, of course, from the vast *scale* of molecular comparisons. Proteins and DNA let us identify and compare genes shared by, say, humans and yeast, or oak trees and bluebirds. We're not talking about the origin of Life itself, but we are talking about development of new life forms from existing ones, from bacteria all the way to bunnies.

THE "FOG"

ReMine's Table 1, of "Evolutionary Explanations," presented items claimed capable of explaining *any* conceivable outcome, much as a fog accommodates any landscape. But many of the items listed are *observations* more than *explanations*. For example, lateral gene transfer (transposition) has been observed many times in microbes, and even in a beetle (Powell 2002). Transposition is something that's *observed*. Its existence does not disprove evolution. It happens very rarely in higher (multicellular) creatures, whose protected germ lines block most lateral gene transfer. That's why we can eat a nice juicy steak, and not wake up the next morning sporting a pair of sharp horns.

Likewise, "Concerted Evolution" is a term for the *observed* homogenization of gene family members within species (and which is *explained* by unequal crossovers and gene conversion). ReMine's example of this, "Molecular Drive," was described by Nature's reviewer as Dover's "pet theory," which "*hardly…rank[s] beside selection and drift as one of the primary determinants of evolutionary change*." (Berry 2000). ReMine's table contained many other speculations not given much weight these days.

Evolution is not as "foggy" as ReMine would have us believe. There is a great degree of scientific consensus on many specific arguments. To suggest that scientists would stand quietly by if, for example, the cytochrome c's of chimps and humans were found to be totally unrelated, is preposterous. Such a find would severely challenge accepted outlines of evolution.

The real "fog" in this debate is Biotic Message Theory, which explains all commonalities as evidence of the work of a single designer, and all differences as evidence of this designer's creativity. *No* observation could fail to fit this theory. By explaining everything, trivially, Biotic Message Theory explains nothing in the end. Moreover, the Biotic Message does not refute all natural explanations; in particular, it does not refute macro-evolution. Most importantly, it lacks a clear rationale, quite unlike evolution, which, as I explained in Round 1, is based directly on "propinquity of descent, the only known cause of the similarity of organic beings…" (Darwin 1859; see Thomas 2002A.)

PHYLOGENY

In his Round 1 essay, my opponent bemoaned a lack of "*clear cut ancestors and lineages*" in evolution. The fact is that phylogenies - trees showing which species are more closely related, and when various groups diverged - can be easily derived from, say, molecular comparisons (Thomas 2002B). Such calculations don't tell us *everything* about the ancestors, but they tell us *enough*.

Two actual cases make the crucial points. The first involves researchers who tracked several strains of rapidly-mutating viruses as they evolved from a single ancestor (Hillis 1992, 1994). The researchers then gave the nine resultant strains to other scientists, and asked them to develop phylogenies by various methods. The results were astounding - for the nine species, there are 135,135 possible bifurcating trees (splitting histories), but each of *several* molecular comparison methods employed found the *one correct tree*. The molecular methods sometimes under- or over-estimated branch lengths, but up to 97% of ancestral characters (actual sequences) were inferred correctly.

That's enough right there. Molecular phylogenies really mean something, and we can confirm it in the lab. But there's another interesting related story, and that's the very strange case of one Larry Hillblom, the rich "H" of shipping company DHL (Smith 2000). He liked to travel Southeast Asia and consort with young virgins, and often left them quickly (and sometimes pregnant). When Hillblom died in a plane crash, his body was never found. His will didn't exclude illegitimate heirs, so several children and their mothers came forward to claim their inheritance. But no DNA from Larry Hillblom was available, and family members refused to cooperate. As far as DNA, it was as if Hillblom had never existed. But, someone realized the plaintiffs *did* have access to some of Hillblom's DNA - some in Lory from Vietnam; some in Jellian and Mercedita of the Phillipines; and some in Larry Junior of Guam. And

when DNA sequences of these four Southeast Asian kids were sequenced and compared, it turned out they were half-brothers and sisters! DNA supplied one very important fact about those kids: their common ancestor was very recent - just one generation removed. Combined with the fact that each of the mothers could prove an association with Hillblom, there was no doubt Hillblom had been the father, and the family quickly settled, giving each child tens of millions of dollars. (More than four claimants were tested, but only the four were siblings).

Comparing the DNA of living children can establish which are more closely related.

Comparing the DNA of living species can establish which are more closely related.

It's really that simple.

CONCLUSION

Evolution is not in shambles. There *is* a consensus Tree of Life; lateral transfers have joined some of the roots, but the higher branches are quite distinct (Doolittle 1999). There are debates about the placement of some of the twigs, but these disputes are being resolved with more data, including independent molecular comparisons.

Since the 1960's, the confirmation of evolution with DNA and protein analysis has proceeded exponentially. I wonder if Walter ReMine is discouraged that the Biotic Message is farther and farther from being understood.

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This document was last modified on 9/26/2003

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Hits from Inception thru August 1st, 2003: 690