

Genetics and biochemistry do not admit evolution as science.

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Arguing against the resolution, on behalf of NMSR : David E. Thomas

The typical creationist argument against evolution by virtue of biochemistry usually goes something like this: "Only an Intelligent Being can produce a coded language (DNA), or very complex biomolecules, so evolution is false." This, of course, misses a huge point. The theory of evolution by natural selection - the Origin of Species - does not claim to explain how life got *started*. It simply explains how living, reproducing organisms like bacteria can eventually evolve into fish, or oak trees, or humans. The question of how life got started is a fascinating one, but *not* one considered "solved" by modern scientists. Indeed, some scientists suspect that the hand of God may have been required to get the bacterial ball rolling. Others continue to look for natural explanations, such as chemical reactions on clay substrates. But to assume that God *must* be the answer to the origin of life is to *stop* looking for other explanations - and that is the end of scientific inquiry.

Charles Darwin did not know of Mendel's discoveries on genetics, nor did he know of the actual nature of the genetic material - the spiral coils of deoxyribose-nucleic acid, DNA. There has been a huge explosion of knowledge on genetics and biochemistry in the past century, but this explosion has not produced one finding that contradicts the basic concepts of evolution. In fact, these discoveries have shed incredible light on how evolution actually occurs, right down to the atomic level.

MOLECULAR COMPARISONS

In recent decades, the bio-molecules (proteins and DNA) of many species have been studied and compared. Some anti-evolution writers, including Denton(1) and Kenyon(2), claim these comparisons "disprove" evolution. Using data that show the percentage of protein sequence *differences* between the cytochrome C of **bacteria** and **other forms** of modern life, they find it surprising that the percentages are all about the same. But this is exactly what evolution predicts! Landau(3) shows Denton's error is the result of misunderstanding evolution as *linear* rather than *branching*, and of failing to recognize that protein evolution doesn't stop once a new species has evolved. When comparing sequences of bacteria and other modern creatures, the common ancestor is so remote (billions of years ago) that the differences average out to 65%. But when recently evolved life forms are compared with each other, the percentage differences are much smaller . Horse and pigeon cytochrome differ by 11%, though both differ from bacteria by 64%. By stressing only parts of the full picture, anti-evolutionists distort the truth. Bio-molecules provide a method of testing evolutionary hypotheses, and so far evolution has passed these tests with flying colors. In recent experiments on rapidly evolving viruses(4,5), scientists were able to deduce exact family histories (independently known) using only molecular methods!

IRREDUCIBLE COMPLEXITY

Michael Behe points to complicated bio-molecules, and declares that natural selection cannot explain such collections of intertwined, interdependent structures. But, as Rochester biology professor H. Allen Orr points out(6), "... gradual Darwinian evolution can easily produce irreducible complexity: all that's required is that parts that were once just favorable become, because of later changes, essential. ...[there are] several beautiful examples of this process, e.g., the evolution by gene duplication of the globin family of proteins, all of which are now required in humans."

THE NYLON BUG

Creationists and Intelligent Designists often claim that mutations are destructive, and that they can not produce new genes or novel functions. But an extensively documented case, that of new bacteria which have evolved the ability to metabolize nylon waste, disproves that assertion(7). Nylon didn't exist before 1937, and neither did these new organisms. In one case(8) the new metabolic ability was found to be due to the microevolutionary addition of a single nucleotide, causing the new bacterium's enzyme to be composed of a completely new sequence of amino acids via a radical mutation mechanism called "frame shifting." The new enzyme is very inefficient, as would be expected for a novel protein that has not been "polished" by natural selection. Other studies(9) have confirmed the stunning evolution of similar novel adaptations in the laboratory. Creationists dismiss these nylon-chewing bugs as "still just bacteria," but that misses the whole point. These are documented examples of the appearance of *novel adaptations*, something that creationists claim only God can produce.

LIMEYS AND EVOLUTION

In years past, British sailors took lime juice on their ocean voyages. The "limeys" got their ascorbic acid (vitamin C, a necessary nutrient) from the juice, and thus avoided the dreaded disease scurvy. These days, Vitamin C is a multi-billion-dollar business. But most people don't realize that only primates (including humans) and guinea pigs lack the ability to make their own ascorbic acid. All other creatures, like cats and cows, *make their own Vitamin C*. It turns out that primates lost this ability because of a mutation that produced a frame shift, and wiped out the last enzyme in the ascorbic acid synthesis. But we survive anyway, because we get needed ascorbic acid from limes or other foods. There is no doubt that the gene to make the key enzyme actually exists in humans and primates; however, its function has been definitely destroyed by the mutations. Detailed examination(10,11) of this junk DNA segment shows the same mutations - "mistakes" - in the genes of humans, chimpanzees, orangutans, and macaque monkeys. When someone is suspected of plagiarizing a document, such as a list, it's not the correct entries that prove the copying. No, it's mistakes that nail copycat criminals. Everyone has access to the same, correct data - but when one person's mistakes start showing up in someone else's work, that is strong evidence of copying. The fact that the same DNA "mistakes" appear in humans and in the other primates is strong evidence that we were all "copied" from a single source - our common ancestor, the evolutionary ancestor of humans and apes.

Genetics and biochemistry don't just "admit" evolution. Indeed, genetics and biochemistry are strong witnesses *for* evolution.

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