§ 9. Excursus on Creation of Life and Biological Diversity
Lecture 30
Three Aspects of the Evolutionary Paradigm

Last time we began looking at the scientific evidence concerning the origin of life on this planet, and I explained that the famous experiments during the 1950's conducted by people like Stanley Miller ultimately failed to prove productive in explaining how life originated on this planet. The book by Bradley, Olsen, and Thaxton (*The Mystery of Life's Origin*[1]) documents the collapse of this attempt. You'll remember I explained that they pointed out that the very processes of natural destruction and dilution in the primordial waters would have prevented the chemical reactions that supposedly led to life. They also point out, however, that thermodynamics poses an insuperable problem for these chemical origin of life scenarios because there just isn't any way to harness the raw energy of lightning strikes or energy from the sun in order to drive chemical evolution forward. There just isn't any sort of mechanism available on the primordial Earth whereby this raw energy could be harnessed to drive chemical evolution forward.

Moreover, Bradley, Olsen, and Thaxton point out that there was no way to preserve any of the products of chemical evolution in order for the supposed second step in the process to take place. The scientist can artificially isolate the products of the first chemical development and then subject them to a second step, but in the primordial seas there wasn't a way of collecting and preserving any products of chemical evolution in the first step for the supposed second step. The same processes that formed them in the first place would also serve to almost immediately destroy them again so that even if the first step could be successfully achieved the second step would not.

Finally, Bradley, Olson, and Thaxton point out that it was originally believed that billions of years were available for life to originate on Earth by purely natural processes. Given billions of years there would be untold billions and billions and billions of chances for life to originate in the primordial soup. The problem is that we now have fossil evidence of life on Earth going back as far as 3.8 billion years ago. Now, when you think that the age of the Earth is probably around five to six billion years, that means that the window of opportunity between the time that the Earth cooled down enough and the seas formed on the one hand and then the first origin of life 3.8 billion years ago on the other hand is being progressively closed. The window of opportunity for life to originate is getting increasingly narrow. In fact, Bradley, Thaxton, and Olson estimate in their book that it is probably a window of only about 25 million years, which is far too short for these naturalistic scenarios. So rather than having billions of years available for life to form by

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[1] Charles B. Thaxton, Walter L. Bradley, Roger L. Olsen, *The Mystery of Life's Origin: Reassessing Current Theories* (Dallas, Texas: Lewis and Stanley, 1992).

chemical evolution, only around 25 million were probably available which was far too short.

So for all of these reasons and more, the old chemical origin of life theories have broken down. The situation has not essentially changed since Thaxton, Bradley, and Olson wrote their book. Today there is a plethora of alternative, speculative theories with no consensus on the horizon. So the origin of life on Earth remains scientifically inexplicable as things now stand.

More recently, Steve Meyer in his book *The Signature in the Cell* has calculated the odds of getting even a single functioning protein molecule by chance to be approximately one chance out of 10^{164}. So just to get a single protein molecule, not to speak of life, is around one chance out of 10^{164}. Meyer says this is a trillion, trillion, trillion, trillion, trillion, trillion, trillion times smaller than the odds of finding a single particle by chance among all of the possible particles in the universe.[2] He writes, "Protein function depends upon hundreds of specifically sequenced amino acids, and the odds of a single functional protein arising by chance are prohibitively low given the probabilistic resources of the entire universe."[3]

Francis Crick, who was the co-discoverer of the DNA molecule, has said that the origin of life on Earth is "almost a miracle."[4] In fact, Crick was driven to the hypothesis that the origin of life on Earth is so improbable that it was probably not originated here but rather seeded from some other planet located elsewhere in the universe and brought here on meteorites, which is, of course, an unfalsifiable hypothesis. There's no way to test such a hypothesis.

Sometimes people will say, *Well, but if the universe is infinite in size then no matter how improbable the origin of life it will originate somewhere by chance.* Given an infinitely large universe then no matter what the odds, no matter how improbable, somewhere on some planet life will have to originate. So why not here? The problem with this objection is that it can be used to explain away virtually any improbable event no matter how improbable that event is. So you could say, *Well, somewhere in an infinite universe it would happen.* For example, it might be unfathomably improbable that the accused's fingerprints would materialize on the murder weapon and that his DNA would be found on the corpse. *But, hey, in an infinite universe anything can happen, and the improbable will happen somewhere.* Rational behavior would become literally impossible. No matter how improbable something is, it can always be explained away by saying that in an infinite universe it would happen somewhere by chance.

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2 Stephen C. Meyer, *Signature in the Cell: DNA and the Evidence for Intelligent Design*, (New York: HarperCollins, 2009), p. 212.

3 Ibid., p. 273.

4 Francis Crick, *Life Itself, Its Origin and Nature*, (New York: Simon and Schuster, 1981), p. 88.

In fact, on this view, one could never have any evidence that the universe is infinite, because if it is infinite, it would become impossible to assess the probability or improbability of the evidence. So you could not even have any evidence that the universe is infinite if it is infinite. Thus the objection is ultimately self-defeating and so cannot be rationally affirmed.

Now, as I said, the Bible doesn't say how life originated. It just says God said, *Let the earth bring forth vegetation, let the waters swarm with fish and other marine life*. The Bible isn't a science book. It doesn't tell us what means God used or whether he used any means at all to bring about the origin of life on this planet. But I think we can say that the scientific evidence is certainly consistent with the origin of life being, in Francis Crick's words, a miracle, that is to say, an event which was supernaturally brought about by God. So minimally we can say that science and the Bible are not in contradiction on this point. In fact, if anything, I think that the scientific evidence is actually clearer than the Bible that the origin of life is due to some sort of supernatural intervention on the part of a Creator God.

START DISCUSSION

Student: That 25 million year window, does that include even the extreme environment microorganisms? Because they say that you get the volcano soup at the bottom of the oceans and that was sort of the beginning of everything. You're saying even to get to the point where the Earth was cool enough for that you have to have that 25 million.

Dr. Craig: Yes. He's speaking of these volcanic vents that have been found in the deep ocean where you have these very primitive life forms that are around these volcanic vents and derive heat from that in order to live. What we're talking about here is something much, much prior to that. We're talking about the origin, as you said, of some sort of a microorganism like a single-cell animal that obviously couldn't occur when the Earth was still a molten mass cooling down or when it was so hot that any rain from the atmosphere would immediately evaporate again. It had to cool down to the point that you could have seas form. What they're estimating is that once those are in place it's only about 25 million years until we begin to find the fossil evidence of life, and of course we don't know how much further back it went than that when they didn't leave perhaps fossils from these soft-bodied microorganisms. So the window of opportunity is, in terms of geological time, very narrow.

Student: These probability theories of improbable events – you talked last year I think about that. If I've got a very improbable event and it occurs (it happens; I win the lottery which is very improbable, but I win it). How do you test that? How do you use probability then to say it couldn't happen if it did?

Dr. Craig: Very good question, and here intelligent design theorists have spent a lot of time discussing that question. Some, like William Dembski that we talked about last time, will freely say that being astronomically improbable is not enough to warrant a design inference. He would say that that improbability needs to be conjoined to an independently established pattern to which it conforms. It will be this union of high improbability (it has to be above one chance out of 10^{80}, he would say[5]) plus this independently established pattern that tips you off to a designing intelligence. Others will use the probability calculus to say that you are justified in inferring a designer in case there is an alternative hypothesis to chance on which the event is considerably more probable. So you're not simply inferring design because of high improbability. There needs to be another alternative that if true would make that event more likely to occur. In a case like that you would infer that it's not simply happening by chance. There needs to be an alternative that would make the observed fact more probable.

END DISCUSSION

Let's move on to the evolution of biological complexity. Given the origin of life, we still want to know how did complex biological organisms (especially multicellular organisms) evolve.

Part of the difficulty in assessing contemporary evolutionary theory is that the word "evolution" is an accordion word, that is to say, it can be expanded or contracted in its meaning depending upon the context. The evolutionary biologist Francisco Ayala, in his book *Darwin's Gift to Science and Religion*, distinguishes three distinct aspects of the contemporary evolutionary paradigm. The first aspect is what he calls "evolution." Ayala defines evolution as "the process of change and diversification of living things over time."[6] Ayala says, "This is what biologists mean when they say that evolution is a fact."[7] What are we to make of this? This definition of evolution is so broad as to be innocuous. Of course living things change and diversify over time! If this is all that biologists mean when they say that evolution is a fact then nobody would care to dispute this. The fact of evolution in this sense is agreed to even by Young Earth Creationists. After all, they think that all of the human races evolved from Adam and Eve, and yet look at the differences between, say, an Australian aborigine and a fair-skinned Laplander.

But I think that Ayala probably means to imply much more by this definition of evolution than simply the change and diversification of living things over time. I think that he probably takes it to imply what we may call the thesis of common ancestry, that all living things are descended from some primordial ancestor. Organisms other than the very first

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[5] This number comes from the fact that it is estimated that there are 10^{80} protons, neutrons, and electrons in the observable universe. See Meyer, *Signature in the Cell*, p. 212.

[6] Francisco Ayala, *Darwin's Gift to Science and Religion* (Washington, D.C.: Joseph Henry Press, 2007), p. 53.

[7] Ibid., p. 141.

are all descended from earlier organisms with changes. Now, this is a far more significant claim. It implies that there exists a sort of evolutionary tree of life that all living things stem from some single primordial ancestor, rather than that there are multiple trees stemming from a multiplicity of ancestors. Such a thesis would obviously demand vastly greater evidence than the innocuous truth that living things change and diversify over time. That's what we might call the thesis of common ancestry.

The second aspect of the contemporary evolutionary paradigm identified by Ayala is what he calls "evolutionary history." This is the reconstruction of the universal tree of life showing the various lineages that branched off from one another. This second claim obviously presupposes the thesis of common ancestry. In other words, it presupposes that there is a universal tree of life rather than multiple trees. Ayala explains that evolution in this sense is a matter of great uncertainty. He says,

> Unfortunately, there is a lot, lot, lot to be discovered still. To reconstruct evolutionary history, we have to know how the mechanisms operate in detail, and we have only the vaguest idea of how they operate at the genetic level, how genetic change relates to development and to function. . . . I am implying that what would be discovered would be not only details, but some major principles.[8]

Because he believes in the thesis of common ancestry, Ayala accepts that there is a universal evolutionary tree, but he recognizes that scientists have not been able to reconstruct it, and one of the reasons for that inability is our failure to understand evolution in the third sense of the word, namely, the mechanisms that explain evolutionary development. Without a thorough understanding of the mechanisms of biological evolution it will not be possible to reconstruct evolutionary history, and so that remains a matter of uncertainty.

Let's turn to that third aspect of the contemporary evolutionary paradigm, namely, the explanatory mechanisms behind evolutionary change. According to Professor Ayala neither descent with modification nor common ancestry represents Charles Darwin's unique contribution to evolutionary theory. He points out that, contrary to popular impression, evolutionary theories of life and the thesis of common ancestry were many and were well-known prior to Darwin. For example, there is Lamarck's version of evolutionary theory proposed in his *Philosophical Zoology* of 1809. Darwin's *Origin of the Species* was not published until 1859. So 50 years prior to Darwin we had an evolutionary theory and common ancestry proposed by Lamarck. On Lamarck's view, species turn into one another due to environmental changes. These environmental changes produce behavioral changes which make the animals adapt to the environment and thereby produce evolutionary change. For example, due to a change in the climate,

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[8] Ayala's interview with Larry Witham, *Where Darwin Meets the Bible* (2002), p. 90.

the giraffes had to forage among the foliage higher in the trees rather than on the ground and so as they stretched their necks to try to reach the higher foliage they would adapt and eventually become long-necked animals over time in response to these environmental changes.

Darwin's contribution lay in providing a mechanism to explain evolutionary change, namely, natural selection operating on variations in living things. Organisms which are well-adapted to their changing environments survive while the maladapted die off and fail to reproduce. It is this mechanism which Darwin used to explain the observed adaptedness of organisms to their environment without the necessity of a designing intelligence. Ayala writes,

> It was Darwin's greatest accomplishment to show that the complex organization and functionality of living beings can be explained as a result of a nature process, natural selection, without any need to resort to a Creator or other external agent.[9]

So according to Darwin's hypothesis, natural selection would weed out those offspring that were not well-adapted to the environment and so as the environment would change those variations in the animal population that were well-suited or well-adapted to the new environment would survive and the others would die off. So over time evolutionary development would occur.

Unfortunately, Darwin had no explanation for the variations among living organisms upon which natural selection operates. It's been aptly said, I think, that while Darwin's theory explained the *survival* of the fittest, it could not explain the *arrival* of the fittest. It explained why the well-adapted survived, but it didn't explain where these variations came from in the first place. Thus, for example, Ian Tattersall of the American Museum of Natural History writes in his book *The Fossil Trail, "*Darwin's theories of inheritance were totally wrong, even though he has escaped the pillorying suffered by the unfortunate Lamarck."[10]

With Gregor Mendel and the development of modern genetics, scientists were able to supplement Darwin's theory of natural selection with a mechanism for supplying an explanation of the variations on which natural selection works. Accordingly, we can call this third aspect "neo-Darwinism." Darwinism – the original Darwinism – was simply a theory of natural selection but without any explanation for where the variations came from. But neo-Darwinism is the synthesis of natural selection with Mendelian genetics. According to Tattersall, by the mid-1940s a synthesis had been achieved in evolutionary biology to which almost everyone subscribed. This emerging "Evolutionary Synthesis" or "Modern Synthesis" as it came to be grandly termed, "was . . . an attractive and

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[9] Francisco Ayala, *Darwin and Intelligent Design* (Minneapolis: Fortress Press, 2006), p. 19.

[10] Ian Tattersall, *The Fossil Trail: How We Know What We Think We Know about Human Evolution*, 2nd ed. (Oxford: Oxford University Press, 2009), p. 16.

ultimately highly reductionist formulation, involving the integration of Darwinian ideas of natural selection with changing frequencies of genes in populations."[11] So mutations would produce variations in a population and then natural selection will weed out the maladapted so that only the well-adapted survive. In this way evolutionary change takes place. This is what is called the Modern Synthesis or neo-Darwinism.

The basic principles of the Modern Synthesis were threefold, and these are again from Ian Tattersall.

> 1. Evolution was a gradual, long-term process, essentially consisting of the accumulation within lineages of small genetic mutations and recombinations. Over enough time, the accumulation of minor changes would result in large effects.
>
> 2. This generation-to-generation change was controlled by natural selection, environmental factors promoting adaptation within the lineage by the differential reproductive success or failure of different variants. As environments changed, populations would change to keep in step and maintain or improve their adaptedness.
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> 3. This same process of the gradual accretion of genetic (hence physical) change could be extrapolated to explain higher-level phenomena, such as the origin of new species and of biotic diversity.[12]

So the third step is this step of extrapolation of these mechanisms to explain not only the minor changes within a population but these larger macroscopic higher-level phenomena such as the origin of new species.

We've seen that Ayala, despite the paradigmatic status of the Modern Synthesis, thinks that we have only the vaguest understanding of the mechanisms behind evolutionary change. He writes,

> The mechanisms accounting for these changes are still undergoing investigation. . . . The evolution of organisms is universally accepted by biological scientists, while the mechanisms of evolution are still actively investigated and are the subject of debate among scientists.

I think you can see how misleading it is therefore when people assert that evolution is a proven fact which is universally accepted by biologists. That is true only in the first sense of the word "evolution" as descent with modification or, at the very most, as the thesis of common ancestry. But evolution in the second and the third senses of the word explained by Ayala is not an accepted fact. According to Ayala,

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11 Tattersall, *Fossil Trail*, p. 87.

12 Ibid., p. 88.

> The second and third issues—seeking to ascertain evolutionary history as well as to explain how and why evolution takes place—are matters of active scientific investigation. Some conclusions are well-established. Many matters are less certain, others are conjectural, and still others . . . remain largely unknown.[13]

So when we assess the contemporary evolutionary paradigm and its truth, we need to be very clear which aspect of the paradigm we are discussing. One can easily mislead people by switching the meanings of the word "evolution" mid-discussion so that in fact one is equivocating – for example, saying that evolution is a universally accepted fact among biologists in the first sense of the word, and taking that then to mean that the mechanisms of genetic mutation and natural selection are universally accepted as adequate in the third sense of the word.

START DISCUSSION

Student: You've talked about how you think the Genesis creation account is not incompatible with the modern evolutionary theory. In that sense do you mean the neo-Darwinism and basically all of the random mutations – not just the core evolutionary term that you used – but you think in all senses of random mutations the Christian creation account is potentially compatible with that, not that it necessarily happened in the way that they say it did, but that we don't know? Is that what you are saying?

Dr. Craig: Yes, that is right. In fact, I would say that not only for neo-Darwinism but for Darwinism and Lamarckianism. I don't think you could give a biblical disproof of Lamarckianism. It seems to me that the Christian is free to follow the evidence where it leads, and if Lamarck was right so be it. But if the neo-Darwinian synthesis is right, so be it. I don't have a peculiarly biblical objection to any of these views.

Student: I have a question about common ancestry. Can you go into more about what that means and what your thoughts are on the subject?

Dr. Craig: My thoughts about it we will do next time. We're just laying out here the ambiguity of the term "evolution" and the different senses in which it's understood and the degree to which these represent the consensus of evolutionary biologists. Just to be clear again – the thesis of common ancestry would say that the animal kingdom and the plant kingdom all eventually go back to some first form of life – some microorganism – that then has exploded in its evolutionary development over time. That's the idea of common ancestry. It means that any organism except the first is descended from a prior organism.

Student: Do the theories at some point give a rationale for sexual reproduction? Because when you look at a single cell and then it goes into requiring sexual reproduction, it

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[13] Ibid.

would require both male and female to evolve simultaneously up those chains within a generation.

Dr. Craig: There are a number of these sorts of, shall we say, leaps or transitions in the evolutionary process that do remain ill-understood. Another one would be the origin of sentience, the origin of mind. The origin of sexual reproduction would be another. Now, I confess this isn't an area that I've read on. I'm just aware from secondary literature that it is one of those very controversial subjects of which I think Ayala spoke when he said some is conjectural, some is completely unknown. You're putting your finger there I think on one of those key links.

Student: A couple of other issues I think not addressed. Why would it be a single tree of life and not a bush of life where you have multiple starting points?

Dr. Craig: OK, let's just pause there for a moment to be sure. When I said "tree," in reviewing my notes I was a little uncomfortable with using that because it does imply a kind of linearity that isn't what biologists think. They do think that it's more like a thicket; like you say, it's a bush. But here's where the metaphor though is apt – it all goes back to a single origin. So whether it's a bush or whether it's a tree, it's got a single organism at the root from which then the metaphorical plant stems. Now where this is significant (and this was brought up the other day in class), how do we know that there weren't multiple origins? And that's not the same as saying a bush. It's to say that instead of a monophyletic origin of life maybe there's a polyphyletic origin of life. Remember we said that in the Cambrian explosion all of the modern phyla exist. In fact, there are more phyla in the Cambrian than there are today. There's been attrition of the number of phyla. So how do you know that the origin of life wasn't polyphyletic rather than monophyletic? I asked an evolutionary biologist this question a few years ago. He backed away almost immediately and said, *Oh, well, we don't know that. I just mean that within the lifeforms with which we're familiar that they evolved from common ancestors*. But when you get back to this he admitted he didn't really know; he couldn't say.

Student: The other problem I would say is ascendancy. There's no reason to assume ascendancy. I mean, there could be descendancy; there could be lateral movement. Or maybe using the *The Selfish Gene* idea that Dawkins has, well, maybe the first cell says, *I don't want any other cells*.

Dr. Craig: I don't think we need to use the metaphor of ascent in order to characterize the theory. In fact, a moment ago I called it "descent" – that we're all descended from a common ancestor. But if you think of us as the climax of creation maybe we're all ascended from one. So whether you use descent or ascent I think isn't material to what the theory is saying.

END DISCUSSION[14]

[14] Total Running Time: 39:38 (Copyright © 2019 William Lane Craig)