§ 9. Excursus on Creation of Life and Biological Diversity
Lecture 33
Inadequacies of the Neo-Darwinian Mechanisms

We've been looking at the adequacy of the neo-Darwinian mechanisms of random mutation and natural selection to draw the extraordinary extrapolation from local effects such as finch beaks and peppered moths to the evolution of all life on Earth from a common ancestor. We looked at the experience of both breeders as well as the peppered moth experiments, and then turned to the question of drug resistance in microorganisms as a result of random mutations. You'll recall that Michael Behe looks at malaria as a counter-example to this claim. Malaria mutates at a tremendously rapid rate, and as a result it's been able to overcome every drug that we've developed against it. But the human respiratory system has also mutated and developed something that malaria has not been able to overcome, namely sickle hemoglobin. The reason that malaria can overcome drugs and poisons is because in order to do so relatively simple mutations need to occur. But, according to Behe, in order to overcome sickle hemoglobin you would need to have multiple mutations either occurring simultaneously or blindly step-by-step, and this is simply too improbable to happen. Therefore, despite trillions of cells and tens of thousands of generations, malaria has never been able to mutate enough to overcome sickle hemoglobin.

Behe looks at HIV as another case study. HIV mutates 10,000 times faster than malaria. In the last 50 years alone the AIDS virus has mutated as much as all the cells that have ever existed on this planet. In just 50 years! It has tried out every possible combination of up to six-point simultaneous mutations and thus has become resistant to every drug that we've developed. But, Behe says, “through all that, there have been no significant basic biochemical changes in the virus at all.” “. . . on a functional biochemical level, the virus has been a complete stick-in-the-mud.”

Behe concludes,

> [blockquote]The studies of malaria and HIV provide by far the best direct evidence [we have] of what [Darwinism] can do. . . . Here we have genetic studies over thousands upon thousands of generations, of trillions and trillions of organisms, and little of biochemical significance to show for it. . . . Our experience with HIV [and malaria] gives good reason . . . to think that Darwinism doesn’t do much—even with billions of years and all the cells in the world at its disposal.”[/blockquote]

Finally, Behe claims that studies on the bacterium *E. coli* carried out by Richard Lenski and his colleagues also support the same conclusion. Lenski published results of their research on 40,000 generations of *E. coli* grown in the laboratory. I've read that it's over

65,000 generations today. They discovered that while there were a couple score beneficial mutations that occurred in these *E. coli* bacteria, nevertheless, they were degradative or degenerative in nature. That is to say, they involved the *loss* of genetic information or the *loss* of protein function. There's no indication that these bacteria were on their way to building new complex systems. So Behe thinks that Lenski's work lines up well with the results of malarial and HIV studies. In a huge number of tries, one sees minor changes, some beneficial, but overwhelmingly degradative with no new complex systems evolving.

Malaria, HIV, and *E. coli* represent three fundamentally different forms of life – a Eukaryote (that has a nucleus), a virus, and a Prokaryote (a cell without a nucleus). In each of these cases the evidence for the efficacy of the neo-Darwinian mechanisms is the same: it doesn't do very much.

I quote from Michael Behe's online blog:

> [blockquote]Instead of imagining what the power of random mutation and selection might do, we can look at the examples of what it has done. And when we look at the best, clearest examples, the results are, to say the least, quite modest. Time and again we see that random mutations are incoherent and much more likely to degrade a genome than to add to it. And these are the positively selected beneficial random mutations. . . . There is no evidence that Darwinian processes can take the multiple, coherent steps needed to build new molecular machinery that fills the cell.[/blockquote]

Thus, the argument from the development of drug resistance in microorganisms appears to completely backfire. Far from providing evidence of the power of the neo-Darwinian mechanisms to produce grand evolutionary change, our experience with drug resistance in bacteria and viruses and microorganisms reveals the severe limits of those mechanisms.

So, again I ask, where is the evidence for the extraordinary extrapolation that neo-Darwinism involves? Behe says “the evidence for common descent seems compelling,” but “. . . except at life’s periphery the evidence for a pivotal role for random mutations is terrible.” If he's wrong about this, then what is the evidence? I am genuinely open to it. Just tell me what it is.

So when I, as an objective albeit lay observer, look at the evidence, it seems to me that we haven't been given any good reason to think that the neo-Darwinian mechanisms are sufficient to explain that extraordinary diversity of life that we see on this planet during the time available.

START DISCUSSION

Student: Sometimes you see comments in the popular press to the effect that evolution has designed us to be, for example, compassionate or empathetic. Or you'll see articles that say, for example, risky behavior by adolescents is something that evolution created. And all of these characteristics have some kind of, the popular thinking is, survival benefit for the species, maybe not the individual but species. Based on what you're saying as you're discussing Behe, it seems like that's just magical thinking to think that evolution has designed these characteristics, and nobody has ever identified the genetic basis for these characteristics, the expressions that we see, or the so-called evolutionary history that got us there.

Dr. Craig: Yes, there's been a great deal of discussion whether altruism for example can have an evolutionary basis because it seems the very opposite of having reproductive advantage if you're willing to sacrifice your life for someone who's not even a kinsman. From what I've read, most of this does seem to just be hand-waving; that in fact it is largely conjectural as to whether or not our moral beliefs can be traced to some sort of genetic basis. But I want to say as a philosopher that even if they can this is really irrelevant to the question of their objectivity because to think that that would undermine the objectivity of the moral values and duties we believe in is to commit the genetic fallacy. It's a textbook example of the genetic fallacy which is the fallacy of trying to invalidate a viewpoint by explaining how the person came to hold it. Even if evolution has programmed into us belief in the noble morals and ideals that we have, that does absolutely nothing to prove that those are not objective and true.

Student: It strikes me that Christians are often accused of magical thinking by believing in divine creation or the New Testament miracles, and it seems to me the shoe’s on the other foot here.

Dr. Craig: OK, fair comment. Each person can make up his own mind.

Student: Along those same lines, a lot of times in the publications they ascribe cognitive qualities to evolution – that evolution do this or decided this – which is completely contradictory to, especially, naturalistic evolution.

Dr. Craig: That doesn't invalidate the theory, but you're quite right that often in sloppy presentations of it anthropomorphic language will be used about natural selection (thinking of what it will do, and choosing to do this or that), and that is to misrepresent the theory.

END DISCUSSION

In their book *The Anthropic Cosmological Principle*, the physicists John Barrow and Frank Tipler list ten steps in the course of human evolution, each of which – *each of which* – is so improbable that before it could occur the sun would have ceased to be a

main-sequence star and incinerated the Earth. These include things like the development of a DNA-based genetic code, the evolution of aerobic respiration, the evolution of glucose fermentation into pyruvic acid, the development of an endoskeleton, and so on and so forth: Ten steps in the evolution of *Homo sapiens,* each of which is so improbable that before it could happen the sun would have gone through the course of its stellar evolution, become a red giant, and incinerated the Earth.

As a result Barrow and Tipler report,

> [blockquote]There has developed a general consensus among evolutionists that the evolution of intelligent life, comparable in information-processing ability to that of *Homo sapiens*, is so improbable that it is unlikely to have occurred on any other planet in the entire visible universe.[/blockquote]

But then the inevitable question arises: Why think in that case that it has evolved by means of these neo-Darwinian mechanisms on *this* planet? Indeed, doesn't the evidence suggest just the opposite? In fact, Tipler himself now believes that the evolutionary process must have been guided in order to arrive at *Homo sapiens.*

I mentioned earlier that during the 1970s within the evolutionary community rumblings began to be felt about the inadequacy of the Modern Synthesis. Those rumblings have continued to grow so that today it is widely recognized that the neo-Darwinian mechanisms are inadequate and so need to be supplemented by additional new mechanisms. In November of 2016 a conference of the Royal Society in London held a conference devoted to the theme of the problems in the Modern Synthesis. As you might expect, numerous new mechanisms were suggested but no consensus emerged except that the standard picture needs major revision.

Stephen Meyer was one of the attendees of this conference, and among the competing alternatives presented were the following that he lists.

1. Evolutionary developmental biology. This is sometimes affectionately called evo-devo. Developmental biology is the development of the embryo in-utero. Many evolutionary developmental biologists will emphasize mutations in the genes that control the expression of other genes during the embryonic development of an organism. For example, a mutation in the so-called Hox genes which are master regulatory genes that affect the location, timing, and expression of other genes might have a disproportionately large effect on development and thus it could play a significant role in modifying animal body plans. So evo-devo advocates have thus broken with the Modern Synthesis regarding the notion of gradualism, the size or the increment of evolutionary change. It could occur in leaps through these embryonic developments. One challenge to this proposal however is that Hox genes in all animal forms are expressed well after the body

plan is already established in-utero. Earlier mutations that occur proved to be inevitably lethal to the organism.

2. Self-organization. Self-organizational theorists try to explain the origin of order in living systems by reference to purely physical or chemical processes. They often point to simple geometric shapes or repetitive forms of order which arise from purely physical or chemical processes. For example, crystals. Think of a snowflake, for example, and the beautiful order that that exhibits. Or vortices, that is to say whirling whirlpools of water or convection currents brought on by temperature in the air. These all illustrate self-organizational processes. Advocates see the embryological development of cells into the different cell types of distinct tissues (like brain cells, heart cells, liver cells, and so forth) to be due to epigenetic information, not genetic information. *Epi* is a Greek prefix meaning “upon” or “in addition to” or “over and above.” Epigenetic information will be information that is outside of the genetic structure. It's not part of the genome, and it specifies the position of the cell or the cell membrane for example relative to its context during embryological development. Advocates of the self-organizational thesis therefore reject the neo-Darwinian assumption that animal development is determined entirely by genetic structure. They deemphasize the role of random mutations in producing change. So on self-organizational theories you have a stronger emphasis on spontaneous order arising through epigenetic information. One challenge this theory faces, however, is that it doesn't explain the origin of the epigenetic information that governs cell differentiation.

3. Neutral evolution. Advocates of neutral evolution downplay natural selection in favor of neutral processes of mutation and genetic drift as the mechanisms responsible for evolution. Evolutionary biologists think that new forms of animal life originated in small populations that got separated from the larger populations. But advocates of neutral evolution argue that in these small populations natural selection will have difficulty overcoming the effects of random genetic drift, meaning that the beneficial mutations are likely to be lost before they can become fixed in the population. So any evolution that takes place in the organisms of small populations is due almost completely to these neutral factors and is almost completely unaffected by natural selection. They just drift neutrally without respect to adaptive advantage. One problem for this view is that there is apparently no experimental evidence that neutral processes like recombination, genetic drift, and mutation can actually produce the genetic complexity required.

4. Neo-Lamarckianism. You’ll remember we talked earlier about Jean-Baptiste Lamarck, the French biologist who preceded Darwin. Lamarck and Darwin both believed, in fact, that heredity was a matter of the use or disuse of certain organs by animals that then could be transmitted to their offspring through reproduction. With the identification of chromosomes as the entity responsible for the transmission of inheritance however Lamarckian theories fell out of favor. The gene now became the locus of all heritable

change. After the discovery of DNA in 1953 biologists equated genes with specifically arranged nucleotide sequences on the DNA molecule. Recently, however, biologists have recognized that some biological information – epigenetic information – resides in structures outside the DNA, and perhaps these non-genetic sources of information influence the course of evolution. Changes in the non-genetic structures of an organism could affect subsequent generations in the course of evolution. I was fascinated to learn that Massimo Pigliucci, whom I debated years ago at UGA, is an advocate of neo-Lamarckianism, which I thought was rather charming. One problem that this view faces is that there is no case of induced epigenetic change which then persists permanently within a population which is what neo-Lamarckianism says happens.

5. Natural genetic engineering. Organisms on this view do not generate mutations randomly but rather they can modify themselves in response to environmental changes. On this view organisms have a pre-programmed adaptive capacity for engineered change where organisms respond intelligently to environmental influences rearranging or mutating their genetic information in regulated ways in order to maintain viability. A problem for this view is that theorists do not explain where the programming that accounts for the pre-programmed adaptive capacity of living organisms comes from in the first place.

In summary, I think you just get a feel here for the debate that is going on among evolutionary theorists today in an effort to provide adequate explanatory mechanisms for evolutionary change. When I was at a conference on the doctrine of creation three years ago one of the speakers offered a critique of what he called Darwinism. During the Q&A afterwards an evolutionary biologist from a major university stood to his feet and challenged him – *Why do you keep talking about Darwinism?*, he said. *Darwinism has been dead for over 100 years*. The speaker replied, *Well, then, neo-Darwinism*. At which the biologist replied, *Neo-Darwinism has been dead since the late 1960s*. And the speaker didn't know what to say at that point. Now, I was more than mildly surprised. Neo-Darwinism is dead? Haven't we been taught for years that it is an incontrovertible fact? That those who challenge it are either religious kooks or ignoramuses on the level of flat-earthers? The Modern Synthesis which dominated 20th century biology for much of the century and which most of us learned in schools is dead? I recall a remark in this connection by William Dembski about mavericks who challenge a scientific paradigm. Dembski said at first they are simply ignored (Ignore them and they'll go away). When they don't go away then they are ridiculed and laughed at. As their critiques continue and can no longer be ignored they are refuted by advocates of the established view. Next they may come to be tolerated. Finally, the response to them is, *Well, we knew that all along! Ho-hum!* The contemporary state of the debate shows, at least I think, that the Modern Synthesis is inadequate to explain evolutionary change and so at least needs

supplementation by additional mechanisms. Doubtless those mechanisms will include some of those that we have just briefly surveyed such as the epigenetic information emphasized by evo-devo theorists. But notice our original question remains unanswered: Are these mechanisms even taken collectively adequate to explain the grand evolutionary story required by the thesis of common descent? I'm rather confident that the whole story has not yet been told, and that even if the doctrine of common ancestry is true these mechanisms are insufficient to explain the biological complexity that we have today. Something more is at work.

START DISCUSSION

Student: If someone were to question taking something like *E. coli* or HIV and looking at it going through a long series of mutations – the extrapolation of that to something much more complex like a human – what could we say to them in response to that?

Dr. Craig: That that extrapolation needs to be justified. I mean, after all, the point that Behe makes in choosing these simple microorganisms is the rapidity with which they reproduce and mutate. They have mutation rates that are just fantastic compared to, say, horses and elephants and other large-scale animals. He's picking organisms like bacteria, microorganisms, and viruses that would be the best candidates for random mutation and natural selection to have a significant effect on their development.

Student: If the mechanisms of evolutionary change and diversity are unknown, can we reject common ancestry and the mechanisms of that? I mean why do we keep talking about it and talking about evolution and common ancestry, I think it's all bunk.

Dr. Craig: You kind of got a fork in the road here, I think. Well, they're two routes that you could take. One route would be to say that the thesis of common ancestry is true but that these mechanisms are inadequate to account for it. That would allow you to be in line with the genetic data that has convinced most biologists that all forms are genetically related to each other but that these mechanisms can't explain it. The other one would be to go back to the thesis of common ancestry and say, wait a minute, maybe these mechanisms do have a kind of limited effectiveness. They can produce small-scale evolutionary changes but not massive ones, and so maybe the thesis of common ancestry isn't true. Then you're going to need to explain the genetic evidence. You're going to need to provide some alternative for that. But that would be a different way of doing it.

Student: Concerning about epigenetic – I'd read about that. Your DNA is not your destiny and in some other things. Neo-Lamarckianism. They found that in Finland (because they had accurate histories of populations for centuries) when you had bumper crops people tended to overeat and had shorter lifespans, but when they didn't have a lot of grain they had healthier greens. It turns out that they now know (and what's odd and what I want to point to is) that it seems like it's designed in there if you eat a lot of greens only healthy

genes get expressed and it's by the methane bonding the closer it is and it controls which genes get expressed. Who put the design to have that? It is like God's trying to train us to take care of ourselves. So there's a design in there that we have. It's not something new. The epigenetics is only controlling what's already in there to be expressed. All that's designed. One of the later things they went on (this is after the DNA is not your destiny), they said a zygote that even where the binding of the nucleus of the films that attached to the cell wall, if you move any of those you change the outcome. They said everything, every bit of information organizational, is used. There's four layers of programming of the DNA, and the methane from eating greens is just one of them.

Dr. Craig: I haven't heard about that specific case, but you're quite right in emphasizing things like even spatial orientation and location can affect this.

Student: If there are all these problems with the mechanisms of evolution that we've been discussing, how does this fit in if one were to accept theistic evolution?

Dr. Craig: That will be the question that we will take up next time. If you look at your outline you will see now that we come to a point of theological synthesis where we try to say: How should we understand this as Christians? We'll look at that when we meet again.

END DISCUSSION[1]

[1] ?Total Running Time: 34:15