Evolution of Biological Complexity

We saw last time that we have virtually no understanding of the origin of life, so that a theistic contingentist creationist account is eminently reasonable. Let's move on to the evolution of biological complexity. Given the origin of life, we still want to know how biologically complex organisms (especially multicellular organisms) came to be.

Before we explore the question of biological evolution, it will be helpful to have before us a brief summary of the history of life on our planet. The history of life on Earth unfolds over a time span so vast that it boggles the imagination. All but young Earth creationists accept that there is a long history of life on this planet, reaching back nearly four billion years. (Fig. 2.4)

Obviously, this figure is not drawn to scale! The Proterozoic Era alone lasts 2 billion years, and the remainder of the chart above it only about a half billion years! To help us grasp the proportionate time involved, Franklin Harold offers a spatial analogy.[1] If we let a millimeter represent one year, the 4.5 billion year history of the Earth could be represented by the distance between Miami and Seattle. Flying from Miami, we might spot the first signs of life somewhere over Tennessee. By Kansas, bacterial life will be clearly present and in Nebraska multicellular life. The Cambrian explosion does not occur until western Montana, and mammals first arise around Spokane. Just four to five kilometers from Seattle the first hominids arrive on the scene.

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[1] Franklin M. Harold, *In Search of Cell History: The Evolution of Life's Building Blocks* (Chicago: University of Chicago Press, 2014), pp. ix-x.

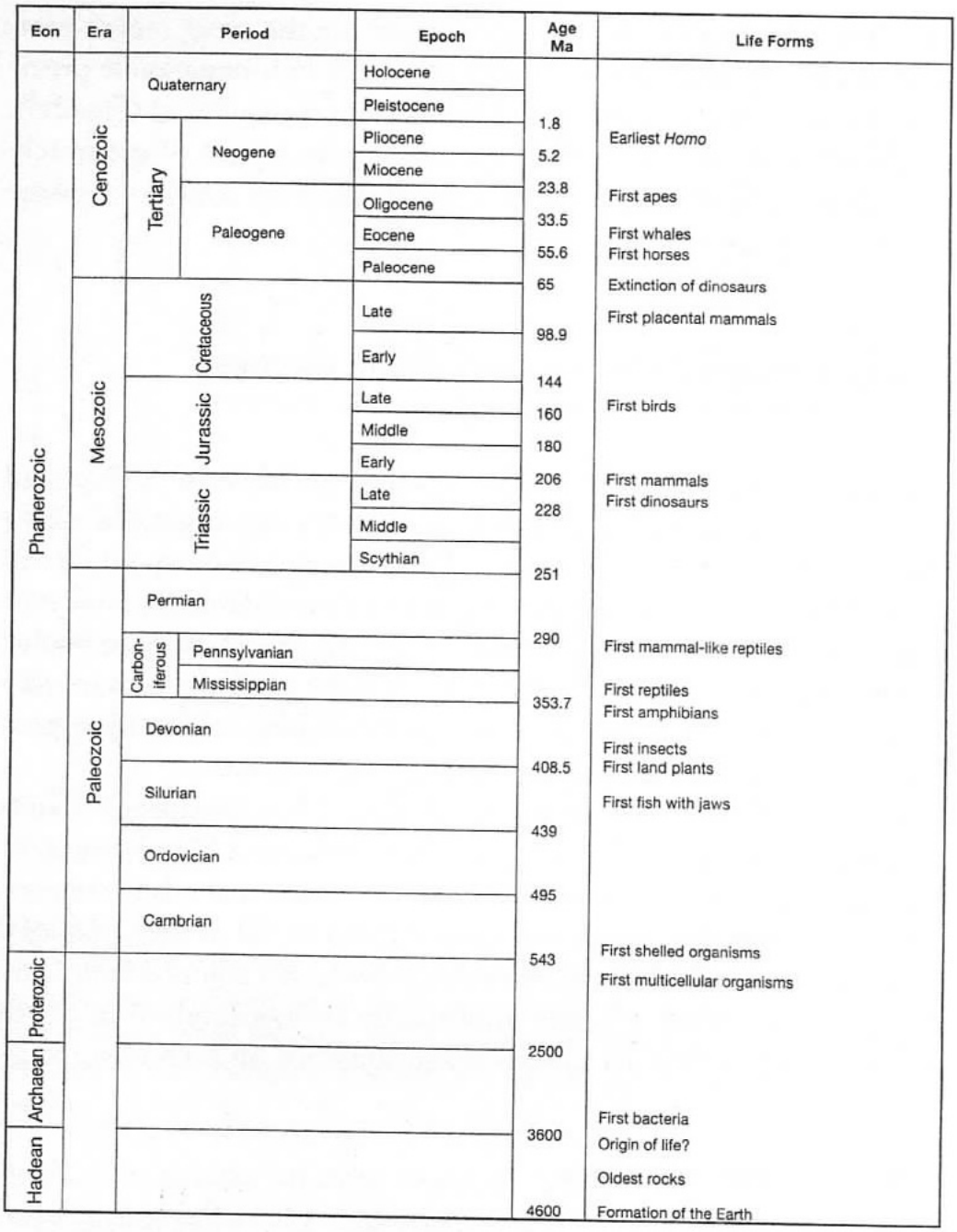

FIGURE 2.4

The geological timescale. The Precambrian ranges from the origin of life (ca. 3,800 million years ago) to the beginning of the Cambrian (ca. 543 million years ago). New fossil finds frequently require a correction of the date of the earliest occurrence of a higher taxon. *Source*: *Evolutionary Analysis* 2nd ed. by Freeman/Herron, copyright © 1997. Reprinted by permission of Pearson Education, Inc., Upper Saddle River, NJ.

Thus, while we should not depreciate the fundamental significance of, for example, the origin of multicellular organisms, still the major, visible changes in living organisms have transpired relatively recently. For three billion of life's nearly four billion years, or almost three-fourths of life's history, life on Earth consisted exclusively of single-celled microorganisms too small to be seen by the naked eye. It is only with the arrival of mulicellularity and the Ediacaran faunas around 600Mya that life really begins to take off.

God has evidently chosen to roll out the scroll of life very gradually over nearly four billion years. We might well wonder why God would take so long—three billion years!—before setting off life's explosion. The primitive bacterial cells that existed for nearly two billion years prior to the arrival of multicellular organisms were largely the same as the bacteria that exist today. But we should not think that the bacteria were therefore idle during all that time, making no contribution to the preparation of the biosphere for the advancement of life. For as a result of photosynthesis, these primitive bacteria were stoking the Earth's atmosphere with oxygen over hundreds of millions of years, thereby setting the stage for the eventual existence of terrestrial life. When living organisms finally colonized the land, it was thanks to the long preparation on the part of these humble bacteria.

Up to this point we have described the history of life on Earth as neutrally as possible, as involving merely a succession of living organisms over time. It is the task of evolutionary biology to provide an explanation of this unfolding history. It does so by regarding the various organisms as genealogically related to one another and then providing an account of their causal connections

that would explain how more recent organisms descended from earlier ancestors. If successful, it will furnish us an account of just how God brought about the diversity of life on this planet.

Three Aspects of the Evolutionary Paradigm

The evolutionary biologist Francisco Ayala distinguishes three distinct aspects of the contemporary evolutionary paradigm.

Universal Common Ancestry

The first aspect is what he calls simply "the fact of evolution." Ayala defines evolution as "the process of change and diversification of living things over time."[2] If this were all that evolutionary biologists mean by "evolution," however, then nobody would care to dispute this fact. But Ayala understands the fact of evolution to imply much more than simply the change and diversification of living things over time. He takes it to imply that all organisms are related by common descent, what we may call the thesis of universal common descent or universal common ancestry (UCA). Ayala says, "This is what biologists mean when they say that evolution is a fact."[3] It implies that there exists a sort of evolutionary tree of life such that all living things (other than the first) stem from some single primordial ancestor, rather than that there are multiple trees stemming from a multiplicity of ancestors.

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

[3] Ayala, *Darwin's Gift,* p. 141.

Phylogenetic Trees

The second aspect of the contemporary evolutionary paradigm identified by Ayala is what he calls "evolutionary history." This is phylogeny, the reconstruction of the universal tree of life showing the various lineages that branched off from one another. Ayala explains that evolution in this sense is a matter of great uncertainty. He cautions,

> 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.[4]

Because he accepts UCA, Ayala holds that there is a universal evolutionary tree, but he recognizes that scientists have not been able to reconstruct it with confidence, and one of the reasons for that inability is our failure to understand the third aspect of evolutionary theory, namely, the mechanisms of evolutionary change. Without a thorough understanding of the mechanisms of biological evolution, including the relations between molecular (genetic) and developmental biology, it will not be possible entirely to reconstruct evolutionary history, and so it remains a matter of uncertainty.

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

Explanatory Mechanisms

The third aspect of the contemporary evolutionary paradigm is the explanatory mechanisms behind evolutionary change. Again, Ayala says that this third aspect of evolutionary biology remains incomplete and is a matter of controversy. 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."[5]

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,

> 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.[6]

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[5] Ayala, *Darwin's Gift,* p. 141.

[6] Ibid.

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.