GENESIS AND SCIENCE
WHERE IS THE EVIDENCE GOING?

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GENESIS AND SCIENCE

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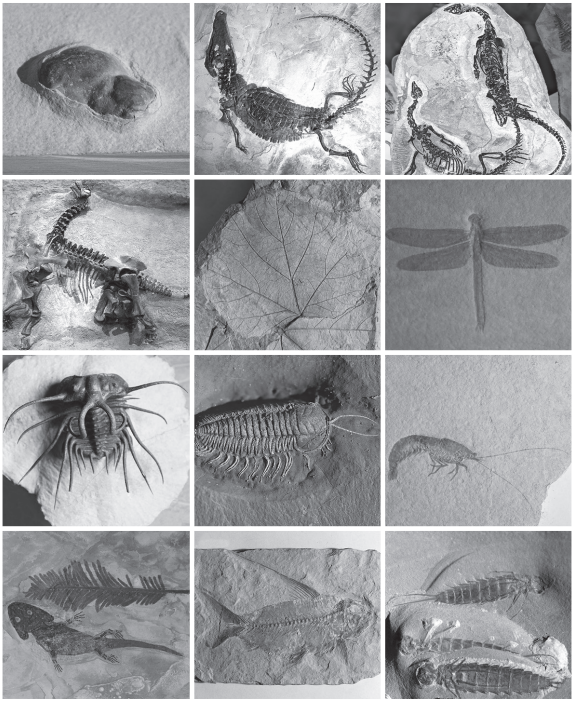

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Dedication

Dedicated to the graduate students and colleagues (including critics of creationism) who, through the years, have challenged my thinking to search for a better understanding of the issues involved in origins.

Contents

Preface

Can the biblical view of origins be reconciled with scientific evidence? Was life on Earth created a few thousand years ago? What answers to these questions would seem credible to you?

In seeking to find answers, I will make two assumptions: first of all, you are willing to consider the possibility that the Bible is worth your attention; second, you want honest answers, not comfortable pabulum. This book is not an exhaustive analysis of science or the evidence for origins. The objective here is to present some especially important issues and evidence related to the origin of life and the history of life and the earth, with a primary focus on recent trends in the evidence in critical topics. I hope to stir your interest in further study to see if I am presenting an unbiased assessment of the evidence, of the approach to the study of the evidence, and of how this relates to biblical truth.

To be fair to the authors of published papers I have cited, I must point out that many of these authors would not agree with my conclusions or interpretations. I cite them only for specific data or concepts, and I seek for reinterpretations that treat the evidence objectively. This book is a focused and updated presentation of selected parts of the information covered in more detail in the book *Faith, Reason, and Earth History*.[1]

My career as a scientist and researcher has focused on questions like the ones I propose above. Early in my graduate education,

a study of the Bible brought to my understanding the reality of what an awesome, loving, and ever-present God we find in the Bible and what a privilege it is to make Scripture the guide for our life experience. Knowing *about* God is not the same as *knowing* Him as a personal Friend and Savior.

It has been most interesting for me to watch the trends in both the nature of the evidence and in scientists' attitudes toward those who take the Bible seriously. The evidence and the attitudes have not always taken the same trajectory. In this book, I will be examining the paths they have taken and making a case for what a thoughtful person would conclude from this.

It is not possible to recognize all the colleagues, students, and friends whose influence is seen in this book. I especially wish to thank Ariel Roth for spending many months introducing us to the geology of the western United States and for his review of this manuscript. I also thank Arthur Chadwick for his valued research collaboration that has been a source of inspiration and my wife, Kim, for her support and patience with the hours spent on projects such as this one.

One most important concept lies behind the discussion presented here: I trust we can disagree on such significant issues and still respect each other. There is too much ridicule, from both sides, directed at persons and positions with which we disagree. Can you imagine Jesus doing that? Ridicule will never convince anyone, so if we disagree, let us at least try to disagree in respectful terms.

My hope is that by the end of the book you will have a clearer understanding of the directions in which the accumulating evidence is moving and how that evidence is an increasing encouragement to recognize the Bible as a superior guide for our lives and even a source of strength in the pursuit of science.

Leonard Brand
February 12, 2019

1. Leonard Brand and Arthur Chadwick, *Faith, Reason, and Earth History: A Paradigm of Earth and Biological Origins by Intelligent Design*, 3rd ed. (Berrien Springs, MI: Andrews University Press, 2016).

Chapter 1

Yellowstone Fossil Forests

In a discussion of Genesis, science, and where the evidence is going, our first question is whether scientific practice and confident belief in the Bible can be compatible. My answer begins with an example taken from fossil forests.*

In the 1960s and early 1970s, a small group of Christian scholars were asserting that a particular fossil deposit in Wyoming indicated that the timescale for life on Earth was much longer than could be reconciled with the Bible. The fossil forests seen on the hillsides of Yellowstone National Park appear to be a series of separate fossilized forests, one horizontal forest level above the other, with each successive forest killed and buried by a flow of volcanic ash and debris (fig. 1.1).

The forests contain upright trees, horizontal fallen logs, and stumps in an upright position of growth. At the base of each forest level is a thin layer of fine volcanic sediment, interpreted as the soil in which the forest grew. Researchers had counted more than sixty forest levels (some researchers claimed many more), and many of these levels contained large trees, with as many as a thousand annual rings. When the rings in all the levels are added up, they do not fit into a timescale of a few thousand years, especially considering that these Eocene fossil forests are above many

* If you are already acquainted with this research project, you may wish to jump down to the last paragraph of this chapter.

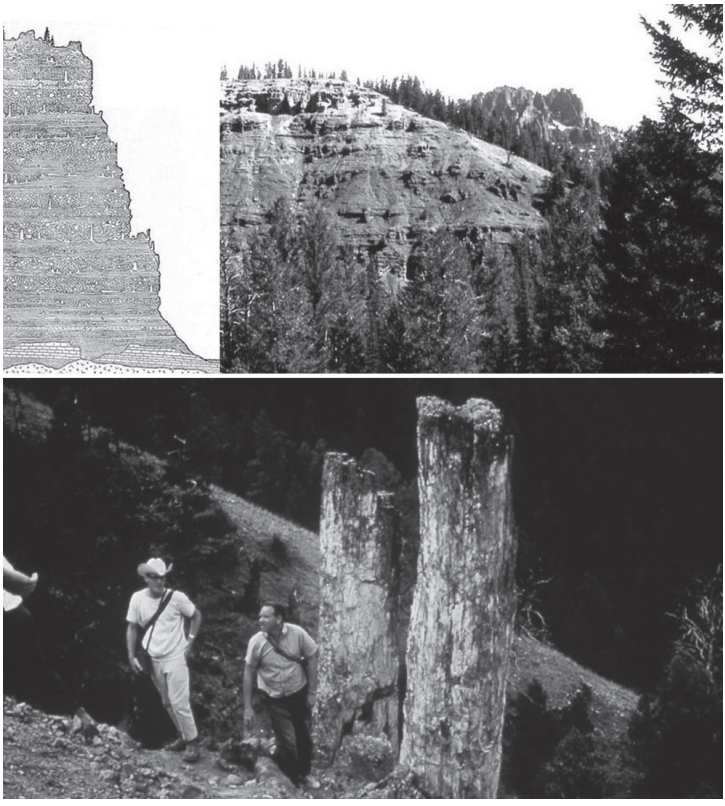

Figure 1.1. *Upper right*, a hillside in Yellowstone National Park composed of a series of horizontal debris flows with fossil trees; *upper left*, a diagram of the hillside, modified from the 1878 Holmes report; *bottom*, two large fossil tree trunks beside the living forest.

older fossil-bearing rock formations dated to the Paleozoic and Mesozoic eras (fig. 1.2). Even a casual study of the hillside where these exposed fossil forests can be seen supports the impression that each of these levels was an actual forest killed by volcanic action and buried where it grew; then, another forest grew on top of its remains.[1]

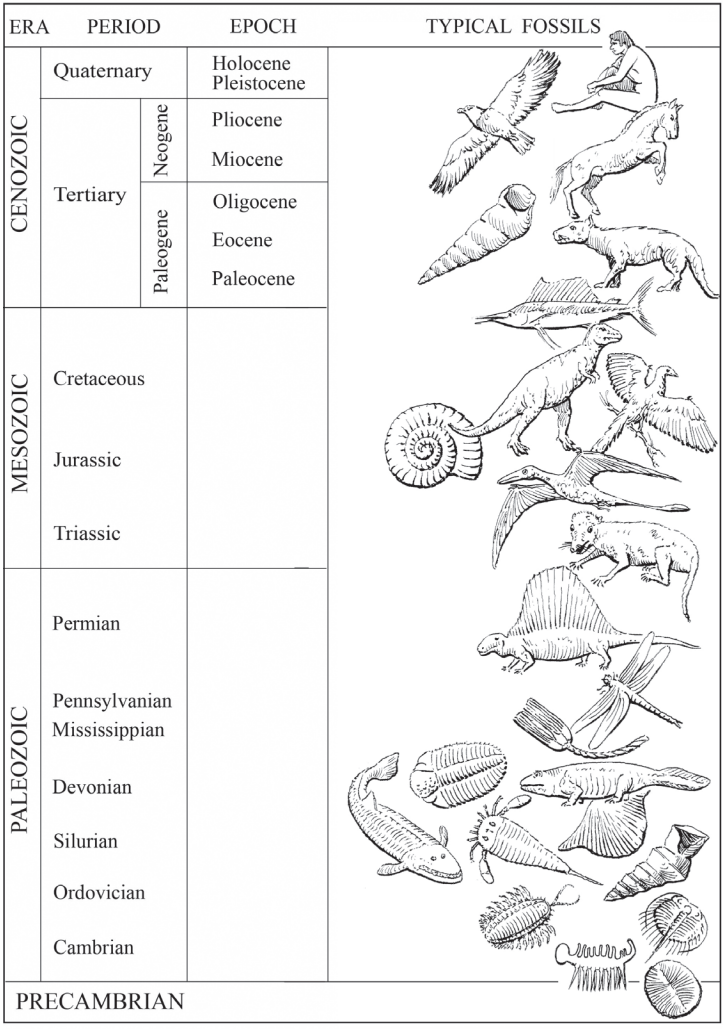

Figure 1.2. The geologic column and the standard geologic timescale, with representative fossils for each part of the column. (Modified from Brand and Chadwick, *Faith, Reason, and Earth History*, 2016.)

At the time of these discoveries, a number of my friends abandoned their confidence in Scripture, and some lost their faith in God because it seemed that these fossil forests could not be reconciled with a belief in the Bible as a trustworthy, factual account of history. Was their decision justified by the evidence? Or should they have held up the Bible as a more reliable source of information than human scientific discoveries? Since it seemed so clear that the forests grew where they were preserved, to look for an alternative explanation may have seemed foolish. Why not just face the scientific evidence and move on with life?

I believe that we have reason to take a different approach. A group of Earth scientists and their graduate students believed there was such a reason—their faith in the Bible as a trustworthy book that describes Earth history correctly, including the basic time frame of a few thousand years since Creation. They did not know what a better explanation for the Yellowstone fossil forests would look like, but they began a very careful study of those trees, stumps, and volcanic sediments, digging deeper into the evidence than others had. They understood that the scientific evidence and explanatory models accepted at any given time are not always the whole story, even if the scientific community has great confidence in them. Science keeps moving ahead and often brings surprises.

They asked the following questions in this research: What evidence do we see in these fossil forests? Does the evidence fit what would be expected if the trees grew where they are now? Several years of negotiating the steep, slippery mountain slopes of Yellowstone yielded unexpected new evidence.[2] We could assume that if a forest had grown where it was buried, we would find certain indications. For example, the types of trees on each level should represent a coherent forest ecology—trees that are expected to grow together and leaves, needles, or pollen on the forest floor that reasonably match the species of trees growing

there. If the soil is preserved with leaves in it, we would expect that the leaves near the surface of the soil would be better preserved, and the decayed leaves would be lower in the soil. Fallen trees in the forest should show various stages of decay, according to the length of time they had lain since falling. Standing trees would have roots extending out into the soil level.

The thorough work of these researchers in the 1970s revealed that much of the evidence did not match what was expected in a forest that had been preserved where it grew. Often, the trees within a particular level represented a wide range of environments, perhaps from high-altitude to lowland, and even subtropical, forests. A lot of leaves and pollen were preserved in the soil zones at the base of the trees, and they generally did not match the types of trees found on that level. When a forest of pine or sequoia trees has a soil base that contains mostly broad leaves and pollen from hardwood trees, something is wrong. This does not match the model of a forest that was buried where it grew. Furthermore, the wood in these fossil trees was consistently very well preserved, and the layers lacked decaying trees that would be expected in the life cycle of a normal forest. Where the bases of trees could be seen, their large roots were broken off, which would not be expected if a tree was preserved where it grew.

The presumed soil zones, referred to as organic zones, contained plenty of leaves and preserved pollen. But that was where the resemblance to soil ended. These organic zones were thin layers of fine volcanic ash, with well-preserved leaves all the way through the layer. They had the characteristics of a layer of ash and leaves deposited by flowing water.

What does this evidence point to? It fits the pattern we would expect for forests that grew somewhere else and whose trees were killed and transported into place by flowing water. Later, these trees were buried by rapid volcanic flows, one level at a time, in their new location. But how could that be? Many of the tree

trunks and stumps were upright, as if they had grown there. If they did not grow there, how could this be explained? This was the primary feature that convinced previous researchers that the forests had grown and were fossilized in the Yellowstone area.

Then, in 1980, the Mount St. Helens volcano in Washington State erupted with a vengeance. It killed many thousands of trees and leveled the surrounding forest. An untold number of trees were washed into Spirit Lake, on the flank of the volcano, covering part of the lake's surface with a huge log raft (fig. 1.3). As time passed after the volcanic eruption, a surprising thing happened. The tree trunks began to get waterlogged at their lower ends, turned upright as they began to sink, and finally rested on the lake bottom in an upright position. So, it turns out there is another way to explain preserved, upright tree trunks! And if the eruption had been followed by a sequence of volcanic debris flows into the lake, the multiple flows would have entombed the trees and produced layered deposits very similar to the Yellowstone fossil forests.

When Mount St. Helens exploded, another unexpected thing happened. A large volume of water flowed down the valleys on the mountainside, taking a huge volume of mud with it. In this mudflow were many tree stumps that ended up being scattered along the lower parts of the valleys. When the transported tree stumps stopped moving, they came to rest in an upright position even though they had been carried at high speeds in a chaotic mudflow for up to sixty miles. It was clear the stumps were brought in by the mudflow and had not been growing in the valley because some came to rest upright on a highway. Mount St. Helens showed us that it is not surprising to find transported tree trunks and stumps standing upright, even though they did not grow where we find them today.[3]

This illustrates a broader concept: geological processes often do not match what we would intuitively expect. It is necessary to

Figure 1.3. Spirit Lake, on the flank of Mount St. Helens, with its raft of logs after the eruption of the volcano.

see actual geological processes in action to know what to expect. Keep this in mind as you read.

At this point, we have to ask whose actions revealed more wisdom—those who gave up on the Bible when they thought they had reasons for doubt or those who allowed biblical insights to lead them into productive scientific research? This challenging research in Yellowstone was not amateur work but was done with scientific rigor and resulted in several research papers being published in reputable scientific journals. Ironically, at the conclusion of this research, Yellowstone National Park employees replaced the signs describing the fossil trees as forests that were buried by volcanic sediment where they grew. The new signs simply said the fossil trees were buried by volcanic sediment flows (although more recently, they brought back the original signs).

Let us ask the hard questions. Is this a legitimate process, allowing Scripture to interface with science? Does it question and challenge scientific explanations? Or were the results of this fossil forest project just a lucky coincidence? It is important to know

the answers to these questions, but adequate answers require us to spend time pondering how worldviews, assumptions, and the scientific process relate to religious faith.

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1. William H. Holmes, "Report of W. H. Holmes: On the Geology of the Yellowstone National Park," in *Twelfth Annual Report of the United States Geological and Geographic Survey of the Territories: A Report of Progress of the Exploration in Wyoming and Idaho for the Year 1878*, pt. 2 (Washington, DC: Government Printing Office, 1883), 1–57; William H. Holmes, "Fossil Forests of the Volcanic Tertiary Formations in Yellowstone National Park," in *Bulletin of the United States Geological and Geographical Survey of the Territories*, *1879–'80*, vol. 5 (Washington, DC: Government Printing Office, 1880), 127–132; E. Dorf, "Tertiary Fossil Forests of Yellowstone National Park, Wyoming," in *Billings Geological Society Guidebook: Eleventh Annual Field Conference, 1960* (Billings, MT: Billings Geological Society, 1960), 253–260; E. Dorf, "The Petrified Forests of Yellowstone Park," *Scientific American* 210, no. 4 (April 1964): 106–112.

2. Harold G. Coffin, "The Yellowstone Petrified 'Forests,' " *Origins* 24, no. 1 (1997): 5–42; Harold G. Coffin, "The Organic Levels of the Yellowstone Petrified Forests," *Origins* 6, no. 2 (1979): 71–82; Harold G. Coffin, "Orientation of Trees in the Yellowstone Petrified Forests," *Journal of Paleontology* 50, no. 3 (1976): 539–543; Arthur Chadwick and Tetsuya Yamamoto, "A Paleoecological Analysis of the Petrified Trees in the Specimen Creek Area of Yellowstone National Park, Montana, U.S.A.," *Palaeogeography, Palaeoclimatology, Palaeoecology* 45, no. 1 (February 1984): 39–48; Richard Ammons et al., "Cross-Identification of Ring Signatures in Eocene Trees (*Sequoia magnifica*) From the Specimen Ridge Locality of the Yellowstone Fossil Forests," *Palaeogeography, Palaeoclimatology, Palaeoecology* 60 (1987): 97–108.

3. Harold G. Coffin, "Erect Floating Stumps in Spirit Lake, Washington," *Geology* 11, no. 5 (May 1983): 298–299; Harold G. Coffin, "Sonar and Scuba Survey of a Submerged Allochthonous 'Forest' in Spirit Lake, Washington," *Palaios* 2, no. 2 (1987): 178–180; W. J. Fritz, "Stumps Transported and Deposited Upright by Mount St. Helens Mud Flows," *Geology* 8, no. 12 (December 1980): 586–588; W. J. Fritz, "Reinterpretation of the Depositional Environment of the Yellowstone 'Fossil Forests,' " *Geology* 8, no. 7 (July 1980): 309–313.

Chapter 2

Worldviews, Evidence, and Assumptions

How do we decide what is true? How do we evaluate information and ideas? What should determine which ideas scientists should take seriously and which should be rejected? Some examples and a discussion of worldviews will help with these epistemological questions.

The first question that needs an answer is, Why should we even consider a viewpoint based on the Bible? Many today do not believe the Bible is a source of reliable information. If that describes you, I invite you to take a careful look at the Bible. It may surprise you how the historical reality of its message can inspire you and your thinking and give meaning to your life, as it has inspired mine in a very personal way.

A *worldview* is a set of ideas that determine how we view the world and how we answer the big questions of life. It also influences how and whether we notice many small things around us. For example, I had a vague knowledge of a particular brand of car but did not think much about it as I drove the car I already owned. Then, after reading reports of the reliability and durability of the other brand, I began to notice that kind of car with a new sense of appreciation. When I passed one on the road, I looked at it with admiration and also a bit of longing; I decided I would like to have one of those. A small part of my worldview

had changed, and I saw things in a different light than before.

When I was conducting research on fossilized animal trackways in Arizona, my student assistant and I were examining trackways on sloping layers of cross-bedded sandstone. I noticed that my assistant was studying a flat surface, which is called a bounding surface. I was about to tell him there would not be any tracks there when he called me over to look at the abundant tracks he had found. I had walked over that surface several times. Why had I not seen the tracks? I had not seen them because I "knew" there would not be any tracks there. Because of my assistant's open-minded (and, to my thinking at the time, naive) exploration, I was shown something I had not noticed before, even though it had been right in front of me, and another small part of my worldview changed.

When I came to know Jesus as a dear Friend, a large part of my worldview changed, and I saw and understood many things differently than I had before. My life had new meaning and enthusiasm. The message of Jesus is revealed in the Bible, starting with His work in Genesis 1. As I have made the biblical account of origins the foundation of my understanding of biology and geology, my scientific work has improved and prospered. The Bible has the ring of truth after all!

Everyone has a worldview, whether they know it or not, and this worldview influences how they think and what they notice.[1] This is true of scientists, of course, and their worldview shapes how they think about geological history and the origin of living things. In the 1920s, a geologist named J Harlen Bretz began several decades of research on an impressive system of gorges, locally known as coulees, in eastern Washington State (fig. 2.1). During those decades, Bretz endured persistent ridicule from fellow geologists because he argued that the evidence he had found indicated that catastrophic erosion, caused by a massive flow of water, formed the coulees. He had done careful research, so why the ridicule?

A century before Bretz, the geologist Charles Lyell wrote books convincing geologists that geological explanations should never invoke catastrophic actions; he proposed that geological processes are always slow and gradual. Lyell's gradualistic or uniformitarian worldview dominated geology for a century, and scientists were unable to see any worth in Bretz's discoveries or in his unorthodox ideas. He had strong evidence, but the ridicule directed at him was the outgrowth of the worldview that expected only slow geological changes—a view that prevented other scientists from taking him seriously.

Bretz was rattling the gates of Lyell's dogma (fig. 2.2), and most geologists were not willing or able to think objectively about his evidence. Instead, they devised a variety of explanations based on slow, gradual processes that formed the Channeled Scablands, as the region was called. Does the ridicule of Bretz indicate that his critics were foolish or incompetent scientists? Not at all. Some of them were excellent geologists. This episode is simply an example of the power of a long-accepted theory or worldview to prevent recognition of evidence contrary to the theory—especially in the study of the ancient past, which is not available for us to observe directly. As is often the case, even in science, *assumptions rule*! It can be a challenge for anyone to get past these assumptions. A dominant theory or worldview constrains the acceptable interpretations to those that are compatible with that viewpoint.

It is likely that an additional factor was involved in Bretz's case. Lyell's uniformitarianism, or gradualism, was partly a reaction against the many geologists of his era who saw in the rocks evidence of catastrophism, in some cases for biblical reasons. Lyell did not like that and purposely worked against it.

Eventually, some crucial evidence was found in the Channeled Scablands that could no longer be brushed aside. When ice-age glaciers formed a dam in the mountains of Montana, a huge lake

Figure 2.1. A portion of the Channeled Scablands, showing Dry Falls and Dry Falls Lake. Dry Falls, the cliff stretching across this photo, was actually an enormous waterfall during the catastrophic water flow.

resulted. The dam broke, and more than 500 cubic miles (2,084 cu. kilometers) of water raged across eastern Washington, carving the Scablands coulees in days.[2] When the truth of this event was recognized, minds were shaken open, and with some agony, Lyell's gradualistic worldview was reevaluated, at least in part.

The scientific community is still committed to interpreting almost all geological events in terms of slow, gradual processes of millions of years. However, the case of Bretz and the Channeled Scablands brought the realization that some catastrophes do happen. In the modern, conventional scientific worldview, a critical core belief is that the ancient geological record was produced by processes we see in the modern world or that are feasible today. As we can see for ourselves, rivers and streams deposit mud and sand, earthquakes occur, and erosion very slowly changes the landscape over long periods of time. However, it is now recognized that uncommon catastrophic events also occur. The conventional geological worldview changed enough to accept these rare events, but it still does not notice or accept any interpretations that might suggest something as catastrophic as

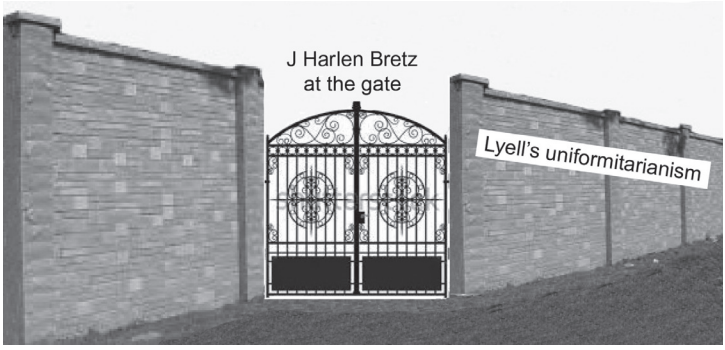

Figure 2.2. Bretz's theories were rattling the gates of geology's commitment to Lyell's uniformitarianism.

the global biblical flood or, for that matter, any time frame too short to provide for the assumed evolution of life.

Some factors that influence our worldview can be evidence, insights, information, experience, and critical thinking. When studying origins and ancient history, I recommend adding one other factor: revelation. Could it be that the God who inspired the Bible's writers knows more about biology and geology than we will ever know?

Worldviews are not based on evidence alone. *All worldviews are based on one or more assumptions that are based on faith.* We may assume that there is a God or that there is no god, that life arose with or without intelligent design, or that the universe came into being by itself or that God made it. We cannot prove any of these things, and that is why assumptions are always the basis of our worldview.

How do we decide on our worldview? How do we evaluate knowledge? These epistemological questions are complex, and I will deal with only one important aspect: the relationship between data and interpretations.

Consider the following statement by Jerry A. Coyne in his

book *Why Evolution Is True*: "All of us—you, me, the elephant, and the potted cactus—share some fundamental traits." These include biochemistry, DNA, and so on. "This tells us that every species goes back to a single common ancestor." He does not admit this, but we can recognize that his statement contains both data and interpretation.[3]

The study of biology tells us that we do all share innumerable traits of biochemistry, including DNA. We can accept this statement as true based on data. But then Coyne's statement quickly shifts to interpretation: "This tells us that every species goes back to a single common ancestor." How does he know this? He has not observed that history. His interpretation is based on an assumption—the assumption that all life resulted from evolution. His conclusion, his interpretation, is actually just a restatement of the assumption that guides his scientific thinking.

Later in the same book, Coyne picks up the same theme. He says, "The most commonly suggested alternative takes us into the realm of the supernatural."[4] The alternative he refers to is the creation of life-forms. He cannot accept this alternative, primarily because his worldview cannot allow it. Many people, including scientists, do not realize the extent to which assumptions and worldviews guide and even control scientific interpretations in the study of ancient history.

This may seem like a radical statement but keep reading. You may be thinking that my assessment is naive and I just do not understand the evidence. I understand why you might think that, and we will deal with that evidence later. First, we will take a closer look at the assumptions and the underlying philosophy of the conventional scientific worldview.

Methodological naturalism

The philosophy that guides the conventional worldview is methodological naturalism, which insists that all scientific interpre-

tations must be based on natural law alone.[5] No supernatural actions or any kind of miracles can ever be used as explanations. That seems logical. If I am conducting a chemistry experiment, am I going to think some supernatural action is interfering with the chemical reactions?

Methodological naturalism (MN) does not claim there is no god. Such a claim comes from philosophical naturalism. Methodological naturalism is merely a method of doing science. If I follow MN, I will never use the supernatural or miraculous as an explanation in any scientific study.

The history of this concept seems quite understandable. In previous centuries, when modern science was in its infancy, it was not uncommon for scientists to think that processes in the human body or in other aspects of nature resulted from mystical forces. Spirits were the explanations for processes they could not understand. As science and scientific discovery progressed, it became evident that these processes could be studied and that they were the result of mechanisms we can understand. No spirits were messing with chemistry experiments after all. That insight developed into the philosophy of MN. Abandoning mystical explanations was appropriate and a necessary shift in thinking to allow science to progress.

The remaining question, however, is, Did the shift go too far?[6]

There is a difference in applying MN in two different types of research.[7] These are (1) experimental or observational science that investigates ongoing contemporary processes, which we can observe and manipulate in the laboratory; and (2) the study of events and their causes in ancient history. This second category includes much of the fields of geology, paleontology, and biological history. These have to do with unobservable events that can only be inferred from limited evidence in the modern world.

Research in the first category would include chemistry, physiology, and much more. We can mix chemicals together to see

what happens, and some mixtures will explode! No scientist I know of is tempted to wonder whether God is tinkering with his or her experiments of this type. Through the past couple of centuries, we have become convinced that God does not work in that way. He has set up, and maintains in continuous operation, His set of laws of chemistry and physics, which we usually call natural law, that manage the day-to-day functioning of His universe. If we choose to think of this in terms of MN, it could be harmless, except that in the practical realities of modern science, MN goes much further than that.

In the second category of science—the study of phenomena in ancient history—MN runs into problematic territory. In practice, those who believe MN must be applied across the board in order for a person to function as a scientist almost always carry this philosophy rigidly and dogmatically into the interpretation of the events of ancient earth history, even though we have not observed those events. Those who believe the biblical story of Creation and a short time span for life on Earth will object to that dogmatic application. But we must then ask whether there is a defensible reason for our objection.

There is such a reason. The chemist can repeat his or her experiment to verify whether the mixture of chemicals really does explode. (Or another chemist can do so, with better safety precautions!) But geologists do not have a time machine. They cannot go back in time to see what happened five million years ago, or even five thousand years ago. We can observe and study modern geological processes today, such as the processes that transport and deposit sediment (mud, sand, gravel, and so on), and we can safely trust that these processes always followed the same physical laws that are operating now. The laws of nature seem to be constant—water never ran uphill in the past. But perhaps there are limits to how far we can use modern processes in interpreting ancient history. (We will

explore that idea more in chapter 4.)

MN does not say there is no god, but it does not allow the miraculous to ever be used as an explanation of any event in ancient history. Think about what that means. If we wish to be accepted as scientific by this measure, the following incidents can never be suggested as actual events of history: the establishment by God of the laws of nature; the creation of the first life-forms; the creation of various major types of living organisms; the global flood described in the Bible; a biblical timescale of only thousands of years since Creation. Such a timescale is drastically too short to allow us to even consider the evolution of major life-forms. In other words, acceptance of MN means that in science we would have to think like atheists.

It is often claimed that some items on our list must be rejected because the evidence is against them. Let us examine the case of the first item in the list—the origin of the first life-forms. Books that discuss the origin of life from a conventional scientific perspective always confidently describe the origin of life as the result of the unaided laws of chemistry bringing life into being by random chemical reactions through deep time (billions of years). How would we know that life began that way? No one observed such a process, and it does not occur today. How much evidence is there to show that life arose that way and not by intelligent design? There is *no* scientific evidence to support that conclusion—none at all. In fact, all the evidence is against it.[8]

Then why is this theory of chemical evolution, or abiogenesis, so firmly and confidently held? It is entirely the result of assumptions—the philosophy of MN, which is maintained *no matter what the evidence says.*

This is the clearest case I know of in which assumptions rule over science. Do you know of physical evidence that demonstrates I am wrong about that? I cannot help wondering what other conclusions of conventional science may be on the same

foundation—firmly held because of the assumption of MN, *no matter what the evidence says*, even in the face of contrary evidence. I do not believe many scientists would hold onto a theory if they could see that it clearly went against the evidence, but perhaps certain factors muddy the waters as these decisions about ancient history are made—factors that unconsciously arise from assumptions and worldviews.

Let us compare this with one other example of assumptions and their effects. If I assume that people do not like me, and I really believe that, what will be the result? No matter what someone does, I will interpret this person's behavior as indicating that he or she does not like me. If an individual smiles, I will likely think, *That is a phony smile*. It can be very hard to see past deeply held assumptions.

Those who believe in Creation are often accused of being biased and thus not able to do valid scientific research. Could this be true? I have met Bible-believing creationists whose scientific ideas reveal obvious biases. They interpret evidence according to what they think the Bible says, or with some of them, their ideas come from their own thoughts and may or may not have much to do with the Bible or with science. So, one answer to this question is yes; creationists can be biased. But I have also met scientists who do not believe in Creation and whose interpretation of evidence is equally biased by their personal preferences and assumptions. Anyone can be biased, in the sense that they do not use defensible logic and the evidence does not have an influence on their interpretations and theorizing.

Even for careful thinkers, their worldview can have a controlling influence on scientific interpretations, as we have seen with origin-of-life theories. So, is it acceptable for a creationist to use the Bible to suggest hypotheses and interpretations for scientific evidence in the same way that other worldviews are used to suggest hypotheses? In the Yellowstone fossil forest research, a

Bible-based approach led to effective science. In that research, a biblical worldview led to new questions and hypotheses, but the answers to these questions came from applying standard, conventional scientific research methods. That is legitimate science. The new, alternative interpretation of the fossil forests produced by this research could also be compatible with the conventional worldview, but that worldview did not provide the motivation to seek an alternative explanation, and it did not suggest the questioning that led to the new explanation of how trees were transported into their final resting places.

We must look a little deeper into the assertion that mixing science and the Bible in the way I have suggested will introduce biases. It is possible to allow personal beliefs, including biblical beliefs, to twist or distort our interpretation of evidence. But will a serious thinker want to do that? If we unnaturally force research data to fit our belief system, would that be satisfying? It would not, and we do not have to do that. What is satisfying is to allow our biblical worldview to open our minds to ask novel questions and consider a broader range of possibilities. If we honestly do that, is it not possible that we might have more chances of finding better explanations?

Did the biblical worldview *control* the interpretations of the Yellowstone fossil forest researchers? No, it did not. I knew those researchers personally, and their research design showed a desire to test alternatives, not to squeeze the evidence into their worldview framework. I also knew one of the primary advocates of the earlier theory that the forests were buried where they grew. He was also a Christian, but he thought within the conventional worldview and argued that the forests contradicted the biblical timescale.[9] I have heard him ridicule those who worked on the alternative explanation. I put effort into analyzing the logic in his published support of his explanation in a popular journal. Of the dozen specific lines of evidence he claimed as a demonstration

that the forests grew in place, all of them were only hypotheses, with no supplied evidence to test whether or not his hypotheses were correct and whether the alternate hypothesis of trees transported into their burial place was incorrect. That is not good science and is inadequate research design.

This is one illustration of the fact that no one worldview has a monopoly on bias, and believers in any worldview may or may not allow their worldview to control or skew their interpretation of evidence. Biased thinking is not a religious problem; it is a human problem, and everyone must seek to avoid it.

Those who accept the biblical worldview and are actively involved in scientific research and publication have an advantage that the critics of this worldview do not understand. I read a lot of the anticreationist publications, and it is clear that the writers of that material have little or no understanding of how educated creationists think or approach research. The advantage we have arises from our awareness of two worldviews. If we want to be effective in research, we have to know all that others know. We have to understand their evidence and the thinking that comes from their worldview as well as our own viewpoints. My friends and I often discuss these contrasting viewpoints and seek to find places where we can test between the two perspectives. An understanding of both viewpoints gives us a distinct advantage in such efforts to find objective answers to deep questions since we give consideration to a wider range of possibilities and how to test them. Because of an awareness of the contrasting viewpoints, it is often clear to us that the objections of our critics are not supported by evidence and may simply reflect their lack of awareness of possibilities different from their own thinking. This does not mean they are not excellent scientists, but the dominant, conventional worldview has a strong and often unrecognized influence.

On the other hand, having a familiarity with both our own

and others' interpretations and knowing their arguments against our viewpoints provide us with an important benefit. These things help us to avoid superficial thinking and foolish mistakes. We are all human and apt to make mistakes, but nothing is quite so helpful in avoiding careless thinking as knowing that our critics may discover our mistakes and publish them for all the world to see.

I will make a prediction that might make you uncomfortable. I predict that the more we practice careful science without allowing assumptions to control the interpretations, the more such science will challenge the conventional MN-based worldview. Significant scientific trends are already headed in that direction.

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Chapter 3

What the Turtles Tell Us

The Yellowstone fossil forest research was followed up by several other research projects that began by asking new questions motivated by a biblical worldview. A number of these are described in the book *Faith, Reason, and Earth History*.[1] Here I will describe just one of these projects—a study of the taphonomy (the processes of fossilization) of Eocene fossil turtles in Wyoming.

The Bridger Formation in southwest Wyoming, with its rich assemblage of vertebrate fossils, has been known since the transcontinental railroad was built through Wyoming in 1869. The railroad ran right through the Bridger Formation and opened up access to its abundant fossil treasures (fig. 3.1), as the railroad crews feasted on bison rounded up by Buffalo Bill and his helpers. Since that time, paleontologists have been collecting fossils there, and the vertebrate paleontologists have been especially interested in fossil mammals for the study of mammal evolution. Untold thousands of fossil turtles have been found there, but they are of lesser interest because turtles don't change much through the fossil record and thus are not helpful in the study of vertebrate evolution. Therefore, most paleontologists ignore the turtles.

Since the turtle fossils have not been heavily collected, the turtles that remain in the ground provide a sufficiently unbiased

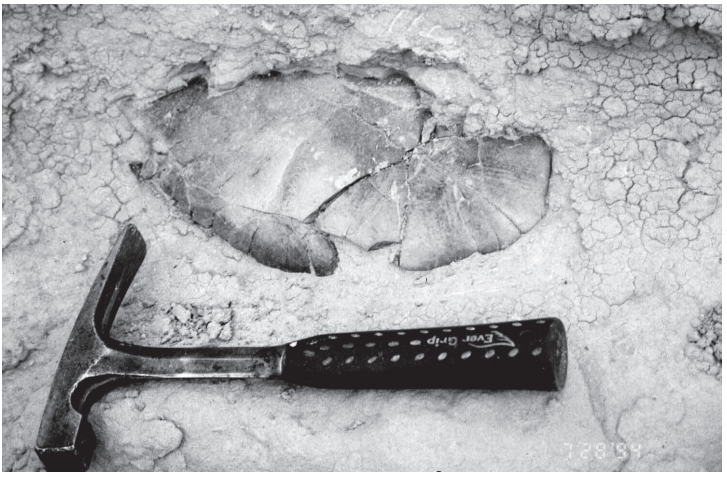

Figure 3.1. A fossil turtle from the Eocene Bridger Formation.

record of turtle distribution and abundance in the Bridger Formation. I became interested in them and started research on the turtles' taphonomy, which is the study of how and why the organisms became fossilized. What was the process of decay, disarticulation, and fossilization? Why do some become well-fossilized skeletons, while others are only isolated bones? This type of research can help us to answer these questions and also tell us about the geological circumstances that produced a fossil deposit.

The Bridger Formation accumulated in the very large Green River basin. It consists of periodic layers of limestone and of sandstones and mudstones deposited by flowing water. Limestones form in water, and the published geological papers on the Bridger Formation described it as a series of local lakes and marshes in which isolated limestone beds were formed. Several papers said that since these limestones were from separate bodies of water, they could not be mapped across the basin but were only local features. The turtles apparently were associated with

these same water bodies as their preferred habitat.

My research was motivated by such questions as, How big were these separate water bodies, and how catastrophic were the conditions when the Bridger sediments were deposited? I see reasons to believe that the Bridger Formation might have formed in the time after the global flood ended. So, a significant question is, How catastrophic were the conditions associated with the Bridger Formation?

I began the research with detailed documentation of the distribution of turtles and the characteristics of each turtle. Were they articulated or disarticulated? Were the bones well preserved, or were they weathered and abraded or otherwise damaged? How abundant were they at each location? These factors were documented across a large individual turtle-rich exposure, then compared on several fossiliferous levels, and then across the entire unit B of the Bridger Formation, which contains by far the most extensive exposure.

The principal conclusions, published in a reputable geological research journal, were that the Bridger turtles occur in mass mortalities at several stratigraphic horizons, or several specific levels, in the Bridger Formation.[2] These mass deaths were the result of episodes of volcanism in northern Wyoming that rapidly killed and buried the turtles. My geological mapping revealed that the limestones did not result from local ponds and lakes. Almost all of the limestone beds could be mapped across all of the Bridger Formation (fig. 3.2). When careful mapping was done without any assumptions of whether the water bodies were local or extensive, it was clear that the limestones extended all across the basin.

Why had this mapping not been done in more than one hundred years of research on the Bridger Formation, especially since accurate geological correlation is a necessary background for research on mammal evolution? I will give my opinion on that question. The published interpretation that the limestones

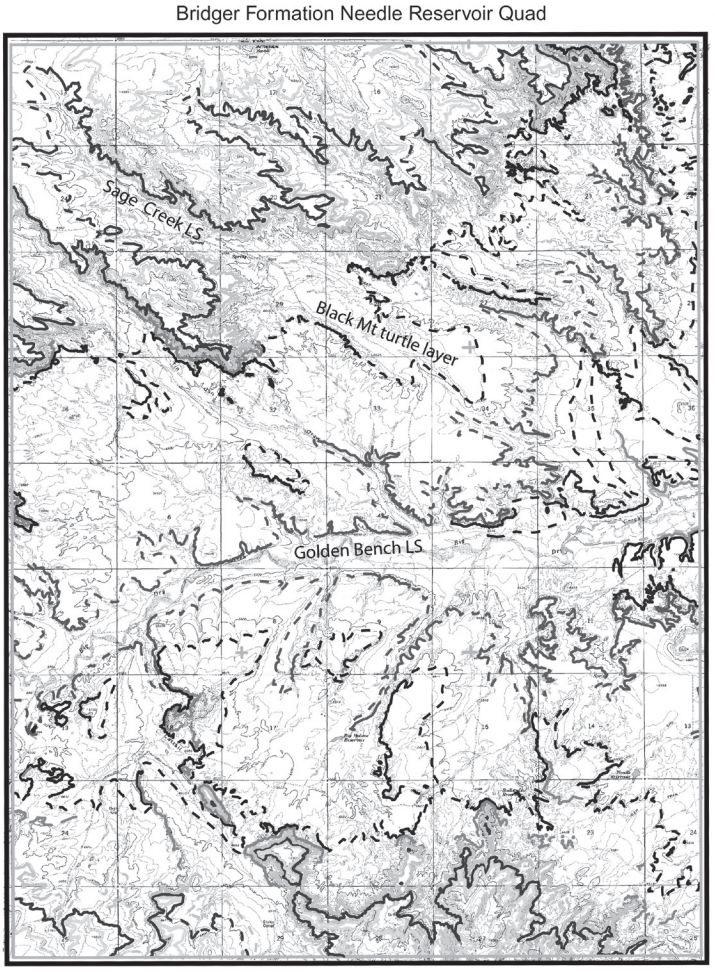

Figure 3.2. A map of the geological marker beds in the Needle Reservoir quad, which is one of twenty-six quads mapped in Bridger unit B. (LS is the abbreviation for limestone.)

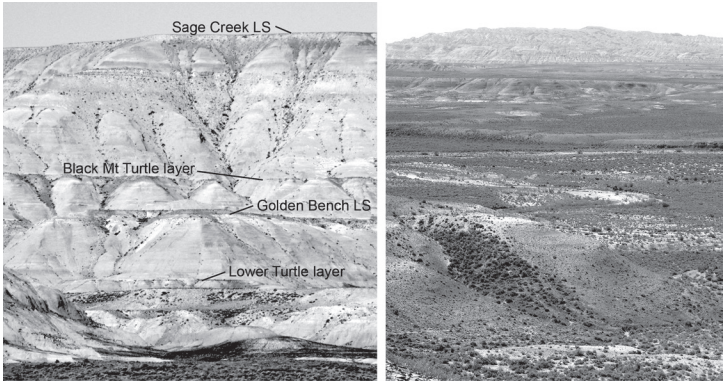

Figure 3.3. *Left,* a cliff in the Bridger Formation with prominent limestone beds. *Right,* a portion of the Bridger Formation exposure with rolling hills and sagebrush cover, making geological mapping a bigger challenge.

resulted from local water bodies led to the idea that accurate correlation across the basin was not feasible. This was probably encouraged by the nature of the Bridger outcrops (fig. 3.3). In some places, individual limestones can be easily followed along the badland cliffs for several miles, but in many other areas, there is more sagebrush cover, and the rolling hills and slightly dipping sedimentary beds did not look promising for geological mapping.

But I suggest that the largest factor was a bias resulting from the assumption that the Bridger deposits represented millions of years of local geological processes similar to modern processes, rather than large-scale catastrophic or semicatastrophic events. When I ignored this entrenched idea, I found that even though the mapping was difficult at times, the limestones could be reliably mapped all across the basin.[3] Each limestone resulted from a body of water that occupied the entire basin. My worldview led me to ask questions, as described above, that I would probably not have thought of otherwise and to notice things I might not have noticed.

While I was doing this mapping, some geologist colleagues and friends who did not in any way share my worldview began mapping other parts of the Bridger Formation and were equally successful. I believe this illustrates that even when we disagree on some things, if we ignore prior assumptions and make careful observations, as scientists, we can accomplish the task together.

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Chapter 4

Geological Evidence: Good and Bad News for the Biblical Worldview

Everybody who studies geology and fossils has unanswered questions. When we examine the geological record and related topics, we find evidence supportive of a biblical worldview and also evidence that challenges this worldview. In this chapter, we will summarize examples of geological evidence that illustrate these two categories. This review will not cover anywhere near all the evidence available, but these are significant case studies and can serve as a pattern for thinking about other evidence.

To help you understand this chapter, I must explain one principle a little more. The studies of the Yellowstone fossil forests and the turtles in the Bridger Formation are examples of valid scientific research that was initiated within a biblical worldview. Those examples, and others like them, begin with the conviction that the Bible is not just an ancient collection of myths but was inspired by the God who knows what happened in earth history and how long the process took. If that is the case, then confidence in the book of Genesis will not interfere with genuine science. Rather, it is worth considering that the Bible can be a very practical asset because it may open our minds to a wider range of interpretations of ancient events. It gives us new hypotheses that we can test against the evidence, and it also possibly gives us

even radically new hypotheses. We want to know whether these hypotheses, or at least a reasonable number of them, will stand in the face of accumulating evidence. We are not using science to test the Bible, but confidence in the Bible allows us to apply Scripture with confidence as we seek better geological understanding.

The challenging evidence

As we study geologic features that formed in the ancient past, long before we were here to see what happened, is it likely that we can fully understand these events and the processes involved? Since we have not seen with our own eyes a global flood or anything approaching it, we have a disadvantage in our efforts to understand what evidence such an event would leave behind. However, it is fascinating to try, and there are some very helpful clues.

The most significant challenge to the biblical worldview, with the literal Creation occurring a few thousand years ago, followed by a global flood, is radiometric dating. These dating methods indicate 541 million years since the base of the Cambrian period (fig. 1.2). Creationists seek alternative interpretations for the radiometric process, and some helpful ideas have come up.[1] But we do not have, at this time, an adequate answer for this challenge. We predict there is an answer, but we do not know what it is yet. This is one of our biggest unanswered questions.

For many of us, the next important unanswered question is why the fossil record shows a sequence that looks, in some ways, like an evolutionary sequence. (This subject will be discussed in detail in chapter 6 and will not be pursued further in this chapter.) There are additional geological features that seem to require a lot of time to grow, such as fossil reefs; these will require much more research before we understand them. We do not have room here for an exhaustive discussion of the topic, but the cases in this chapter are examples of the challenges.

Those who follow the conventional worldview will inevitably

Figure 4.1. A typical view of the Pisco Formation, with a group excavating a fossil whale.

interpret all geological evidence using the assumptions of methodological naturalism and deep time. An abundance of available evidence is used at times as an argument against a biblical worldview. Some catastrophic events and episodes of rapid geological processes can be recognized by anyone, but overall, the evidence will always be interpreted in a way that is compatible with the controlling assumption of deep time.

One of my personal research projects provides an example of how a researcher's worldview and assumptions influence interpretations, and it illustrates that a biblical worldview can lead to different interpretations that explain the evidence better than those resulting from a conventional worldview.

Several scientists from the United States and Peru and I were introduced to an assemblage of fossil whales in the Miocene/Pliocene Pisco Formation in Peru (fig. 4.1). The geological descriptions of these whales said they were buried in sand and diatoms at a rate of a few centimeters every thousand years, and the entire formation took about ten to twelve million years. How

Figure 4.2. One of the numerous articulated whales in the Pisco Formation.

can this be explained in a biblical time frame?

We began a decade-long research effort to understand the taphonomy of the whales and their sedimentological context. In the previous twenty years of published research on the many thousands of whales, there had been no discussion of an issue that we recognized immediately as a serious problem for the accepted interpretation.

The large whales were mostly articulated skeletons, and all the bones—even in skeletons that were partly disarticulated—were very well preserved (fig. 4.2). This is not compatible with slow burial, as has been shown by research on the fate of modern whale carcasses. I found only one brief published comment suggesting that the well-preserved Pisco whales seemed to imply rapid burial.[2] The previous researchers were competent geologists, so why had there been no other recognition of this anomaly? Why were we the ones who noticed it and pursued a research project to draw attention to this evidence?

The rapid burial of the whales did not, in itself, demonstrate that the entire Pisco Formation was rapidly formed, so it does

not provide a good reason to think the previous researchers had a persistent bias against the recognition of rapid whale burial. The most likely explanation is simply that the conventional theory did not provide any incentive to question the accepted rate of sediment accumulation. But our biblical worldview opened our eyes and minds to quickly notice the mismatch between theory and evidence. Our eyes were opened to notice this and to ask a new question: How rapidly were these whales buried? At that point, we used standard scientific procedures to seek an answer to the question, and the accumulating evidence indicated that each whale must have been buried in a maximum of some weeks to months.[3] The possibility of a well-preserved whale carcass lasting a number of years, let alone thousands of years, is simply not realistic, based on research on living whales that die and sink to the ocean floor.

This is one example of how a seeming conflict between a geological deposit and the biblical timescale can be resolved to the mutual benefit of both science and religion. Creationist scientists noticed the problem, and their biblical insights led to research that found a better interpretation for at least the part of the puzzle that they studied.

This is a pattern that has been repeated in every case of this type of research, in which a biblical worldview prompts the researcher to suggest new questions. There is reason to expect such a result in each case where the biblical worldview is accepted as a guide for research, as long as careful research is done. Bringing alternative explanations to the table for consideration can always benefit science because it can lead to deeper questioning and more research. Science is never benefited by constricting research to avoid new and challenging questions. Will it always be easy? Certainly not, especially in the study of ancient history. Is it rewarding? Absolutely, and it can lead to some very good science.

This research example illustrates why evidence that seems to

argue against a short time since Creation is not necessarily a valid argument. Current published geological interpretations may be dependent on an excessive influence from the conventional model and its assumptions. This possibility should always be considered before drawing final conclusions. I predict this excessive influence of assumptions has prepared the way for *many* opportunities for research from a creationist worldview to ask new questions and find better explanations through deeper research.

Before leaving this topic, I will raise a couple of common questions and concerns that need a response. Do we seek to prove the biblical flood? And do we expect to find better explanations because we think other geologists are doing a poor job? The answer to both questions is a resounding no! Proving such a complex event as the Flood may not be a realistic goal. We seek to allow an alternate worldview to help us understand the geological record. A more accurate worldview can lead to more insightful questions and observations and the incentive to pursue an examination of those questions. It might even lend support to the reality of a global catastrophe.

Other geologists often have more resources, many will have more focused research time, and they may have more brainpower than those in the creationist group. However, they have one significant disadvantage: they are, I believe, following a false worldview, and in many geological investigations, this can lead them in the wrong direction. Our approach may bring to notice important new evidence and provide guidance in understanding what that evidence reveals about geological events and processes.

The most enduring type of trust and confidence is based on a relationship with a person we have reason to trust. Jesus Christ is someone we can fully trust. The One who has seen all of Earth's history—the same One who died to give us life—is also responsible for giving us the Bible. We can fully trust Him and His Written Word, even if we do not understand all the things that

puzzle us. If we love our Creator as a trustworthy, dear Friend, following His lead in this way can be irresistible!

Evidence favoring a short time since Creation

Even with the evidence already available, some serious problems for deep time emerge, and we will explore the current state of the evidence. As we seek to understand the ancient past, the geological record, and the fossils, we cannot go back in time and observe the events or processes. We can only interpret the geological record by a comparison with the processes we see in the modern world (fig. 4.3). We can study how rivers and streams deposit sediment and how flowing water results in erosion. We can then compare, for example, an ancient sandstone with modern processes (modern analogues) that deposit sand and interpret how the sandstone was formed.

That is a process that all geologists must use, whether we are creationists or conventional-thinking scientists. The difference is that in conventional science, all ancient events must be interpreted as the result of processes that are seen or feasible in the modern world. In contrast, if we accept the possibility of a catastrophic understanding of earth history—the global flood—this can open our thinking to notice evidence that seems to point to more catastrophic explanations, which are likely to be rejected by others.

A thorough knowledge of modern geological processes can prepare us to see that many ancient rock formations cannot be explained by these modern processes. The ancient geological events were generally far more catastrophic.[4] The laws of nature were the same, but different geological circumstances produced results that were different from what occurs in the modern world. The following sections describe some primary examples of this evidence. In our study of these issues, we simply ask questions such as the following: What processes can be seen in the pertinent modern analogues? Do ancient rock formations show

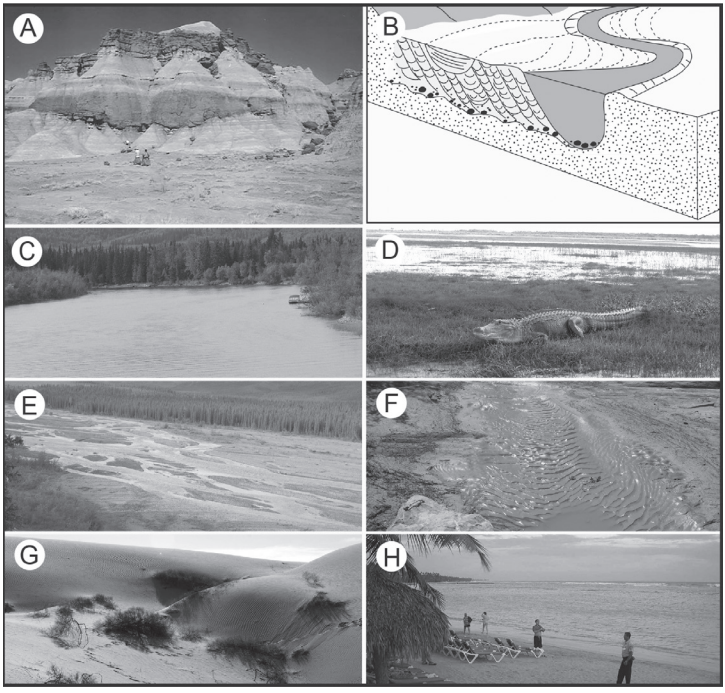

Figure 4.3. Modern or ancient depositional environments where sediment can be deposited. *A*, the Eocene Bridger Formation; the darker-colored sediments are river channels surrounded by floodplain deposits of finer sediment; *B*, a cross section of the complex sediments in a typical modern river and floodplain; *C*, a river; *D*, a swamp; *E*, a braided stream; *F*, ripples in the mud of a streambed; *G*, desert windblown (eolian) sand deposit; *H*, beach; sand accumulates on the beach, and other sediments are deposited offshore.

evidence of similar processes? Do modern geological analogues provide adequate explanations for those ancient rocks, or does the comparison reveal significant differences between the modern world and what happened in ancient history?

Geographically widespread formations

Our first example is the Morrison Formation (fig. 4.4), which is

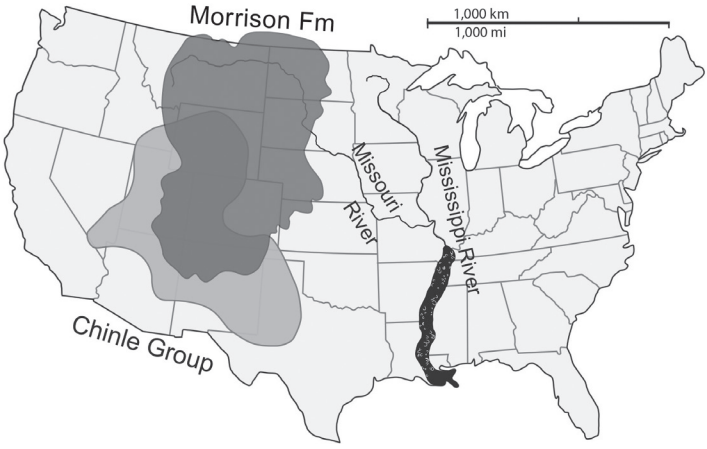

Figure 4.4. Maps of the geographical extent of the Morrison Formation and the Chinle Group of formations. The Missouri and Mississippi Rivers are also shown, and their widths show how wide the rivers and their floodplains get. Abandoned channels forming oxbow lakes can be seen in the wide part of the Mississippi floodplain.

a colorful sedimentary formation that extends from Canada to New Mexico and from Idaho eastward to central North Dakota, covering 1.5 million square kilometers (579,000 square miles). It consists of sandstone, siltstone, mudstone, and limestone and is interpreted as being formed by rivers and floodplains, with part of it deposited in lakes or swampy areas. It contains many animal fossils, including abundant fossils of dinosaurs.

Try to imagine how rivers and streams could deposit such a set of sediments on any modern landscape—depositing them over hundreds of thousands of square miles of plains, valleys, hills, and mountains, producing deposits that are so sufficiently continuous, persistent, and coherent that they can be mapped as a single rock formation.

Keep in mind that the laws of nature have always been constant. Our geological interpretations must recognize that

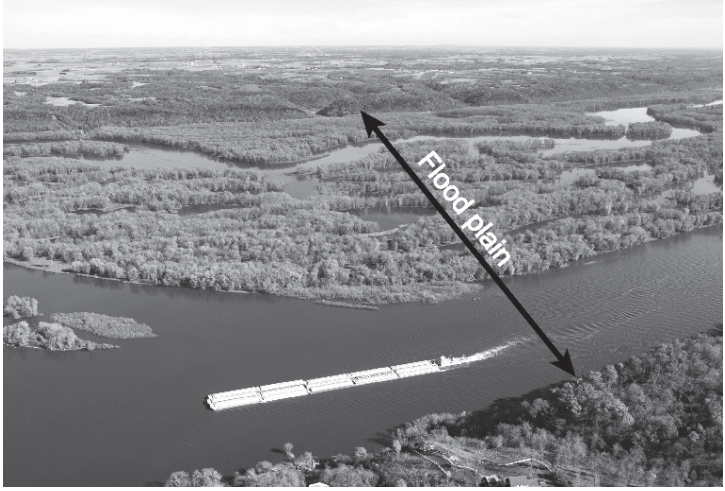

Figure 4.5. A photograph of the Mississippi River and its floodplain. During past centuries, the river meandered across the floodplain but did not extend into the surrounding countryside.

principle, even while they find evidence for more catastrophic conditions. Modern analogues can help us see that the modern world is, in many cases, not a good explanation for the ancient world. In the modern world, rivers and streams deposit their sediment loads over a belt of land, leaving a complex pattern of mud, sand, and pebbles *in that belt* (figs. 4.4 and 4.5), which is between the riverbanks on either side, rather than as an awesomely widespread and relatively uniform deposit.

If the Morrison Formation covered an area the size of a typical sheet of paper, proportionally, it would be no thicker than the sheet of paper, which emphasizes its striking uniformity and contrast with modern processes that deposit sediment. To make the point clear, modern processes do not produce any deposit like the Morrison Formation, and evidence for a major river that could have helped spread sediments over the 1.5 million square kilometers (579,000 square miles) of the Morrison Formation

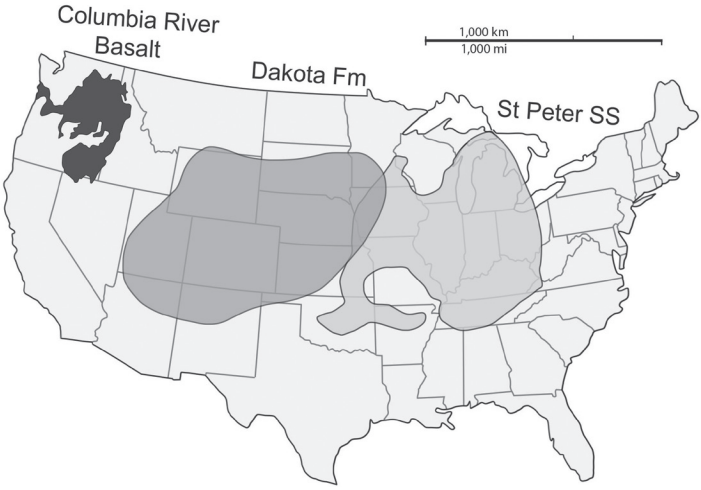

Figure 4.6. Map of the geographical extent of the Dakota Formation, the St. Peter Sandstone, and the Columbia River Basalt Group.

has never been found. This formation fairly screams that it was deposited under conditions that were drastically different from anything that happens in the modern world.

Let us consider some other formations. The Dakota Formation consists of sandy sediment with some mud and is interpreted as having been formed by shallow marine (ocean) deposits and occasional stream deposits. It occurs widely across the Colorado Plateau and the Great Plains, stretching all the way to Minnesota and Iowa and covering 815,000 square kilometers (about 315,000 square miles). The St. Peter Sandstone is spread north to south from Minnesota to Arkansas and east to west from Ohio into Kansas (fig. 4.6).

The Mowry Shale and Mancos Shale cover 250,000 square kilometers (about 96,500 square miles). Their fossils represent freshwater and marine faunas and include dinosaurs and fish scales. The Mancos Shale is from offshore and marine

environments and rests on the Dakota Formation. The contact between them is well defined, showing no erosion or other evidence to indicate the passage of a long period of time.

The Frontier Formation covers 300,000 square kilometers (about 116,000 square miles). It is sandstone and shale, and its fossils include dinosaurs and other reptiles. The upper half of the formation is considered to be marine, and the lower half is nonmarine. Each of these formations is far too widespread and uniform to be the result of rivers or other modern processes.

Enormous volcanic accumulations called flood basalts are scattered in a number of places over the globe (table 4.1). They are called flood basalts because they flooded the landscape. They may be thousands of feet thick and have up to a million cubic kilometers or more (about 240,000 cubic miles) of lava. In 1980, we were impressed when Mount St. Helens deposited 10 cubic kilometers (2.4 cubic miles) of new volcanic material. But that is a small modern eruption compared to the massive ancient flood basalts.

Table 4.1. Several flood basalts

Columbia River Basalt	164,000 cu. km. (39,000 cu. mi.)	Cenozoic, NW United States
Deccan Traps	325,000 cu. km. (78,000 cu. mi.)	Upper Cretaceous, India
Karoo Basalts	1,400,000 cu. km. (336,000 cu. mi.)	Lower Jurassic, southern Africa and other continents
Siberian Traps	over 1,000,000 cu. km. (240,000 cu. mi.)	Permian-Triassic, Russia

The examples I selected so far in this chapter are not rare exceptions to the normal types of ancient deposits. These are normal deposits, typical of Paleozoic and Mesozoic formations. Figure 4.7 is a geological cross section showing what we would

see if we could bulldoze a deep trench across 320 kilometers (200 miles) of the western United States. This figure is based on many observations I have made of the geology in this region and on a detailed geological atlas of the Rocky Mountain area. If we cut the trench near the end of the Mesozoic deposit, the rock layers would resemble part A of the diagram. Many formations stretch across all or most of this area, but some go partway across and are replaced by another formation. The continuity and persistence of these rock units are striking and incompatible with the proposed ordinary local deposition over long geological ages. Figure 4.8 shows photographs of several of the formations that make up the Paleozoic and Mesozoic deposits diagrammed in figure 4.7.

If we were to leave the landscape alone through the Paleozoic and Mesozoic formations and make the trench soon after the beginning of the Cenozoic formation, it would look similar to *B* in figure 4.7. By this time, the uplift of the Rocky Mountains would have changed the shape of the Paleozoic and Mesozoic formations, forming mountain ranges with valleys between them. Sediments deposited after this mountain uplift could not make such widespread formations but could fill the valleys between the mountains. They are still significant deposits, but they lack the geographic extent of the deposits that formed earlier. Later in the Cenozoic formation, the sedimentation process was further reduced. By that time, erosion processes removed enormous volumes of sediment, forming a network of smaller valleys and hills. Modern-day rivers now wander through these valleys, leaving their belts of river sediments, as seen in the upper-middle section of *C* in figure 4.7.

Compare the river deposits in figures 4.7*C*, 4.3*B*, 4.4, and 4.5 with the extensive formations in figures 4.7*A* and 4.8. Does it appear that those Paleozoic and Mesozoic formations were formed by modern river systems? Not only is this extremely unlikely, but if we look carefully at the overall pattern, we notice

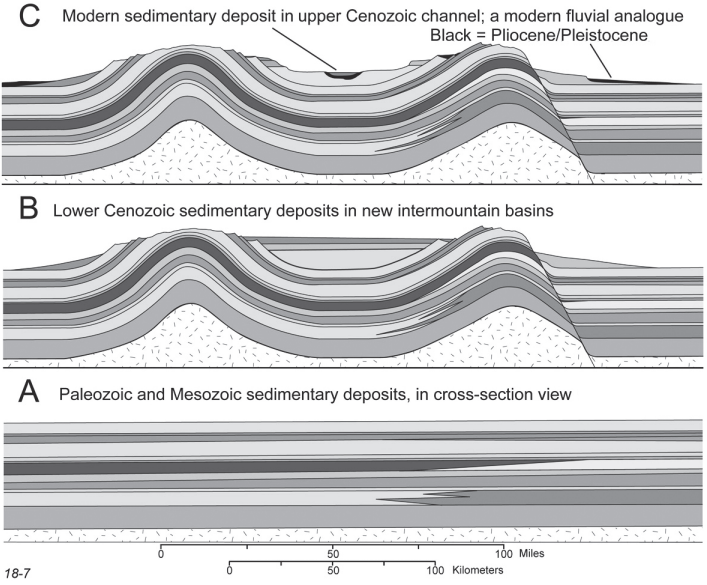

Figure 4.7. A diagrammatic representation of the geological history of the Rocky Mountain region in North America, in cross-section view. *A*, widespread, persistent sedimentary layers, as is typical of much of the Paleozoic and Mesozoic; *B*, uplift of the Rocky Mountain ranges and deposition of lower Mesozoic sediments; examples are the Green River and Bridger Formations (see fig. 4.3); *C*, erosion of part of the Mesozoic sediments and local deposit of Pliocene to Pleistocene sediments. A river channel in an intermountain basin represents the primary modern fluvial (flowing water) analogue. (Figure from Brand and Chadwick, *Faith, Reason, and Earth History*, 2016.)

that the sequence of sedimentary layers does not wander from modern river-type environments to large-scale environments and back again. The geological column, as can be seen so well in the dry and often unforested western United States, is a one-way slide that narrows through time from geographically extensive deposits at the bottom to the small, constrained river systems of the Upper Cenozoic. This trend continues, shrinking even more to smaller deposits in the Pleistocene and then in the modern

Figure 4.8. Visual examples of the widespread formations diagrammed in figure 4.7. *A*, a view of the Grand Staircase, with several Triassic formations (Vermilion Cliffs), Jurassic Navajo Sandstone (White Cliffs), several Cretaceous formations (Gray Cliffs, not evident in this view), and at the top, the Cenozoic Pink Cliffs (Claron Formation); *B*, a wider view of the Jurassic Navajo Sandstone in the White Cliffs. The Navajo Sandstone extends about 500 kilometers (310 miles) east to west and 800 kilometers (500 miles) north to south; *C*, several Paleozoic and Mesozoic formations in Canyonlands National Park. All of these formations extend much farther than the portion shown in these photographs.

world. It can be argued that this looks like the expected sequence of a continent-wide (or wider) catastrophe that finally, gradually settled down to the statelier geological world we live in today, with its generally slow and gradual earth processes.[5]

Today, the earth still experiences tsunamis, floods, volcanic eruptions, and earthquakes that catastrophically kill large numbers of people. But these catastrophes are on an entirely different scale from those of the geological past. The extent of the sedimentary deposits these modern catastrophes produce is a tiny fraction of what we see in the lower two-thirds of the Cambrian to recent rock record.

Does this evidence of widespread deposits extend farther than North America? A British geologist made a point during his career of traveling widely and becoming acquainted with the geological record around the globe.[6] He found that many geological deposits with the same characteristics and at the same level in the geological column occur widely around the earth. In his book, he warned creationists not to take his findings as evidence for creationist interpretations. Why did he think it necessary to say that? It is because his findings fit extremely well into a biblical worldview.[7] If there was not a major global geological event, why would geological deposits in, for example, Australia or South America match rocks of the same geological age in Europe or North America? Why would geological processes in Australia not be controlled by circumstances in Australia instead of by what was happening on the other side of the globe? The pattern of geological formations is much too consistent across continents and even the globe to be explained by the uniformitarian theory, which says that geological processes are not global but are controlled by local conditions.

Paleocurrents and water movement patterns

What else can we learn about those laterally extensive sedimentary formations? Can we tell where the sediments came from? Sedimentary structures in the rocks can tell us in which direction the wind or water (almost always water) that brought and deposited the sediment was moving. This also tells us from which direction the fossils came.

Conventional geologists would likely not think it worthwhile to collect these data on a large scale since their understanding of earth history would lead them not to expect such data to be useful. This is because in the modern world processes that deposit sediment do so on a fairly local scale. Today, water currents flow from all directions into basins where sediment is being deposited.

These basins can be on any scale, from a small pond to the Mississippi River drainage area, which covers much of the eastern and central United States. And currents in the Mississippi River drainage basin flow in all directions into local stream or river valleys before they reach the big river. The result is that a collection of such current directions over a large region would indicate random directions with no meaningful average direction. Since ancient sedimentary deposits are usually thought to have formed in the same way as modern analogues, the conventional theory would expect ancient current directions to be random, with no specific overall direction.

On the other hand, if, in the global flood, a mass of water was moving over a large region, it would be likely to yield current directions that were often consistent over much or all of that region. Thus, it would be logical for a believer in a global flood to gather these current directions from many geological formations over a large region. That data has the potential to show whether the current flow during the Flood was more local and complex than was thought or the water-flow pattern was regional, continental, or even global.

A group of geologists collected global paleocurrent data, seeking to understand these water-flow patterns during and after the Flood. They read many graduate theses and dissertations and amassed more than a million paleocurrent data points from several continents.[8] These data reveal an instructive pattern (fig. 4.9). Current directions in the Precambrian were essentially random, much as in the modern world. Then in the Paleozoic and Mesozoic, which many creationists think formed during the Flood, the current directions show much more uniformity in direction.

The direction of currents changes from one geological era to another and gives us insights into how the water was moving at different stages in the Flood process and how uniform the

flow was across continents. The pattern can be continental or even global. These large-scale patterns would be very difficult to explain if geological processes during that time were similar to what we see happening in our modern world.

Then in the Cenozoic, quite likely as the Flood was ending and after the Flood, the currents changed again toward a more random pattern like what we see occurring on the earth today.

Bedded sedimentary rocks

Now let us go back through the sedimentary formations and look more closely at what is inside them. Modern analogues are helpful for indicating what would be expected or not expected if sediments are deposited in modern environments. Those on both sides of the debate need modern analogues, and we on the creationist side must take them even more seriously than conventional scientists do.

As layers of sediment are deposited in the ocean or in a lake, they do not remain undisturbed. Innumerable small invertebrates live there and burrow through them. This process is called bioturbation. As they burrow, the invertebrates blend the sediment, progressively obliterating the visible boundaries between the layers, which are also called beds. Even a dry ground surface does not remain undisturbed as time passes. Worms and rodents burrow through the soil, and tree roots and smaller plants gradually churn up the ground (fig. 4.10).

With the assistance of several students, Arthur Chadwick and I began research to quantify evidence for bioturbation in a broad range of rock formations to determine how much bioturbation can be seen there and how well it matches what happens in modern analogues.

If the sediments accumulate slowly, as happens in the modern world, bioturbation destroys the boundaries between layers within hours to weeks.[9] If the conventional geological theory

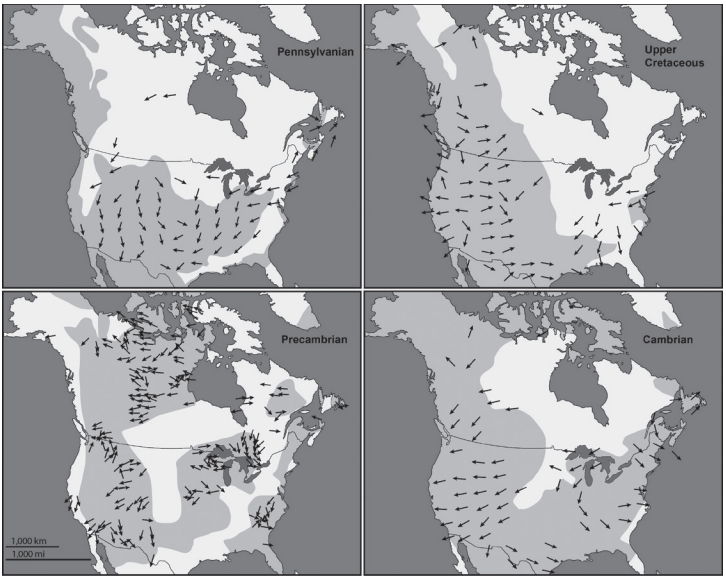

Figure 4.9. Paleocurrents from representative parts of the geological column. Light gray indicates areas with most of the existing sediment from that era. Each arrow is the average direction of the current in the area around the arrow. Current patterns in the Precambrian are the most similar to the currents in the modern world. The others show patterns that are uniform over larger regions, or even approach a continental scale.

is correct, bioturbation should have eliminated boundaries between beds, leaving a more or less homogenized sedimentary mass. But that is not what we find in the rocks (fig. 4.11). There are fossil burrows and even some plant roots, but they are not enough to eliminate the obvious contacts between beds. Most of the sedimentary rocks occur as distinct beds, with many fairly sharp boundaries between them. The rock record has too much distinct bedding for it to be explained by the conventional theory. In some cases, anoxic water (water with no oxygen) may have kept bioturbators out, but there is far too much distinct bedding for the result to be explained this way. I suggest that

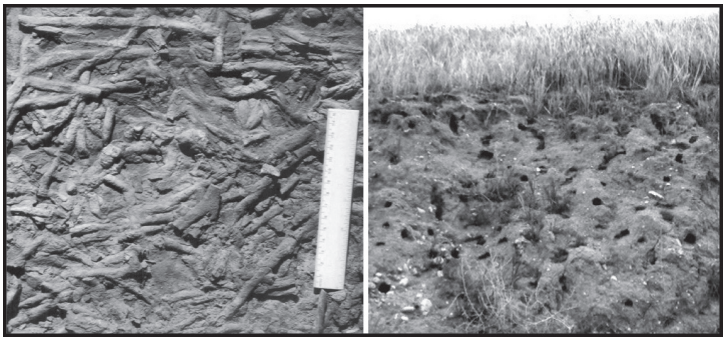

Figure 4.10. Examples of bioturbation. *Left,* fossil invertebrate burrows from an aquatic environment (scale is a six-inch ruler). *Right,* modern rodent burrows in the soil, exposed on a road bank by erosion (grass on bank top for scale).

most of the geological record formed too rapidly for bioturbation to do what it does in modern analogues.

In addition to bioturbation, another factor should have come into play if the record was accumulating over long ages of time. Many levels in the sediments are interpreted as recording a change in climate or in the environment in which the sediments were deposited. An example is the Coconino Sandstone, presumed to be a desert deposit, with distinct contacts at its top and bottom. Below it is a muddy water-deposited (fluvial) shale, the Hermit Formation, and above the Coconino is the marine Toroweap Formation. In each case, the contact between the two formations is a sharp boundary (fig. 4.12). Changes in environments such as these, as understood by conventional thinking, would be expected to take thousands of years at the very least. If that were so, the change in sediments would be a slow transition and not a distinct line in the rocks. These gradual transitions should be typical of the rock record, but instead, it is common to see sharp, distinct breaks that record where the centuries of transition should have been. Could there be conditions that

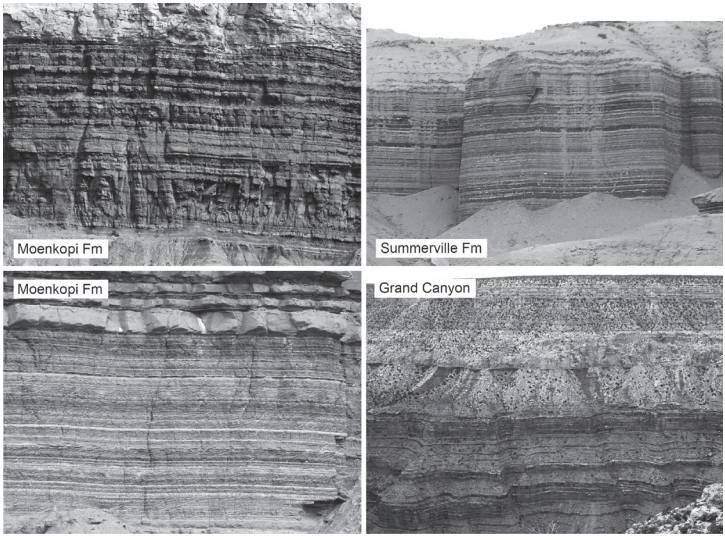

Figure 4.11. Examples of the distinct bedding, or layering, often evident in sedimentary rocks from the Moenkopi Formation, the Summerville Formation, the Pennsylvanian and Permian Limestones, and sandstone and shale in the Grand Canyon.

erase the record of such a transition, leaving a distinct break? Of course, that could presumably happen. But the distinct breaks are much too common.

Sharp contacts between layers or formations are pervasive, but if the conventional timescale is correct, they should be the exception. Not all contacts are so sharp, but far too many are. Some of these contacts, called unconformities, show evidence of some, or even a lot, of erosion. But far too many contacts are not like that. The sharp contacts should not have survived bioturbation, erosion, or other effects of the passing of long time periods. There is something fundamentally wrong with the standard model.

The Grand Staircase

In northern Arizona and southern Utah, a landscape feature pres-

Figure 4.12. Photographs of the contact (sharp boundary) of the Coconino Sandstone with the Hermit Shale below it (*bottom*) and the upper contact of the Coconino Sandstone with the Toroweap Formation (*top*). Arrows indicate the contacts.

ents another challenge to the conventional geological theory—a series of cliffs and plateaus called the Grand Staircase. (You cannot climb this staircase unless you are Paul Bunyan!) I began research to evaluate what processes would be needed to explain the origin of the Grand Staircase. An intriguing picture emerged from my many years of geological experience in Utah and from a careful study of the literature.

Figures 4.13 and 4.14 document the staircase. From central Arizona to northern Utah, the rocks provide a reasonable sampling of the geological column from Precambrian to Eocene. As the dotted lines in figure 4.13 show, the Mesozoic and Cenozoic

formations are believed to have originally extended all the way into at least northern Arizona and some into California. How much farther they might have extended is anyone's guess. The Paleozoic rock formations, seen in the walls of the Grand Canyon, are still present all the way to central Arizona, where they end in a cliff. Above that, successive groups of formations come partway south in Utah, and then each group ends in a cliff. The next highest group comes a shorter distance south and ends in another cliff. These cliffs, from top to bottom, are (with the rocks in that cliff) as follows:

- Higher, unnamed cliffs (Eocene Uinta and Green River Formations)
- Pink Cliffs (Eocene Claron Formation)
- Grey Cliffs (Cretaceous [softer rocks that do not make such a distinct cliff])
- White Cliffs (Jurassic, primarily Navajo Sandstone)
- Vermilion Cliffs (Upper Triassic)
- Chocolate or Shinarump Cliffs (Lower Triassic)
- Mogollon Rim in central Arizona (Paleozoic)

These cliffs are not local features but are hundreds of feet high and extend a considerable distance from east to west across Utah and even into western Colorado and New Mexico.

What modern processes can erode the landscape into an enormous staircase? Modern erosional processes carve river valleys, canyons, or floodplains. Meandering rivers, such as the Mississippi, move back and forth over the centuries, carving out a wide floodplain (fig. 4.5). However, all of these types of fluvial erosional processes leave a bank or cliff on each side of the eroded area. If we think of the Grand Staircase as the northern bank of a tremendous series of floodplains, then where is the southern bank? Where is the southern staircase? It does not exist. The

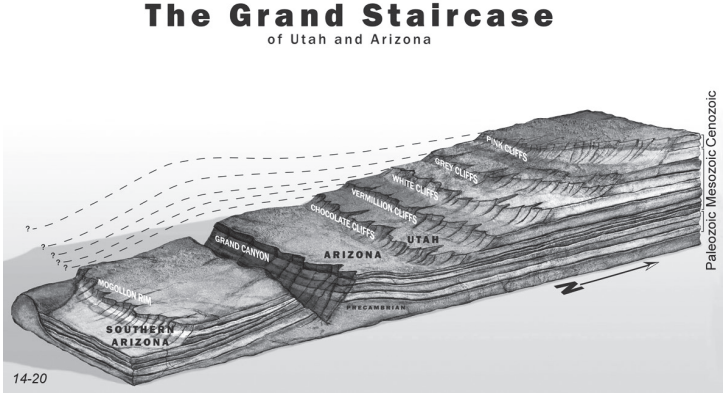

Figure 4.13. North-south cross section through the Grand Staircase in northern Arizona and southern Utah, showing the sedimentary rocks that form the geologic column in that area and the series of steps, or cliffs, forming the Grand Staircase. (Image from Brand and Chadwick, *Faith, Reason, and Earth History*, 2016.)

Grand Staircase is a unique landscape structure that seems to require a massive, catastrophic flow of water across Utah, western Colorado, and western New Mexico to account for its existence. Rivers or other modern analogues are not adequate to the task of explaining its existence—they are not even remotely close.[10]

Missing time

How can time be missing? Missing time, in the geological sense, refers to a level between two rock formations that is interpreted as indicating that the upper formation was not deposited until long after the lower formation was present. That intervening time is not represented by sediments and fossils. The period of time, according to the radiometric timescale, must have occurred, but nothing happened during that time to record its passing in the rocks. Did the lower formation in each case lie there undisturbed for thousands or millions of years before the upper formation was formed? Or was other sediment deposited

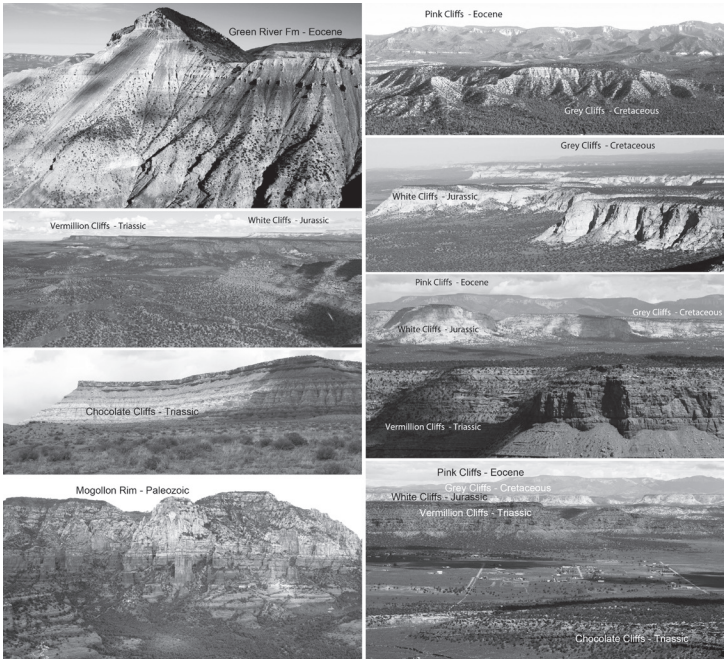

Figure 4.14. Photographs of the Grand Staircase cliffs, looking approximately to the north. The order of the cliffs is as shown in figure 4.13.

there that eroded away before the existing upper formation was brought in? Those are the typical explanations that are given. But are they adequate? My personal geological experience in the western United States, and the similar experience of other researchers, raises challenges to these conventional explanations.

On our earth, every place is subject either to erosion or deposition. As erosion cuts valleys and gullies, it is invariably irregular rather than leaving a flat, regular surface. The extensive flat contact surfaces in the rocks with "missing time" are called paraconformities, and they present a major puzzle for the conventional geological timescale.[11] Here is a list of some examples of paraconformities:

- *Muav Limestone*. In most of the Grand Canyon, there is a hundred-million-year gap between the Muav and the overlying Redwall Limestone.
- *Moenkopi Formation*. Over many thousands of square miles, the Moenkopi Formation is overlain by the Shinarump Conglomerate, with a gap variously estimated at ten to thirty million years. In northwestern Arizona, the gap is more remarkable, as the Shinarump lies on the De Chelly Sandstone, with a fifty- to eighty-million-year gap (fig. 4.15).
- *Coconino Sandstone*. Below the Coconino, above the Hermit Formation, is a six-million-year gap. In central Arizona, that gap is occupied by the Schnebly Hill Formation.

A number of these gaps appear in sediments in different parts of the globe. The existence of these paraconformities with little or no erosion, bioturbation, or other processes that are expected to mark long times with sediment sitting uncovered at the surface, are much more easily explained if the times involved were too short for erosion or bioturbation to occur. Some paraconformities do have erosional channels, even some big ones. This is not surprising in any worldview. What is surprising is that such extensive exposures of these contacts have little or no erosion.

This conclusion is emphasized when it is compared with how erosion occurs in the modern world. If we use a conservative estimate of modern rates of erosion, the continents would erode to sea level in ten to twenty million years. The presumed long time periods for these paraconformities should have produced evidence of more erosion; however, for many of them, the presumed time was long enough to erode the continents down to sea level! It did not happen that way, and this requires an explanation.[12] A global flood process that happened a short time ago is a good option as an explanation.

In summary

In modern environments, bioturbation destroys distinct contacts between layers of sediment, leaving little evidence of a layer change. This usually did not happen in ancient geological sediments. Slow transitions from one environment to another in the same area should also destroy any sharp contacts between the sediments from these two environments. In most cases, this did not happen in the ancient world. Sharp, distinct contacts between layers are the normal situation in at least the Paleozoic and Mesozoic.

Those same geological sediments are also generally very widespread, fairly uniform formations. They sometimes contain assumed time gaps between formations when no sediment was deposited, but there is a shortage of evidence of the passage of significant time. These common features all strongly imply a short time for the geological record and not hundreds of millions of years. They are much more consistent with a rapid, catastrophic geological history. All of this evidence, and more, is rattling the gates of conventional geological understanding (fig. 4.16)—in other words, challenging the standard geological model. The conclusions in this chapter did not arise from armchair speculations or from reading what others have said and accepting their conclusions. The ideas presented here resulted from my personal geological exploration, research, and publications with a number of colleagues over almost five decades.

Thanks to J Harlen Bretz, the definition of Lyell's uniformitarianism has changed to recognize that catastrophes do happen. But the conventional worldview will still not accept any types of catastrophic worldviews that would undermine the millions of years needed for the macroevolutionary origin of all life. The evidence summarized above is raising serious questions about geological time, and that is why it is rattling the gates of the conventional scientific worldview.

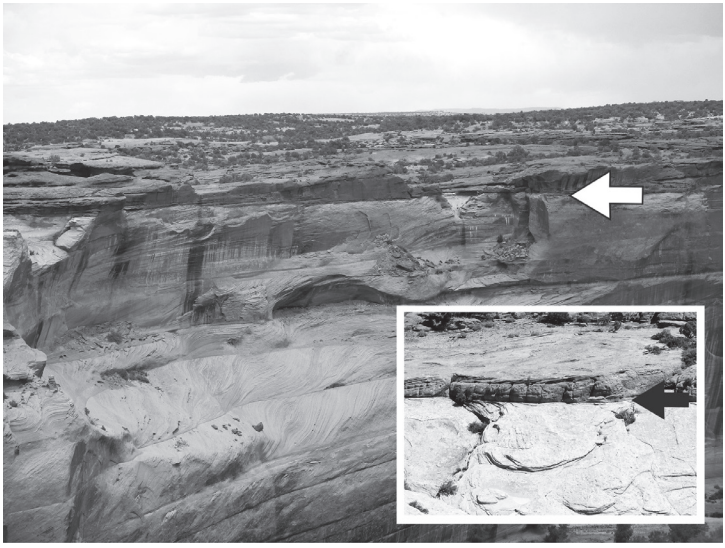

Figure 4.15. The contact of the Shinarump Conglomerate (darker rocks near the top) with the De Chelly Sandstone below it. Inset is a close-up of the contact.

In this section, I am not criticizing the conventional geological model without providing an alternative model for geological history. The evidence presented actually speaks in favor of a model consistent with a short time for this history. We do want to go further than that and develop a more detailed geological model of a short history since the Cambrian. A number of publications go further in that direction, but we have much yet to do on the model.[13] Here I will say that the geological record shows a clear sequence of transitioning progressively from geographically extensive, catastrophic deposits in the Paleozoic and Mesozoic to smaller, more localized deposits through the Cenozoic. This is consistent with what we would expect in a biblical time frame for earth history that includes a global flood. To properly understand a new explanation for some

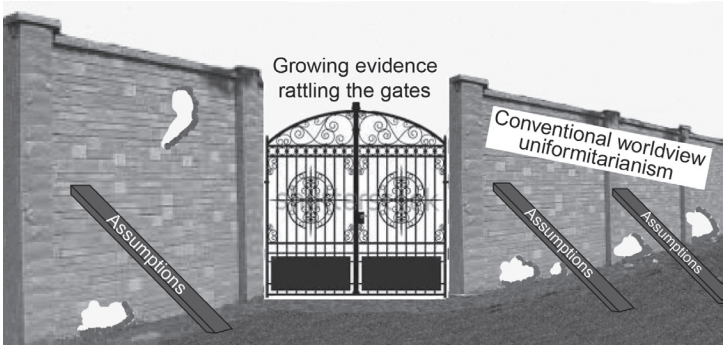

Figure 4.16. A representation of how accumulating evidence is rattling the gates of conventional geological understanding. There is growing evidence that the standard geological model must now be propped up by the assumptions of the conventional worldview.

geological features, we have to realize that a few modifications of the prevailing theory may not be enough. We often have to open our thinking to truly new types of explanations, and this approach works. We do not try to use science to prove the Bible, but if we study geology within a foundation of faith, our research is often more successful because of it.

Questions and answers

This chapter presented a lot of evidence. Has it answered all of your questions? If you are in the habit of puzzling over geological issues, it probably has not answered all of them. It has not answered all of mine either. How *could* a catastrophe spread a sediment layer over such an awesomely huge area and then bring a completely different type of sediment and spread it over an equally wide area? This is just an example of the big questions we ponder.

One concept that helps me to think realistically about the unanswered questions is that we have never seen geological events or processes on a scale that can answer such questions. We

observe small-scale processes, such as rivers, flash floods, and tsunamis, but we have never seen processes on a scale of many thousands or hundreds of thousands of square miles. It is not helpful to simply try to think about how these could happen because many geological processes are not intuitive, meaning they could not have been discovered by thinking about them. They were not discovered or even thought of until someone saw a unique process happen. That is why geologists conduct experiments or run to watch some unusual event that is occurring somewhere. It is useful to think of hypotheses and then try to test them, but just trying to answer big questions about unobserved geological events by imagining how they happened is not a useful exercise. A biologist has living specimens to study, but a geologist does not have a living, pulsating Paleozoic world to study.

On the other hand, I have sought in this chapter to answer some major questions that we do have evidence to address, and the evidence is amazingly positive.

In the next chapter, we look at the question of why geological time matters to Christians.

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Chapter 5

Geological Time by the Millions: Why Does It Matter to a Christian?

Geological time documented by radiometric dating indicates 541 million years since complex life appeared at the base of the Cambrian. Some Christians accept that number and wrap their biblical interpretations around it. Others take the biblical view of history more literally and hold to a time of a few thousand years since Creation week, which is usually seen as having taken place six to ten thousand years ago. Why do we care about this? Would it not be easier to fit in with the majority of scientific opinion and go with 541 million years? In many ways, it certainly would be much easier, but easy explanations are not our priority.

Our primary concern is to understand the biblical text and the message it contains. We want to comprehend the theme of the Bible and what it tells us about God and His saving message. We think God not only loves us but is also the greatest Geologist of all time. We want to know what actually happened and what these events mean for us, and He has been an eyewitness of earth history. Remember that the God who is the eyewitness is the same One who cared enough to die for us. We can trust Him and His Written Word, even if we do not understand everything.

Some theologians have told me they take the Bible seriously but not literally. What does that mean? Let us say that my wife

asks me if I have been faithful, and I tell her I take the Ten Commandments seriously but not literally. Will she be impressed? I might be impressed with a frying pan against my head. And I fail to be impressed by the idea of taking the Bible seriously but not literally, or by any similar approach. We need to use careful thought as we study the Bible, but if we cannot believe the facts presented there and think the Bible is an uninspired book of legends that fraudulently pretends to be inspired, then why waste valuable time on it? We have to stop pretending and either believe it is inspired, trustworthy, and valuable or that it is uninspired, untrustworthy, and worthless. I suggest that the middle ground—trying to take it seriously but not literally—makes no sense. It seems to represent a decision to reject the trustworthiness of the Bible while being unwilling to face the reality of what that decision means.

The Bible and origins

Christianity is not simply a philosophy. The Bible's stories of origins and salvation are based on a series of historical events:

- Seven-day Creation week (Genesis 1)
- Literal man and woman—Adam and Eve—created during Creation week (Genesis 1:27, 28)
- Fall into sin by Adam and Eve (Genesis 3)
- Global flood (Genesis 6:5–8:22)
- A long series of subsequent historical events

Scripture does not give a specific date for Creation, but if we take the Bible as a factual, inspired account, it indicates a date of approximately six to seven thousand years ago, depending on which translation from New Testament times we have more confidence in.[1]

A reader may ask, Do you really expect me to take this

seriously *and* literally? I do not ask you to do anything except to thoughtfully consider the options. The conventional scientific worldview will quickly reject the concepts presented here. But if we think God knows more about history than we do and that He has communicated it to us, then the Bible story is worth considering as a truthful account.

This is not just a question of how to understand the book of Genesis because Bible writers, and Jesus also, accepted the Genesis account of Creation, the appearance of Adam and Eve, the Fall into sin, and the Flood as literal history.[2] Their confidence did not come from their naivete or imagination but from the fact that they knew what is historically true. The Bible stands as a unified document on the issue of origins. We cannot pick and choose what parts to believe unless we think we understand ancient history better than the God who inspired the Bible.

From my reading and conversations, I am convinced that those who do not accept Genesis as literal history have instead accepted modern scientific theory as their standard of truth about origins and consider it more reliable than the inspired account. They interpret the Bible to fit conventional scientific theory. Whether or not to accept that philosophy is a crucial choice that each of us must make. Geology, as we currently understand it, has some evidence that seems supportive of the Bible and some that seems to be contrary to the biblical account. Science alone does not give us a clear choice. Consequently, our choice will not be based on science alone but on our philosophical belief of which is more credible—God's Word or our opinions. My interactions with friends who have made one or the other of these choices convinces me of the truth of this claim.

It is common to see people make this important decision and then, after they are settled in the decision, encounter evidence that has little effect on their thinking, one way or the other. While it does not have to be this way, decisions of this type have

a tendency to result in permanent commitments that determine how all further evidence will be interpreted. I have also noticed that when friends move toward anything like theistic evolution, God moves further into the distance in their experience, and He shifts from a dear, loving Friend into something more disconnected.

Does this decision entail choosing between science and the Bible? That is not a proper understanding of the issue. The choice is between contemporary scientific *interpretations* of evidence and what the Bible text, *properly understood*, actually tells us. "Properly understood" means how the Bible writers intended their writings to be understood. If our interpretation of the text depends on our subjective opinions, the Bible is not worth our time since we have no way of deciding on our own what God did or what it means. If we trust what God has revealed to us, we have a solid foundation. Otherwise, we sit on shifting theological sand, and we are dependent on the changing conclusions of human scientists or theologians about events that no recently living human being ever witnessed.

An obvious theme extends through Scripture—the story of Redemption. Humanity has fallen into Satan's trap, but our gracious God offers a way out. Here we can expand on our original list of historical events and facts revealed in the Bible.

- Sinless creation
- Humans fall into sin; our slavery to sin and the option to accept strength from Jesus to resist it
- Global flood to deal with the almost universally violent and evil human race existing at that time
- Redemption accomplished through Jesus' sacrifice of His own life and the offer of the gift of life
- Complete restoration and eternal life for those who accept it

This brings us to a question: Why do we care whether the duration of life on Earth has been thousands or many millions of years? That is actually an important choice to make because the two viewpoints have very definite implications for the reliability of the Bible's story of Redemption. Consider the following contrasts:

Millions or billions of years for life on Earth	**Thousands of years for life on Earth**
A claim of secular science; no Creation	Bible story describes the origin of life
The Genesis Creation story is false	The Genesis account is true
Geological record over millions of years	Geological record from a global flood and its aftermath
All life is from evolution	God is Creator; life-forms are not from macroevolution
No Garden of Eden	Literal Garden of Eden
Humans evolved; no Adam and Eve	Humans created; literal Adam and Eve
No Satan	Satan's presence and influence is real
No fall into sin; no need for Redemption	Fall into sin, followed by Redemption
The story of Redemption is false	The Bible story of Redemption is true and vital
	

If the geological record occupies millions of years, then the fossil record requires evolution as its explanation. And if the catastrophic global flood did not happen, millions of years of gradual

processes are required to explain how all of those rock layers were formed (fig. 1.2).

Coming back to the idea that the Bible can be taken seriously but not literally, could a compromise in the middle ground be the answer to this conflict? Can the important elements on the right side of the table above be added to the list on the left? Such a combination is accepted by many Christian scholars and is generally called theistic evolution or evolutionary creation.[3] Some authors who subscribe to this view may not use those terms for describing their perspective, but they do think in the way I am describing here. They argue that evolution through millions of years was the way God created. On the surface, this may seem to solve the problem, but a few serious difficulties arise with this model.

First of all, the Bible says it did not happen this way. Second, it really is not consistent with either the Bible or science. Theistic and atheistic evolution interpret the scientific evidence exactly the same way, but theistic evolution inserts the supernatural into the process. How can this be "scientific"? Theistic evolution is the conventional, secular worldview with a few religious ideas awkwardly inserted, and the result is not a coherent scenario.

In 1 Corinthians 1:27, we are told, "God has chosen the foolish things of the world to put to shame the wise," and 1 Corinthians 3:19 says, "For the wisdom of this world is foolishness with God." First Corinthians 2:14 states, "The natural man does not receive the things of the Spirit of God, for they are foolishness to him; nor can he know them, because they are spiritually discerned." What does this mean? The phrase "the foolish things of the world" refers to things that appear foolish to anyone who is convinced that conventional science understands everything better than the Bible writers did. In contrast, some believe that God is the only one who actually knows the history of life and our earth, and He has taken responsibility to inspire the Bible

writers with the true facts of that history. God often sees our human wisdom as foolishness because He knows better.

The idea that some things are "spiritually discerned" may sound mystical, but it is not. Spiritual discernment is an ability to know and understand one's Creator as a dear Friend who brings meaning and joy to one's life. It is not mystical but a real relationship experience, and it makes all the difference between having meaning and having no meaning in life.

One question that has been argued throughout the history of humanity is, Why is evil present in the world? Why is there pain, suffering, and death? Where does God fit into a world full of evil? This thorny question has caused many to doubt that there is a God at all.[4] The two lists in the table above speak strongly to this question. According to the conventional scientific worldview (the list on the left), evil, suffering, and death are an inevitable part of life—this is just the way it is. Evolution requires the death of innumerable generations of animals, plants, and humans. Evolution cannot happen without the death and suffering that goes along with it.

On the other hand, if we accept the Bible's story of a Creation that was followed by sin and Redemption, then the world was not created with evil, suffering, and death in it. Those phenomena began because of the presence and actions of a literal Satan, and human sin began with the human choice to believe him rather than God. This decision turned Satan loose on the earth, and he brought with him evil and death.

Theistic evolution claims that God used evolution as His method of creation. If that were true, then God must have invented evolution, along with its endless train of suffering and death. In that case, evolution and its necessary component of death would be God's plan and not the result of Satan's work. This gives us three clear choices: (1) evil, suffering, and death were initiated by God (theistic evolution); (2) they are a natural

part of a godless evolutionary process; or (3) they were initiated by Satan as part of a great cosmic war with God—the great controversy between Christ and Satan (the literal Bible story). For those of us who outright reject the second option, the choice is between a Creator God who is directly responsible for evil and death because it was part of His plan, and evil and death were inserted by Satan into God's originally good creation. Whether we have a coherent explanation for evil depends on whether or not we take the Bible's stories of Creation, the Fall, and Redemption seriously *and* literally (Genesis 1–3; 1 Corinthians 15).

In the previous chapter, we learned about significant geological evidence that is best explained by the biblical flood but is difficult to explain by the conventional worldview. What about the fossils? Now we turn to the fossil record since we need to understand how fossils fit into our understanding of history.

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1. Pete Williams, "Some Remarks Preliminary to a Biblical Chronology," *Journal of Creation* 12, no. 1 (April 1998): 98–106.

2. Leonard Brand and Richard M. Davidson, *Choose You This Day: Why It Matters What You Believe About Creation* (Nampa, ID: Pacific Press®, 2013), chap. 4.

3. Denis O. Lamoureux, *Evolutionary Creation: A Christian Approach to Evolution* (Eugene, OR: Wipf and Stock, 2008); Nancey Murphy, *Theology in the Age of Scientific Reasoning* (Ithaca, NY: Cornell University Press, 1990); Ian G. Barbour, *When Science Meets Religion* (San Francisco, CA: HarperSanFrancisco, 2000); J. P. Moreland and John Mark Reynolds, eds., *Three Views on Creation and Evolution* (Grand Rapids, MI: Zondervan, 1999); J. P. Moreland et al., eds., *Theistic Evolution: A Scientific, Philosophical, and Theological Critique* (Wheaton, IL: Crossway, 2017).

4. Cornelius G. Hunter, *Darwin's God: Evolution and the Problem of Evil* (Grand Rapids, MI: Brazos Press, 2001); Cornelius G. Hunter, *Science's Blind Spot: The Unseen Religion of Scientific Naturalism* (Grand Rapids, MI: Brazos Press, 2007).

Chapter 6

Fossils!

Fossils can be the remains of organisms that are mineralized (spaces in their tissues are filled with minerals), unmineralized bones, or just impressions in the sediment. They show us what kinds of organisms lived on Earth in the past and in what part of the geological column they were buried. Notice I did not say we can determine when they lived. To some extent, they do tell us when they lived, but fossils primarily tell us in what part of the geological record they died and were buried. The distribution of fossils in the rock layers is the data from which we seek to understand the history of fossils.

We find an incredibly fascinating fossil record from Cambrian to Pleistocene (fig. 1.2). Invertebrates, plants, and vertebrates are represented by an awesome variety of fossils. The types of animals and plants that were created during Creation week were not preserved as fossils until the Flood. The fossils at the base of the Cambrian, in what is called the Cambrian explosion, are a record of the first burials in the Flood, not a record from Creation week. We do not know how much biological change could have occurred between Creation and the Flood since we have no fossils that we can date from that earlier time period.[1] Changes in behavior must indeed have come about since, according to the Bible, predation was not present in the original creation, and there is obvious predation represented in the fossil record. Quite

a few fossils also seem to show that physical changes happened before the Flood, with some animals adapting to a life of predation; there were probably other physical changes as well.

We find a dazzling variety of organisms on Earth today, and many of them are the same basic types as the fossils in the geological record. But many kinds of fossils do not have living descendants on Earth today. They apparently did not survive the Flood, or they died out soon afterward because of changes in the climate and habitats.

Questions about the fossil record

In order to understand fossils and how to relate their record to the Bible, we will address four questions about the fossil record.

1. How long does it take to fossilize an organism? Some decades ago, it was commonly claimed that it takes millions of years to make a fossil. However, in recent decades, much experimental research has focused on the process of fossilization, and now it is known that fossils form quickly.[2] An animal or plant will fossilize rapidly, or it will not fossilize at all. Soft tissue decays rapidly or is eaten by scavengers, skeletons disarticulate, and the bones break down as time passes.

One of my favorite fossil specimens is a coprolite, fossil dung, that sits on my desk (fig. 6.1*A*). It is from the Green River Formation and is probably a crocodile coprolite. It is encased in finely laminated carbonate sediment, and many geologists interpret the laminations as having formed at about one lamination per year. This coprolite is surrounded by about 180 laminations. What are the chances that the dung lay on the bottom of a lake for more than one hundred years and then was perfectly preserved? There is no chance this could be true—it had to be buried quickly in order to fossilize. Those laminations must have formed rapidly, although no one knows how.

The crocodile poop is just one interesting example of many

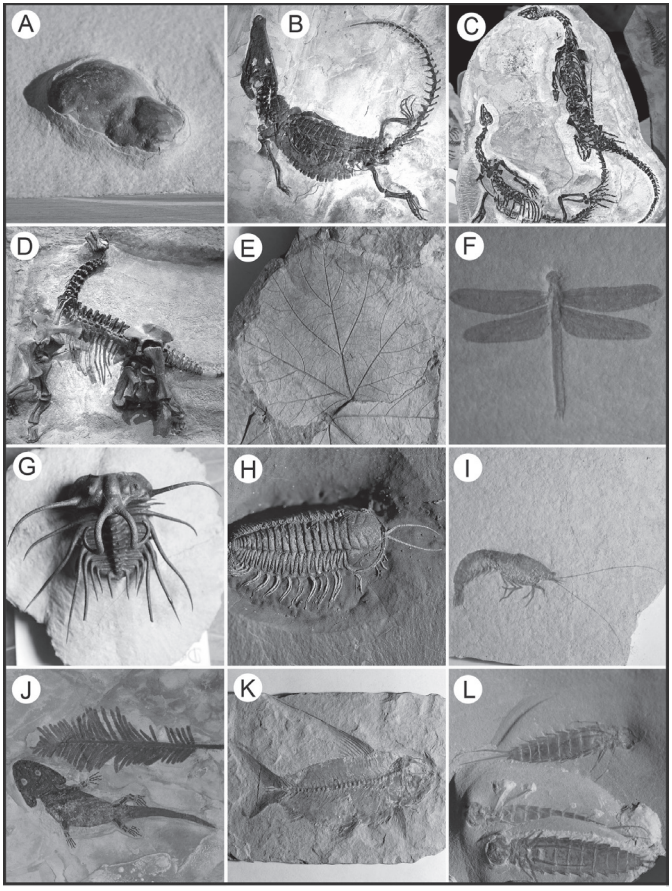


Figure 6.1. Examples of the well-preserved fossils that are common in the fossil record. *A*, a coprolite, probably crocodilian, from the Green River Formation; *B*, a Green River crocodile; *C*, a Permian amphibian; *D*, an Upper Cretaceous *Camarasaurus* dinosaur from the Morrison Formation; *E*, a Miocene tree leaf from Idaho; *F*, a Miocene dragonfly; *G*, a Devonian trilobite from Morocco; *H*, an Upper Ordovician trilobite from New York State with soft tissues preserved; *I*, a Jurassic shrimp from the Solnhofen Limestone in Germany; *J*, a Permian amphibian from Germany with a conifer twig; *K*, a fish from the Upper Cretaceous; *L*, Jurassic arthropod nymphs. Specimens in *A*, *E*, *F*, *H*, *I*, *L*, and the leaf in *J* show preservation of soft, nonbony tissue.

excellently preserved fossils that have been found (fig. 6.1*A*). Research on the fossilization process tells us they became fossils quickly after the animal's death, instead of fossilizing over long time periods. There are even many fossils of soft-bodied animals, which required an especially rapid burial.

2. What is the explanation for the sequence in the fossil record? The fossils are not arranged at random in the fossil record (fig. 1.2). The lowest Cambrian rocks mainly contain invertebrate fossils. A little later in the rocks, fish appear, and then farther up, there are amphibians and then reptiles. Higher up are the first mammals and birds. Humans and our best-known animal friends are only in the Upper Cenozoic rocks. Why is the fossil sequence orderly like this?

When a friend of mine was studying in his undergraduate program in geology, one of his professors, a famous paleontologist, asked him, "What do creationists mean when they talk about order in the fossil record?" He reminded the professor that fish appear first in the fossil record, then amphibians, then reptiles, and finally birds and mammals. This looks like an evolutionary sequence. The famous professor said, "Oh, I know about those, but what else is there?" I wish I could ask him what he meant by implying that there is not another order in the record, beyond the vertebrates.

Whatever the professor meant, we seek to better understand the features of the fossil record. Beginning at the top of the record, in the Upper Cenozoic, and looking down through the record to the lower parts, the animals most familiar to us do not continue very far down in the rocks. Human fossils are only present in the Pleistocene. Most mammal families only go down through the Eocene or, in a few cases, to the uppermost Paleocene. The first bats, deer and their relatives, cats, and many others are not found below this level. The major groups of invertebrates continue all the way down to the Lower Cambrian,[3]

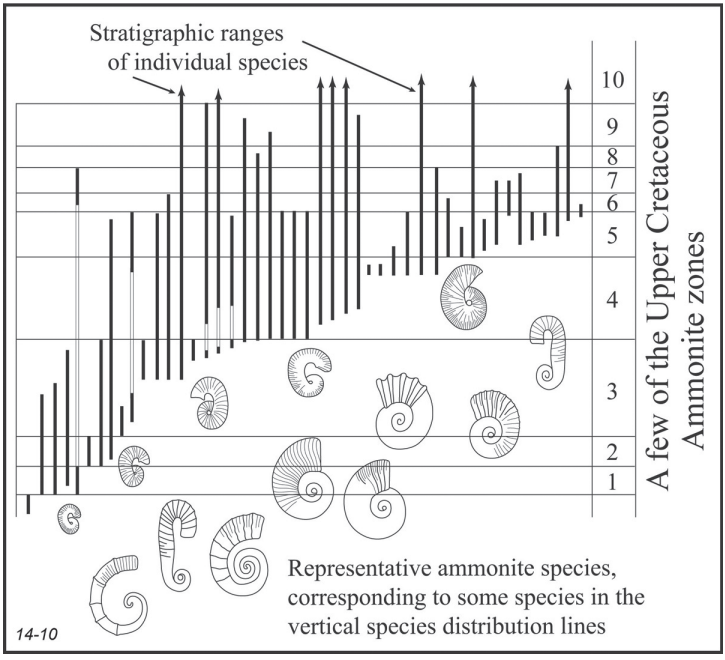


Figure 6.2. An example of fossil zonation: several arbitrarily numbered ammonite zones in the upper Cretaceous. The vertical lines are species ranges, showing the beginning and end of the range of that species in the fossil record. The lines with arrows at the upper end are species whose stratigraphic ranges extend into higher levels. Each zone is characterized by the presence of one or more specific ammonite species and the absence of other species. (From Cobban 1951; Wiedmann 1969; and Kauffman et al. 1993;[4] reproduced from Brand and Chadwick, *Faith, Reason, and Earth History*, 2016.)

but species, genera, and even families change as we move down through the record.

There are other details that need to be explained. Within quite a few invertebrate groups, there are zones in the rocks containing different species. Figure 6.2 shows one example of this, which is the ammonite zones in the Cretaceous. Why are there different species from zone to zone?

Two basic theories attempt to explain all of this. The evolution theory claims that when an animal does not appear below some specific level in the fossil record, it is because that group did not evolve until that time. The fossil sequence is interpreted as a record of the evolution of life-forms through millions of years. This theory says that zonation like the ammonite zones is a record of the evolution of species after species and their successive extinction events.

The second theory is that there are different explanations, other than macroevolution, for these fossil events. We can have confidence that our biblical worldview is true, and we can use it to make predictions and seek better explanations. This alternate explanation is that the fossil sequence resulted from processes during the global flood. We are only beginning to develop this line of thinking, but here are some initial concepts.

In the part of the fossil record, perhaps much of the Cenozoic, that formed after the Flood, there would be time for plenty of microevolution and speciation—postdiluvian biological change within created groups. But in the rock layers below that level, which were formed during the Flood, there was no time for even microevolution. There has to be a different explanation for the sequence of fossils and zonation in that part of the record.

As we seek to explain this alternate model, keep one important concept in mind: *we have never seen a global flood*. This means that we do not have any modern analogues to help us understand the fossil record. Some of our questions cannot be answered now since it is likely that influences that we could not intuitively know would be at work in such an unusual event. But we can give some helpful answers and suggestions, and more study brings improved answers.

If we look at how animals are distributed through the habitats and life zones on the earth now, we can see how ecology could influence the time when antediluvian animals were killed

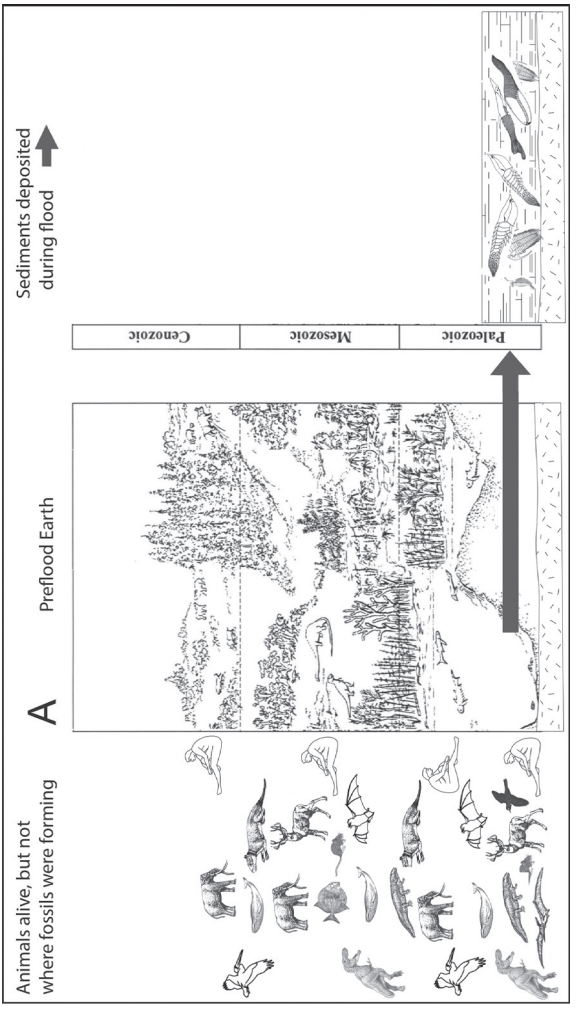
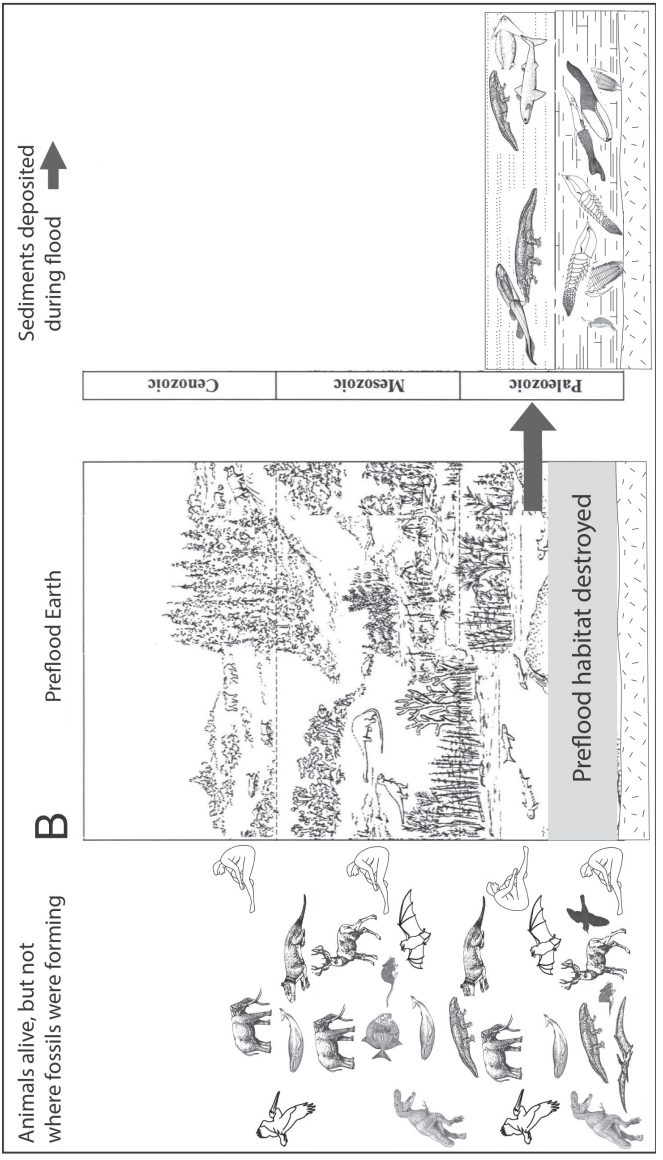
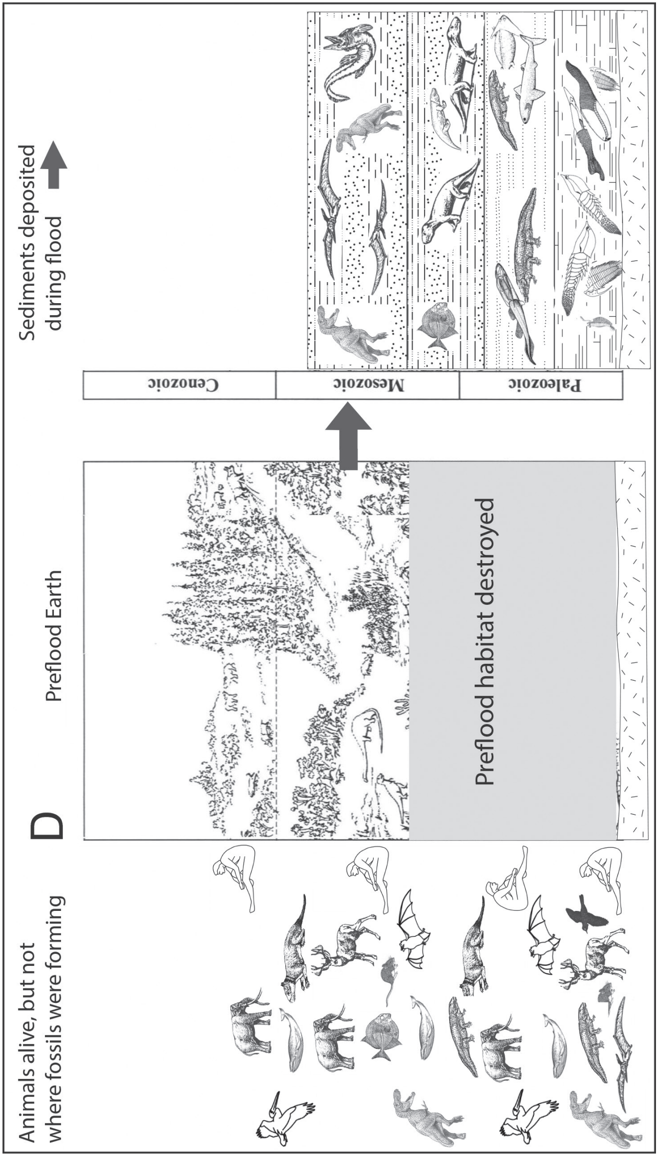


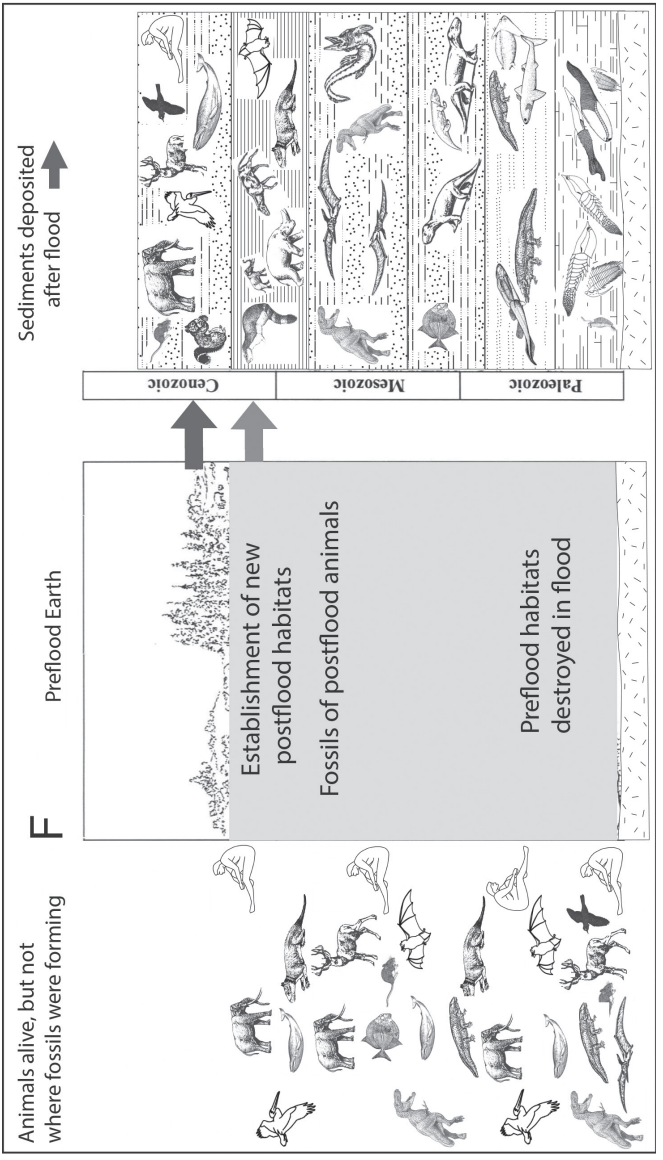
Figure 6.3, *A–F*. Diagrams showing a possible interpretation of events during the global flood. The arrows show the transfer of living animals from the antediluvian earth (*middle picture*) to the fossil record (*right column*) during the Flood (diagrams *A–D*), or they show the transfer of animals living after the Flood (*diagrams E and F*) to the fossil record.


Animals alive, but not where fossils were forming
B
Preflood Earth
Preflood habitat destroyed
Paleozoic
Mesozoic
Cenozoic
Sediments deposited during flood

Animals alive, but not
where fossils were forming
C
Preflood Earth
Prefloood habitat destroyed
Cenozoic
Mesozoic
Paleozoic
Sediments deposited
during flood


Animals alive, but not where fossils were forming
D
Preflood Earth
Preflood habitat destroyed
Sediments deposited during flood
Cenozoic
Mesozoic
Paleozoic

Animals alive, but not where fossils were forming
E
Preflood Earth
Establishment of new postflood habitats?
Fossils of postflood animals?
Cenozoic
Mesozoic
Paleozoic
Sediments deposited after flood


Animals alive, but not where fossils were forming
F
Preflood Earth
Establishment of new postflood habitats
Fossils of postflood animals
Preflood habitats destroyed in flood
Cenozoic
Mesozoic
Paleozoic
Sediments deposited after flood

and buried during the Flood. If the rising floodwater first overwhelmed marine environments, would we expect to find monkeys or antelope in the first sediment layers? Not likely. Applying this concept to the sequence of events during the Flood suggests the following hypothesis, which is the beginning of a model.[5]

In figure 6.3*A*, the middle column is a guess as to what an antediluvian landscape might have looked like. The column on the right is the framework for the fossil record, which we will fill in as we describe a partial hypothesis of Flood dynamics. I will get to the column on the left but not yet. In figure 6.3*A*, the right column shows the fish living in the deepest water being buried by the first Flood sediments. Figure 6.3*B* shows the next step, when the lowest habitat has already been destroyed, and its animals have been buried in the new sediments. At this step, the animals living in the next highest habitat were being buried in the next set of new sediments, and their original habitat was being destroyed.

The Lower Paleozoic rocks do not contain any organisms that lived on land. This fits the Flood model I am describing, but this would seem strange if the rock record had been formed by modern processes.

Now we can consider the column on the left. It is necessary to include this column because of what happened during Creation week. In that week, all the basic groups of animals were created: invertebrates, fish, amphibians, reptiles, birds, and mammals, including humans. All of these animals were living in the antediluvian world, so they must have been alive when the Flood began. However, many of them are not found in the lower parts of the fossil record, so why were they not preserved in those layers? We have to guess because we do not know why. We were not there, and Noah was not taking notes! (Actually, he was probably too busy keeping the lions out of the sheep pen.)

The story described here of the sequential preservation of

different animal types is a guess—a hypothesis of how it might have happened. We will keep studying to figure out if this hypothesis is going in the right direction or if we need a better hypothesis. One thing we can say is that the animals represented in the left column were living somewhere on the earth, even during the early stages of the Flood, but apparently were not living in places where fossils were being buried and preserved.

In figure 6.3*C*, the animals from the lowest two levels had been buried, and the animals from the third habitat were being buried as their original habitat was being destroyed. This continued in one habitat after another (fig. 6.3*D*), and the occupants were buried in the fossil record. As the process proceeded, different animals from the left column were killed and entered the fossil record, according to their habitat and other unknown factors. At some point in this process, perhaps in the Lower Cenozoic (figs. 6.3*E* and *F*), the main Flood event transitioned to a less catastrophic postdiluvian period, with the animals leaving the ark and repopulating a new world that was still a challenging place to live in, as it had not yet settled down to a stable condition.

As the animals and plants repopulated the earth, they encountered a bewildering array of new and changing environments. Since God made the genetic system with the capacity to adapt to environmental changes, the animals and plants adapted by microevolution. They divided fairly rapidly into many new species. These changes, I believe, only occurred within the genetic potential created in each group in the beginning.

The human fossil record is puzzling. Why are human fossils only in the Pleistocene? Why do we not have any fossils of antediluvian humans? As was suggested earlier, humans must have been living in areas where fossils were not preserved during the Flood. That general idea is not very satisfying, and we do not know the details. Possibly humans escaped to higher elevations and then floated away without being buried. Or they were living

	Ecology	Behavior	Mobility	Mean
Birds	4	4	4	4.0
Mammals	4	5	3	4.0
Reptiles	3	3	2	2.7
Amphibians	2	2	1	1.7
Fish	1	1		0.7

Figure 6.4. Three factors that would likely influence the time when each of three vertebrate groups would first enter the fossil record in the Flood.

on one continent that was totally destroyed. Those are wild guesses since we do not have any historical records of this episode.

Does this hypothesis answer all the questions? It does not, but it is a beginning. The actual Flood process must have been a lot more complex than this. We can suggest some additional processes that probably helped to determine the details of the time a given group of animals entered the fossil record (fig. 6.4).

Figure 6.4 is based on three factors, including the animals' ecology. Those living in lower-level habitats were likely to be in the group that was buried first, as illustrated in figure 6.3. But notice one complication. Fish enter the fossil record before other vertebrates, but fish appear all through the record. The point here is that the *first* fish to be killed became fossils before the *first* amphibians, and so on.

Another factor is an animal's behavior and intelligence. Some animals respond to disturbances in their environment by diving down to hide on the bottom of a lake or ocean. That would not serve them well in a catastrophic event. A more intelligent and

behaviorally flexible animal that seeks an alternative has a better chance of surviving longer.

The next factor is mobility. If I am out fishing in my boat and am faced with an oncoming tsunami, I hope I have a very fast boat! Fast-running animals, and especially birds, had a better chance of living longer in the Flood.

Successive stages in the Flood process would dismantle different parts of the Earth's inhabited surface, which is the outer part of the Earth's crust. This would bring different combinations of minerals into the water and perhaps change the salinity and pH of the water. Perhaps, just perhaps, those various species of ammonites in the ammonite zones had different levels of physiological tolerance to these water changes. If so, these changes may have determined the time when different species were killed and buried.

Now we have answered all the questions, right? No, wrong. We have never observed a global flood, and we have many unanswered questions about it. But as we keep studying, we can make progress in improving our hypotheses within the limits of the evidence available to us.

3. Are fossil evolutionary intermediates common? Some evolutionary scientists say there are *lots* of these intermediates. Some creationists say there are *no* intermediates. But many in both groups have a more candid understanding of the evidence. Charles Darwin recognized that the fossil record was a problem for his theory because the expected intermediate forms were virtually absent from the record. Almost all phyla of animals are found fully formed in the Lower Cambrian rocks, and this was a big puzzle for Darwin. He thought the missing intermediates would be found as more collecting was done.

A vastly larger number of fossils has now been found, but the problem for Darwinism has not been solved. With a few exceptions that will be mentioned later, the series of intermediates that

Darwin needed have not been found. The gaps between groups of animals are more distinct now because so many more fossils have been collected, and they fit into the existing groups. Clams have always been clams, coral has always been coral, and the same for others. Phyla, classes, and orders remain consistently distinct without intermediates. This even applies to species; they appear in the record, remain essentially unchanged as they turn up in higher layers, and then disappear and are replaced by other fossil species.

This lack of evolutionary change is called stasis. The general presence of stasis in fossil species led Stephen Gould to suggest his theory of punctuated equilibrium.[6] We will not go into that here, but it is worth reading about.

The lack of evolutionary intermediates is a difficult problem for the evolution theory. Where is the evidence for evolution? The fossils do not generally provide that evidence. But we will now come to the exceptions, which are in several groups of vertebrate fossils. Here is a list of the most significant of these proposed series of intermediates:[7]

- Triassic reptile to mammal transition
- Evolution of whales from terrestrial mammals
- Evolution of birds from dinosaurs
- Evolution from fish to amphibians, the first tetrapods (four-footed vertebrates)

Some of these pose important unanswered questions for creationists. There are others, but they are not as impressive or important.

The Triassic series of proposed intermediates between reptiles and mammals are the most challenging group for a creationist interpretation. Different groups in that level, if they are being interpreted correctly, appear to change through the Triassic from

obvious reptile to more mammal-like. The fossils that seem to have changing jaw and ear bones are the most puzzling to me. They are a strange and complex phenomenon. But they are still not the type of evidence needed to prove whether mammals evolved from reptiles.

I will suggest one very preliminary possibility. It looks as though a set of genes, under the control of DNA management systems, can be used to make the extra jawbones in reptiles or middle-ear bones in mammals, and the Creator designed this basic vertebrate template in that way. Perhaps in the Triassic, a variety of species appeared with damaging mutations to this system, resulting in those puzzling fossils. Even for me, this explanation does not explain all the complexities of these fossils. It will not be acceptable to most scientists. My purpose is to begin to understand what the options could be for a creationist like me.

The claimed sequence from terrestrial mammals to whales is a mixture of positive evidence and doubts. It is not very clear whether some of the presumed ancestors are fully terrestrial or semiaquatic. Also, a fully aquatic whale fossil has been found that seems to date to a time period older than that of those who are claimed to be whale ancestors. In any case, taking this handful of mammalian species and portraying them as an evolutionary sequence to whales is strictly an interpretation, which is based on the assumption that whales arose by evolution.[8] For the same reasons, the claim that whales were not the result of evolution is also an interpretation. We cannot make absolute claims based on science, but we can make a prediction of what the final conclusion will be: the initial whales were created. I suggest that at least part of the whale sequence was the result of evolution after the Flood—evolution within the genetic potential established with the creation of whales.

Did amphibians evolve from fish? One specific fossil, which is called *Tiktaalik*, is claimed to be the crucial link that demonstrates

this transition. It has some fishlike and some amphibian-like characteristics. The big problem with this hypothesis is that a definite tetrapod trackway was found that is supposedly twelve million years older than *Tiktaalik*,[9] and this evidence indicates that tetrapods already existed. If this evidence is correct, then *Tiktaalik* cannot be the ancestor of the tetrapods.

The relation of birds to their presumed dinosaur ancestors is more interesting. Some dinosaurs evidently had feathers,[10] which seems to fit well with the hypothesis that birds evolved from dinosaurs. But we have to examine the whole picture to evaluate the likelihood that dinosaurs were the ancestors of birds. One hitch in this scenario is that the fossil dinosaurs that would be possible bird ancestors are located perhaps twenty million years after the fossil bird *Archaeopteryx*. Also, there could be other reasons for some dinosaurs to have feathers. One persistent hypothesis says that at least some dinosaurs were warm blooded. If they were, they would need some kind of insulation, so why not feathers? Reptiles are anatomically more analogous to birds than mammals are, so feathers are a more likely insulation for dinosaurs than fur or hair.

Does having feathers demonstrate that dinosaurs were the ancestors of birds? Having feathers is not enough evidence; the important factor is finding evidence for the development of flight in dinosaurs. But no convincing evidence exists that dinosaurs were evolving the anatomy of flight. A variety of feathered dinosaurs and Mesozoic birds can be lined up in a way that looks like an evolutionary sequence, but there is plenty of room for other hypotheses. The evolution of birds from dinosaurs is required by the naturalistic worldview, but the kind of evidence necessary to support the sophisticated anatomical modifications that would be involved in the evolution of flight is not available.

The first piece of additional evidence likely to be brought forward in this case is from the genetic relationship between birds

and reptiles. Similarities or homologies in genetics and anatomy are a primary type of evidence used in developing evolutionary trees (phylogenetic trees) or cladograms. Does this evidence in itself demonstrate descent from a common ancestor, or is this interpretation dependent on any assumptions? It is clearly dependent on one assumption, and that is a critical one—the assumption that all living forms descended from a common ancestor and were not created. If we work within a naturalistic worldview, that assumption is obvious and absolutely necessary. But if we are willing to openly ask whether or not the evolutionary tree of life is real, the assumption of evolution makes the logic partly a tautology, or reasoning in a circle: animal groups evolved from a common ancestor because we assume they evolved from a common ancestor.

The reason I used the phrase "partly a tautology" is that the evidence does support part of the original hypothesis. *If* birds arose by evolution, the evidence supports dinosaurs as the most likely group that they evolved from. But that is where the evidence stops; the hypothesis that flight is the result of evolution is not supported by adequate evidence.

If life was the result of macroevolution through the ages, we would expect the largest number of intermediates to represent the transitions between major groups like phyla or divisions, but that is precisely where they are totally absent.

We do not have space here for an adequate discussion of hominid fossils, but I recommend a book that presents a well-thought-out analysis of these fossils, and the record of human evolution is less than impressive.[11]

We must consider one more very significant aspect of the fossil record. Think about the initial process. If the first living cells were to begin the journey toward our complex living world by random mutation and natural selection, this process could not have any insight regarding where it is going. It could not

know that there is a need to branch out, evolving a variety of body forms. The most likely scenario would be the evolution of one initial form of living organism. Natural selection would then need to advance this first form into a successful organism, and then microevolution would have a platform on which to radiate into a complex of varieties within this initial body plan. As this process continued through time, there would need to be increasing variability within this first group. If that occurred, then perhaps over a long time span a larger variety of body plans (phyla) could evolve from within that initial variable group. If it worked this way, the fossil record would show one, or very few, phyla in the early stages and new phyla gradually appearing, one at a time, as millions of years rolled on.[12]

The problem here is that the fossil record is the opposite of that pattern. Almost all the major phyla appear in the Lower Cambrian, in the Cambrian explosion.[13] I expect it is highly unlikely that random processes like random mutations and selection would, even at their best, have any chance to produce all of those phyla at the beginning of the Cambrian. And many classes also appeared early. Higher in the record, we find more variety within each of these phyla and classes. To evolve all the phyla at the beginning by random mutations and natural selection is extremely unlikely. And if that did happen, why would there be only smaller variations forming later and no new phyla?

We can summarize this brief analysis of the fossil record with a couple of conclusions. The major aspects of the sequence of fossils present a challenge to a Creation-and-Flood model; we have only the beginning of a model to explain the sequence of Cambrian fish to Cenozoic birds and mammals. The other side of the picture consists of some very serious challenges to the naturalistic model. They include the lack of most of the series of evolutionary intermediates that evolution should have produced. The other challenge comes from the pattern that turns

the evolution theory on its head—the presence of almost all phyla in the Lower Cambrian. Everyone, including Darwinists, has significant unanswered questions about the ancient fossils.

4. What conditions produce a rich fossil record? Because there are so many fossils in the rocks, any model of earth history must be able to explain their presence. Recall the conventional scientific worldview and how it explains ancient geological history. All ancient events and processes must be explained by what is observable or feasible in the modern world. Is it common to observe fossils being preserved on a large scale in the modern world? Complex questions seldom have all-or-nothing answers. And yet the answer to this question seems clear. When North America was overrun by European invaders, millions of bison were spread over the plains. They have almost all disappeared, leaving precious few fossils (note that I am speaking of the modern world, not the Pleistocene or before).

A more recent example comes from Africa. Vast herds of wildebeests still live on the African savanna, and these animals make long annual migrations to find the best feeding grounds. These are dangerous trips, as they must cross swollen rivers and find their way safely up the far riverbanks. Often, they are not successful, and carcasses are spread across the landscape. In one bad year, about ten thousand wildebeests died due to miscalculations of conditions in the rivers and on the riverbanks. In this case, scientists documented the results over the following years. Of those ten thousand carcasses, none were preserved as fossils. The bones deteriorated in a few years to an unrecognizable state.

In the modern world, fossil preservation occurs very rarely, in unique, specialized situations like natural traps—tar pools, caves, or rock crevices. Previous to the Pleistocene, fossils are found in water-deposited sediment. When comparing modern conditions with the Cambrian to Pleistocene fossil record, it is evident that it takes catastrophic conditions to give us abundant

fossils. My explanation is that we have such a rich fossil record because of the catastrophic conditions during and right after the global flood. The fossils speak loudly of catastrophic death and burial. Scientists within the conventional worldview do not realize that their great success in the study of the awesome fossil record is the result of the biblical global flood. If it were not for that global flood, I believe we would have only a very meager fossil record.

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2. Peter A. Allison and Derek E. Briggs, eds., *Taphonomy: Releasing the Data Locked in the Fossil Record* (New York: Plenum Press, 1991); Peter A. Allison and David J. Bottjer, eds., *Taphonomy*, 2nd ed. (New York: Springer, 2011); Peter A. Allison et al., "Deep-Water Taphonomy of Vertebrate Carcasses: A Whale Skeleton in the Bathyal Santa Catalina Basin," *Paleobiology* 17, no. 1 (Winter 1991): 78–89.

3. Leonard Brand and Arthur Chadwick, *Faith, Reason, and Earth History*, 3rd ed. (Berrien Springs, MI: Andrews University Press, 2016), 243–246.

4. The illustration is from W. A. Cobban, *Scaphitoid Cephalopods of the Colorado Group*, Geological Survey Professional Paper 239 (Washington, DC: Government Printing Office, 1951), 1–39; Jost Wiedmann, "The Heteromorphs and Ammonoid Extinction," *Biological Reviews* 44, no. 4 (1969): 563–602; E. G. Kauffman et al., "Molluscan Biostratigraphy of the Cretaceous Western Interior Basin, North America," in *Evolution of the Western Interior Basin*, ed. W. G. E. Caldwell and E. G. Kauffman, Geological Association of Canada, Special Paper 39 (St. John's, Newfoundland: Geological Association of Canada, 1993), 397–434.

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7. Brand and Chadwick, *Faith, Reason, and Earth History*, 247–251, 283–288.

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9. Rex Dalton, "Discovery Pushes Back Date of First Four-Legged Animal," *Nature*, January 6, 2010, https://doi.org/10.1038/news.2010.1.

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11. Christopher Rupe and John Sanford, *Contested Bones*, updated ed. (Livonia, NY: FMS Publications, 2019).

12. Brand and Chadwick, *Faith, Reason, and Earth History*, 171, 172.

13. Stephen C. Meyer, *Darwin's Doubt: The Explosive Origin of Animal Life and the Case for Intelligent Design* (New York: HarperOne, 2013), 26–76; David Klinghoffer, ed., *Debating "Darwin's Doubt": A Scientific Controversy That Can No Longer Be Denied* (Seattle, WA: Discovery Institute Press, 2015).

Chapter 7

Can Evolution Survive the Latest Biological Evidence?

Asking whether evolution can survive the latest biological evidence may sound a bit arrogant or unrealistic. It implies that the answer might be that it cannot survive, and that is what I intend to imply. In this chapter, as in chapter 4, my underlying principle is a conviction that the Bible gives a correct history of life on Earth. If so, then the interpretations based on that history should provide increasingly accurate scientific concepts of life origins. Is the evidence moving in that direction or not? I will look first at the origin of the first life-forms and then at the theory of evolution.

It is easy to evaluate theories of the origin of life. Any naturalistic worldview requires a jump from nonliving chemicals to life (abiogenesis or chemical evolution) without the intervention of an intelligent Designer. The philosophy requires it, but all the biochemical evidence says this idea is wildly unrealistic. If that sounds like too bold or too biased an assertion, I suggest you carefully read *Signature in the Cell* by Stephen Meyer.[1] If you can offer a solution to even half of the issues he discusses, then maybe abiogenesis should be given more consideration. Or you could watch world-class synthetic biochemist James Tour's technical lecture titled "The Origin of Life: An Inside Story," which I noted earlier.[2]

The intelligent design (ID) movement has described impressive evidence that the origin of life requires intelligence. ID stops there and does not concern itself with identifying the Designer or engaging with the geological record. In this book, I am going beyond ID and addressing geological time and the nature of the Designer.

The origin of the first life-form cannot involve the process of evolution because evolution requires living, reproducing organisms with bodies and genetic systems. Only with that requirement met can natural selection determine which individuals will survive and reproduce and pass on their genes. The origin of life by abiogenesis could only occur by chance, and by any calculation, the chances of that occurring are zero. This is by far the weakest link in any naturalistic theory of origins, but perhaps other links are not far behind in their weakness.

It is clear to me that microevolution, the origin of new species, and even the origin of new genera, are not among those weak links. Abundant evidence exists for this category of evolution. I do not know of any biologically educated creationist who does not accept the reality of these parts of the evolution theory. Where evolution runs into serious challenges is with macroevolution, which tries to explain the origin of new, complex structures and physiological systems needed to make new orders, classes, or phyla of organisms. This is different from microevolution because macroevolution requires the evolution (invention) of new features, such as skeletons, kidneys, human brains, consciousness, and the love of a dog for its master. The rest of this chapter will address growing challenges to these large-scale aspects of evolution and to the naturalistic philosophy that undergirds macroevolution.

Evolution deals with what happens after life-forms are present that could change or evolve, and this is where more careful evaluation is required. An article published in 2014 with the

title "Does Evolutionary Theory Need a Rethink?" elicited two responses from teams of evolutionary biologists; the responses were yes, urgently, and no, all is well.[3] This specific exchange of views in a publication is a sample of a broader contemporary controversy within science. It seems that in the twenty-first century, different opinions on this question have emerged among noncreationist scientists who are experts in the study of evolution. To put this modern controversy over macroevolution in context, we need to look at an outline of a brief bit of the history of biology:

- *Darwin and Darwinism*
  - Came up in the mid-1800s
  - Molecular biology unknown
  - Genetics still decades in the future
- *Neo-Darwinian synthesis (the modern synthesis of evolution)*
  - Defined in the 1930s and 1940s
  - Synthesis of population biology, genetics, mathematical biology, and paleontology
  - Molecular biology still in the future
- *Molecular biology*
  - Emerged since the 1950s
  - Rapid recent advances

Note that when Charles Darwin wrote *On the Origin of Species*, essentially nothing was known about the contents of a living cell. The cell was thought to be a tiny bag with some simple contents that could easily evolve. Genetics was still decades in the future. Darwin's ideas of how living things change were detached from any understanding of life as we know it in the twenty-first century.

In the 1930s and 1940s, a group of prominent scientists made

a serious effort to bring together Darwin's theory with what was then known about population biology, genetics, mathematical biology, and paleontology. Their combined work produced the Neo-Darwinian synthesis, or modern synthesis, which is basically evolution as it is understood today by most evolutionary biologists. Genetics was a developing field at that time, but molecular biology and molecular genetics did not get a serious start until the 1950s. This twentieth-century effort was still based on Darwin's theory that all biological change occurs by random mutations and natural selection.

What do we know in the twenty-first century that scientists did not know in the late twentieth century? Some years ago, I spoke to a group of secondary-school teachers and was asked, "Why do evolutionary biologists seem more confident about their theory now than they used to be? Is there new evidence giving stronger support for the theory?" I can answer that better now than I could at the time. As we proceed, you will see what I mean.

Molecular biology—a field of study that is a necessary foundation for truly understanding biological change—has been making progress, especially since the 1950s, and has been exploding in the early decades of this century with the arrival of new techniques such as the ability to sequence whole genomes.

First, here are some definitions for nonbiologists. *Microevolution* is the process of organisms adapting to stimuli around them. The upper lizard in figure 7.1 lives on gray granite rocks in California, and the lower one is from Arizona, where the sandstone rocks are red. They are the same species of lizard, but they have adapted to their different environments. These adaptations within a species are termed *microevolution*. Creationists understand that such changes can and do occur within created groups of animals and plants. Speciation (the emergence of brand-new species), which results from changes that do not

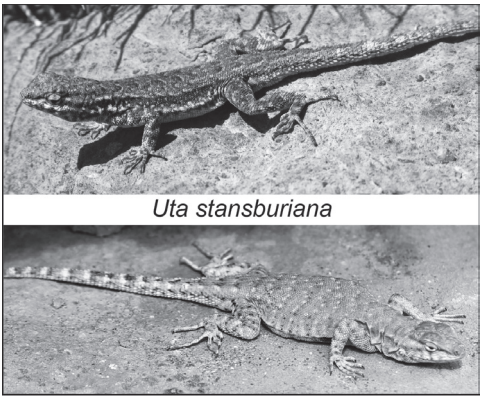

Figure 7.1. Two lizards of the species *Uta stansburiana*. *Above*, from Southern California, living on gray granite; *below*, from northeast Arizona, on red Navajo Sandstone.

allow populations to interbreed anymore, is also compatible with creationist thinking, but we will not deal further with speciation here.

Figure 7.2 shows a phylogenetic tree representing the presumed pathways of the evolution of animal groups from a common ancestor. This level of biological change is termed *macroevolution. Macroevolution* has a variety of definitions,[4] but I will use the term to refer to the evolution of major groups such as orders, classes, or phyla (body structures). Macroevolution is not compatible with the Bible story of Creation but is part of the backbone of Darwinian evolution.

In the accepted theory of evolution, both microevolution and macroevolution occur by two processes: (1) random mutations (changes to the DNA) and (2) natural selection. These two processes are the core of the Darwinian theory. Mutations bring new variation into the population, and these mutations must be random, meaning that the mutation process cannot have foresight—it cannot plan ahead or know anything about what

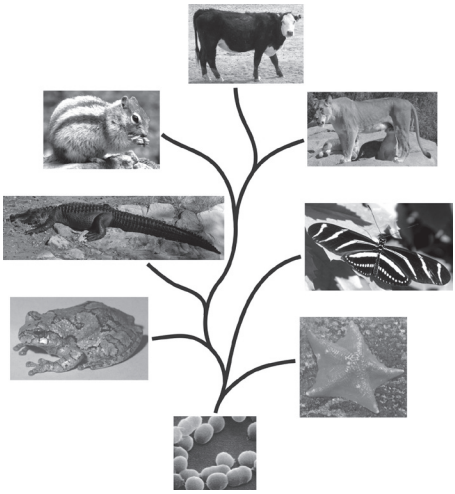

Figure 7.2. A phylogenetic tree showing presumed macroevolutionary relationships between several phyla of animals and ancestral bacteria.

would be beneficial to the organism. If any type of foresight or recognition of what would be good for the animal were present, this would indicate that some kind of intelligent action was going on and that someone or some genetic process knew what would be beneficial. Such intelligent action cannot be tolerated in naturalistic theory. Natural selection is the only process that can be allowed to determine which genes will survive.

To continue this elementary lesson in evolution, note that natural selection occurs when some organisms can survive better in their environment than other organisms. For example, faster rabbits will outrun more predators. That process simply happens and does not need any intelligent guidance.

When creationists challenge evolution, they are speaking of macroevolution, but in recent years, even Darwinian explanations for microevolution are running into difficulty. We know that microevolution and speciation are real processes in the natural

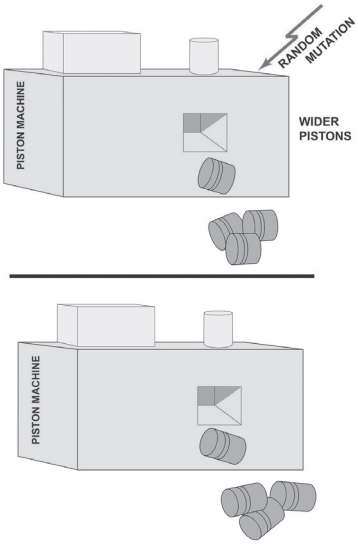

Figure 7.3. An analogy from an automobile factory: The Darwinian process of random mutations (*lightning bolt*) changes some instruction in the computer, thereby changing the size of the product (image from Brand and Chadwick, *Faith, Reason, and Earth History*, 2016).

world. Darwinism, however, claims that all microevolution and macroevolution occur by random mutations and natural selection. New evidence is raising puzzling questions about that claim.

A simple analogy will illustrate the concept of random mutations. A machine, under the control of a computer in an automobile factory, makes pistons (fig. 7.3). One day a huge electric shock, such as lightning, strikes the computer and makes a random change to the software, and now it makes larger pistons. Of course, in the biological world, a significant change would no doubt require many mutations, not just one, but this illustrates the concept of how evolutionary theory explains biological changes.

In recent years, however, new discoveries made primarily by

molecular biologists are bringing problems for the Darwinian theory of evolution by random mutation and natural selection. We will discuss five of the major problems for Darwinism.

Problems for Darwinism

1. Junk DNA. DNA comes in two different categories: (1) protein-coding DNA, which has the instructions for making proteins, and (2) noncoding genes, also called silent genes because they do not make proteins. Since these silent genes do not seem to be doing anything, they have been called junk DNA for decades. Most scientists had thought that junk DNA consists of useless, nonfunctional genes left over from the evolutionary process.[5] The human genome is about 98 percent junk DNA—junk that used to be important genes but is now useless. Since these are useless, would you be willing to have 98 percent of your DNA removed?

Junk DNA is important for evolutionary theory because these presumably nonfunctional genes provide a resource—a collection of old genes—that, so the theory proposes, can mutate and evolve into new genes with new functions. There is no evidence that this actually occurs,[6] but it is a critically important part of the theory.

Through the years, some problems for junk DNA began to appear. A graph of data based on a very large number of research papers showed that the percentage of DNA that is junk increases as animal complexity increases (fig. 7.4). This seems to imply that junk DNA is somehow involved in producing that complexity. How could that be, if it really is junk? In the most complex animals—human beings—98 percent of the DNA is junk. Why would the percentage of junk DNA in humans be several times as high as the percentage in single-celled organisms? Data like this brought a suspicion that something was wrong with our understanding of DNA.

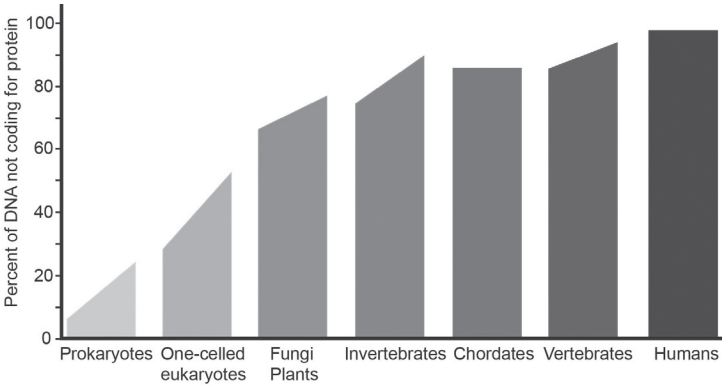

Figure 7.4. The relationship between the percentage of DNA that has been considered to be "junk" (noncoding DNA) and the structural complexity of organisms (Mattick 2004).[7]

More papers appeared from time to time, with indications that junk DNA was actually doing something. My favorite was the *Nature* article titled "It's the Junk That Makes Us Human."[8] Junk DNA somehow seemed to be controlling the other genetic information. That train of clues reached a climax with the completion of the ENCODE research project, which was a massive government-funded study by several hundred molecular geneticists of the human genome. At the project's completion, thirty papers were simultaneously published in research journals in September 2012, with the lead articles published in the prestigious journal *Nature*.[9] The primary conclusion was that most junk DNA has a function and is not junk at all. *Junk DNA* is not even a useful term or concept anymore. That supposedly useless "junk" DNA is turning out to be critically important since it functions as regulatory DNA, controlling the functioning of the protein-coding genes.

Proteins are building blocks like bricks. The same bricks can be used to make a doghouse or a palace, depending on the instructions in the engineering drawings. In living animals, the

regulatory genes tell, for example, whether the proteins are to make a chimpanzee, a mouse, or a human. The supposed junk DNA is really the most important part of the genome. The demise of the idea of junk DNA is an example of another failed evolutionary prediction, and it left doubts as to whether a source of unneeded genes is available that can evolve into new genes. Some evolutionary biologists are trying to downplay the trend toward little or no junk DNA, but the evidence is not going their way.

In the early 1970s, molecular biologist friends of mine, who were creationists, were predicting that junk DNA would be found not to be junk, and that is being confirmed.

2. Orphan genes. As Charles Darwin correctly pointed out long ago, all new biological features must develop through a long series of small changes if there is no Creator.[10] The possibility of large jumps in complexity would be too improbable to consider seriously (or literally). This also applies to individual genes. Even a single functioning gene is a very complex molecule, and each one will probably also require some associated regulatory genes in order to be functional. Macroevolution, and even naturalistic microevolution, requires that no new gene will form without leaving an evolutionary trail in its ancestors to show how it evolved. A new gene cannot simply pop into existence.

But that is just what has happened—often! The newly developed ability to sequence DNA has revealed a completely unsuspected phenomenon called orphan genes (ORFans). These are genes without any evolutionary ancestry. A good example is the genes that give honeybees the ability to make honey but do not occur in other insects; there are no ancestors to these genes. They suddenly appear fully formed in honeybees.[11] It looks suspiciously as though someone put the genes there because the honeybees would need them.

Orphan genes are not rare; they have been found by the

thousands, and all organisms seem to have them. Humans have hundreds of orphan genes. I suggest that someone putting orphan genes in organisms that need them is the only credible explanation. This is not a case of religious bias but a matter of following strong evidence to its logical, though for some persons unwanted, conclusion. It is reasonable to suggest that orphan genes refute any naturalistic theory of evolution.

3. Epigenetics. I often wondered what Exodus 20:5 meant. It speaks of punishing children for the sins of their fathers to the third and fourth generation. Epigenetics—a topic that has been studied since at least the 1980s but is becoming prominent in recent years—offers an explanation. *Epigenetics* is the study of the management system outside of, or above, the DNA that handles the information in DNA.[12] Epigenetics is a rapidly advancing field, with new discoveries of its effects coming out all the time.

An article in the journal *Nature* describes a research project that illustrates how epigenetics works. The title of the article is "Epigenetics: The Sins of the Father."[13] Can you guess where the authors got that title? In the experiment described in the article, male mice were exposed to the gentle odor of peach blossoms, and each time they smelled this odor, they received a mild shock on their feet. They were given this treatment for just three days, and after that, when they smelled this odor with no shock, they reacted strongly to the odor alone. Then they were mated to virgin female mice. The offspring were presented with the odor of peach blossoms, with no shock or any other unpleasant stimuli. The young reacted to the odor in the same way their fathers did, and there were also changes in the olfactory parts of their brains, apparently because of their fathers' experience. This response was inherited for several generations.

The mouse research just described is an example of epigenetics, so called because it is a system that manages the DNA without making any changes in it. No mutations are involved, and, thus,

there are no changes in the DNA. The epigenetic system places little chemical tags on the DNA, turning genes on or off or altering how they are expressed.

When a woman is pregnant, her fetus will likely be affected by significant factors in her life, such as stress or diet. These effects do not involve mutations but are epigenetic effects, and they may last for more than one generation.

Another example is blind cave fish. I used to tell my students the accepted interpretation: these blind fish became blind because of mutations to the eye genes. Since there was no light in the cave, the fish were not at any disadvantage from being blind, so natural selection did not eliminate or select against the blind fish. (I also sometimes told my students that half of what we teach them is wrong, but we do not know which half is wrong until science moves on and shows us.) Now we know that the standard story about blind cave fish is wrong. They do not have mutations to their eye genes. The eye genes are intact, and the blindness is caused by epigenetic management of the genes.[14] The fish do not need eyes, so the eye genes are turned off.

Why have I listed epigenetics as a problem for Darwinism? A notable reason is that environmental influences stimulate epigenetic alterations that commonly have three characteristics: they are (1) beneficial to the organism, (2) inheritable, and (3) nonrandom. Remember that in Darwinian theory, with no intelligent Creator in the picture, all biological changes must begin with random mutation—that is, random in relation to the needs of an organism. If the changes occur *because* they benefit the organism, without natural selection being necessarily involved, then how is the organism recognizing that they will be beneficial? Perhaps a beneficial change could happen by chance on very rare occasions, but if such changes are common, some kind of intelligence is meddling with the system.

We now know that living cells have sensors that detect

environmental factors and stimulate these nonrandom, beneficial epigenetic changes, and such changes can be inherited, perhaps for many generations. Certainly, we would not suggest that God is tinkering with animals and plants and directly causing these epigenetic changes. The genetic/epigenetic system knows how to do that, however, and this same epigenetic system is present in all organisms. This presence implies that the epigenetic system has been there since the beginning.

How could this system—a genetic/epigenetic system capable of managing the entire complex biological world—have evolved at a time when there was nothing more complex than bacteria? The problem for Darwinism is that there is clearly a need for intelligence somewhere in the origin of this genetic/epigenetic system.

Many other examples of epigenetic changes, which are not accompanied by mutations, exist in nature.[15] Evolutionary biologists try to downplay the significance of epigenetics, but it seems clear that epigenetics is not going away, and the body of knowledge keeps growing. Researchers are discovering more and more ways in which it influences animals and plants.

Actually, in the past, we were all naive to think that DNA alone was adequate to direct the biochemistry of life without higher-level management systems like epigenetics to determine how the information in the DNA will be used. DNA is comparable to a computer's hard drive. It is full of information but can do nothing without the management system that directs the use of that information.

4. Irreducible complexity. If I make an automobile, it must have a finished core of connected major parts before I can drive it down the highway. If it lacks seats, a speedometer, windows, or a roof, it can still move down the road, but if the driveshaft or the pistons in the engine are missing, it cannot be driven. A minimum level of complexity must be present before it will work.

An animal, plant, or bacterium must also have a minimum set of parts before it will live. Many complicated parts of the body must be present and connected, representing irreducible complexity, before they can carry out their functions and the body can live. Biochemist Michael Behe presented this concept of irreducible complexity in his book *Darwin's Black Box*.[16] Through the years since the appearance of *Darwin's Black Box*, numerous attempts have been made to undermine that issue. But the more we learn about living organisms, the more convincing Behe's argument becomes.

How can evolution develop a part such as the heart at an early stage of an embryo if other significant and necessary parts are not present? And the more critical question is, How could mutation and natural selection design and make the missing parts if the heart will not function until the core parts are all there? How could there be any assessment of what is missing? This question applies all the way through the formation of a living cell or a complex body. I will not reproduce the arguments in Behe's book or the logic of his critics, but this issue can be followed through published literature or online sources from recent years. Can anyone answer the challenge of how to provide the needed irreducible complexity without the assistance of ID?

5. The new evolutionists. For years, conflicts have arisen between creationists and evolutionists, but recent advances in molecular biology and molecular genetics are stirring a growing conflict within mainline science. The conflict involves all of our first four problems for Darwinism: (1) the demise of junk DNA, (2) orphan genes, (3) epigenetics, and (4) irreducible complexity. We will look at the broader aspects of this developing skirmish.[17]

A group of scientists referred to as the "new evolutionists" are recognizing that Darwinian random mutations and natural selection do not work. In recent decades, new research techniques, such as the ability to sequence DNA, have opened up a whole

new world of understanding of the living cell. It is becoming evident that the cell is much too sophisticated for random mutations to work for anything other than a few very minor changes.[18] New genetic information must arise from some other process. As stated in one book by these new evolutionists, "One century of studies on mutations has not provided a single verified example of a gene mutation that led to an adaptive morphological change in metazoans."[19] In other words, not even one gene mutation has been shown to produce a new biological feature and certainly not a new order or body type of animal. Keep in mind that the molecular biologists I am talking about are not creationists. The evidence simply tells them that Darwin was wrong in his theory of how biological change occurs, and their well-documented challenges pose a serious threat to macroevolution.

One of the molecular biologists who has spoken out quite clearly is James Shapiro. In his book *Evolution: A View From the 21st Century*, he says that "the Modern Evolutionary Synthesis included an *ad hoc* assumption about the random nature of hereditary variation."[20] If an idea is ad hoc, that means it does not come from evidence but is required by some theory. Shapiro comments further, "It requires great faith to believe that a process of random, accidental genome change could serve this function" of adaptation.[21] I could not have defined this challenge better myself.

Shapiro goes on to say, "Hereditary change results" from "active cell processes rather than a series of random accidents."[22] He makes it clear in his book that he believes life is the result of millions of years of evolution, but he says the evidence refutes random mutations and selection as the mechanism for this evolution.

For a person who does not believe in Creation, Shapiro's candor is refreshing. He says that biological change occurs through active cell processes and not through random accidents. He calls

this active process "natural genetic engineering," which means that "cells are now reasonably seen to operate teleologically [with purpose]: their goals are survival, growth, and reproduction."[23] He even states that the complex biochemistry in the cell "decides" how to interpret the DNA. This all adds up to his conclusion that random mutations are not the source of genetic change. His language is describing a teleological (purpose-driven) process that is not at all compatible with Darwinian theory. How does Shapiro account for this non-Darwinian genetic/epigenetic system? In discussing parts of this system, he glosses over their evolution as a mystery.

Shapiro is not the only one saying these things. He happens to be very honest with the evidence and is bold in how he states it. Most evolutionary biologists object strenuously to ideas like this and criticize Shapiro and his new evolutionist colleagues. Shapiro replies that their objections are philosophical, not scientific, and are not supported by empirical data.

The findings of these molecular biologists suggest to me that a serious modification is needed in the analogy in figure 7.3. My new version of the analogy is drawn in figure 7.5. The complexity of the genetic system is exponentially greater than was previously envisioned. As portrayed in the analogy, the cell has sensors that monitor the environment, sending information to control modules and to stage-two and stage-three controllers, and after much assimilation and integration, the combined assessment is shared with the computer that is the main control center. During this process, very advanced damage-repair systems correct mistakes in the DNA. The simplest cells have a bewildering array of DNA error-correction mechanisms. Some mistakes do get through the system, and these are the mutations that cause problems for living things.

Evidence in nature indicates the presence of standby specifications, which in a cell would be standby genetic information

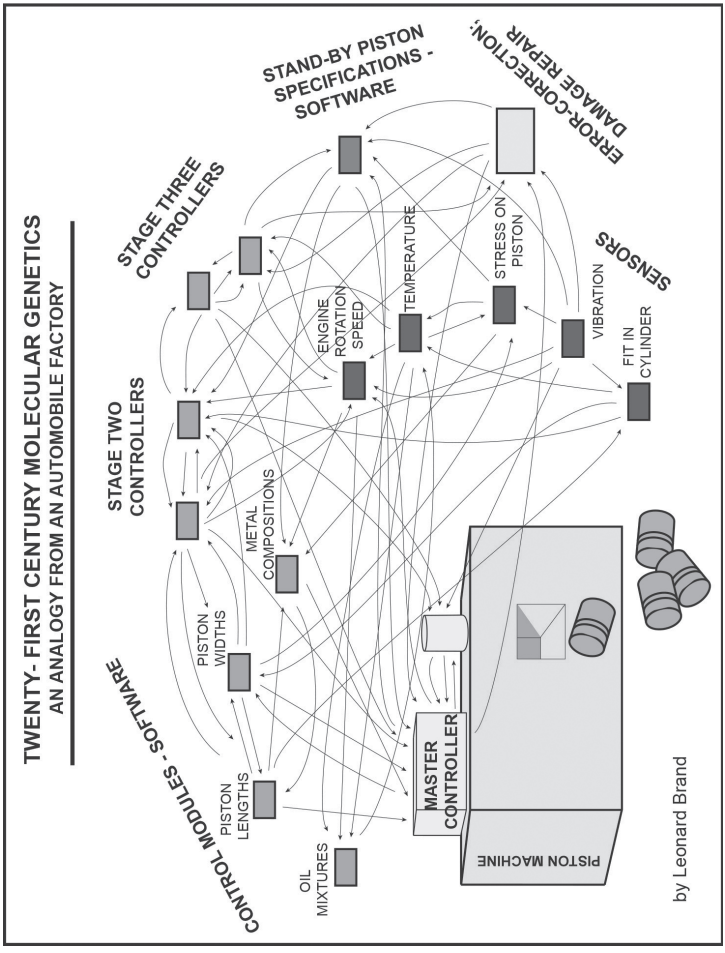

Figure 7.5. An analogy from an automobile factory (continued from figure 7.3): a complex control system, analogous to the twenty-first-century understanding of the genetic system, with its multiple layers of genetic control and response to the environment.

designed to facilitate adaptations to meet environmental conditions and changes when needed. An example of this can be seen in the impressive variety of dog breeds (fig. 7.6). Abundant genetic evidence indicates that dog breeds originated from the selective breeding of wolves.[24] More than two hundred breeds of dogs now exist, and many of these were produced during the past two centuries. We should note a couple of pertinent facts about the origin of these breeds. A few mutations were important for a small number of dog breeds, but the vast majority of the features of today's dog breeds come from epigenetic effects, not from mutations.

The second important fact is that *these dog breeds did not arise by evolution.* Most of these breeds originated within the past two centuries by purposeful selective breeding, so the genetic potential—the genetic information behind these dog breeds—must have been present before dog fanciers began to dream of making their chosen breed of dog. I call this standby genetic information: it is present in the organism, standing by and ready in order to make a new breed that was not imagined before. Two centuries are not nearly enough time for the evolution of that information. It had to be available there from the beginning, before anyone even thought of generating new breeds of dogs.

I propose that in the beginning, the Creator designed the wolf genome with the genetic potential to make dogs, such as Chihuahuas to Great Danes, knowing that humans would need protection, companionship, and help with many other things that dogs do so well. I know of no other animal with such a wide range of real or potential genetic variation.

Cats, by contrast, are one example of animals that have far less genetic variability. Plenty of cat lovers seek to generate breeds of cats, but there are simply no bulldog cats or Doberman cats. Leaving the big cats aside, domestic cats exist in many breeds, but the differences are minor. If we shave off their fur, they

Figure 7.6. A wolf (*center*) and several breeds of domestic dogs. The wolf is the apparent ancestor of domestic dogs.

almost all look very similar. They evidently were not created with a wide genetic potential. So why were cats created? Perhaps to keep us humble and remind us that we are not in charge! Other animals and plants also have variation in their amount of genetic potential for adaptation, but none have the diversity of forms that we see in dogs.

Coming back to the analogy in figure 7.5, what happens when mutations cause damage to the genes? There are three outcomes that are most likely: (1) system failure (e.g., you die of cancer); (2) reduced efficiency (your body does not work as well as it should; does that resonate with anyone?); or (3) elimination of

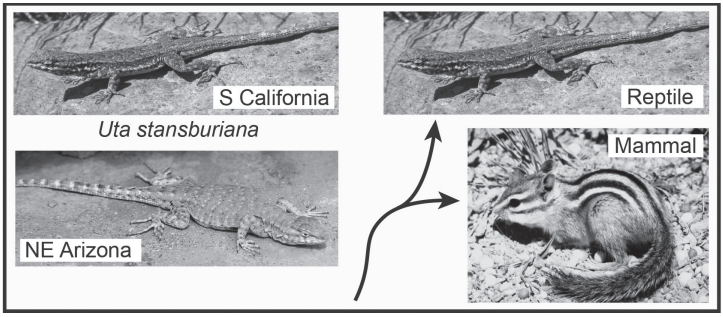

Figure 7.7. *Left*, the two lizards as seen in figure 7.1, illustrating microevolution; *right*, if the lizard (a reptile) and the chipmunk (a mammal) evolved from a common ancestor, this would represent macroevolution.

the mutation by the error-correction system. The third option is probably the most common, but unrepaired mutations do make it through the repair system. Many of them cause problems, and none are likely to result in any constructive evolution. They accumulate through the centuries and produce what is called genetic load—increased inefficiency in biological systems.[25]

Microevolution, macroevolution, and the nature of the evidence

For decades, it has been argued that macroevolution is just the accumulation of small microevolutionary changes over time. The new challenges to Darwinism, described in the sections above, have slowly been building doubts that macroevolution is simply accumulated microevolution, and these doubts seem to be escalating as research methods improve. The study of microevolution in nature in the past couple of decades has shown that it does not require thousands of years as previously thought. It can happen in a researcher's lifetime, or even in the span of an individual research grant, as occurred in the study of Galapagos finches.[26] Many epigenetic findings also show how microevolution can happen rapidly, since these changes do not depend on

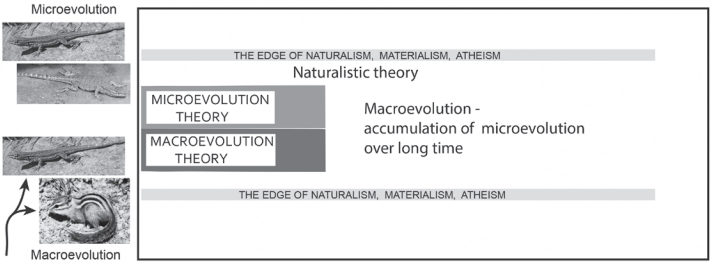

Figure 7.8. This figure and the following ones are diagrams representing different stages in the understanding of micro- and macroevolution in relation to the evidence and to the philosophy of methodological naturalism. If either bar crosses the upper or lower line, this represents part of the theory becoming compatible with creationist interpretations (also in figs. 7.9–7.12, 7.14).

random mutations and selection. Let us look at a set of diagrams illustrating how these ideas are changing.

In figure 7.7, microevolution is illustrated by the adaptation of two lizards to very different environments, which we saw earlier. They are the same species, but the rocks they inhabit are different. The top one lives in Southern California, where the rocks are gray. The red one is from northeast Arizona, where the rocks are red; the lizards are well adapted to these conditions.

On the right side of the figure, the lizard and chipmunk represent two classes of vertebrates. If mammals like the chipmunk and reptiles like the lizard[27] evolved from a common ancestor, this would represent macroevolution.

Figure 7.8 represents the long-standing idea that macroevolution is the natural result of microevolution over long spans of time and that the process is the same for both. Figure 7.9 shows that in recent times the evidence is pushing micro- and macroevolution theory apart; doubts have arisen that the microevolution process naturally leads to macroevolution. The new evidence seems to require that macroevolution is a different process from microevolution. As this new evidence accumulates, I

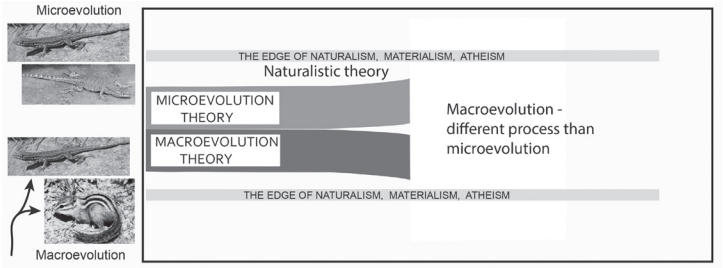

Figure 7.9. This figure represents the stage in which the processes of macroevolution are thought to be different from the processes of microevolution.

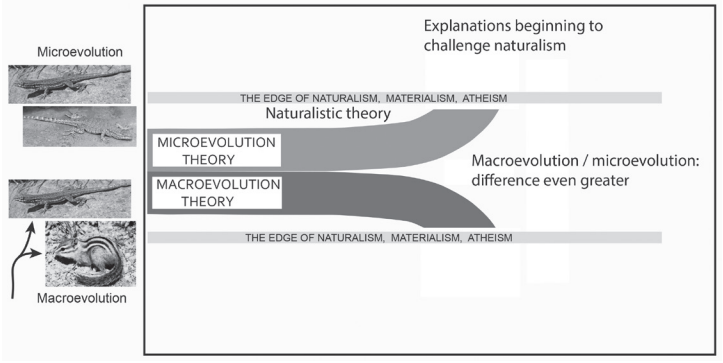

Figure 7.10. The differences between the micro- and macroevolution processes are interpreted as greater than in figure 7.9.

suggest that it is pushing micro- and macroevolution even further apart (fig. 7.10), and it is even beginning to challenge strictly naturalistic explanations.

As this separation of microevolution from macroevolution has proceeded, the evidence is revealing features that, to me, make microevolution more difficult to explain as a strictly naturalistic process. Microevolution often involves epigenetics, and as we have discussed, epigenetics is difficult to explain without intelligent involvement somewhere along the way in the origin of this system.

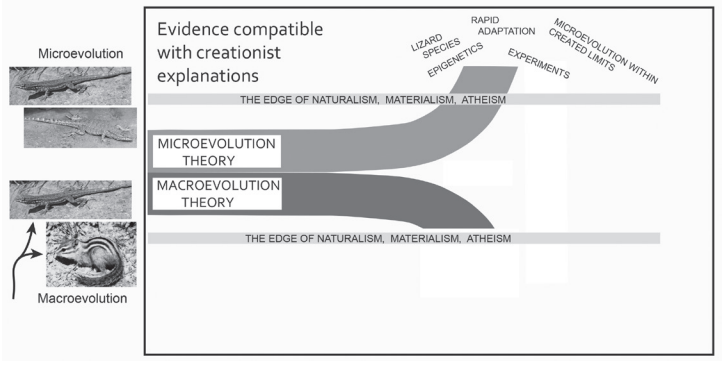

Figure 7.11. New developments suggesting that microevolution is most easily explained by creationist concepts—or at least is clearly compatible with those concepts.

Creationists have predicted for decades that microevolution is a much more rapid process than others have thought. This is being confirmed by recent research. This does not refute the naturalistic theory, but combined with other evidence, the recognition of rapid microevolution fits well into creationist thinking. For these reasons, figure 7.11 shows the band for microevolution extending up into the region of creationist explanations. I suggest microevolution and its underlying genetic/epigenetic mechanism is a process that was created in the beginning to allow animals and plants to adapt fairly quickly to changing environments. I also propose that the only evolution that has happened is adaptation within the limits of the originally created potential in each group of plants or animals.

Figure 7.12 shows the theory of origin for orders, classes, and phyla taking a bend down below that lower line into creationist explanations. There are a number of reasons for this, and it is a much more decided departure from naturalistic explanations than is the case for microevolution.

We can argue about the naturalistic basis for microevolution,

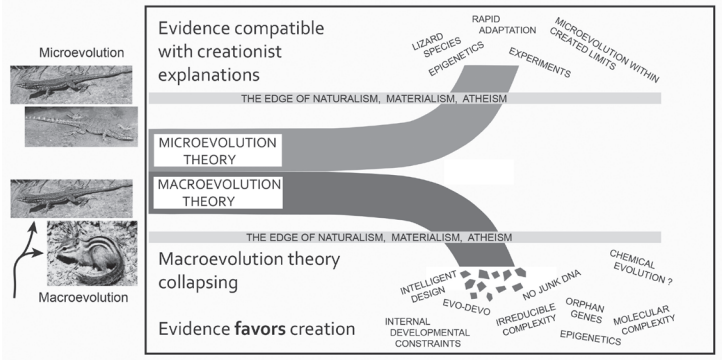

Figure 7.12. New discoveries are undermining the genetic feasibility of macroevolution. The origin of major phyla of organisms seems to require intelligent design (divine creation).

but macroevolution theory *is collapsing*. Reasons for this claim include the demise of junk DNA, orphan genes, epigenetics, irreducible complexity, abundant evidence from the ID movement, and other evidence. ID does not make claims about macroevolution, but I would argue that much of the ID evidence is not compatible with the Darwinian theory of random mutations and natural selection.

What options are there? The noncreationist geneticist James Shapiro suggests that the origin of at least some parts of the biochemical system are a mystery.[28] That is a good summary, and I will go further and suggest that the only viable answer to that mystery is God the Creator.

How are evolutionary biologists responding to these challenges from junk DNA, orphan genes, epigenetics, and the claims of the new evolutionists? To seek an answer to this, I purchased and examined the latest editions of seven textbooks on evolution and a book of readings on evolution (fig. 7.13*A*).[29] None of them contained any reference to orphan genes. Why do they ignore this evidence? The older ones did not contain

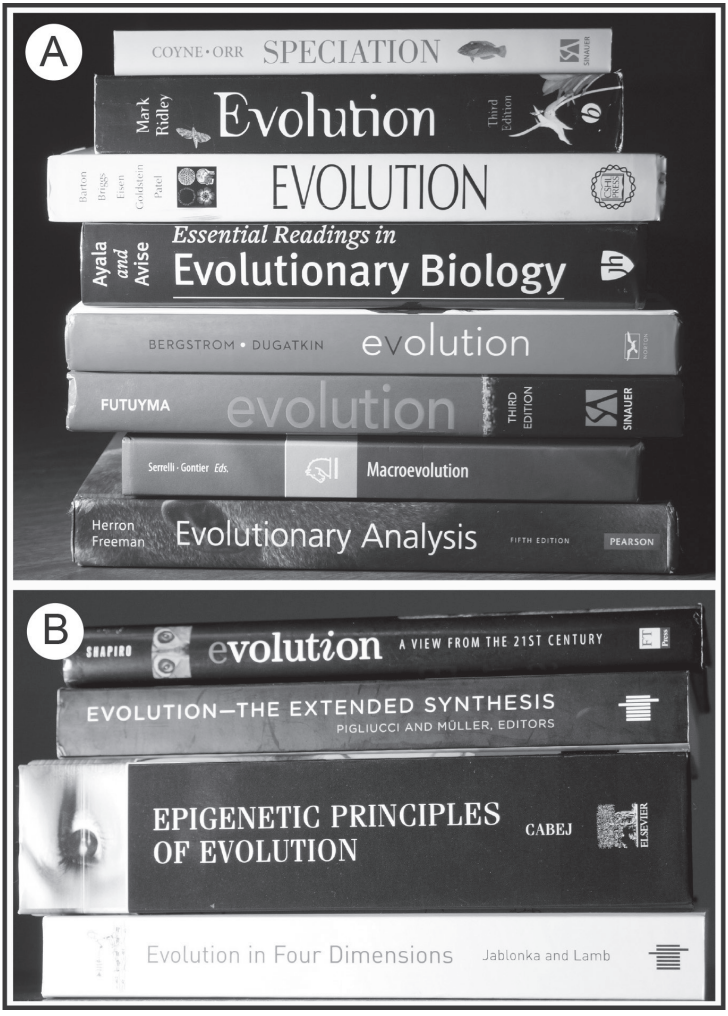

Figure 7.13. *A*, the seven textbooks on evolution and a book of readings on evolution, as described in the text; *B*, four books that seek to build a new evolutionary synthesis based on epigenetics—the extended synthesis.

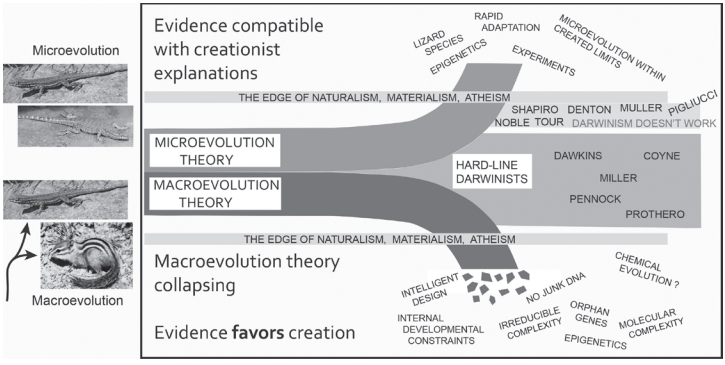

Figure 7.14. A diagram with a proposed explanation for the continued confidence in macroevolution in spite of the problems illustrated in figure 7.12. Just below the upper line are several names of noncreationist scientists who maintain that Darwinism and/or abiogenesis do not work, and several names of hard-line Darwinists who insist on holding on to traditional Darwinian theory.

the term *epigenetics*, which is understandable. The rest had one sentence to a couple of pages on epigenetics. They all downplayed epigenetics as having any significance to evolution. Some evolution textbooks recognize that part of the noncoding DNA is functional, but some individual evolutionary scientists have trouble accepting this. Published or online responses to issues such as junk DNA, orphan genes, and epigenetics indicate that evolutionary biologists who work within conventional thinking are trying to fight against these new insights, but their efforts so far do not seem very impressive.

Other books on evolution by the new evolutionists have come out, and four of these are pictured in figure 7.13*B*.[30] These individuals recognize that epigenetics is here to stay, and they are trying to use it as the basis for a new evolutionary synthesis, called the extended synthesis. They recognize that Darwinian random mutations and natural selection do not work, and their synthesis is offered as a replacement theory.

In the fall of 2016, a conference held in Europe was the site of a face-off between Darwinians and advocates of the extended synthesis. Reports of this conference indicate that it was inconclusive. Evidence and conclusions from the extended synthesis were presented, and observers noted that the Darwinians did not answer these arguments but simply insisted that natural selection was adequate to explain everything. It seems that neither position had an explanation for the origin of new structures like feathers, bones, the vertebrate skeleton, and so on. That is a major reason why the macroevolution theory is collapsing.

If the macroevolution theory is collapsing, why do conventional evolutionary biologists seem more committed to Darwinian theory than ever? The answer is that their firm commitment comes from philosophy, not from evidence. The evidence is not providing more support for their theory; it is quite the opposite. But a commitment to naturalism does not allow the option of admitting any explanation that needs more than the operation of the laws of chemistry and physics. So far, the extended synthesis has not provided a convincing explanation for life without involving epigenetics, with its implication of some kind of intelligent knowledge of which changes will be beneficial to organisms.

Notice in figure 7.14 the section at the right end of the diagram. This portrays the relationship between the new evolutionists and what I am calling hard-line Darwinists. The names just below the upper line are scientists who argue against the origin of life by chemical evolution and against Darwinian explanations for evolution.[31] Remember that none of them are creationists, which is the reason they are listed below the upper line, but they do recognize that Darwinism does not work.

The hard-line Darwinists, in contrast, are holding tight to their theory of evolution, resisting the insights being brought by the new evolutionists and by molecular biology in general. Their resistance is philosophical, not scientific, and it provides

the answer to the question I was asked by those high-school teachers some years ago. The apparent increase in confidence in evolution does not come from increased evidence for it. The evidence is going the other way—against macroevolution. The firm confidence in evolution expressed by hard-line Darwinists is purely based on a philosophical commitment to naturalism. I strongly suspect it also reflects a level of insecurity generated by the increasing weakness of the evidence underlying the theory.

If any philosophy is not supported by adequate evidence, the temptation arises to lash out at those who ask difficult questions. This reminds me of a pastor who supposedly wrote in the margin of his sermon notes, next to one particular paragraph, "Argument weak; shout louder."

Conclusions

A major reason for the collapse of the conventional evolution theory is a growing realization of the significance of the limits in what natural selection can do. Natural selection only eliminates individuals with unfavorable characteristics. It does nothing—nothing at all—to generate better characteristics. If life depends on Darwinian processes, the new genes to make novelties such as feathers, bones, livers, vertebrate skeletons, and many other features will only arise by those random mutations. The new evolutionists have generated an increased understanding that the Darwinian processes of random mutation and natural selection are not adequate to explain the existence of the awesome complexity in living things. It cannot explain the origin of any of those novelties. But so far, the new evolutionists have not produced a convincing alternative to Darwinian random mutations and natural selection that explains how to generate new biological information.

The conflicts discussed here are not minor issues; Darwinian theory is facing deadly challenges. This is a new day for

creationists! You will not read about these developments in books on evolution. Those who work within the naturalist worldview will not recognize, or even express, doubts about naturalistic explanations for life.

In Charles Darwin's day, it was easy to think one could explain life's origin and its expansion into its present diversity, but we can forgive Darwin for his naivete since he lived in an era of gross biological ignorance. Today, we have a rapidly decreasing excuse for thinking that the living world can simply happen without God. Small-scale evolution, such as microevolution and speciation, is real, but macroevolution theory is running into serious trouble.

Molecular biologists and many other biologists have a significant advantage over geologists or paleontologists in seeking to understand origins. Biologists who engage in laboratory studies of living organisms can study processes that are underway now, right in front of them. Geologists, paleontologists, and many evolutionary biologists, in contrast, are attempting to understand ancient history—to interpret events and processes in the distant past. In the study of ancient events that cannot be directly observed, interpretations are far more influenced by worldview assumptions, and this makes such a study more challenging for geologists and paleontologists. This is the primary reason why creationists have more unanswered questions in these disciplines than in biology.

In spite of this difficulty, scientists who allow a biblical worldview to help them think of better questions to ask have been making progress in pursuing an understanding of geology and paleontology without depending on the naturalistic worldview. This progress is making it increasingly plain that the evidence is more compatible with a biblical worldview than has been thought. I believe that following the biblical worldview and using it to help us ask the right questions is, in fact, the approach

Figure 7.15. Building a railroad to Mars.

that will bring us to the most accurate understanding of life and earth history.

The Christian gospel is not about geology or biology. The gospel is about Jesus and His forgiving and saving grace. But some of us spend time dealing with scientific topics because modern scientific philosophy claims to have disproven what the Bible says. We do not want to see friends give up on the Bible and on the gospel because of what many scientists claim.

Many Christians and non-Christians will encourage doubt by urging the message that life could have arisen by natural means. I will not give you that message because I am not willing to deceive you. The minds of innocent children have the natural intuition that complex things were designed by intelligence. Modern culture works hard to educate that intuition right out of us. But that inborn intuition is correct and is being increasingly supported by scientific advances.[32] Do not give it up!

Our foundation is still faith in God and in the reliability of Scripture. Some things we cannot know unless God tells us about them. But scientific advances are being increasingly helpful in revealing new evidence that is supportive and encouraging of a biblical explanation for life and earth history. This is especially true if we allow the Bible to inform our scientific search into the history of the earth and life. We do not try to use science to prove the Bible, but if we build on a foundation of faith and believe what the Bible tells us, this can improve our success in science, as some of us have found through several decades of experience.

People interested in Creation and evolution often spend time pondering specific arguments like the panda's thumb, the fine-tuning of the universe, the quadrate bone of therapsids, or the meaning of probabilities like one chance in 10^{195} for abiogenesis. Those can help us search out the issues, but how can we grasp the full truth about origins? The most helpful perspective only comes from gaining a broad and deep understanding of life and all the complexities of life processes. This understanding needs to include everything from a full, integrated awareness of physiology and structure to the biochemical details of, for example, how a cell converts and packages energy and how it uses that energy to power all the myriad biochemical machines that make a cell function. If we can put our assumptions aside and comprehend the enormity of what it takes to make something live, and if we can deepen our broadscale knowledge of the processes of life, the more likely it is that ideas like abiogenesis (chemical evolution) and large-scale macroevolution will sink into an abyss of impossibility, right next to a plan to build a railroad to Mars.

One likely response to these challenges is as follows: "You have summarized a number of challenges to the theory of evolution, but what scientific alternative do you have to replace it?" Here is my brief summarizing answer, which has two parts.

First, microevolution and speciation are real processes. I suggest that there are reasons to think these same processes may produce variation up to about the level of new genera or families. These changes do not involve the evolution of any new biological structures or physiological systems. The processes involved in microevolution can be studied by the same scientific methods that anyone uses but must be done with minds open to new discoveries, including the newer concepts of epigenetics, orphan genes, the shortage of junk DNA, and the possibility that random mutations are not adequate to generate any really new biological features.[33]

Second, concerning the origin of the first life-forms (abiogenesis) and macroevolution, defined as the origin of major groups of animals and plants approximately above the level of family (which would involve the evolution of new biological structures and physiological systems, such as the evolutionary invention of kidneys, bones, feathers, live births, and the finger coordination of a concert violinist, something not needed for survival): I propose that origin of this level of biological complexity could not happen without divine creation, and thus on these topics there is no scientific explanation that comes close to working, and is acceptable to methodological naturalism, for how life or the major groups of life-forms could arise. The necessity of a Creator cannot be avoided. The supernatural creation process cannot be investigated by science, but scientific study can indicate whether biological origin at this level is a realistic possibility without a Creator. Scientists who follow the philosophy of methodological naturalism will quickly reject this idea, but some of us will not allow assumptions to control our understanding of reality. Perhaps being realistic is preferable to accepting biological explanations that are empty of any substance.

The thinking of Bible-based creationists is ultimately based on faith, as is the thinking of a person following methodological

naturalism. Our faith is in the God of the Bible and is not dependent on scientific verification. But science has been bringing to light much new evidence that is encouraging to a Bible believer.

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26. Jonathan B. Losos, "What Darwin Got Wrong," *Chronicle of Higher Education*, January 20, 2014, http://chronicle.com/article/What-Darwin-Got-Wrong/144021/; Jane Braxton Little, "Life in the Fast Lane," Notes From Earth, *Discover* 36, no. 2 (March 2015): 70, 72; Virginia Morell, "Predator-Free Guppies Take an Evolutionary Leap Forward," *Science* 275, no. 5308 (March 1997): 1880; David N. Reznick et al., "Evaluation of the Rate of Evolution in Natural Populations of Guppies (*Poecilia reticulata*)," *Science* 275, no. 5308 (March 1997): 1934–1937; Peter R. Grant and B. Rosemary Grant, *40 Years of Evolution: Darwin's Finches on Daphne Major Island* (Princeton, NJ: Princeton University Press, 2014).

27. In modern systematics, the term *reptile* is usually not used, as it describes a paraphyletic group. I am using that term here because many readers may not be familiar with this approach to naming organisms.

28. Shapiro, *Evolution*, 54, 57, 103.

29. Brand and Chadwick, *Faith, Reason, and Earth History*, 166, 167.

30. Shapiro, *Evolution*; Michael Denton, *Evolution: A Theory in Crisis* (Chevy Chase, MD: Adler & Adler, 1986); Michael Denton, *Evolution: Still a Theory in Crisis* (Seattle, WA: Discovery Institute Press, 2016); Massimo Pigliucci and Gerd B. Müller, eds., *Evolution: The Extended Synthesis* (Cambridge, MA: MIT Press, 2010); Denis Noble, "Physiology Is Rocking the Foundations of Evolutionary Biology," *Experimental Physiology* 98, no. 8 (August 2013): 1235–1243; Tour, "The Origin of Life"; Thomas Nagel, *Mind and Cosmos: Why the Materialist Neo-Darwinian Conception of Nature Is Almost Certainly False* (New York: Oxford University Press, 2012).

31. Chap. 4 in the present volume, and Brand and Chadwick, *Faith, Reason, and Earth History*, chaps. 14–18.

32. J. P. Moreland et al., eds., *Theistic Evolution: A Scientific, Philosophical, and Theological Critique* (Wheaton, IL: Crossway, 2017); Douglas D. Axe, "Three Good Reasons for People of Faith to Reject Darwin's Explanation of Life," in *Theistic Evolution*, 83–104; Douglas D. Axe, *Undeniable: How Biology Confirms Our Intuition That Life Is Designed* (New York: HarperCollins, 2016).

33. Brand and Chadwick, *Faith, Reason, and Earth History*, chaps. 7–12.

Chapter 8

Where Is the Evidence Going?

The answer one gets to the question of where the scientific evidence is going, depends on who we ask. What assumptions are they making? What options are they willing to consider? Are they asking whether long-age, macroevolutionary, naturalistic theories are right or whether they could be wrong? Or are their questions limited to which *details* in the conventional theory are correct and which details need adjusting? In the study of the science of origins, the part misunderstood by almost everyone is the controlling role of assumptions and worldviews in science, especially in the study of the unobservable ancient history of life and of geological history.

I remember a time, not so long ago, when creationist biologists puzzled over how to explain the biological evidence that seemed to support macroevolution. Recent dramatic advances in molecular biology and biochemistry have reversed that situation for those aware of the new evidence. Awesome techniques for analyzing DNA and other biomolecules are generating conflicts and debates within the scientific community because of new evidence that is raising serious challenges for naturalistic theories.

The theory of chemical evolution remains the standard textbook explanation for the origin of life, even though the biochemical evidence is *all* against it. Why is that? Typical "scientific" responses ignore this evidence and ridicule those who

advocate Creation or intelligent design. Study the literature for yourself and see if I am wrong about that. The origin of all life-forms by evolution (random mutation and natural selection) is also still textbook orthodoxy, and it must remain so if the naturalistic worldview is to survive.

Molecular biologists and molecular geneticists are the ones who best understand what is going on in living cells. Because of new research tools and resulting discoveries, a growing number of noncreationists are boldly saying that the Darwinian theory of change by random mutation and natural selection does not work, except for very minor modifications. In contrast to what the evolution textbooks say, the increasing evidence against junk DNA, the discovery of numerous orphan genes in all organisms, the growing evidence for epigenetics with its implications for Darwinism, and other controversies are challenging conventional theories.

Evolutionary biologists committed to naturalism insist on the acceptance of their theory, and many university faculty have lost their jobs or have been denied tenure if their colleagues have doubts about their commitment to conventional theories of origins.[1] How can this be explained unless the naturalistic worldview controls large parts of the scientific enterprise? Are naturalistic scientists afraid that asking challenging questions could refute their theories? Why should scientists not welcome careful science that could cause changes in these favorite theories? Is that not what science is supposed to be—the testing of our theories? Something else is going on here besides thoughtful, open-minded science. It is the dominant role of the naturalistic worldview in preventing the pursuit of challenging questions.

If someone reads conventional geological literature and believes it, Genesis will seem wrong. If one then goes out and examines the rocks, with a full acceptance of conventional explanations firmly set in mind, it will no doubt appear that what one

read about Genesis being wrong is correct. To reach a different conclusion requires a person to be geologically knowledgeable, but it also requires spending a considerable amount of time traveling, for example, in the western United States, following the rock formations for hundreds of miles and examining details such as bioturbation and distinctly bedded rocks that can indicate whether any significant time has elapsed during the deposition of the sediments. Furthermore, all of this must be done with a mind that is at least open to the possibility that conventional science has missed something significant or that conventional science may even be wrong. Few geologists approach the geological record in this way. When almost all geologists work within the same conventional worldview and do not question it, the result is the appearance of a convincing success of their theory, whether or not the theory is correct. This situation will not change significantly unless some are willing to seriously ask new questions and pursue them with careful research.

A corrected worldview should lead to better scientific explanations. Will the scientific community become more willing to answer challenges to conventional theories with convincing evidence? Or will reliance on tradition and ridicule remain a common response? Hopefully, we will all realize that ridicule, in the long run, will not win the day. If the argument is weak, shouting louder will not convince thoughtful people. Accumulating research, even in geology, is providing more evidence in favor of a biblical worldview, and the theory of biological macroevolution is facing deadly new challenges. I predict that this trend will continue.

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1. Jerry Bergman, *Slaughter of the Dissidents*, vol 1., 2nd ed. (Southworth, WA: Leafcutter Press, 2012).