What Does the Fossil Record Tell Us?

The fossil record is an archive showing the history of life on Earth. It includes related data—for example, the nature of the rock layers in which it is found. Researchers have developed an impressively large database[1] containing not only raw data, but also interpretations about the remains, rocks, processes, time involved, and the supposed ecology of those organisms. It is important to keep in mind that the database contains both objective data and interpretations of it.

How well known is the fossil record? A recent study[2] has shown that when the fossil collector's curves[3] are analyzed, the number of fossil vertebrate and invertebrate families described during the past 200 years have shown a continuous increase to more than 3.000 families at present. On the other hand, the number of families with both fossil and living representatives has leveled off at about 1,600 families. This suggests that the global Phanerozoic (that is, current geologic era) record of fossil metazoans (multicellular organisms) is still fairly incomplete; however, it is believed that the known record is quite representative.

When considering the available data, great care should be taken in making interpretations and constructing arguments to support our views. In the next section, we will discuss some widely held views that are not supported by the data.

Dispelling Erroneous Conceptions

As Christian scientists, students, and teachers, we need to be on the lookout for "bad science"—claims that are unsupported by either data or the Scriptures. Examples of erroneous ideas that have been promoted by some creationists are listed on the next page.

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Misconception 1:

Because the geologic or stratigraphic (rock layer) column is a construct/theory based on an evolutionary paradigm, it is false and likely to mislead us. We noted earlier that the record is real, the data are real, and in spite of problems with some interpretations, the overall stratigraphic sequence is real. Problems arise from differences in interpretation regarding the origin of the observed sequence or the nature of the processes that produced the sequence. How could there be order, some ask, if everything resulted from a major catastrophe such as a global flood? However, experience in the field consistently shows that order is present in the fossil record. This very consistency in the ordered sequence is the reason for the success of various geological exploration technologies that are used in the exploitation of mineral and fossil resources.

Misconception 2:

Fossil reconstructions are full of errors. In the first years of paleontology as a science, many errors were committed as organisms were reconstructed based on very few fossil bones, or when parts that had been discovered were assigned to a particular organism. However, today's reconstructions have become quite accurate due to the development of various subspecialties and the discovery of vast numbers of remains on all continents.

Misconception 3:

Dinosaurs are not real. Today, nearly everyone recognizes that dinosaurs really existed.[4] Paleontologists as well as dinosaur enthusiasts have found thousands of dinosaur fossils, including eggs and embryos, and recently, organic molecules, such as the protein collagen, and what appear to be well-preserved blood and bone cells and blood vessels.

Misconception 4:

There are human footprints alongside those of dinosaurs. This notion became very popular (and in some places remains so) based on claims of such a discovery in the bedrock at Paluxy River, Texas. What is not well-known is that Seventh-day Adventist creation scientists were the ones who put the evidence to the test and discovered the fraudulent nature of the human track claims. As Christians, we must be wary of claims publicized as "proofs" that are necessary to sustain our beliefs.

Misconception 5:

The entire fossil record or geologic column was laid down during the one year of the biblical flood. Some may have envisioned the formation of the geologic column as the result of a single catastrophic event, but we now know that the record is more complex than a single event could produce. Based on the data, a reasonable scenario suggests that part of the lower portion of the record consists of pre-Flood rocks that were not completely altered or eroded away by the catastrophe. In the same way, an upper part of the section most likely represents the strata and processes that occurred after the Flood. In this way, a significant amount of geological activity would be represented in the "pre-Flood" and the "post-Flood" rocks.

Misconception 6:

Marine fossils high in the mountains are proof that the floodwaters covered the highest peaks and therefore the whole earth. Those fossils were not strewn around the mountain peaks as the water covered them, but were produced when organisms died in a body of water (or were washed in) and were then covered with layers of sediment. Later, those layers were uplifted during mountain-forming processes. The fossils or the sediments that buried them could have been a direct result of the Flood or a consequence of Flood-related events.

Misconception 7:

The fossil record proves evolution (or proves the biblical flood). We like certainty—the knowledge that we have the right answers or beliefs. Unfortunately, science, because of its methods and limitations, does not provide ultimate truth, especially regarding theories such as evolution or Creation, which have a metaphysical component. What it can do is provide evidence for aspects of evolutionary theory, such as the ways in which similar organisms are adapted for different environments, or for catastrophic processes that led to the extinction of some life forms.

Evidence Consistent With a Short-Age Geological Model That Considers Data From the Biblical Record[5]

We will now consider some of the arguments that earth scientists have proposed in attempting to develop a degree of harmony between the biblical record and the scientific evidence.[6] At present, we still experience serious problems with some unresolved questions.

First, we don't yet have a satisfactory overarching detailed model for the development of the geologic column and its fossil record. Hypotheses have been proposed (for example, trying to fit all the geologic column in the year of the Flood, or in an extended Flood model), but each one has numerous problems and raises more questions than it answers. Nevertheless, some attempts have been made,[7] and this remains an area of active research.

Second, some major features of the fossil record are difficult to interpret within a short time frame.[8] These include (1) the existence of fossils with characteristics that appear to be intermediate between recognized groups of species (however, some of these "forms" may have been part of the original creation); (2) the existence of an overall fossil sequence, and even some sequences within certain groups of fossil organisms; (3) the number of

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fossil families with living representatives, which increases as one moves upward through the geologic column; and (4) some biogeographic distribution patterns that prove difficult to explain.

In spite of these problems, there is abundant evidence suggesting an alternative view to that of conventional geology and paleontology, as described below.

Evidence 1:

Geological and paleontological data demonstrate sediment and fossil accumulation through catastrophic processes. There is increased recognition among mainstream earth scientists that many rock strata have formed catastrophically. Until only a few decades ago, the dominant principle for geological interpretation was that of *uniformitarianism*—the idea that processes in the past occurred at the same rates as they do in the present. However, many scientists have recognized the problems of this influential paradigm and have come to accept the occurrence of many catastrophic events in the geologic past. Examples of catastrophic features include recognition of well-documented megaflood events (Lake Missoula,[9] Mediterranean Sea,[10] and British Channel,[11] among others); recognition of turbidites (rock units resulting from high-speed subaqueous flows)[12]; rapid accumulation of rhythmites[13]—layers of sedimentary rock laid down with an obvious periodicity—which were previously interpreted as a result of slow multiyear deposition or attributed to yearly seasonal deposition, such as varves (layers of sediment deposited in a body of still water in a single year); the influence of large-scale volcanism in rapid burial events (for example, sedimentary accumulation of volcanic ash)[14]; the large-scale effects of bolide impacts[15]—from meteors that hit the Earth (an amazing number of asteroids have hit the Earth and exploded, causing environmental disruption and destruction of life). One must keep in mind that the fossil record is embedded in rock units possessing these features, showing that the fossils accumulated in catastrophic conditions.

Associated with this evidence of rapid geological activity are many nonuniformitarian features,[16] such as large-scale sedimentary processes (for example, Jurassic Morrison Formation and associated rock units); global distribution of marine rocks (with extensive strata bearing fossils such as trilobites and ammonites); continent-scale patterns of paleocurrents (for example, Chinle Formation)[17]; discontinuities in the stratigraphic record, such as paraconformities—gaps in the record with no apparent evidence for the amount of time supposedly represented; large-scale volcanism (for example, Deccan basalts, India; Columbia River basalts, northwestern U.S.)[18]; global/regional tectonic events (for example, mountain uplifting, plate movements, basin subsidence, massive sediment supply for basinal infilling);[19] and bolide impacts[20]—more than 150 structures of possible extraterrestrial impact origin since the Precambrian, some of which measure up to 250-300 kilometers in diameter (for example, Vredefort in South Africa; Chicxulub in Yucatan, Mexico).

Evidence 2:

Fossil preservation and occurrence. The preservation of abundant organisms, their remains, or evidence of their activities (such as tracks and burrows) is very difficult to explain using present-day processes (that is, in actualistic terms), particularly when we consider the nature of the fossiliferous deposits. Many features of the fossils themselves support catastrophic events or rapid burial processes. A description of these features follows.

• *Abundance of mass mortality events throughout the record.*[21] Currently, paleontologists recognize that the majority of these deposits formed catastrophically. An example of this is the massive burial of dinosaur remains. Thousands of bones and complete skeletons have been discovered. In many cases, sediments in which these remains are found contain a significant amount of volcanic material.

• *Worldwide extinction events.*[22] Throughout the fossil record, there are many (not only the popular "big five") strata that record the sudden disappearance of numerous taxa. For example, when discussing extinctions, we usually refer to popular species like di-

nosaurs, trilobites,[23] and ammonites, but in reality, there are hundreds of genera and many more species that not only have become extinct, but more significantly have been preserved, something that is extremely uncommon in present-day conditions.

• *Exquisite preservation of organisms.*[24] Complete articulated skeletons have been found as well as preserved soft body parts (for example, whale baleen; internal organs such as those in the Santana Formation fossilized fish; articulated shells in both clams and ostracodes [tiny shrimplike crustaceans]). These parts would have decayed rapidly had they been exposed for long on the surface (on land or under water). All point to rapid burial and/or rapid mineralization.

• *Opisthotonic posture of many well-preserved articulated vertebrate skeletons.* An extreme, dorsally hyperextended posture of the spine,[25] where the skull and neck are curved over the back, and strong extension of the tail, is attributed not to postmortem processes but rather "death throes"; in turn, the consequence of unusual chemical changes in the environment (for example, hypoxia, asphyxiation, environmental toxins) that could be reasonably expected in a catastrophic scenario.

Evidence 3:

Appearance and distribution of fossil remains. Many types of data relating to the first occurrence of a fossil organism or group of organisms, and the subsequent distribution of those species in the record, support the biblical model well, and in turn present problems for an evolutionary interpretation.

• *The Cambrian explosion.*[26] The sudden appearance of more than 20 phyla or different types of organisms poses a major problem for evolutionary theory, which proposes that all forms of life came from a single common ancestor. With no real ancestors farther down in the geologic record, the evidence supports a polyphyletic origin of life,[27] something one would expect in a model of creation including different "kinds."

In fact, while evolutionary theory has proposed the development of life forms from a "universal common ancestor," the fossil biodiversity trend data in the fossil record depicts precisely the opposite—an "inverted tree of life." Several other sudden "explosions" present in the fossil record[28] suggest the existence of different lineages with separate origins. The diversity we see today may have come from diversification of the originally created kinds through a process of "descent with modification," to use darwinistic terminology. (In fact, the biblical record is not incompatible with eventual evolutionary change such as microevolution and speciation.[29])

• *The sudden appearance of complex body plans and structures.* An example of this is the classic complex optical nature of the trilobite compound eye, with no "simpler" eye structures found in the underlying strata.

• *The lack of intermediate forms between major phyla groups.* Claimed "evolutionary links" turn out not to be such even for the paleontologists studying these fossils. In the past few years, several purported "evolutionary links" have been shown not to be such (for example, *Archaeopteryx* and the origin of birds).[30] The presence of these morphological gaps among higher taxonomic categories actually serves to document the lack of evolutionary continuity.

• *The occurrence of a number of successive strata containing allochthonous fossil remains (that is, remains that did not live there but were transported into place) deposited catastrophically.* The famous Yellowstone "petrified forests"[31] are an example—trees that first appeared to be in growth position turned out to have been transported from elsewhere.

• *Record of animal activity: The presence of "ichnofossils" (that is, trace fossils such as trackways and burrows, larval cases, and reptile and bird eggs).*[32] This data is very valuable for the development of a depositional model since it means that, throughout the formation of the fossil record, some organisms remained alive and active. Even though this data implies that a certain length of time has elapsed, it also suggests that abundant sediment input is needed, as well as rapid burial processes. In addition, the abundance of some of these remains (for example, thousands of dinosaur tracks and eggs in many different parts of the world), as well as the nature of the sediments in which they are preserved, suggest unusual, possibly stressed, environmental conditions that would correspond to a worldwide catastrophic scenario.

A survey of 25 reported fossil patterns and trends in the fossil record has been published, with an evaluation of them in relation to evolutionary and biblical accounts of earth history.[33] The study concluded that more research is needed, but, by comparing the Scriptures and the fossil record, a better understanding can be developed of the geologic column.

Conclusion

There is broad agreement among Christian earth scientists who trust the biblical account that the general aspect of the fossil record is catastrophic[34]—one of destruction and death. Much data in the fossil record point to dramatically different physical conditions existing in the past and do not support a naturalistic evolutionary history of life on Earth. The sudden appearance of a diversity of complex life forms and the lack of morphological continuity affirm the biblical account of creation of many different kinds of organisms. Although there are still many questions, when the different types of data (that is, from geology and paleontology among others) are considered, there is significant evidence to support an interpretation of earth history that is consistent with the biblical record. ✎

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NOTES AND REFERENCES

1. See M. J. Benton, *The Fossil Record 2* (London: Chapman and Hall, 1993); and the online database at http://www.fossilrecord.net/fossilrecord/index.html. Also see M. J. Benton, "Diversification and Extinction in the History of Life," *Science* 268 (1995):52-58.

2. A. Kalmar and D. J. Currie, "The Completeness of the Continental Fossil Record and Its Impact on Patterns of Diversification," *Paleobiology* 36:1 (2010):51-60.

3. A "collector's curve" is a graph of the rate of discovery of new fossil types as more fossil specimens are collected. The line continues to rise as long as new types are discovered and then levels off when essentially all types have been found.

4. See Raúl Esperante's Chapter 14 on dinosaurs in L. James Gibson and Humberto M. Rasi, eds., *Understanding Creation* (Nampa, Idaho: Pacific Press Publ. Assn., 2011) and his article in *Ministry* (December 2009) titled "What Does the Bible Say About Dinosaurs?" available at http://www.ministrymagazine.org/archive/2009/december/what-does-the-bible-say-about-dinosaurs.

5. For example, see Leonard Brand with David Jarnes, *Beginnings: Are Science and Scrip-*

ture Partners in the Search for Origins? (Nampa, Idaho: Pacific Press Publ. Assn., 2006), pages 120 and 121. Brand here describes in his Model 2 a "wholistic geology" model, in which the Earth records geological processes that "have been operating from the time of the Fall [entrance of sin in the world] to the present."

6. Recent literature by Adventist scientists who discuss many of the issues relating to Earth history include Leonard Brand, *Faith, Reason, and Earth History, A Paradigm of Earth and Biological Origins by Intelligent Design,* 2nd rev. ed. (Berrien Springs, Mich.: Andrews University Press, 2009); H. G. Coffin, R. H. Brown, and L. James Gibson, *Origin by Design* (Hagerstown, Md.: Review and Herald Publ. Assn., 2005); R. M. Ritland, *A Search for Meaning in Nature: A New Look at Creation and Evolution* (Mountain View, Calif.: Pacific Press Publ. Assn., 1970); A. A. Roth, *Origins: Linking Science and Scripture* (Hagerstown, Md.: Review and Herald Publ. Assn., 1998); _____, *Science Discovers God: Seven Convincing Lines of Evidence for His Existence* (Hagerstown, Md.: Autumn House Publishing, 2008). Keep in mind that when this article refers to the biblical record (of creation week and the worldwide flood), it is referring to the traditional Seventh-day Adventist interpretation of the events recorded there. On the other hand, the evolutionary view implies a materialistic atheistic explanation of history.

7. Brand, *Beginnings* (2006), op cit., p. 120.

8. Ibid., p. 76.

9. See V. R. Baker, "The Channeled Scabland: a Retrospective," *Annual Review of Earth and Planetary Science* 37 (2009):393-411. In Baker's view, the stronghold of Uniformitarianism on the geologic community has hindered the advancement of science. See also J. Soennichsen, *Bretz's Flood: The Remarkable Story of a Rebel Geologist and the World's Greatest Flood* (Seattle, Wash.: Sasquatch Books, 2009).

10. D. Garcia-Castellanos, et al., "Catastrophic Flood of the Mediterranean After the Messinian Salinity Crisis," *Nature* 462 (2009): 778-781.

11. S. Gupta, et al., "Catastrophic Flooding Origin of Shelf Valley Systems in the English Channel," *Nature* 448 (2007):342-345.

12. Brand, *Beginnings,* op cit.; Roth, *Origins: Linking Science and Scripture,* op cit.; G. Shanmugam, "Fifty Years of the Turbidite Paradigm (1950s-1990s): Deep-Water Processes and Facies Models: a Critical Perspective," *Marine and Petroleum Geology* 17 (2000):285-342.

13. B. C. Yang, et al., "Wave-Generated Tidal Bundles as an Indication of Wave-Dominated Tidal Flats," *Geology* 36 (2008):39-42.

14. See M. Brongersma-Sanders, "Mass Mortality in the Sea," *GSA Memoir* 67 (1957):941-1010; M. Lockley and A. Rice, "Volcanism and Fossil Biotas," *GSA Special Paper* 244 (1990):1-136.

15. P. Schulte, et al., "The Chicxulub Asteroid Impact and Mass Extinction at the Cretaceous-Paleogene Boundary," *Science* 327 (2010):1214-1218. Read about the latest debate on the causes of the K-T mass extinction in *Science* 328 (2010), pages 973 and 974; R. A. F. Grieve, "Terrestrial Impact Structures," *Annual Review of Earth and Planetary Science* 15 (1987):245-270.

16. Baker, "The Channeled Scabland," op cit.; D. V. Ager, *The Nature of the Stratigraphical Record,* 3rd ed. (New York: John Wiley and Sons, 1993).

17. R. F. Dubiel, et al., "The Pangaean Megamonsoon—Evidence From the Upper Triassic Chinle Formation, Colorado Plateau," *Palaios* 6 (1991):347-370; Roth, *Origins: Linking Science and Scripture,* op cit.

18. J. P. Lockwood and R. W. Hazlett, *Volcanoes: Global Perspectives* (Hoboken, N.J.: John Wiley & Sons Ltd., 2010).

19. P. Kearey, et al., *Global Tectonics,* 3rd ed. (Hoboken, N.J.: Wiley-Blackwell, 2009).

20. K. R. Evans, et al., eds., "The Sedimentary Record of Meteorite Impacts," *GSA Special Paper* 437 (2008).

21. For an example, see D. M. Martill, et al., "Mass Mortality of Fishes in the Santana Formation (Lower Cretaceous ?Albian) of Northeast Brazil," *Cretaceous Research* 29 (2008): 649-658. See also D. J. Varricchio and J. R. Horner, "Hadrosaurid and Lambeosaurid Bone Beds From the Upper Cretaceous 2 Medicine Formation of Montana—Taphonomic and Biologic Implications," *Canadian Journal of Earth Sciences* 30:5 (1993):997-1006.

22. C. Koeberl and K. G. MacLeod, eds., "Catastrophic Events and Mass Extinctions: Impacts and Beyond," *GSA Special Paper* 356 (2002).

23. There are more than 15,000 species of trilobites, all of them extinct, to mention only one example.

24. D. J. Bottjer, et al., *Exceptional Fossil Preservation: A Unique View on the Evolution of Marine Life* (New York: Columbia University Press, 2002); P. A. Allison, "Konservat-Lagerstatten: Cause and Classification," *Paleobiology* 14:4 (1988):331-344.

25. C. M. Faux and K. Padian, "The Opisthotonic Posture of Vertebrate Skeletons: Postmortem Contraction or Death Throes?" *Paleobiology* 33:2 (2007):201-226.

26. See A. A. Roth, *Science Discovers God,* op cit., Chapter 5. Roth points out the major problem of explaining the origin of 19 different body plans in the phyla of the "Cambrian Explosion," when in the underlying Precambrian, and in very close stratigraphic proximity, there are only three.

27. See Brand, *Beginnings* (2006), op cit., page 73, Figure 7.7 (A and B), for a description of the actual pattern found in the fossil record, in which the diversity of phyla (major category of organisms), contrary to what one would expect in an evolutionary model, is higher at the bottom of the record and decreases upwards in the geologic column.

28. D. L. Rabosky and I. J. Lovette, "Explosive Evolutionary Radiations: Decreasing Speciation or Increasing Extinction Through Time?" *Evolution* 62 (2008):1866-1875.

29. For more on the question of microevolution and speciation within an interventionist (biblical) framework, see Brand, *Beginnings* (2006), op cit., page 53, and _____, *Faith, Reason, and Earth History* (2009), op cit., pages 162-179.

30. Roth, *Science Discovers God,* op cit., Chapter 6, discusses at length this famous "intermediate" and all the controversy among the paleontologists studying the origin of birds, feathers, and flight.

31. For more than a hundred years, scientists interpreted these layers as a succession of about 48 fossil forests. A body of data exists now (much of it a result of research stimulated by biblically shaped geohistorical paradigms) that suggests a catastrophic scenario of transported trees and vegetation such as the one documented after the eruption of Mount St. Helens. See W. J. Fritz, "Reinterpretation of the Depositional Environment of the Yellowstone 'Fossil Forests,'" *Geology* 8 (1980):309-313. For a detailed discussion, see Coffin, et al., *Origin by Design,* op cit., Chapter 18, and for a brief summary, see Brand, *Beginnings* (2006), op cit., page 156. These results might very well apply to other similar petrified forests.

32. Brand, *Beginnings* (2006), op cit., pages 133 to 136, discusses the implications of trace fossils and fossil eggs in the fossil record. While many of these activities require time (and any model should account for it), the preservation of these remains indicates unusual and catastrophic conditions.

33. See James Gibson, "Fossil Patterns: A Classification and Evaluation," *Origins* 23:2 (1996):68-96. These reported patterns found in the fossil record are classified into four categories: fossil diversity patterns, fossil morphological patterns, fossil ecological patterns, and depositional patterns. Gibson concludes that these patterns, catastrophic activity, global patterns, sudden, abrupt appearance of morphological disparity among marine animals in the "Cambrian Explosion," widespread extinction events, lack of ancestors in Precambrian rocks, and morphological gaps among higher taxa throughout the fossil record are all evidences expected within a biblical framework for the history of the Earth.

34. Almost 20 years ago, Ager, in *The Nature of the Stratigraphical Record* (op cit.), suggested that "we are beginning to see a somewhat 'catastrophic' picture." It is evident that he has been proven right. In addition, this overall nature of the record might be directly related to the strong imprint of the taphonomic processes that led to the preservation of remains of organisms in the fossil record, what has been termed the "taphonomic megabias" of the record (Kalmar and Currie [2010]:51); for reference, see endnote 2).