

Book Reviews

The first six chapters of the book make an attempt to give the reader an overview of the pertinent science relating to genetically diagnosing embryos. There were only a couple of times I cringed as I read through those early chapters. There were several errors/over-simplifications, and I was disappointed that the author touches only briefly on epigenetics (a mere page and a half). However, the first part of the book is not intended for scientists, and it does provide an interesting example of how someone with little to no scientific background can work toward an understanding of the field. The author does a nice job of explaining scientific concepts in a manner that nonscientists will likely be able to grasp.

Greely provides many examples of scientific advancements in the past and relevant legal cases with regard to human rights. In doing so, Greely gives his audience the tools to begin to wrestle with some of the important questions. Have the scientific and legal communities really examined the trajectory we are on? Do we want to live in a world in which we have parents genetically selecting which offspring should be given a chance at life? How do we educate those without a scientific background so they can make informed decisions when it comes to utilizing genetic diagnosis? What future injustices are we setting up? Who gets to say what traits are allowable, and which ones should be selected against? Can we, and should we, implement regulations of such a technology? Whom do we permit to enforce laws?

Ideally, the book will motivate Christian readers to think about where we want to go with the plausible scientific advances now on the horizon. We need to participate in ongoing discussions pertaining to genetic testing and stem-cell-related advances. However, we need to be aware not only of the subject matter but also of our audience. For example, the author points out that he is unwilling to engage in conversations with people who cite biblical references to argue that utilizing genetics to select embryos and choosing genetic traits for offspring is wrong. Greely clearly states that he is a consequentialist when it comes to ethical dilemmas and expresses that it is “surprisingly difficult” to find religious positions pertaining to EPGD, claiming he could not readily find a central authority figure who addresses the technologies on the horizon. As Christians, this should give us pause. Hopefully, we will contemplate and discuss what role Christians will/should play in answering these questions. Ideally, we can all participate in this discussion in a respectful and informed manner.

Choosing to have a child is a major decision many wrestle with. Imagine now a world in which we

have to wrestle with what traits we want that child to have. In *The End of Sex and the Future of Human Reproduction*, Greely calls us to learn as much as we can before this technology fully exists, so that we can be equipped to make informed decisions.

Reviewed by Elizabeth Y. Heeg, Associate Professor of Biology, Northwestern College, Orange City, IA 51041.



GEOLOGY

THE GRAND CANYON, MONUMENT TO AN ANCIENT EARTH: Can Noah's Flood Explain the Grand Canyon? by Carol Hill, Gregg Davidson, Tim Helble, and Wayne Ranney, eds. Grand Rapids, MI: Kregel Publications, 2016. 240 pages. Hardcover; \$26.99. ISBN: 9780825444210.

At last! We now have a scientifically credible, readable book about the Grand Canyon geology geared to nongeologists: *The Grand Canyon, Monument to an Ancient Earth: Can Noah's Flood Explain the Grand Canyon?* The answer given to the question posed by the title is a resounding “NO, IT CAN'T!” Although not stated in so many words, the authors were clearly motivated by a fervent desire to drive “flood geology” into extinction. I join the authors in hoping that they succeed.

This eagerly anticipated book has long been gestating, but the wait has been worth it. The full story behind *The Grand Canyon* was told in the June 2016 issue of *Perspectives on Science and Christian Faith* by Carol Hill, the instigator and driving force behind the book. A Christian geologist who specializes in cave geology and hydrology, Hill is the author of *Cave Minerals* and has published several technical articles on aspects of the Grand Canyon geology. She assembled a first-rate team of eleven contributors, at least eight of whom are Christians. Hill, Stephen Moshier, and Gregg Davidson did the lion's share of the writing, but every one of the eleven wrote at least one chapter and helped to shape the entire manuscript. The team of authors includes three hydrologists, a carbonate sedimentologist, an aqueous geochemist, two paleontologists, a structural geologist, a planetary scientist, a petroleum geologist, and a botanist, thus providing a wide range of professional expertise necessary for a competent discussion of virtually all aspects of the Grand Canyon geology. The contributors represent the American Association of Petroleum Geologists, five major universities (New Mexico, Mississippi, Tulsa, Northern Arizona, and Akron), two Christian colleges (Wheaton and Calvin), and two federal agencies (National Weather Service and

Los Alamos National Laboratory). At least one is also an independent geological consultant.

The authors were joined by photographer Bronze Black and graphic designer Susan Coman, both of whom did superlative work.

The Grand Canyon accomplishes many objectives. Readers are treated to a feast of palatable scientific information about the Grand Canyon. Many visitors to the canyon will want to acquire this book if for no other reason than to understand the geology that is exposed in the walls of the canyon as well as the history of the canyon itself. For others, the volume can serve as an elementary geology text. Readers who lack geological training receive a solid education in basic geologic principles that are applicable anywhere. These principles are routinely applied by field geologists around the world in their efforts to reconstruct the history of the rocks which they are investigating. Finally, the writers have provided an avalanche of evidence to refute the pseudo-science of flood geology. These ends have been achieved with clarity, vigor, and precision, but also in an irenic spirit that respects those whose fallacious views are vigorously challenged. One finds no epithets hurled at those who subscribe to flood geology.

This book consists of five parts. Part One sets the stage by providing an overview of the basic principles of flood geology and its relation to the Grand Canyon, along with a review of biblical texts invoked to support flood geology. The beginning section includes a helpful tabular comparison of flood geology and modern geology. Part One also contrasts the time frames of flood geology and modern geology. An outstanding feature is a two-page (pp. 42–43) set of color illustrations that depict the successive steps involved in the historical development of the local geology.

Part Two, a superb presentation in eight chapters on “How Geology Works,” provides the meat and potatoes of the book. Here the reader is treated to a sizeable chunk of Geology 101 at its finest. Given that the canyon walls consist predominantly of sandstone, shale, limestone, and conglomerate, Part Two focuses primarily on the nature and formation of sedimentary rocks. Distinctive structures of these rocks, such as ripple marks, mud cracks, and cross bedding, are discussed. The reader is shown how to apply modern sedimentary processes and features to the interpretation of ancient sedimentary rocks. The text is accompanied by gorgeous photographs of the features under discussion, along with clear maps and diagrams, all in color. The authors also explain how to determine the relative time relationships among

spatially associated rock bodies by means of the principles of superposition, cross-cutting relationships, original horizontality, lateral continuity, and faunal succession. The geologic timescale is described. The determination and reliability of the ages of (mostly) igneous rocks are due to the various methods of radiometric dating.

An extremely important section in Part Two is chapter 10 (Missing Time), which deals with gaps in the rock record, gaps that flood geology tends to gloss over in light of its stress on the catastrophic activity of a yearlong deluge. The authors describe the characteristics of unconformities, which are discontinuities in a pile of sedimentary rocks that have resulted from temporary nondeposition of sediment, erosion of previously deposited sediment, changes in the rate of sedimentation, changes in the composition of sediment being deposited, or combinations of those factors. The reader learns how to recognize the presence of unconformities features in rock exposures. Adherents of flood geology and young earth creationists contend that the sediment layers were deposited almost uninterrupted during the deluge, such that virtually the entire stack of sediments in the Grand Canyon remained essentially unconsolidated throughout the period of deposition. These contentions are readily refuted. This chapter is enhanced by photographs of unconformities and an impressive table (p. 100) that identifies and describes nineteen unconformities that have been detected in the walls of the Grand Canyon. Each one of the erosional episodes is indicated by the presence of an unconformity affected sedimentary material, which had already been consolidated into rock before subsequent layers of sediment were deposited.

Part Two concludes with a summary of the theory of plate tectonics and a lesson on how to extract historical information from the exceedingly common fractures, faults, and folds that are indicative of episodes of rock deformation.

Part Three turns to the study of fossil remains of the Grand Canyon, addressed in three chapters: fossil animals (fauna) of the Grand Canyon and the Grand Staircase to the north; fossil plants (flora) of the region; and trace fossils, which are features found on the surfaces of sedimentary rock layers, such as burrows and footprints, trails, and tail drag marks. Part Three includes excellent photographs of *in situ* fossils. Two informative tables summarize the characteristic animal and plant fossils that occur in the rock formations of each time period of the geologic column from Proterozoic (Early Proterozoic) to Cenozoic (Neogene). Stress is also laid on the significance of the animal and plant fossils that are not

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found in the Grand Canyon rocks, fossils that one might reasonably predict should be there if flood geology were valid.

An important aspect of Part Three is a discussion that debunks the claim made by some flood geology advocates that the rocks must be very recent because modern pollen has been found at the Grand Canyon. It is pointed out that any pollen found in the Grand Canyon was not extracted from the rocks themselves but derived solely from local plants currently growing in the canyon.

Part Four discusses the pros and cons of various processes by which the canyon may have been excavated and considers the age of the canyon. This section includes a brief look at modern life forms currently living in the canyon and a discussion of the implications of extinct animal fossils found in caves within the canyon for theories of canyon formation.

Although the entire text incorporates a running refutation of aspects of flood geology in the light of modern geological findings, the concluding Part Five lays out an overview of the geological history of the Grand Canyon area by summarizing the evidence drawn from the rocks exposed in the canyon. Here the reader is escorted on a step-by-step, river-to-rim, upward journey from the crystalline rocks exposed at the bottom of the canyon to the Kaibab Formation that occurs at the rim. The final chapter drives home the point that the totality of geological evidence found in the Grand Canyon unequivocally supports a complex, vastly ancient history involving the long-continued operation of depositional and erosional processes in shallow marine, deltaic, fluvial (river), lacustrine (lake), and eolian environments. The evidence bears no relation to Noah's or any other great flood.

The text of *The Grand Canyon* is a nutritious and tasty intellectual feast, but the to-die-for dessert is provided by spectacular color illustrations that greatly enhance the impact of the book. Approximately 250 maps, idealized cross sections, block diagrams, tables, and gorgeous photographs of the canyon taken from every perspective imaginable accompany the text. A compilation of references and general reading for further enlightenment rounds out the book.

Every pastor, every theologian and seminary student, every science professor and science student in a Christian college, every school board member, principal, science teacher, student, and parent connected with a Christian school, and every parent who homeschooled a child should read this book cover to cover. They should study the diagrams, tables, and photo-

graphs. After reading the book, they should place it on the coffee table as a permanent fixture. Then, as soon as possible, they should visit the Grand Canyon with their families and look for features explained in the book for themselves.

Congratulations are due to Kregel Publications for publishing this magnificent book and offering it at such a reasonable price.

Reviewed by Davis A. Young, Professor of Geology, Emeritus, Calvin College, Grand Rapids, MI 49546.



ORIGINS

DARWIN IN THE TWENTY-FIRST CENTURY: Nature, Humanity, and God by Phillip R. Sloan, Gerald McKenny, and Kathleen Eggleston, eds. Notre Dame, IN: University of Notre Dame Press, 2015. xviii+461 pages. Paperback; \$49.00. ISBN: 0268041474.

The title under review derives from one of the major academic conferences commemorating the 150th anniversary of the publication of Darwin's *On the Origin of Species* (November 24, 1859) and the bicentennial of Darwin's birth on February 12, 1809. Cosponsored by the John J. Reilly Center for Science, Technology, and Values at Notre Dame, and the Science, Theology, and the Ontological Quest project within the Vatican Pontifical Council for Culture, it brought together well over twenty interdisciplinarians to explore the heritage of evolutionary theory and its implications for human, social, and religious concerns in November 2009. The volume is intended both as a product of the events that transpired and as an advancement toward maturity of the field in the twenty-first century.

The focus of this volume is on present and future developments within evolutionary science and its impact on the humanities, rather than a strict historical commemoration of achievements. While based on the conference at Notre Dame, it does not include all the papers presented there, and has a distinctly Roman Catholic orientation (as might be surmised). The division of this collection of essays into the three areas of nature, humanity, and God reflects not only the conference itself, but also the major areas that evolutionary theory impacts: natural philosophy, humanity's place in the cosmos, evolutionary ethics, and the relation between scientific and theological explanations of human origins. What follows are selective highlights that seem particularly important.

A particularly strong chapter within the first section on nature is Scott F. Gilbert's "Evolution