

THE BIBLE, ROCKS AND TIME

Geological Evidence for the Age of the Earth



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& Ralph F. Stearley



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CONTENTS

Preface	9
List of Figures and Tables	13
Abbreviations	17
Introduction	19
PART ONE: HISTORICAL PERSPECTIVES	
1. The Age of the Earth Through the Seventeenth Century.	27
2. Investigation of the Earth in the Seventeenth Century	47
3. The Emergence of Modern Geology	71
4. Harmonizing Geological Chronology and Scripture in the Nineteenth Century	101
5. Antiquity of the Earth: Twentieth Century to the Present	132
PART TWO: BIBLICAL PERSPECTIVES	
6. The Bible and the Antiquity of the Earth: Part One	165
7. The Bible and the Antiquity of the Earth: Part Two	184
PART THREE: GEOLOGICAL PERSPECTIVES	
8. The Nature and Nurture of the Stratigraphic Record	213
9. Fossil Graveyards: A Rumble in the Jumble?	243
10. Sands Through the Hourglass: Sedimentation, Ancient Environments and Time	288
11. Of Time, Temperature and Turkeys: Clues from the Depths	312

12. Time and the Stratigraphy of the Michigan Basin: A Case Study	341
13. Illumination from the Range of Light: The Sierra Nevada	365
14. Radiometric Dating: Part One	388
15. Radiometric Dating: Part Two	415

PART FOUR: PHILOSOPHICAL PERSPECTIVES

16. Uniformitarianism, Catastrophism and Empiricism	447
17. Creationism, Evangelism and Apologetics.	475
Name Index	496
Subject Index	501
Scripture Index	509

PREFACE

THE PROJECT CULMINATING IN THE PUBLICATION OF *The Bible, Rocks and Time* began innocuously enough when Ralph poked his head into Dave's office one day in 2002. He had dropped in for another of the hundreds of informal conversations that we had enjoyed as friends and colleagues in the Department of Geology, Geography, and Environmental Studies at Calvin College. After ten years of teaching geology at New York University and the University of North Carolina at Wilmington, Dave came to Calvin in 1978 to help develop a geology program. As a "hard-rock" geologist, Dave taught mineralogy, igneous and metamorphic petrology, geochemistry and other geology courses. Ralph joined the department in 1992 and lent his expertise to the program by teaching courses in paleontology, stratigraphy, sedimentology and historical geology.

Along with our common love for and commitment to Jesus Christ, the Reformed tradition of Christianity, God's creation and the science of geology, we were both greatly interested in the history of geologic thought as well as issues concerning the integration of Christian faith and the natural sciences, issues that we frequently discussed and were privileged to teach our students at Calvin. Besides these common interests, both of us can attest to the fact that some of our most satisfying and enjoyable experiences at Calvin involved collaborative efforts. On several occasions, we co-taught courses or co-led extended geology field trips outside our regional mid-continent setting.

With his responsibility for teaching historical geology each spring, Ralph annually assigned as required reading a book that Dave had published in

1982, *Christianity and the Age of the Earth*. After many years using the book, Ralph recognized topics that he wished were in the book and also saw places in which the argumentation of the text could be improved or abandoned altogether. Thus, when Ralph showed up in Dave's office that day in 2002 he simply posed the question, "What would you think about collaborating on a revision of *Christianity and the Age of the Earth*?" Dave normally has several writing projects whirling around in his brain, but a revision of this book was not among them. It didn't take long, however, for him to realize the importance of undertaking the project, and the prospect of collaborating with Ralph on the book made the whole idea much more enticing. We agreed to do it.

Given the other teaching, writing and administrative commitments that accompany the academic life, progress at first was slow, limited to fleshing out a broad outline of what we wanted to accomplish and determining the division of labor. The project gathered momentum when Dave retired in June 2004, after thirty-six years of college teaching (twenty-six at Calvin). He and his wife, Dottie, immediately moved to Tucson, Arizona, an incredibly inspiring and stimulating place in which to write. Dave now had ample time to devote to the revision. Ralph was able to devote summers to the project, and during a sabbatical leave in early 2007, he at last had a large uninterrupted block of time. We communicated our progress via email, but midway through that sabbatical Ralph and his wife, Gloria, drove to Tucson for a six-week stay. During this period, we were able to work through and fine-tune the entire manuscript for publication.

The Bible, Rocks and Time is virtually a total rewrite of *Christianity and the Age of the Earth*. Although the theme and format of both books are very similar, they are very different books. The goal of our book is to convince readers, on both biblical and geological grounds, of the vast antiquity of this amazing planet that is our God-given home. Along the way we point out the flaws of so-called young-Earth creationism. Although the issue of Earth's antiquity may seem to be little more than an interesting intellectual exercise that has little immediate bearing on one's life, we point out that this issue can have profound spiritual consequences for the church of Jesus Christ, the individual Christian and the nonbeliever as well.

This book is addressed primarily to Christian pastors, theologians, biblical scholars, students and lay people with some interest in scientific questions, but we extend an open invitation to non-Christians to read the book as well because we not only seek to persuade Christians to abandon any idea that the Bible demands belief in God's creation of the world only a few thousand years ago but also to show non-Christians that acceptance of modern geological conclusions regarding an ancient Earth is by no means incompatible with

biblical Christianity. In other words, nobody needs to abandon sound science in order to become a Bible-believing follower of Jesus Christ.

Readers should take note that wherever we make reference to the biblical flood associated with Noah, we have capitalized the words *Flood* and *Deluge*, in distinction from “generic” floods for which we use lowercase. We also refer to a significant component of young-Earth creationism known as “Flood geology,” a fundamentally flawed way of looking at Earth history compared with that of standard, mainstream scientific geology. By the same token we have typically capitalized *Fall* in reference to the Fall of Adam because of its unique significance.

The reader will also note that sometimes we capitalize *Earth* and at other times we use lowercase letters. When references to “the earth” occur in the context of the biblical text, we typically use lowercase. On the other hand, we capitalize *Earth* where discussing the planet in a scientific context. To scientists, the planet on which we live is named “Earth” with a capital E just as Jupiter, Venus, Saturn and the other planets of the Solar System are capitalized. Thus, we frequently refer to “Earth.” As many readers are not accustomed to that usage, however, we sometimes use the more familiar expression, “the Earth.” Terms like “the sun” and “the moon” are treated in similar fashion. Throughout the text, we also normally refer to distance measurements in terms familiar to most English readers such as feet and miles. In places, however, we employ the metric system: centimeters, meters and kilometers. The reader can make a rough conversion between kilometers and miles by remembering that one kilometer is about 0.6 mile.

We are greatly indebted to the assistance of many friends and colleagues in preparation of the book. We have received helpful reviews of historical and biblical chapters from David Rylaarsdam of Calvin Theological Seminary and Pete Enns of Westminster Theological Seminary. Material pertaining to geology was reviewed by several members and friends of the Affiliation of Christian Geologists that include Michael Roberts, Steve Moshier, Kent Ratajeski, Ken Van Dellen, Jeff Greenberg, and our colleague Gerry Van Kooten at Calvin College. The constructive comments of these Christian geologists, all of whom have no doubt that God’s Earth is billions of years old, are deeply appreciated. Bruce Rubidge of the Bernard Price Institute, University of Witwatersrand, kindly provided information concerning the vertebrate faunas of the Karoo Formation of South Africa. William Harrison II of Western Michigan University provided historical information on oil and gas exploration in the Michigan Basin.

We also express our gratitude to Jim Bratt, director of the Calvin Center for Christian Scholarship, for his strong support and encouragement. The Center

provided a summer stipend for Ralph as well as a generous grant that made it possible for him to spend a significant portion of his sabbatical leave in Tucson so that we could finalize our manuscript. Ralph is also grateful to Calvin College for two Calvin Research Fellowships in support of this work. Ellen Alderink of Calvin's audiovisual department graciously drafted several of the diagrams. Tim and Mary Ann Young generously scanned some of the slides and illustrations.

To the following institutions we acknowledge permission and express gratitude for permission to quote or to use illustrations: Princeton University Press, Zondervan, Continuum International Publishing Group, Harvard University Press, Paulist Press, Creation Science Fellowship, P & R Publishing, Reivew and Herald Publishing Association, Master Books/NewLeaf Publishing Group, Andrews University Press, Wysong Corporation, Institute for Creation Research, The Word for Today, American Association of Petroleum Geologists (AAPG), National Portrait Gallery, Natural History Museum, Geological Society (London), California Institute of Technology, The McGraw-Hill Companies, Geological Society of America, Institute of Medical Anatomy/University of Copenhagen, National Trust of Scotland/Hugh Miller Museum, Technische Universität Bergakademie Freiberg, International Ocean Drilling Program/Texas A & M University, Dinosaur National Monument, University of Nebraska State Museum, Larry Agenbroad, Walt Brown, Stephen O. Moshier and Jody Brown Zylstra.

Dave is grateful to Dottie for her unflagging support, and Ralph expresses his indebtedness to his parents for their love, support and encouragement over the years and to Gloria and children for their patience during the project.

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INTRODUCTION

HUGH MILLER (1802-1856) WAS ONE OF THE eminent figures of nineteenth-century Scotland (fig. I.1).¹ A native of the coastal town of Cromarty on the Moray Firth, a few miles north of Inverness, Miller lost his father at the age of five and grew up in poverty. As a young man he made a hardscrabble living as a stonemason, but his discovery of the remains of excellently preserved fossil fishes embedded in the blocks of red Devonian sandstones of the quarries in which he labored triggered a deep interest in geology that would alter his life. Fueled by his newfound passion for geology, Miller became an excellent field geologist and paleontologist who acquired considerable knowledge of fossil fishes, thanks to study with Louis Agassiz, the preeminent authority on fossil fishes of his era. Miller's fame, however, rested on his remarkable gift for written expression. Although he acquired a reputation among the Scottish populace for his verse and books about Scottish folklore, it was especially his rare talent for lucid, popular expositions of geology that expanded that reputation. Among his geology books that remain a pleasure to read to this day are

¹On Miller's life see Michael Shortland, ed., *Hugh Miller's Memoir: From Stonemason to Geologist* (Edinburgh: Edinburgh University Press, 1995); and *Hugh Miller and the Controversies of Victorian Science* (Oxford: Clarendon, 1996). Several works by Miller have recently been republished, including *My Schools and Schoolmasters* (Edinburgh: B & W Publishing, 1993); *Legends and Tales of the North of Scotland* (Edinburgh: B & W Publishing, 1994); and his last great work, *The Testimony of the Rocks; or, Geology in Its Bearings on the Two Theologies, Natural and Revealed* (Cambridge: St. Matthew Publishing, 2001). Miller's cottage, now a small museum that is well worth a visit, still stands in Cromarty and contains many displays pertaining to Miller's life and work.

The Old Red Sandstone, The Footprints of the Creator and his greatest work, *The Testimony of the Rocks*.²

Miller's writings were distinctive, however, because he was also a devout Presbyterian who was concerned about the spiritual condition of his church,

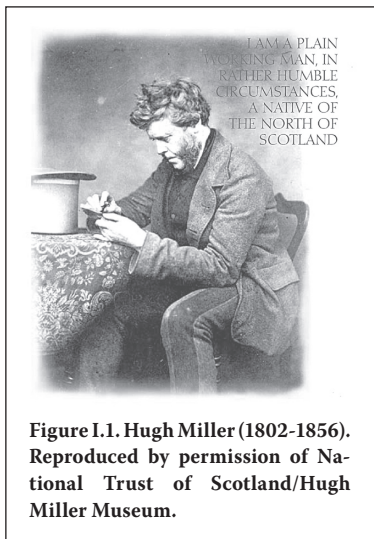


Figure I.1. Hugh Miller (1802-1856). Reproduced by permission of National Trust of Scotland/Hugh Miller Museum.

the national Church of Scotland. Along with many other Scots, he aligned himself with the evangelical movement led by Thomas Chalmers that culminated in the Disruption of 1843 when 450 ministers walked out of the General Assembly of the Church of Scotland down the street to Tanfield Hall where they established the Free Church of Scotland, a denomination that recognized that Jesus Christ is the sole head of the church and that congregations had the right to select their own ministers. Miller was profoundly influential in the new denomination because, in view of his literary skill, he was appointed as editor of *The Witness*, the ecclesiastical journal of the Free Church of Scotland. In

its editorial columns, Miller educated members of the Free Church and the Scottish public not only about ecclesiastical and theological affairs but also about geology! As both a Christian and an experienced paleontologist, Miller thought much about the relation of his faith to his geological knowledge, and he recognized from Scottish geology, with which he had plenty of field experience, that God's Earth was far older than the 6,000 years entertained by Christians of a bygone era.³

In *The Testimony of the Rocks*, the great masterpiece written just before his tragic suicide in 1856, Miller elegantly laid out a persuasive case on biblical and scientific grounds for an old Earth and a localized Noachic Flood. He

²Arguably Miller's three most important geological works are *The Old Red Sandstone; or, New Walks in an Old Field* (Edinburgh: John Johnstone, 1841); *The Footprints of the Creator; or, The Asterolepis of Stromness* (London: Johnstone and Hunter, 1849); and *The Testimony of the Rocks; or, Geology in its Bearings on the Two Theologies, Natural and Revealed* (Edinburgh: Thomas Constable, 1857). This last work was a compilation of public lectures given in Edinburgh and Glasgow.

³Toward the end of his life, Miller was working on a big book summarizing the geology of Scotland. After his death, Miller's wife, Lydia, no mean writer herself, published a set of his lectures that incorporated material that formed part of the projected magnum opus. See Hugh Miller, *Popular Geology: A Series of Lectures Read Before the Philosophical Institution of Edinburgh with Descriptive Sketches from a Geologist's Portfolio* (Boston: Gould and Lincoln, 1859).

predicted that the ideas of a group that he termed “anti-geologists” would soon be as obsolete as those of the astronomers who upheld the geocentric world picture of Ptolemy. Miller’s “anti-geology” referred to a belief, based on a very literalistic interpretation of the early chapters of Genesis, in the concept of a very young Earth that had been destroyed by a global Flood. He envisioned a time when it would be plain to everyone that such belief would be a relic of a bygone era. The time was at hand, Miller maintained, when the history of the Earth unfolding through long geological ages would be found “more worthy of its Divine Author than that which would huddle the whole into a few literal days, and convert the incalculably ancient universe which we inhabit into a hastily run-up erection of yesterday.”⁴

Miller proved to be a far better geologist than prophet. Little did he suspect that the second half of the twentieth century would witness a stunning and baffling explosion of “anti-geology” in its modern guise of young-Earth creationism (also known variously as scientific creationism, biblical creationism, literal creationism) and its associate, Flood geology. Far from fading away, these convictions about Earth history not only flourished in the evangelical wing of the Christian church but also came to the attention of the general public and attracted a hostile response from the scientific community.

To combat the geological fallacies associated with the modern version of “anti-geology” that infected the Christian community, D. A. Young published *Christianity and the Age of the Earth (CAE)* in 1982.⁵ This book was well received by younger Christian natural scientists who had been strongly influenced during their youth by young-Earth creationism and were unsure how to integrate their Christian faith with the scientific knowledge they gained in their formal studies. *CAE* also received favorable notice in a number of recent works on systematic theology. Unfortunately, some people writing about geology in relation to the Bible in recent works on systematic theology could have profited from reading *CAE*. Predictably, leaders in the young-Earth creationist movement failed to render a warm welcome to *CAE*.⁶

Despite the publication of *CAE* and other works by Christians advocating an ancient Earth, young-Earth creationism continues to thrive in the evangelical universe. Miller’s prediction seems no closer to fulfillment today than it did a quarter century ago when *CAE* first appeared. Far too many Christian institutions, including colleges, elementary and secondary schools, theological

⁴Miller, *The Testimony of the Rocks*, p. 428.

⁵Davis A. Young, *Christianity and the Age of the Earth* (Grand Rapids: Zondervan, 1982).

⁶For example, Henry M. Morris, *Science, Scripture, and the Young Earth* (El Cajon, Calif.: Institute for Creation Research, 1983); and Henry M. Morris and John D. Morris, *Science, Scripture, and the Young Earth*, 2nd ed. (El Cajon, Calif.: Institute for Creation Research, 1989).

seminaries, ecclesiastical denominations, and individual congregations, and far too many individual Christians, including pastors, theologians, educated lay people, leaders and students, along with much of the general population, continue to dwell in appalling gross darkness when it comes to knowledge about the composition, structure, processes and history of the planet on which they live. The sad thing is that this ignorance accompanies the confession of evangelicals that the Earth is a creation of the God they worship and serve. Not infrequently the little “knowledge” that evangelicals possess about Earth’s history is fiction rather than fact.

Although public attention has been somewhat diverted from young-Earth creationism and Flood geology in recent years thanks to the rising popularity of the Intelligent Design movement, young-Earth creationism continues to exert pervasive influence throughout the evangelical and fundamentalist world. Within the past half-century, well-meaning but poorly informed Christians have written hundreds of books, pamphlets and articles under the conviction that the globe is only a few thousand years old and that the biblical Deluge was responsible for a vast portion of Earth’s layered, fossiliferous sedimentary rocks. Young-Earth creationists with well-honed debating skills take on proponents of strictly materialistic versions of biological evolution on many college and university campuses. Young-Earth creationism and Flood geology are commonly featured on Christian radio programs, and these views appear in curricular materials, especially those employed by the home-schooling movement. In this new age of the Internet, young-Earth creationism has increased its influence through dozens of websites maintained by individuals and organizations such as Answers in Genesis. Of particular significance is the fact that every four years a technical conference on creationism is held in Pittsburgh. The current crop of young-Earth leaders is geologically more savvy than was the case twenty-five years ago, and their geological arguments have become considerably more sophisticated. Fortunately, the newer generation has tried to weed out some of the more egregiously fallacious claims that permeate the movement.

Despite widespread popularity of young-Earth creationism, particularly in evangelical circles, other Christians are convinced, as was Hugh Miller, that a long geological history is both demanded by the scientific evidence and consistent with the inspired account of creation in the book of Genesis.⁷ Among these are the authors of this book, along with the vast majority of members of the Affiliation of Christian Geologists. Moreover, the worldwide profes-

⁷See, for example, Alan Hayward, *Creation and Evolution: The Facts and Fallacies* (London: Triangle, 1985); Dan Wonderly, *God’s Time-Records in Ancient Sediments: Evidences of Long Time Spans in Earth’s History* (Flint, Mich.: Crystal Press, 1977); and John L. Wiester, *The Genesis Connection* (Nashville: Thomas Nelson, 1983).

sional geological community, consisting of tens of thousands of geologists, both Christian and non-Christian, is totally convinced of the vast antiquity of our planet. They are also convinced that sedimentary rocks were formed by a wide variety of processes, including deposition by wind, rivers, ocean waves and glaciers along coasts, in the deep ocean, in river valleys, on desert floors, rather than by a single, global, catastrophic Flood. Mainstream geologists are persuaded that young-Earth creationism and Flood geology, despite the façade of scientific sophistication with which they are presented to a geologically naive public, are deeply flawed both scientifically and biblically. Christian geologists are especially concerned that persistent efforts by well-intentioned believers to gain acceptance for young-Earth creationism as a viable alternative to mainstream geological thinking will result in deepening alienation of the scientific community from evangelical Christianity, a trend that does not bode well for evangelization of scientists.

To provide a fresh critique of young-Earth creationism and Flood geology for the benefit of Christians and non-Christians alike, we present *The Bible, Rocks and Time*, a completely revised, rewritten, and updated work based on the theme and format of *CAE*. In support of the vast antiquity of God's Earth, we present a case that has historical, biblical, scientific and philosophical dimensions. We write to convince Bible-believing Christians that the Earth really is extremely old and to show them that acceptance of such a belief need not be in any way a threat to their Christian faith. But we also write to demonstrate to non-Christians who may understandably entertain the false impression that Christianity entails commitments to a young Earth and a global Deluge that such commitments are by no means inherent to Christian faith.

To provide a context for the ongoing controversy about Earth's antiquity, we begin with a survey of the history of ideas about the age of the Earth.⁸ While noting the diversity of interpretations of Genesis 1 in the early and medieval church, we point out that the church's scholars took it for granted that the Earth was only a few thousand years old. In the context of the birth and maturing of scientific geology after the Protestant Reformation, we describe the growing awareness that the globe might be older than had traditionally been perceived. Finally, we discuss the varied biblically based responses to the idea of an ancient Earth within the Christian community.

Next, we proceed to the biblical aspects of the discussion about terrestrial

⁸For an overview of ideas about the age of the Earth, including the Greeks, see Patrick Wyse Jackson, *The Chronologer's Quest: The Search for the Age of the Earth* (Cambridge: Cambridge University Press, 2006). Some useful older works include Francis Haber, *The Age of the World: Moses to Darwin* (Baltimore, Md.: Johns Hopkins Press, 1959); and Stephen Toulmin and June Goodfield, *The Discovery of Time* (New York: Harper & Row, 1965).

antiquity. Those who argue that the Earth is only a few thousands of years old generally maintain that the six days of creation mentioned in Genesis 1 must be taken as six literal, ordinary, twenty-four-hour days.⁹ They also maintain that the Flood of Noah described in Genesis 6—8 covered the entire globe and did a tremendous amount of geological work. Other Christians who believe that the Earth is extremely old have interpreted the creation account of Genesis 1 in a variety of alternative ways, and they also maintain that Genesis does not necessarily require belief that the Flood of Noah covered the entire globe.¹⁰ We present evidence that the biblical text does not demand adherence to the traditional interpretation that God created the world in six successive, twenty-four-hour days only a few thousand years ago. On that basis we claim that the Bible does not demand assent to any specific age for the planet.

In the third section of the book we examine geological evidence pertinent to Earth's antiquity. We show from several angles that geological evidence overwhelmingly indicates that the Earth has had an extremely long, dynamic history. We examine and refute, in light of contemporary geology, many of the geological arguments that are alleged by young-Earth creationists to support a young-Earth view. Some readers without a scientific background may find chapters eleven, fourteen and fifteen daunting, but even without reading those chapters, they should still be able to recognize that geology demands an old Earth.

The book concludes with a look at the philosophical side of the discussion. We demonstrate that, despite their adherence to a philosophical principle of catastrophism, young-Earth creationists, nonetheless, unavoidably often present their case from a "uniformitarian" point of view in much the same way as mainstream geologists do, that is, by appeal to geologic evidence and present-day understanding of natural processes. They simply misinterpret and/or ignore the evidence. We further show that young-Earth creationists completely fail to understand the concept of "uniformitarianism" as employed by contemporary geologists. The final chapter concerns the implications of acceptance of an old Earth for Christian faith and shows that such acceptance need pose no threat to Christianity. In contrast, the cause of Christian faith is damaged by promotion of false belief.

Let's get underway.

⁹The second article of the statement of belief of the Creation Research Society says that "All basic types of living things, including man, were made by direct creative acts of God during the Creation Week described in Genesis." Rebuttals of alternative interpretations of Genesis 1 are presented in Henry M. Morris, *Scientific Creationism*, 1st ed. (El Cajon, Calif.: Master Books, 1974).

¹⁰On the church's response to scientific discoveries pertaining to Noah's flood, see Davis A. Young, *The Biblical Flood: A Case Study of the Church's Response to Extrabiblical Evidence* (Grand Rapids: Eerdmans, 1995).