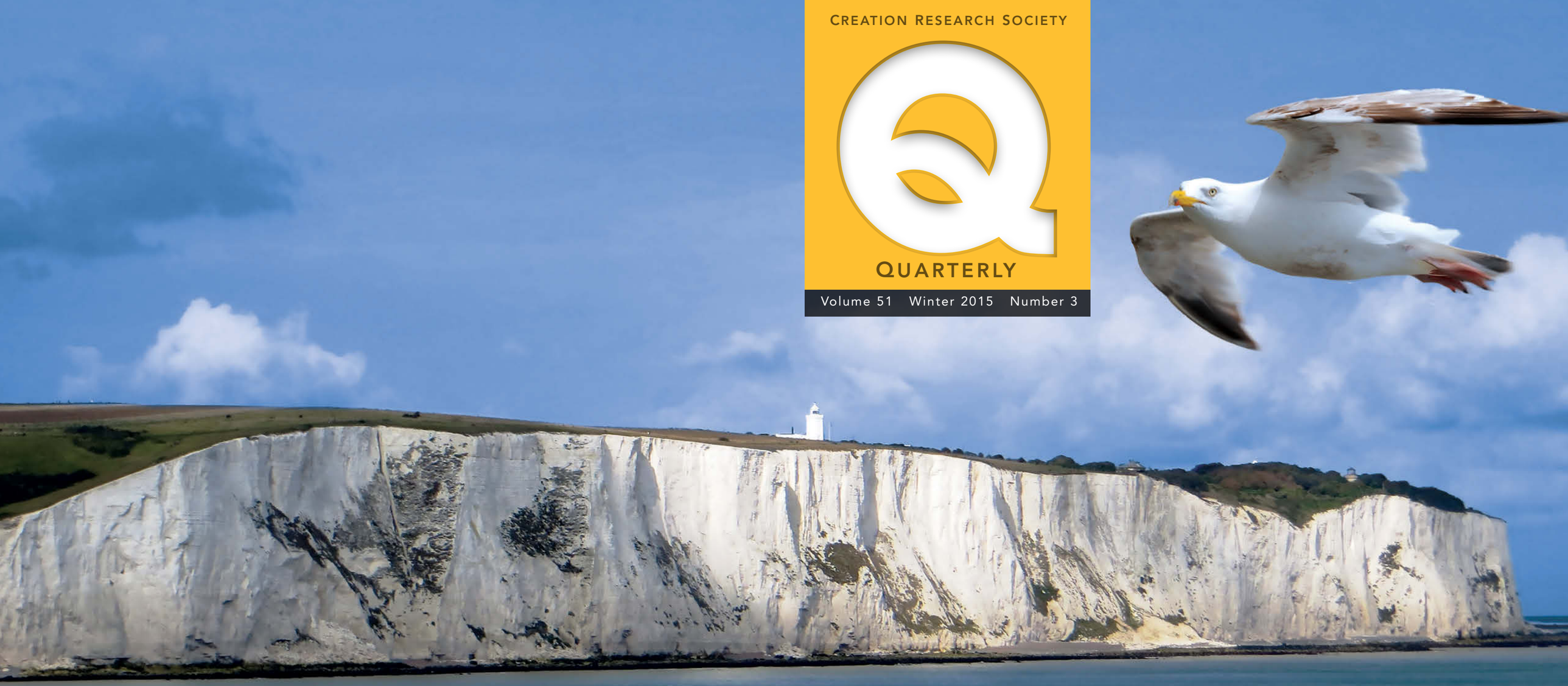
CREATION RESEARCH SOCIETY

QUARTERLY

Volume 51 Winter 2015 Number 3



- *Battlegrounds of Natural History III: Historicism*
- *Dating Pedigree of Seafloor Sediment: A Case Study*
- *Erosion of the Weald—Part 1*
- *Biocomplexity of Interlocking Genome Languages*
- *Copernicus, Heliocentricity, and the Catholic Church*

Creation Research Society Quarterly

Volume 51
Number 3
Winter 2015

Articles

Departments

Haec Credimus

For in six days the Lord made heaven and earth, the sea, and all that in them is, and rested on the seventh.—Exodus 20:11

Creation Research Society Quarterly

Volume 51
Number 3
Winter 2015

Cover photo from DollarPhotoClub.com

Cover design by Michael Erkel:
Michael Erkel and Associates, 1171 Carter Street,
Crozet, Virginia 22932

Design services by Cindy Blandon, cblandon@aol.com

The *Creation Research Society Quarterly* is published by the Creation Research Society, 6801 N. Highway 89, Chino Valley, AZ 86323, and it is indexed in the *Christian Periodical Index* and the *Zoological Record*.

Send papers on all subjects to the Editor:
CRSQeditor@creationresearch.org or to
Danny R. Faulkner, 1414 Bur Oak Ct,
Hebron, KY 41048.

Send book reviews to the Book Review Editor:
Don B. DeYoung, 200 Seminary Dr.,
Winona Lake, IN 46590, dbdeyoung@grace.edu.

ISSN 0092-9166

Printed in the United States of America

Editorial

Christian Gnosticism

The early church had to deal with Gnosticism. The Gnostics taught that matter is inherently evil but spirit is good. They advocated asceticism as a means to free oneself from the impure physical state in which we are born. This dualism led the Gnostics into at least two heresies. One was the denial of the physical resurrection of both Christ and believers. If matter by its very nature is evil, then a physical body cannot be free of that corruption. The apostle Paul likely was refuting an early form of this heresy in his discussion of the resurrection in 1 Corinthians 15. The second heresy the Gnostics held was an improper view of the nature of Jesus Christ. Since they taught that the physical is evil, they could not fathom that Jesus was Emmanuel, God with us, so they denied the deity and incarnation of Jesus. The apostle John dealt with this error in his gospel and in his first epistle.

The Gnostic concept of Jesus took several forms. Some Gnostics taught that Jesus was born a man but obtained a superior spiritual status at some point. Others taught that God created Jesus as a sort of angelic being, who in turn created the world. Many of the Gnostic doctrines about Jesus best could be described as a form of Arianism, a belief that persists today among many cults and false religions. While Gnosticism was an issue in the first-century church, Gnosticism as dealt with in the New Testament was incipient. It probably did not reach its peak till around AD 150, long after the New Testament books were written. The battle continued from there. For instance, Arius, for whom Arianism is named, lived from AD 250 to 336. However, it was during the lifetime of Arius that victory over this Gnosticism largely was achieved. The Nicene Creed, adopted in 325, largely was an anti-Gnostic document, and it defined orthodoxy as we now know it. Gnosticism never entirely went away, but its influence within the church with regard to the resurrection and the nature of Christ waned considerably after the Council of Nicaea in 325.

This is as far as most discussions about Gnosticism and its effect upon the church go, but there is far more that could be said. Gnosticism has a very long history and has assumed many different forms. A full discussion of Gnosticism would be very lengthy, and I am hardly qualified to engage in anything like a thorough discussion of it. Hence, it is not my intention to give a full treatment of Gnosticism here. Rather, I wish to focus on one aspect of Gnosticism that has affected the church but has received scant attention.

The word "Gnosticism" comes from the Greek adjective *gnostikos*, meaning "learned," which in turn comes from the Greek word for knowledge, *gnosis*. The Gnostics thought that secret knowledge led to salvation or at least to some higher spiritual plane. Those who were enlightened by this secret knowledge were initiated into that higher spiritual existence; hence, the Gnostics were eager to seek out the hidden knowledge and to share what special knowledge they had discovered. Unfortunately, this form of Gnosticism is still present within Christianity today. I will briefly discuss some manifestations of this.

The Bible Code

Perhaps the best example of this form of Gnosticism is the supposed Bible code. The modern version of this began just two decades ago with the publication of an article in a scholarly journal suggesting hidden messages in the Hebrew Torah (Witztum, Rips, Rosenberg, 1994). These authors claimed that by looking at letters equally spaced in the Hebrew text of Genesis, they could see hidden messages spelled out. Of course, which number one selected for equal spacing of letters appears arbitrary, and any messages gleaned were subject to interpretation in what amounted to a sort of Rorschach test.

A few years later, Michael Drosnin expanded and popularized these ideas in a bestselling book and a sequel (Drosnin, 1997, 2002). Many others have followed the lead of Drosnin and written their own books or established websites dedicated to the supposed Bible code. Unfortunately, many Christians got caught up in this nonsense and began spreading Drosnin's conclusions and embellishing them. While well intentioned, these Christians appear oblivious to grave concerns about Drosnin's approach. Not the least of these concerns is Drosnin's poor view of Scripture, in that he

believes extraterrestrial aliens wrote the code, and presumably the Bible as well.

The Bible code is in direct conflict with the perspicuity, or clarity, of Scripture, a foundational doctrine of the Protestant Reformation and of the modern creation movement. The Roman Catholic Church had obscured Scripture and discouraged people from reading the Bible because it found that when people read the Bible, they often saw that the Bible contradicted teachings of the Roman Catholic Church. Indeed, Martin Luther was led to his life's work by reading the Bible and finding that what he had learned in his education from the Roman Catholic Church departed remarkably from what Scripture said. To counter this problem, the Roman Catholic Church asserted that it alone has the authority to interpret the Bible, and so individuals must disregard what they think the Bible actually says. This amounts to a form of hidden knowledge that must be decoded by the Roman Catholic Church. It is sad to see so many Christians today abandoning the perspicuity of Scripture in favor of hidden meanings and messages in Sripture.

What is the attraction of the Bible code? One possible reason for it is the validation some people might receive from hidden messages in Scripture. We believe the Bible is inspired, because the Bible makes that claim (2 Timothy 3:16). However, any supposed sacred writing can make that claim, so making such a claim does not automatically make the claim true. The inspiration of the Bible is objective reality, and it is true regardless of whether we believe it or have some sort of evidence other than the self-testimony of Scripture to support that belief. Belief in the inspiration of Scripture is a matter of faith, and that faith is directly related to our faith in Jesus Christ, of whom the Bible testifies. Still, some believers desire other confirmatory evidence for their faith, and in their minds, a special code hidden within the Bible suffices to establish this. That is, a code hidden in the Bible constitutes evidence that the Bible truly is inspired by God; thus, it validates their belief in the doctrine of inspiration.

Another possible reason for ready acceptance of the Bible code is that some believers may think it is an effective evangelistic tool. They may believe God can use hidden messages in the Bible to show skeptics the Bible is not just a human-authored book.

Numerology

Nor is this search for hidden knowledge restricted just to the Bible code. Many Christians subscribe to numerology, the belief that numbers found throughout the Bible have special meanings. Probably the authoritative source on this subject is the book by E. W. Bullinger (1837–1913), *Number in Scripture* (Bullinger, 1967). No one can dispute that certain numbers appear frequently in the Bible and that certain numbers may share some themes. Consider that Jacob had twelve sons, and hence there were twelve tribes of Israel. In some cases, the number twelve found elsewhere in Scripture is tied to the twelve tribes. For instance, the breastplate made for the high priest had twelve stones, with each stone identified with one of the twelve tribes (Exodus 28:15–21). In similar manner, the New Jerusalem will have twelve gates and twelve angels, with each gate's name bearing the name of one of the twelve tribes (Revelation 21:12). However, in other cases, the number twelve is not identified with anything, let alone the number of tribes of Israel. This is the case with the twelve disciples of Jesus. It is tempting to make the identification of each disciple with a tribe, but there is no scriptural basis for doing so. It is acceptable to conjecture that that is the reason why there were twelve disciples, but it is improper to dogmatically assert that necessarily is the case.

Or consider the number seven. There were seven days in the Creation Week, and this is the pattern we continue to follow today. The number seven repeatedly appears in the book of Revelation—the seven churches, the seven lamps, and the seven stars in Jesus' hand are in chapter 1 alone. What is the significance of each instance of the number seven? We don't know, because the Bible does not reveal that to us. Once again, it is fine to conjecture about this, but one must be very careful to ensure that this remains in the realm of speculation and does not become dogma. Some numbers appear to be poetic, so their use in Scripture may not amount to anything more than beauty. This is not to suggest that the numbers and the things they were counting necessarily were not real, but the numbers can convey beauty. Consider Jesus' response to Peter (Matthew 18:21–22), when Peter asked how many times he ought to forgive a brother and suggested up to seven times. It was a common teaching among the Jews at the time that they were required to forgive someone up to three times, so why did Peter ask about forgiving seven times? Perhaps Peter thought seven was nobler than three, or maybe he was being poetic. It made no matter, because Jesus replied that one should forgive up to seventy times seven. No one hearing that would have thought that number was to be taken literally, that is, that one is required to forgive up to 490 times but no more. Rather, Jesus was telling them to continue to forgive without keeping track of the number of times.

Why does 1 Samuel 17:40 record that David picked up five stones when he went out to slay Goliath? Probably because that is how many stones David picked up. Apparently it took but one stone to bring Goliath down (1 Samuel 17:49), so why did David pick up five stones rather than one? We don't know, because the writer of 1 Samuel (acting under inspiration of the Holy Spirit) did not see fit to tell us. That, however, has not stopped many people from speculating as to the meaning or reason why Da-

vid picked up five stones. With apologies to Freud, sometimes a number is just a number. To teach that certain numbers in the Bible have great significance and to glean meanings for those numbers is to go beyond what Scripture tells us. We need to be careful that we do not add to what the Bible says on these matters.

Gospel in the Stars

The gospel in the stars is the belief that the original purpose of the constellations was to provide a graphic message to man about God's plan of salvation but that this message has been perverted and garbled by astrology and various mythologies. I have previously published on the numerous problems with this theory (Faulkner, 2013a). Despite its poor foundation, many Christians find encouragement in the gospel in the stars. Why? This is a bit baffling, because it amounts to extrabiblical teaching. However, the gospel in the stars does intersect with several questions or issues with which some people grapple, such as why people can be held accountable for a gospel they have not heard. However, the supposed lost knowledge contained in the stars that people have recently rediscovered amounts to a form of secret knowledge and hence amounts to Gnosticism.

Bible Prophecy and the Return of the Lord

Many people are consumed by Bible prophecy and end times. Some of the interest obviously comes from a genuine curiosity about what the future holds. Other motivations include confirmation for the truth of Scripture. After all, if prophecies made thousands of years ago unfold today, then that is powerful evidence for the inspiration and authority of Scripture. Connected to this is evangelism. If sinners see biblical prophecy fulfilled, then the rational response is repentance and salvation. However, in their zeal to see prophecy fulfilled, some prophecy teachers may be doing irreparable harm to the cause of Christ. For instance, a well-known prophecy teacher began his ministry more than 45 years ago laying out a scenario in which the Lord likely would return by 1976. Of course, this did not take place, and in retrospect, this prophecy teacher did not exactly set dates. Rather, he led listeners to the conclusion that the Lord would return by 1976, though most people (including me at the time) missed that distinction.

This was not the end of the matter. In the 1970s there were two oil shocks in which the price of oil rapidly rose. For the first time, OPEC became a major player in establishing oil prices. OPEC appeared to be dominated by Middle Eastern states, many of which were hostile to Israel and the United States. Some Christians saw in the undue influence of these countries the possibility of world events culminating in what they saw in Bible prophecy concerning the return of the Lord and the end of this age. But this could happen only as long as these Middle Eastern states had such influence. At that time, predictions called for Middle Eastern oil production soon to peak, followed by gradual decline in production by the end of the century. Therefore, many preachers laid out a scenario whereby the Lord had to return by the end of the twentieth century. Of course, we are well into the twenty-first century, and the Lord has not yet returned.

In 1974, two astronomers published *The Jupiter Effect* (*Gribbin* and Plagemann, 1974), in which they predicted that a supposed alignment of planets in March 1982 would cause unusually strong tidal forces on the earth, resulting in earthquakes and volcanic eruptions. Much later, one of the authors expressed regret in writing the book. By the late 1970s, many prophecy speakers had read this book and put their own spin on the subject, suggesting that such calamities would usher in the Lord's return. When the date passed without incident, most of the prophecy teachers quietly forgot about that as they moved on to the next predicted end of the world. That came in 1988 in conjunction with the fortieth anniversary of the establishment of the modern state of Israel. One of the notable proponents of this idea was Edgar C. Whisenant, who published a book with the provocative title, "88 Reasons Why the Rapture Will Be in 1988." He predicted Rosh Hashanah as the likely date that year. When that prediction failed, Whisenant quickly followed it up with a revised book and prediction for 1989, based upon a math error, in there not being a year zero—the year 1 BC was immediately followed by AD 1. When that prediction failed, Whisenant was not finished, because he and others next selected 1993 as the date of the Lord's return. They reasoned that this age must end in the year 2000, and their understanding of eschatology was that this must be preceded by a seven-year tribulation, yielding the 1993 date. Many others thought the pending disaster of Y2K at the end of 1999 would hasten the Lord's return.

Since the beginning of the twenty-first century, there have been several more proposed dates. Many thought the 2007 fortieth anniversary of the capture of Jerusalem by the Israelis in the Six-Day War would be the end. Others selected the end of 2012 because of the supposed Mayan calendar prediction and some vague claims about a hypothetical rogue planet named Nibiru colliding with the earth. And of course, one cannot forget about Harold Camping's famous prediction of Judgment Day being May 21, 2011, followed by the revision to October 21 that year when the first prediction failed. These failures have not seemed to deter many people, for the current prophecy craze that is sweeping the world is the tetrad of total lunar eclipses during 2014–2015 that supposedly will usher in the Lord's

return during the Feast of Tabernacles, if not 2014, certainly by 2015. Please see my recent articles critiquing this idea (Faulkner, 2013b, 2014).

These are just some of the predictions of the end of the world made over the past four decades. There were many more prior to this time, so this interest in end times and predictions for the end of this age is not new. It ought to be shameful how many pastors, prophecy teachers, and their followers get excited over these various predictions, but when the predictions fail, they blithely forget about those failures and move onto the next new one. The people who make and propagate these predictions mean well, but each failed prediction ultimately brings disrepute upon our Lord and God's Word. We all need to be vigilant not to cause this.

Conclusion

Why is there all this interest in end-time prophecy? As previously mentioned, it probably involves curiosity, validation, and a genuine concern for the salvation of others. However, as with Bible codes, numerology, and the gospel in the stars, the search for special, hidden knowledge appears to be a factor. People instinctively think there must be more to salvation than just grace. This is why so many people think they must do something to gain God's favor, leading to belief in a salvation that relies on our works, at least in part. Even people who understand that salvation is by grace alone and not by our works may unconsciously think there must be more to salvation than a free gift. This may be why the Gnostic teaching of hidden knowledge leading to enlightenment is so appealing to many Christians. It is not that secret knowledge leads to salvation but that attainment of generally unknown things can lead one to a closer relationship to God. True, in-depth study of God's Word does lead us to greater understanding of God, and this deepens our relationship with Him. However, concentration on obscure, often extrabiblical topics is not a substitute for this and cannot suffice as a shortcut to increased understanding of God.

There is an even greater danger in the Gnostic practice of seeking out hidden knowledge. While modern followers of this idea do not believe it leads to salvation as the Gnostics did, modern seekers of secret knowledge within the church do desire a state of higher spiritual understanding. This can lead to a form of spiritual pride. We must all be vigilant to examine our motives, even as we seek to grow in our faith. Is our desire for spiritual growth motivated by love for God and our sincere desire to please Him, or are we driven by selfish ambition to achieve a higher spiritual status? Are we seeking the deep things of God within Scripture, or are we looking for hidden meanings and codes that the uninitiated cannot find?

As with so many other topics, what I call Christian Gnosticism has an impact upon the important doctrine of creation. There are subtleties in the Hebrew of the Genesis Creation account and other relevant passages, but we ought not to extract meanings that are not there. Certainly, those who espouse billions of years in the Creation account rely upon supposed hidden meaning in the Hebrew to make their case. For instance, we often hear those who support the day-age theory claim that we must look at the subtleties of the Hebrew word for day (*yom*) to really understand what Genesis 1 is telling us. They argue that there are four distinct meanings for *yom*, one of those meanings being a period of time. Many people hearing that can be bamboozled into believing the day-age theory. However, there is nothing particularly obscured in Genesis 1 on this, for our English word "day" carries the identical four possible meanings. Therefore, the meaning is clear, even in English. How do we know this? In both English and in Hebrew, it is not what possible meanings the words can have that is the issue, but rather what is the most likely meaning given the context. And there are abundant contextual reasons for seeing that the clear meaning of the six days in Genesis 1 is that they were normal days.

In building the recent-creation model, do we sometimes derive too much from supposed subtleties of the Hebrew text? I don't know. However, none of us are totally immune to the allure of Gnosticism, so it behooves us to be aware of this problem and hence vigilant to avoid it.

Danny R. Faulkner
Editor
Creation Research Society Quarterly

References

Bullinger, E.W. 1967. *Number in Scripture*. Reprint, Kregel Publications, Grand Rapids, MI.

Drosnin, M. 1997. *The Bible Code*. Simon and Schuster, New York, NY.

Drosnin, M. 2002. *Bible Code II: The Countdown*. Viking Books, New York, NY.

Faulkner, D. 2013a. A further examination of the gospel in the stars. *Answers Research Journal* 6:35–36.

Faulkner, D. 2013b. Will lunar eclipses cause four blood moons in 2014 and 2015? https://answersingenesis.org/astronomy/moon/will-lunar-eclipses-cause-four-blood-moons-in-2014-and-2015/

Faulkner, D. 2014. Do total lunar eclipses qualify as great signs for biblical prophecy? https://answersingenesis.org/astronomy/moon/lunar-eclipses-biblical-prophecy/

Gribbin, J.R., and S. Plagemann. 1974. *The Jupiter Effect: The Planets as Triggers of Devastating Earthquakes*. Vintage Books, New York, NY.

Witztum, D., E. Rips, and Y. Rosenberg. 1994. Equidistant letter sequences in the Book of Genesis. *Statistical Science* 9(3): 429–438.

Creation Research Society Quarterly 2015. 51:152–164.

The Dating "Pedigree" of Seafloor Sediment Core MD97-2120: A Case Study

Jake Hebert*

Abstract

The fact that different, seemingly independent dating methods appear to "tell" a consistent "story" about Earth history over millions of years is a seemingly formidable argument for an old earth. Hence, in the minds of many, this apparent agreement is a major obstacle to serious consideration of the biblical creation position. Hence, it is important for creation scientists to understand and be able to clearly explain why the different dating methods are not really independent of one another. The interconnectedness of the different dating methods can be illustrated by tracing the dating "pedigree" of a particular deep-sea sediment core, the MD97-2120 sediment core from the Chatham Rise east of New Zealand. Dating of the deep sediment cores, including this one, is tied to the astronomical (or Milankovitch) hypothesis of Pleistocene ice ages via a process known as "orbital tuning." Moreover, dating of a deep-sea sediment core frequently involves "tying" that core's timescale to that of other sediment cores, as well as to those of the deep ice cores of Antarctica and Greenland. This critique includes suggestions for future creation research in this area.

Introduction

Critics of biblical creation argue that the apparent agreement between multiple dating methods presents an unchallengeable argument for an old earth. How, they ask, can the earth really be only ~6,000 years old, when so many different, and apparently *independent*, dating methods yield age assignments of millions of years, age assignments that appear to "tell" a consistent "story" of Earth history? Hence, in order to demonstrate to a skeptical world the reasonableness of the young-earth position, it is important that creation scientists have a clear understanding of how such generally "consistent" dating results are obtained. Once we are clear in our own understanding of how the different dating methods are interconnected, then we can communicate to others why the apparent agreement between different dating methods is not the formidable argument that it initially appears.

With a few exceptions (Oard, 1984, 1985; Vardiman, 1996; Hebert, 2014), uniformitarian dating of the seafloor

* Jake Hebert, Institute for Creation Research, Dallas, TX, jhebert@icr.org
Accepted for publication December 17, 2014

sediments has received little attention in the creation technical literature, although the subject has been touched upon in works dealing with the dating of the ice cores (Oard 2004, 2005, 2007). This paper discusses one particular sediment core in an effort to shed some light on the interconnectedness of the different dating methods.

Scientists have drilled and extracted cores from the deep-seafloor sediments and assigned them, via uniformitarian assumptions, ages of many millions of years. However, these dates are often obtained by assuming the validity of the astronomical (or Milankovitch) hypothesis of Pleistocene ice ages and then using that theory to date the sediments via a technique called *orbital tuning*. Moreover, dating of the seafloor sediments often involves the "tying" of different sediment and ice cores to one another, showing that the dates assigned to the different cores are not truly independent. This is illustrated by examining, as a case study, the methods used to date the MD97–2120 core from the Chatham Rise off the eastern coast of New Zealand. The methods used to date this core are described by Pahnke et al. (2003). A very brief overview of the dating of this core was provided by Hebert (2014), but this paper examines the dating of the core in much greater detail.

Background: The Oxygen Isotope Ratio

In order to understand the interconnectedness between the age assignments for different sediment and ice cores, it is necessary to first cover some background material. Foraminifera (or forams) are ocean-dwelling marine protists. Generally speaking, *planktonic* foraminifera are free-floating organisms that can dwell at various depths (Mortyn and Charles, 2003), while *benthic* forams dwell on and within the seafloor sediments (Kingston, 2010). These forams construct shells (or tests) composed of calcium carbonate ($CaCO_3$). Some of the oxygen within the calcium carbonate is the "heavier" but less abundant oxygen-18 isotope, while some is the "lighter" and more abundant oxygen-16 isotope (oxygen-17 is very rare and will not be considered here). The ratio of "heavy" oxygen-18 to the "lighter" oxygen-16 isotope (compared to a "standard" $^{18}O/^{16}O$ value) is called the *oxygen isotope ratio*, denoted by the symbol $\delta^{18}O$. This "standard" $^{18}O/^{16}O$ value was originally taken to be the $^{18}O/^{16}O$ ratio from the crushed shell of a Cretaceous squidlike creature called a *belemnite*, taken from the South Carolina Peedee formation. Other standards have since been calibrated to this original standard (Wright, 2010). It should be noted that $\delta^{18}O$ values also can be calculated for seawater and ice, due to the presence of oxygen in the H_2O molecule. Also, a similar "deuterium/hydrogen," or D/H, ratio (sometimes denoted by the symbol δD) may be calculated for water or ice using isotopes of the hydrogen atom (deuterium is a "heavy" isotope of hydrogen). When the forams die, their shells become part of the thick ocean sediments accumulating on the ocean floors.

Scientists have drilled and extracted cores from the sediments on the ocean floor, and oxygen isotope ratios may be calculated from foram tests at different depths within these cores. If one plots these $\delta^{18}O$ values on a graph, multiple "wiggles" become apparent (Figure 1). Secular scientists believe that the oxygen isotope ratio is a climate indicator: larger foram $\delta^{18}O$ values from within the sediments are generally thought to indicate times of greater global ice volume, while smaller values are thought to indicate times of decreased amounts of global ice. However, there are a number of complications that make inferring information about past climates from foraminiferal $\delta^{18}O$ values quite problematic.

The most obvious difficulty in attaching climatic significance to these foram $\delta^{18}O$ values is that an empirically determined formula for these $\delta^{18}O$ values has *two* unknowns, the temperature and $\delta^{18}O$ value for the surrounding ocean water at the time the foram test was formed (Oard, 1984; Wright, 2010). The foram $\delta^{18}O$ value can be determined

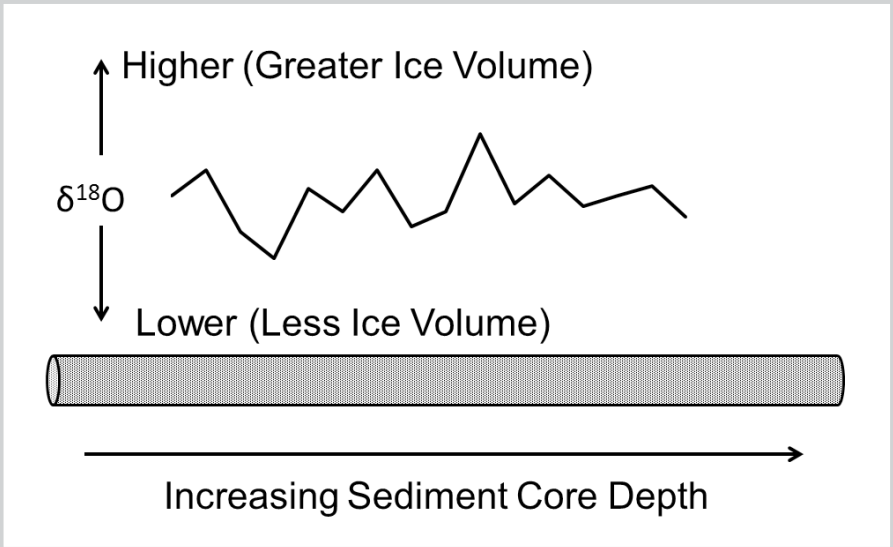


Figure 1. Secular scientists interpret variations in foraminiferal $\delta^{18}O$ values within the seafloor sediments as climate indicators.

in a laboratory, but there is no way to actually know these other two values. For this reason, secular scientists must make assumptions in order to attempt to "fill in" this missing information. Actually, there are multiple such empirical equations for foram $\delta^{18}O$ values (Grossman, 2012). Although these equations are generally similar, they take into account different temperature ranges, different crystal forms of calcium carbonate (such as aragonite), and differences between different foram species.

Another problem with interpretation of these foram $\delta^{18}O$ values is that seawater temperature is influenced, not just by global averages, but also by short-term spatial and temporal fluctuations. So how does one de-convolve which "part" of the temperature at the time of shell formation represents a global average temperature and which part represents short-term variations due to local hydrographical effects? This issue is especially problematic for oxygen isotope ratios obtained from free-floating planktonic forams, since one would expect surface water temperatures to be more variable than deep-water temperatures.

Hence, secular scientists have long attempted to separate these two effects. One way is to find other temperature-dependent signals that might also be contained within foraminiferal $CaCO_3$. For instance, magnesium ions can replace calcium ions within the $CaCO_3$, and this effect is temperature dependent. Theoretical and empirical data indicate that the Mg/Ca ratio depends exponentially upon the temperature at which the $CaCO_3$ was formed. In fact, planktonic foraminiferal Mg/Ca ratios are now viewed as the optimal paleothermometer for tropical waters (Kucera, 2009, p. 334).

However, a complication with this method is that magnesium is preferentially removed as $CaCO_3$ is being dissolved, a temperature-dependent effect that is thought to amount to a maximum bias of ~0.5° C for the three foraminiferal species most commonly used for such purposes (Kucera, 2009, p. 334).

Secular scientists have claimed to have used Mg/Ca ratios to separate the effects of ice volume and temperature within foraminiferal $\delta^{18}O$ values (Sosdian and Rosenthal, 2009, 2010), although this claim has been criticized by Yu and Broecker (2010). Elderfield et al. (2012) have made a similar but more recent claim.

However, separating these effects requires either long records of sea-level or deep-ocean temperatures or a model-dependent reconstruction of one or more of these variables (Bintanja et al., 2005). Of course, since such records and models are interpreted through the "deep time" paradigm, secular scientists have not achieved a separation of these two effects that is truly independent of old-earth, evolutionary assumptions.

Another problem with attempting to infer information about paleoclimates from foraminiferal chemistry is that the sediment records are nearly always at least partially disturbed by bioturbation, the reworking of sediments by living organisms (Shackleton, 1987).

A very good (albeit dated) early discussion of the many difficulties involved in secular interpretations of foram $\delta^{18}O$ values is found in Oard's work (Oard, 1984).

Background: The Astronomical Theory

Within the last thirty years or so, the astronomical (or Milankovitch) hypothesis of ice ages (Milankovic, 1941) has become extremely popular. This hypothesis holds that the Pleistocene glacial intervals ("ice ages" in popular speech) were caused by slow, subtle variations in the amount of summer sunlight falling on the northern high latitudes. It is thought that the northern, high-latitude ice sheets advanced during times of decreased (northern hemisphere) summer sunlight and retreated during times of increased sunlight. These variations in sunlight are thought to have been caused by subtle changes in the tilt and orientation of the earth's axis, as well as changes in the shape and orientation (relative to the background stars) of the earth's elliptical orbit around the sun. Despite the popularity of this hypothesis, it has a number of serious problems (Oard, 2007), many of which are acknowledged even in the secular literature (Cronin, 2010, pp. 130–139).

The astronomical theory received apparent support from a seminal paper (Hays et al., 1976) that used statistical analysis to purportedly show that earth's climate was responding to the dominant 100,000-year, 41,000-year, and 23,000-year Milankovitch cycles. Because the 100,000-year cycle seemed to be making the largest contribution to these climate responses, secular paleoclimatologists concluded that the 100,000-year cycle was the most important, despite the fact that, of the three cycles, it should theoretically have the weakest climatic effect (Cronin, 2010).

Likewise, there are other puzzling aspects to the astronomical hypothesis. For instance, there is a transition from 41,000-year cycles to 100,000-year cycles that takes place between 700 thousand and 1.25 million years ago. This so-called "mid-Pleistocene transition" does not correspond to any significant change in orbital forcing (Elderfield et al., 2012) and is as yet unexplained within the context of the model (Cronin, 2010, pp. 130–132).

Background: Orbital Tuning

How do secular scientists assign ages to seafloor sediments? Generally one cannot use radioisotope methods to date the sediments, so an age-depth model, which translates a depth down the sediment core into an age, is needed. The simplest possible (albeit unrealistic) age-depth model for a seafloor sediment core would assume that the seafloor

sediments at that location have always been deposited at a perfectly constant rate (Herbert, 2010). Such a model would ignore compaction and possible reworking of the sediments. Instead, uniformitarian scientists use the Milankovitch hypothesis to assign ages to the sediments via a process called *orbital tuning* (Herbert, 2010).

Conceptually, the simplest way to perform orbital tuning is to visually inspect the $\delta^{18}O$ signal within a sediment core and to identify the highest peaks and deepest troughs within that signal. Recall that the highest "peaks" in $\delta^{18}O$ values are thought to indicate times of maximum glacial extent, while the deepest "troughs" are thought to indicate times of minimum glacial extent. Recall also that the presumed times for these periods of maximum and minimum glacial extent may be *calculated* from the Milankovitch hypothesis. Hence, the Milankovitch hypothesis assigns ages (in thousands or millions of years) to the highest peaks and deepest troughs within the $\delta^{18}O$ signal. This can be done either by direct calculation from the Milankovitch hypothesis or by "tying" these peaks and troughs to age assignments in *other* data sets that were *themselves* determined from the Milankovitch hypothesis. Once this has been done, the ages for the smaller "wiggles" between these dominant peaks and troughs may be obtained via interpolation.

Of course, these dominant peaks and troughs will occur at different depths within the core than would be predicted by an age-depth model that naively assumes a perfectly constant past sedimentation rate. This implies that the orbitally tuned timescale will *not* be linear: if one were to use tick marks to label intervals of, say ten-thousand years, at different depths within the core, the spacing between the "tick marks" would vary with depth, closer together in some sections and farther apart in others.

However, this is not a problem within the secular worldview, since even uniformitarian scientists do not believe that past sedimentation rates have been *perfectly* constant! As an example, suppose that in one section of the core, a (presumed) 100,000-year $\delta^{18}O$ cycle has been "stretched out" so that it corresponds to a greater-than-expected length down the core. This can be attributed to an interval during which the sedimentation rate at that location was higher than average, resulting in a greater depth of sediment deposited per unit time. Likewise, suppose that in another section of the core, a (presumed) 100,000-year cycle has been "squashed" so that it corresponds to a shorter-than-expected length down the core. This can be attributed to a lower-than-average sedimentation rate. Hence, the orbital-tuning method demands variable sedimentation rates, although the rates are still assumed to be "slow and gradual."

This implies that if one *were* to plot the $\delta^{18}O$ signal (as a function of time) on a linear timescale, this would be equivalent to selectively stretching and compressing different sections of the $\delta^{18}O$ signal within the core. Although different mathematical techniques may be used to facilitate this process, this is conceptually the heart of the orbital-tuning method.

Of course, one might expect there to be much local "noise" within the $\delta^{18}O$ signal of a single core, so a "globally averaged" signal using data from multiple cores is preferable to using only a single core. For this reason, secular researchers will often "stack" $\delta^{18}O$ data from multiple cores in an effort to produce a "cleaner" (and longer) global signal. In order to do this, however, the different $\delta^{18}O$ signals must be placed on a common vertical scale, since $\delta^{18}O$ values between different foraminiferal species can vary, even when their shells are formed under identical conditions. This can be accomplished by adding or subtracting the appropriate constant, as needed, to every measured $\delta^{18}O$ value within a particular core. Once all the different $\delta^{18}O$ records have been placed on a common vertical scale, the Milankovitch hypothesis is used to assign absolute ages to the prominent peaks and troughs within all the separate signals (this may be done either by visual inspection or via an automated computer program). This implies that corresponding $\delta^{18}O$ peaks and troughs within the different cores are all assumed to be the same age, even though they are usually found at different (sometimes dramatically different) depths below the seafloor. Once these key "tie points" within the different signals have all been assigned the same age, they are all placed on a common timescale, with the concomitant accordionlike "compression" and "expansion," as needed, of the different $\delta^{18}O$ signals (Figure 2). Once this has been done, the results are averaged to produce a stacked "global" signal (greater weight may be given to data sets of higher resolution). One of the best-known "stacked" records is that of Lisiecki and Raymo (2005), which consists of 57 different benthic $\delta^{18}O$ records and is thought to "cover" a total of 5.3 million years.

Pisias et al. (1984) present a good early discussion of this technique (their paper could be freely read online as of November 21, 2014). Their Figure 1 shows $\delta^{18}O$ values plotted as a function of depth and dramatically illustrates the compression and stretching of $\delta^{18}O$ signals that is demanded by orbital tuning: prominent troughs in two different cores (RC13–229 and Y7211–1) are assumed to be the same age, even though one is found at a depth of ~3 meters, and the other is found at a depth of 12 meters!

Since the orbital tuning method assumes the validity of the astronomical theory, there is much potential for circular reasoning, as has been pointed out even by secular scientists. Herbert noted, "The possibility clearly exists to produce a tuned sedimentary series that has been forced to resemble an orbital template by overenthusiastic correlation" (Herbert, 2010, p. 372). Moreover, secu-

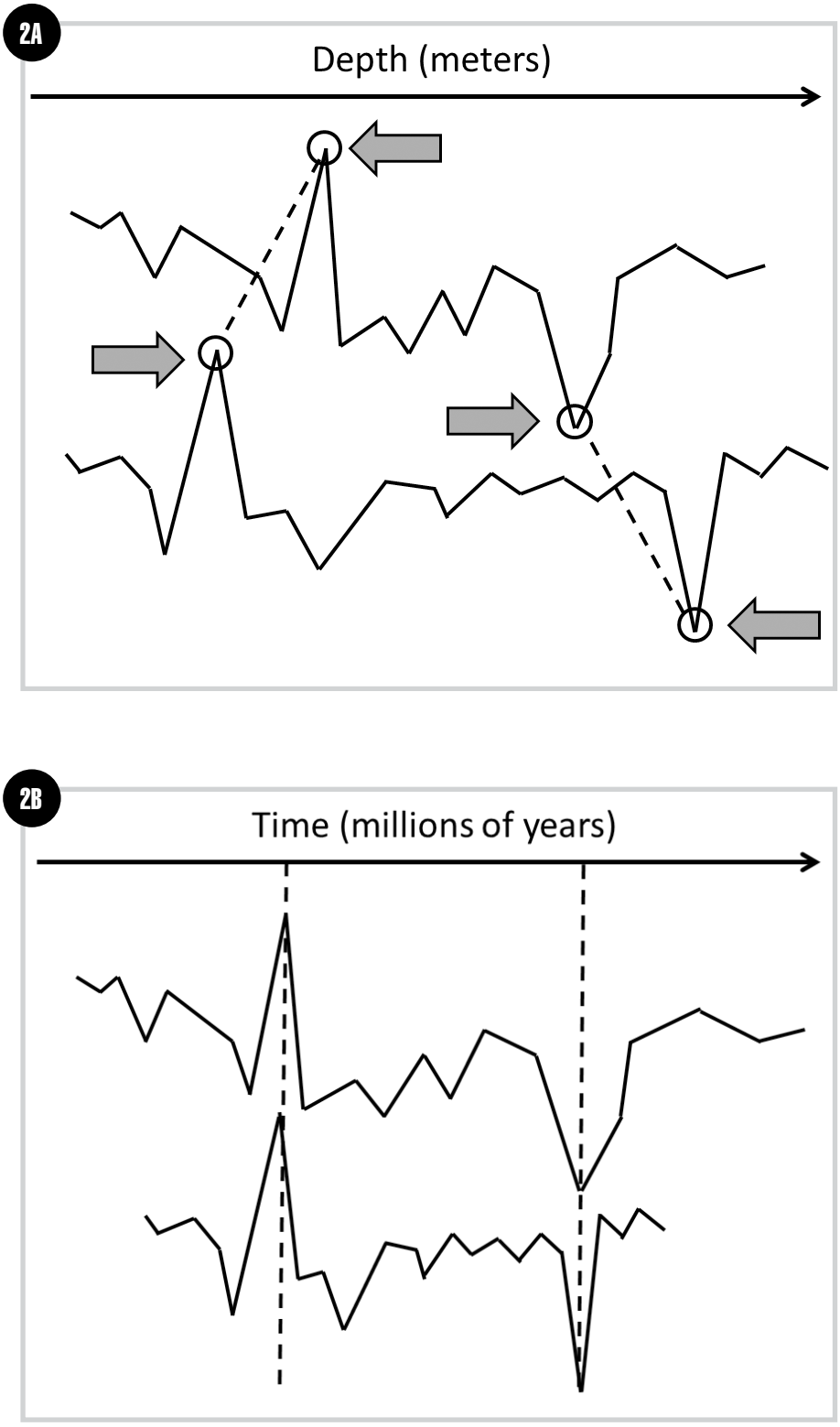


Figure 2. The Milankovitch hypothesis is used to assign the same ages to corresponding prominent $\delta^{18}O$ "peaks" and "troughs" within two different sediment cores, even though these peaks and troughs are almost always at different depths below the seafloor surface. This requires an accordion-like stretching and compressing (a) of different sections of the two $\delta^{18}O$ signals in order to (b) put the two signals on a common timescale.

lar researchers (Blaauw, 2010; Blaauw et al., 2010) have already demonstrated that it is possible to convincingly "tune" random signals that are unrelated to one another! Hence, despite the seemingly impressive correlations that secular scientists make between different paleoclimatological data sets, these correlations could very well be meaningless, even within the uniformitarian framework.

Additional factors give secular scientists even more "wiggle room" (pardon the pun!) when assigning ages to the deep-sea sediments. For instance, they can assume that the climate system takes a fixed amount of (lag) time to respond to a change in solar insolation (e.g., Shackleton, et al., 1990), or they can assume that this lag time can vary (e.g., Shackleton, 2000). They can also assume that the climate system is responding to insolation changes at different latitudes. Although most uniformitarian paleoclimatologists assume that it is summer insolation variations at 65° N that drive the ice ages, others have claimed better "fitting" of the data to insolation changes at other latitudes, as noted by Herbert (2010). Different assumptions can yield radically different conclusions about the past. "Depending on the latitude and season considered most significant, grossly different climatic records can be predicted from the same astronomical data" (Hays et al., 1976, p. 1121).

In fairness, secular scientists have recognized these potential dangers, and they make efforts to guard against them (Herbert, 2010). For instance, they sometimes use automated algorithms in the tuning process in an attempt to objectively find the optimal timescale for a stacked record. They may also code their algorithms to "penalize" timescales that require extreme or sudden changes in sedimentation rate (Lisiecki and Raymo, 2005, p. 3). However, their checks implicitly assume the validity of the astronomical theory and the old-earth timescale, so although these checks can

perhaps distinguish between reasonable and unreasonable climate histories *within* the uniformitarian framework, they do not validate the choice of a uniformitarian model over a creation model. Moreover, the dates assigned to a sediment or ice core are often tied to dates that have been assigned to other cores, as discussed below.

A Case Study: New Zealand Core MD97–2120

The interconnectedness of age assignments for different cores can be illustrated by tracing the age-scale "pedigree" of the 36-meter-long MD97–2120 International Marine Past Global Changes Study (IMAGES) deep-sea sediment core, from the Chatham Rise east of New Zealand (45° 32.06´ S, 174° 55.85´ E, water depth of 1,210 meters).

The "MD" in the core designation refers to the French research ship, *Marion Dufresne*, which was used in its extraction. The "97" refers to the sediment hole from which the core was extracted, and the "2120" designates the particular core sample from within the hole. The dating of this core by Pahnke et al. (2003) was briefly mentioned by Hebert, (2014), but the more detailed examination presented here reveals the many assumptions involved in the dating of a deep-sea sediment core, as well as the interconnectedness between dates assigned to different cores.

Pahnke et al. (2003) explicitly describe the dating methods used for four different sections of the core, corresponding to presumed ages of 0–20 ky, 26.6–32.3 ky, 40–72 ky, and 72–340 ky BP (before present). An interpolation process was presumably used to assign "in between" dates that did not fall into one of these four date ranges. Before examining these methods in more detail, it should be noted that the timescale for this core has since been slightly revised for ages between 29 and 35 ky BP (Pahnke and Zahn, 2005, especially the caption on their Figure 2, and the "Age model" section of their online supporting material). Pahnke and Zahn used a new radiocarbon calibration data set (Hughen et al., 2004) to revise three radiocarbon dates in the upper portion of the core. This new calibration data set was itself tied to a well-known ice core in central Greenland, the GISP2 (Greenland Ice Sheet Project 2) core, which was itself a "follow-up" to another nearby core called the GRIP (Greenland Ice Sheet Project) core. Also, Shackleton et al. (2004) proposed a new age scale for both the GRIP and GISP2 cores, based upon ^{14}C dates for foraminifera within the deep-sea sediment core MD95–2042 that had been calibrated by means of ^{230}Th coral measurements. Because the dating of the MD97–2120 sediment core was tied to these other cores (as discussed below), Pahnke and Zahn acknowledged that acceptance of the new timescale of Shackleton et al. would also affect their absolute timescale for the MD97–2120 core, although they argued that this would not affect the previously determined correlations between the cores (i.e., one could presumably place the cores on a "floating" timescale while maintaining the relative "connections" between them).

Although this discussion focuses only on the original 2003 timescale of Pahnke et al., these chronological revisions illustrate two important points. First, the ice core and sediment core timescales are indeed interconnected: changes to the timescale of one sediment or ice core influence the chronologies for other cores. Second, one particular biblical critic (Seely, 2003) has claimed that the GISP2 ice core is the "ultimate proof" against a global, worldwide Flood (and by implication, the Bible's short chronology), since the long GISP2 timescale (Meese et al., 1997) was supposedly obtained "simply" by layer counting, independent of any doubtful old-earth assumptions. However, it has already been shown (Oard, 2004, 2005) that the GISP2 chronology was indeed subtly influenced by such assumptions. This proposed chronological revision by Shackleton et al. (2004) illustrates the tentative nature of secular age assignments: even this "ultimate proof" is subject to change! Furthermore, as pointed out by Skinner (2008), this proposed revision to the GISP and GISP2 timescales results in a potential contradiction to a new layer-counted chronology for the North Greenland Ice Core Project (NGRIP) core!

Dating of the Upper Core: 0 to 20 ky BP

The uppermost few meters of the core were assigned ages of 0 to 20 ky via a "marine calibration data set" that converted measured accelerator mass spectrometry (AMS) radiocarbon ages from within the core into "true" calendar ages (Pahnke et al., 2003 and online supplemental material). This calibration data set, which was obtained from dated tree rings, corals dated via the uranium-thorium method, and varves counted within marine sediments (Stuiver et al., 1998), was considered applicable to dates extending back to 24,000 years BP (0 years BP corresponds to AD 1950). This calibration process included a great many assumptions (in addition to the normal assumptions of radioisotope dating methods), as described by Stuiver et al. (1998), some of which were the following:

1. An extended tree-ring chronology (obtained by ^{14}C matching a "floating" German pine tree chronology to an "absolutely dated" tree chronology) is accurate to 11,857 years BP (p. 1041).
2. The C-14 "reservoir correction" was accurately determined for dates between 12,000 and 10,000 years BP (p. 1041). As a result of different amounts of carbon-14 in the ocean and atmosphere, the radiocarbon content of terrestrial and marine

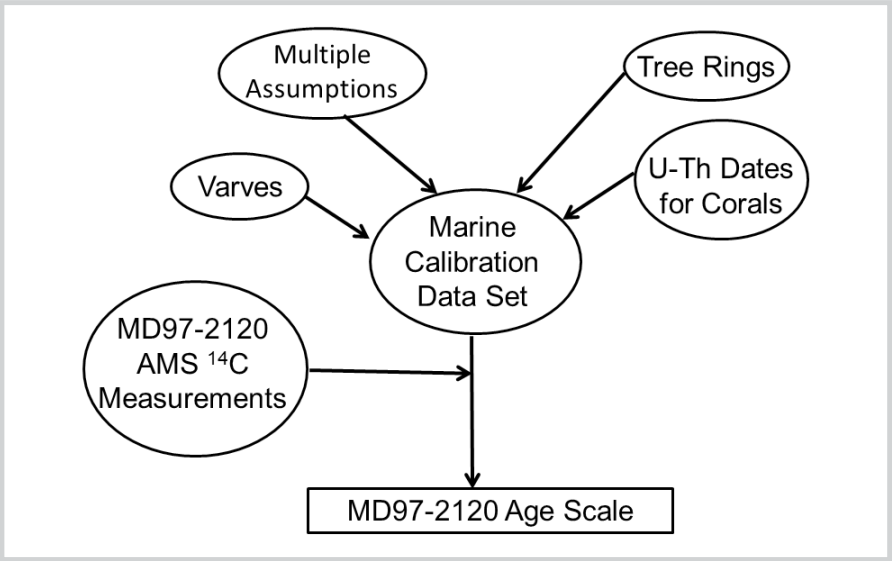


Figure 3. Schematic showing the logic used in dating the uppermost portion (0 to 20 ky BP) of the MD97–2120 New Zealand deep-sea sediment core. A marine calibration data set was used to convert accelerator mass spectrometry ^{14}C "ages" to calendar ages. The calibration data set was itself tied to varves, tree rings, radioisotope dates for corals, and multiple uniformitarian assumptions.

specimens will differ, even if they are of the same age. Hence, this effect must be taken into account when constructing a calibration that involves both "atmospheric" and "marine" samples.

3. The absolute times that had been attached to a "floating" marine varve chronology by matching with tree-ring ^{14}C ages (after taking into account the reservoir effect) were accurate (p. 1042).
4. An atmospheric transport model accurately determined differences in ^{14}C content for trees used in the calibration process that were from different geographic locations (pp. 1045–1046).

Pahnke et al. discarded two radiocarbon ages during their analysis, as they deviated from the overall linear age versus depth relation produced by the other radiocarbon data (Pahnke et al., 2003, online supplemental material, p. 2). The New Zealand Kawakawa ash (radiocarbon age of 22.59 ky BP; calendar age of 26.17 ky BP) also served as a constraint on the dating of the upper section of the core.

The methods used in the dating of the uppermost portion of core MD97–2120 are illustrated in Figure 3.

Dating of the Upper Core: 26.6 to 32.3 ky

Because the radiocarbon calibration of Stuiver et al. (1998) extended only to 24,000 years BP, Pahnke et al. (2003) needed some other means for presumed dates older than this to convert ^{14}C ages from within the core into calendar ages. For the portion of the MD97–2120 core dated as between 26.6 and 32.3 ky, Pahnke et al. (2003) used a calibration obtained by Voelker et al. (2000). In order to obtain their calibration points, Voelker et al. used the PS2644 sediment core from the western Iceland Sea (67° 52.02´ N, 21° 45.92´ W, water depth of 777 meters), tying planktonic $\delta^{18}O$ and $\delta^{13}C$ values from within this sediment core to Dansgaard-Oeschger cycles within the GISP2 ice core. Dansgaard-Oeschger cycles are fluctuations found within the supposed previous "interglacial" portion of the ice cores. Within the uniformitarian framework, these cycles are thought to be characterized by abrupt temperature increases within a decade or so, followed by slow, gradual cooling over several hundreds or thousands of years (Rahmstorf, 2010).

Since an age scale had already been assigned to the GISP2 ice core (Meese et al., 1997), this effectively transferred the GISP2 timescale to the PS2644 sediment core and allowed Voelker et al. (2000) to assign calendar ages to ^{14}C ages from within this Icelandic core. However, the transfer of the GISP2 timescale to the PS2644 sediment core required a great many selective expansions and contractions of the data: Figure 2 in Voelker et al. (2000) provides a classic illustration (the paper was accessible online, as of November 21, 2014) of the manner in which a data set can be "accordioned" via selective expansions and contractions in order to "correlate" it with another data set.

Voelker et al. (2000) argued that their calibration data set was confirmed by the correspondence between high excursions in ^{14}C and times of decreased geomagnetic intensity (one expects greater ^{14}C production during such geomagnetic "excursions"). It was this resulting calibration data set that Pahnke et al. (2003) used to date this section of the MD97–2120 core (Figure 4).

Dating of the Upper Core: 40 to 72 ky BP

Pahnke et al. (2003) assigned ages ranging from 40 to 72 ky BP to the section of the core between 6.8 to 10.6 meters in depth. They did this by tuning the core's benthic foraminiferal $\delta^{18}O$ values to the benthic $\delta^{18}O$ values within another

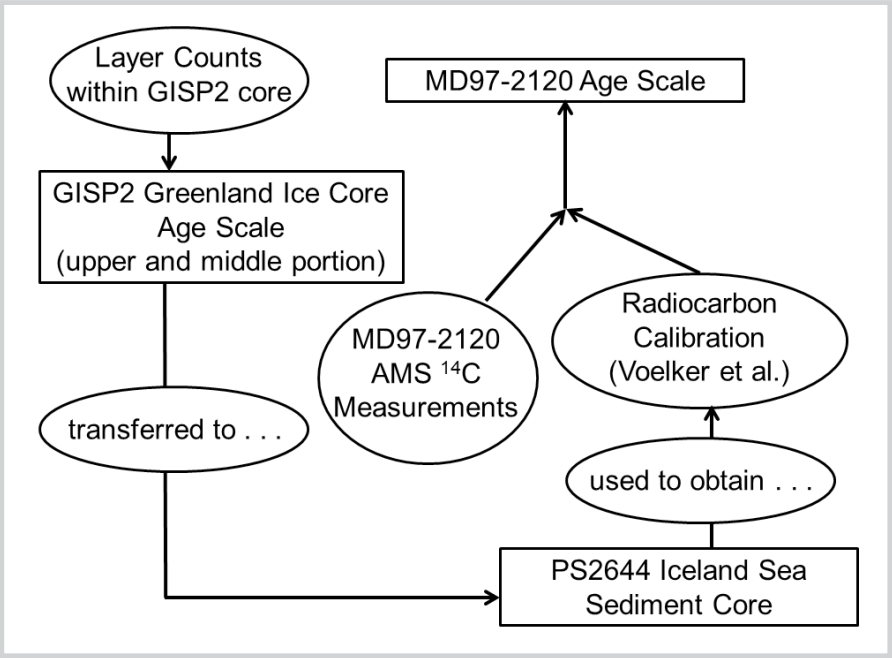


Figure 4. Schematic showing the logic used in dating the 26.6 to 32.3 ky BP section of the MD97–2120 New Zealand deep-sea sediment core. A second radiocarbon calibration data set was used to convert ^{14}C "ages" into calendar ages. But this radiocarbon calibration was tied to a sediment core from the Icelandic Sea, which was itself tied to the upper and middle portions of the GISP2 ice core chronology.

seafloor sediment core, the MD95–2042 core located off the coast of Portugal (37° 47.99′ N, 10° 09.99′ W, water depth of 3,146 meters). But the initial timescale for the 32-meter-long Portuguese sediment core was obtained from *another* sediment core, the nearby SU81–18 core (Shackleton et al., 2000, p. 565), and marine oxygen isotope values:

> *Cayre et al.* [1999] developed an age model for the core [the Portuguese MD95–2042 core] partly by correlation with nearby core SU81–18, which had been the subject of a very detailed AMS ^{14}C dating study [*Bard et al.*, 1987], and partly using the oxygen isotope stratigraphy. (Second set of brackets mine.)

From Cayre et al. (1999), one can see that the SU-18 core was used to date the upper portion of the MD95–2042 core, while ages for isotopic boundaries that had been assigned by Martinson et al. (1987) were used for assigning dates to the deeper parts of the MD95–2042 core. But Martinson et al. obtained these ages via orbital tuning. Hence, the astronomical theory played a significant role in the dating of the MD95–2042 core.

When the planktonic $\delta^{18}O$ values from MD95–2042 (dated according to this rough, initial timescale) were aligned with the $\delta^{18}O$ values from the GRIP (Greenland Ice Core Project) ice core, there was good agreement between their respective "wiggles" for ages between 0 and 100 ky BP. Hence, Shackleton et al. (2000) felt justified in transferring the higher resolution GRIP timescale to the MD95–2042 sediment core. However, as we shall see below, the astronomical theory *also* played a role in the dating of the GRIP ice core! Hence, good agreement between the timescales for their respective "wiggles" is not that surprising.

Shackleton, et al. (2000) noted that the GRIP ice core had been assigned a timescale by Johnsen et al. (1992). However, the timescale of Johnsen, which was obtained by stratigraphic methods, extended only to about 40 ky BP. Hence, some other means was required to extend this timescale to 100 ky BP before Shackleton et al. could make their comparison to MD95–2042. This was done (Anklin et al. 1993) via ice-flow modelling and was supposedly confirmed by correspondence between long-period (> 5 kyr) features in the Vostok ice core, a "standard" isotope curve for the SPECMAP (SPECtral MAping Project) marine timescale, and a vein calcite $\delta^{18}O$ record from Devil's Hole, Nevada.

This correspondence would superficially seem to validate the GRIP timescale. After all, the ages assigned by the flow model agreed with these previously determined age scales. However, the flow model for the GRIP ice core was *not* truly independent. (Dansgaard et al. acknowledge,

> The h and f_b values [flow model parameters, J. H.] are chosen so as to assign well-established ages to two characteristic features in the δ record: 11.5 kyr for the end of the Younger Dryas event[1,12] and 110 kyr for the marine isotope stage (MIS) 5d[4], which appears at depths of 1,624 m and 2,788 m, respectively, in the δ record. (Dansgaard et al., 1993, p. 219)

Thus, model parameters were "tweaked" to ensure an age scale that agreed with previous uniformitarian age expectations. Furthermore, Dansgaard et al. (1993) acknowledge that "orbital tuning" (see their Figure 2 caption) was used to assign the ages to the SPECMAP marine isotope curve!

Likewise, it should also be noted that the flow model Dansgaard et al. used to construct the GRIP chronology implic-

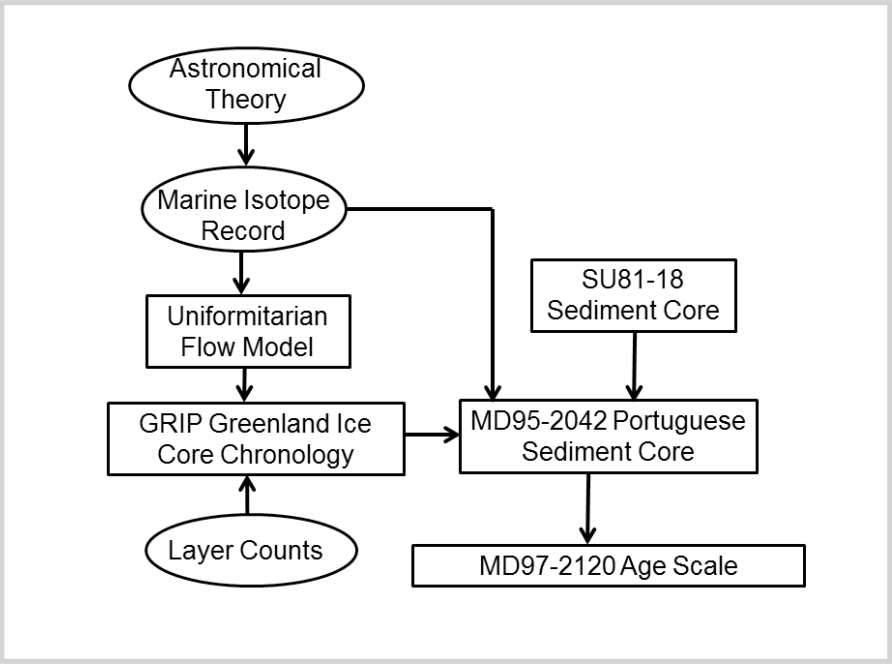


Figure 5. Schematic showing the logic used in dating the 40 to 72 ky BP section of the MD97–2120 New Zealand deep-sea sediment core. The age scale from another sediment core was transferred to the MD97–2120 core, but this age scale was itself tied to the age scale for still another (!) sediment core, as well as the GRIP ice core chronology. The GRIP chronology was in turn obtained via layer counts and a flow model that was calibrated, via the marine isotope record, to the astronomical theory of Pleistocene ice ages.

itly assumed the old-earth timescale, because such a "steady-state" model assumes that the thickness of the ice sheet has remained constant over extremely long ages (uniformitarians believe the ice sheets are millions of years old).

Note also that, because of light snowfall on the Antarctic plateau (Palerme et al., 2014), well-defined layering is not present in deep Antarctic ice cores like Vostok. Hence, glaciologists are especially dependent upon flow models in order to assign ages to the deep Antarctic cores, and these flow models are usually calibrated by the astronomical theory (e.g., Waelbroeck et al., 1995). Hence, the correspondence between the GRIP age-scale and that assigned to the Vostok core is not surprising either.

Although correspondence between the GRIP timescale and the Devil's Hole chronology supposedly helped to confirm the validity of the GRIP timescale, it should be noted in passing that the Devil's Hole chronology actually has been quite problematic for uniformitarian scientists, as it implies that the penultimate (second-to-last) deglaciation began at least 10,000 years before the changes in solar insolation that supposedly caused it (Winograd et al., 1992; Shakun et al., 2011)!

The methods used to date this section of the New Zealand sediment core are summarized in Figure 5.

Dating of the Lower Core: 72 to 338 ky BP

In order to obtain the age scale for depths within the MD97–2120 core greater than 10.6 meters, Pahnke et al. (2003) used Mg/Ca values measured within the MD97–2120 core in order to estimate sea surface temperatures via an empirically determined equation. These estimated sea surface temperatures were then correlated with chemical isotope data (and the associated timescale) of the Vostok ice core in order to establish an age scale. Specifically, the Mg/Ca-derived sea surface temperature values were correlated with Vostok values of the deuterium/hydrogen (D/H) ratio, which were thought to represent air temperatures at Vostok. As noted earlier, since ice is composed of water, one can calculate a "deuterium ratio," δD, for a given depth within the ice, in addition to an oxygen isotope ratio, $\delta^{18}O$.

One may wonder why Pahnke et al. used Mg/Ca values to establish a timescale for the bottom of the New Zealand core, rather than $\delta^{18}O$ values. Since they were attempting to construct a centennial-scale record of *surface* water hydrographic changes (Pahnke et al., 2003, p. 949), they would have needed to use values of $\delta^{18}O$ obtained from free-floating planktonic forams. However, they did not think that the MD97–2120 planktonic foraminiferal $\delta^{18}O$ values could really be used for this purpose, since they believed that these planktonic $\delta^{18}O$ values reflected global changes in ice volume, in addition to surface water effects (Pahnke et al., 2003, p. 949). In order to prevent complications from such global effects, they opted to use Mg/Ca rather than $\delta^{18}O$ values.

Likewise, why did they correlate these Mg/Ca values to Vostok δD values instead of to the high-resolution MD95–2042 timescale (which had been linked to the GRIP ice core)? There are likely a number of reasons for the use of the Vostok chronology, some of which are suggested by Shackleton et al. (2000). The most obvious reason is that the MD95–2042 chronology extended only to about 160 ky BP; hence, some other method was required to extend the MD97–2120 chronology beyond this

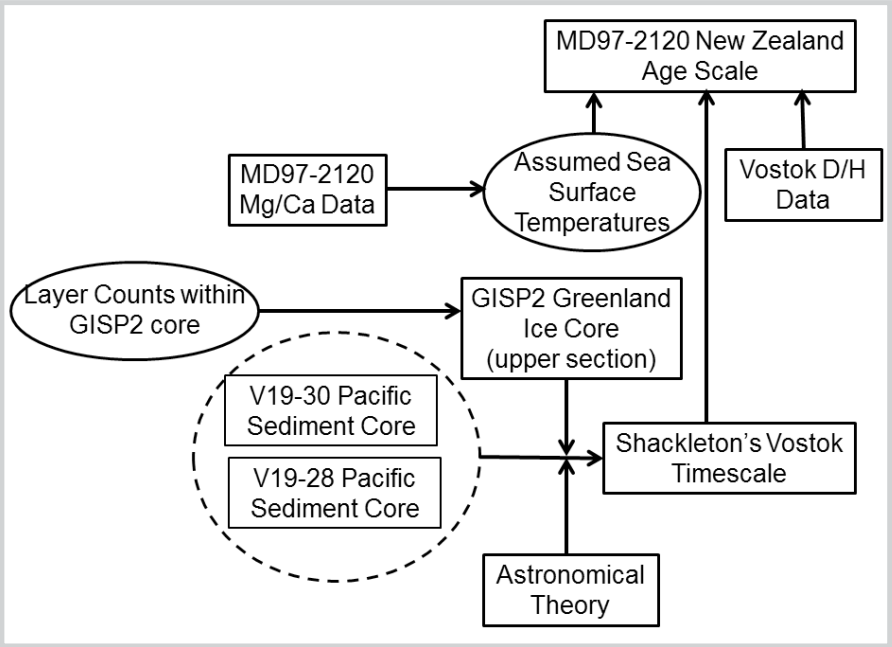


Figure 6. Schematic showing the logic used in dating the 70 to 338 ky BP section of the MD97–2120 New Zealand deep-sea sediment core. Mg/Ca data within the MD97–2120 core was used to infer presumed sea surface temperatures, which were correlated to Vostok δD values and a chronology for the Vostok core that was itself tied to the GISP2 ice core chronology, two other sediment cores, and the astronomical theory of Pleistocene ice ages.

point. Second, the age "control points" used to correlate the MD95–2042 chronology with the higher resolution GRIP chronology extended only to about 66 ky BP. Hence, Pahnke et al. probably did not feel justified in using the GRIP-tuned MD95–2042 chronology for presumed ages in the New Zealand core much greater than this.

The Vostok timescale Pahnke et al. applied to the bottom of the MD97–2120 core was constructed by Shackleton (2000). But Shackleton obtained his timescale by using the Eastern Pacific V19–30 sediment core (3° 21′ S, 83° 21′ W, water depth of 3,091 meters). After extending the sediment record somewhat by including $\delta^{18}O$ values from the nearby V19–28 (2° 22′ S, 84° 39′ W, water depth of 2,720 meters) sediment core, Shackleton then tuned benthic $\delta^{18}O$ values within these two cores to (presumed) 65° N summer insolation variations over the last 400,000 years. Hence, he assumed the validity of the astronomical theory and then used that assumption to assign an age scale to the V19–30 and V19–28 sediment cores, which was then applied to the Vostok ice core.

However, in order to determine the precession lag between the solar insolation signal and the V19–30 $\delta^{18}O$ values, Shackleton (2000) needed an "independent" age, which he obtained by assuming that the midpoint of the most recent glacial-to-interglacial transition occurred 13,000 years ago, on the basis of (presumed) annual layer counts in the upper portion of the GISP2 ice core. Once he obtained the value for this precession lag, he then inferred the value for the obliquity (axial tilt) lag.

Upon imposing this requirement and obtaining an age scale for the V19–30 core, Shackleton was able to transfer this timescale to the Vostok ice core data, including the D/H data. Pahnke et al. (2003) then correlated the assumed sea surface temperatures obtained from MD97–2120 to these variations in the Vostok D/H data, thereby transferring Shackleton's Vostok timescale to the bottom portion of the MD97–2120 sediment core.

It should be noted that Shackleton (2000) concluded, on the basis of his analysis, that the presumed 100,000-year cycle found in the seafloor $\delta^{18}O$ values was *not* the result (at least not directly) of changes in volume of the high-latitude ice sheets, as is generally assumed within the astronomical theory. Rather, he concluded that this 100,000-year cycle probably resulted instead from the influence of atmospheric carbon dioxide. This is interesting for two reasons. First, it suggests that part of the rationale for assuming that changing atmospheric CO_2 could dramatically influence climate is coming from old-earth interpretations of the climate data. Second, it was Shackleton himself (Shackleton, 1967) who argued that variations in sediment $\delta^{18}O$ values were caused mainly by variations in the amount of high-latitude ice, rather than by changes in sea temperature, as originally argued by Emiliani (1966). The fact that Shackleton reversed himself regarding the correct climatic interpretation of seafloor sediment chemistry is just one more example of the ever-changing nature of secular "origin stories."

The dating of this bottom section of the New Zealand core is summarized in Figure 6.

Discussion

Secular dates assigned to the deep seafloor sediments and ice cores are not independent but rather are tied to one

another through a complex network of reasoning that assumes that the astronomical (or Milankovitch) hypothesis of ice ages is correct. This is demonstrated by examining in detail the methods used to date a single deep-sea sediment core, the MD97–2120 core off the eastern coast of New Zealand. It is worth noting that despite the interconnectedness between the different dating methods, there are still many contradictions between the different secular chronologies (e.g., the Devil's Hole chronology), although these are generally rather subtle and one has to "dig" into the literature in order to find them. Such contradictions are to be expected when a flawed paradigm is used to interpret the data.

Suggestions for Future Research

Due to the general lack of recent work on the seafloor sediments in the creation technical literature, this is an area that is "wide open" to creation researchers. Consideration of this topic suggests a number of avenues for future research. For instance, Vardiman (1996) has noted a trend of decreasing $\delta^{18}O$ values at greater sediment depths, consistent with postulated higher ocean temperatures during and after the Flood (Oard, 1990). However, Vardiman analyzed only three drilling sites: DSDP 277, 279, and 281. Given the wealth of sediment data available, it should be possible to confirm this trend for other cores. Likewise, Vardiman's model of seafloor sedimentation, though groundbreaking, was very preliminary, and there is a need to refine and expand it.

Also, there is a need to "tighten" up and revise a classic young-earth argument involving the seafloor sediments. Creation scientists have long pointed out that even if one assumes that sediment transport to the oceans has always been "slow and gradual," the many millions of years assumed by uniformitarian models imply that the ocean basins should now be choked with sediment (Roth, 1986; Nevins, 1973; Morris, 1994). However, these earlier arguments used old estimates of sedimentation rates, and there is a need to revisit this argument using the most up-to-date numbers. Snelling (2009, 2012) has already done this to some extent, although one online critic (Anonymous, 2014) has criticized his 2012 popular-level work. Snelling uses in his calculation a value of 20 billion tons of annual sediment discharge into the oceans, citing a figure from Milliman and Syvitski (1992). However, Milliman and Syvitski state that prior to 2000–2500 years ago, the rate of annual sediment discharge was probably less than half this number (< 10 billion tons per year). Hence, it could be argued that ~10 billion tons per year would have been the more appropriate number for the calculation, if one trusts Milliman and Syvitski's estimates. But it is also possible that their estimates could have been based on dubious old-earth assumptions. Either way, there is a real need to revisit and "tighten" this argument.

Also, Patrick (2010) has pointed out that the general scarcity of manganese and other polymetallic nodules within all but the shallowest seafloor sediments is a powerful argument that the bulk of the sediments were deposited rapidly, consistent with rapid Flood and post-Flood deposition of sediment but inconsistent with "slow and gradual" deposition over millions of years. Hence, geographical and depth variations in manganese nodule distribution might prove helpful in "fleshing out" the details of the Flood event, particularly its later stages as deposition rates slowed. In particular, they might help to determine how late-Flood and post-Flood sedimentation rates varied with location.

Much seafloor sediment data is publicly available, for example at ftp://ftp.ncdc.noaa.gov/pub/data/paleo/paleocean/. These data may provide a number of relatively inexpensive opportunities for the creation science community to strengthen and refine the Creation-Flood model.

References

Anklin, M., J.M. Barnola, J. Beer, T. Blunier, J. Chappellaz, H.B. Clausen, D. Dahl-Jensen, W. Dansgaard, M. De Angelis, R.J. Delmas, P. Duval, M. Fratta, A. Fuchs, K. Fuhrer, N. Gundestrup, C. Hammer, P. Iversen, S. Johnsen, J. Jouzel, J. Kipfstuhl, M. Legrand, C. Lorius, V. Maggi, H. Miller, J.C. Moore, H. Oeschger, G. Orombelli, D.A. Peel, G. Raisbeck, D. Raynaud, C. Schøtt-Hvidberg, J. Schwander, H. Shoji, R. Souchez, B. Stauffer, J.P. Steffensen, M. Stievenard, A. Sveinbjörnsdottir, T. Thorsteinsson, and E.W. Wolff. 1993. Climate instability during the last interglacial period recorded in the GRIP ice core. *Nature* 364(6434): 203–207.

Anonymous. 2014. "Best evidences for a young earth": Snelling and the ocean-sediment flux. Questioning Answers in Genesis blog. http://questioninganswersingenesis.blogspot.com/2014/05/best-evidences-for-young-earth-snelling.html

Bard, E., M. Arnold, J. Duprat, J. Moyes, and J. C. Duplessy. 1987. Reconstruction of the last deglaciation: deconvolved records of $\delta^{18}O$ profiles, micropaleontological variations and accelerator mass spectrometric ^{14}C dating. *Climate Dynamics* 1(2): 101–112.

Bintanja, R., R.S. W. van de Wal, and J. Oerlemans. 2005. Modelled atmospheric temperatures and global sea levels over the past million years. *Nature* 437(7055): 125–128.

Blaauw, M. 2010. Out of tune: the dangers of aligning proxy archives. *Quaternary Science Reviews* 36 (March 12): 38–49.

Blaauw, M., K.D. Bennett, and J.A. Christen. 2010. Random walk simulations of fossil proxy data. *The Holocene* 20(4): 645–649.

Cayre, O., Y. Lancelot, E. Vincent, and M. A. Hall. 1999. Paleoceanographic reconstructions from planktonic foraminifera off the Iberian Margin: temperature,

salinity, and Heinrich Events. *Paleoceanography* 14(3): 384–396.

Cronin, T. M. 2010. *Paleoclimates: Understanding Climate Change Past and Present*. Columbia University Press, New York, NY.

Dansgaard, W., S.J. Johnsen, H.B. Clausen, D. Dahl-Jensen, N.S. Gundestrup, C.U. Hammer, C.S. Hvldberg, J.P. Steffensen, A.E. Sveinbjörnsdottir, J. Jouzel, and G. Bond. 1993. Evidence for general instability of past climate from a 250-kyr ice-core record. *Nature* 364(6434): 218–220.

Elderfield, H., P. Ferretti, M. Greaves, S. Crowhurst, I.N. McCave, D. Hodell, and A.M. Piotrowkski. 2012. Evolution of ocean temperature and ice volume through the mid-Pleistocene transition. *Science* 337(6095): 704–709.

Emiliani, C. 1966. Isotopic paleotemperatures. *Science* 154(3751): 851–857.

Grossman, E.L. 2012. Applying oxygen isotope paleothermometry in deep time. In Ivany, L.C., and B.T. Huber (editors), *Reconstructing Earth's Deep Time Climate—The State of the Art in 2012, Paleontological Society Short Course*, pp. 39–67. The Paleontological Society Papers 18 (November 3, 2012). GSA Annual Meeting, Charlotte, NC.

Hayes, J.D., J. Imbrie, and N.J. Shackleton. 1976. Variations in the earth's orbit: pacemaker of the ice ages. *Science* 194(4270): 1121–1132.

Hebert, J. 2014. Circular reasoning in the dating of deep seafloor sediments and ice cores: the orbital tuning method. *Answers Research Journal* 7:297–309.

Herbert, T.D. 2010. Paleoceanography: orbitally tuned timescales. In Steele, J.H. (editor), *Climates and Oceans*, pp. 370–377. Academic Press, Amsterdam, Netherlands.

Hughen, K., S. Lehman, J. Southon, J. Overpeck, O. Marchal, C. Herring, and J. Turnbull. 2004. ^{14}C activity and global carbon cycle changes over the past 50,000 years. *Science* 303(5655): 202–207.

Johnsen, S.J., H.B. Clausen, W. Dansgaard, K. Fuhrer, N. Gundestrup, C.U. Hammer, P. Iversen, J. Jouzel, B. Stauffer, and J.P. Steffensen. 1992. Irregular glacial interstadials recorded in a new Greenland ice core. *Nature* 359(6393): 311–313.

Kingston, P.F. 2010. Benthic organisms overview. In Steele, J.H. (editor), *Climates and Oceans*, pp. 416–424. Academic Press, Amsterdam, Netherlands.

Kucera, M. 2010. Determination of past sea surface temperatures. In Steele, J.H. (editor), *Climates and Oceans*, pp. 328–343. Academic Press, Amsterdam, Netherlands.

Lisiecki, L.E., and M.E. Raymo. 2005. A Pliocene-Pleistocene stack of 57 globally distributed benthic $\delta^{18}O$ records. *Paleoceanography* 20(1): PA1003

Martinson, D.G., N.G. Pisias, J.D. Hays, J. Imbrie, T.C. Moore Jr., and N.J. Shackleton. 1987. Age dating and the orbital theory of the ice ages: development of a high-resolution 0 to 300,000-year chronostratigraphy. *Quaternary Research* 27(1): 1–29.

Meese, D.A., A.J. Gow, R.B. Alley, G.A. Zielinski, and P.M. Grootes. 1997. The Greenland Ice Sheet Project 2 depth-age scale: methods and results. *Journal of Geophysical Res*earch 102, No. C12: 26411–26423. The depth-age scale for the GISP2 core has been archived at ftp://ftp.ncdc.noaa.gov/pub/data/paleo/icecore/greenland/summit/gisp2/depthage/gisp2age.txt (accessed July 15, 2014).

Milankovic, M. 1941. *Canon on Insolation and the Ice-Age Problem* (in German). Special Publications of the Royal Serbian Academy, vol. 132, Belgrade, Yugoslavia.

Milliman, J.D., and J.P.M. Syvitski. 1992. Geomorphic/tectonic control of sediment discharge to the ocean: the importance of small mountainous rivers. *The Journal of Geology* 100(5): 525–544.

Morris, J. 1994. *The Young Earth*. Master Books, Colorado Springs, CO.

Mortyn, P.G., and C.D. Charles. 2003. Planktonic foraminiferal depth habitat and $\delta^{18}O$ calibrations: plankton tow results from the Atlantic sector of the southern ocean. *Paleoceanography* 18(2): 1037.

Nevins, S.E. 1973. Evolution: the ocean says no! *Acts & Facts* 8. Institute for Creation Research.

Oard, M.J. 1984. Ice ages: the mystery solved? Part II: the manipulation of deep-sea cores. *Creation Research Society Quarterly* 21:125–137.

Oard, M.J. 1985. Ice ages: the mystery solved? Part III: paleomagnetic stratigraphy and data manipulation. *Creation Research Society Quarterly* 21:170–181.

Oard, M.J. 1990. *An Ice Age Caused by the Genesis Flood*. Institute for Creation Research, El Cajon, CA.

Oard, M.J. 2004. Ice cores vs the Flood. *Journal of Creation* 18(2): 58–61.

Oard, M.J. 2005. *The Frozen Record*. Institute for Creation Research, Santee, CA.

Oard, M.J. 2007. Astronomical troubles for the astronomical hypothesis of ice ages. *Journal of Creation* 21(3): 19–23.

Pahnke, K., and R. Zahn. 2005. Southern Hemisphere water mass conversion linked with North Atlantic climate variability. *Science* 307(5716): 1741–1746. Online supplemental material at http://www.sciencemag.org/content/suppl/2005/03/16/307.5716.1741.DC1/Pahnke_SOM.pdf (accessed November 21, 2014).

Pahnke, K., R. Zahn, H. Elderfield, and M. Schulz. 2003. 340,000-year centennial-scale marine record of Southern Hemisphere climatic oscillation. *Science* 301(5635): 948–952. Online supplemental material at http://www.sciencemag.org/content/suppl/2003/08/14/301.5635.948.DC1/Pahnke.SOM.pdf (accessed November 21, 2014). Likewise, a summary of the age model applied to the core has been archived at http://ftp.ncdc.noaa.gov/pub/data/paleo/contributions_by_author/pahnke2003/pahnke2003.txt (accessed November 21, 2014).

Palerme, C., J.E. Kay, C. Genthon, T. L'Ecuyer, N.B. Wood, and C. Claud. 2014. How much snow falls on the Antarctic ice sheet? *The Cryosphere*

Discussions 8:1279–1304. http://www.the-cryosphere-discuss.net/8/1279/2014/tcd-8–1279–2014-print.pdf (accessed November 11, 2014).

Patrick, K. 2010. Manganese nodules and the age of the ocean floor. *Journal of Creation* 24(3): 82–86.

Pisias, N.G., D.G. Martinson, T.C. Moore Jr., N.J. Shackleton, W. Prell, J. Hays, and G. Boden. 1984. High resolution stratigraphic correlation of benthic oxygen isotope records spanning the last 300,000 years. *Marine Geology* 56(1–4): 119–136.

Rahmstorf, S. 2010. Abrupt climate change. In Steele, J.H. (editor), *Climates and Oceans*, pp. 41–46. Academic Press, Amsterdam, Netherlands.

Roth, A. 1986. Some questions about geochronology. *Origins* 13(2): 64–85.

Seely, P.H. 2003.The GISP2 ice core: ultimate proof that Noah's Flood was not global. *Perspectives on Science and Christian Faith* 55(4): 252–260.

Shackleton, N. 1967. Oxygen isotope analyses and pleistocene temperatures re-assessed. *Nature* 215:15–17.

Shackleton, N. 1987. Oxygen isotopes, ice volume, and sea level. *Quaternary Science Reviews* 6(3–4): 183–190.

Shackleton, N.J. 2000. The 100,000-year ice-age cycle identified and found to lag temperature, carbon dioxide, and orbital eccentricity. *Science* 289(5486): 1897–1902.

Shackleton, N.J., A. Berger, and W.R. Peltier. 1990. An alternative astronomical calibration of the lower Pleistocene timescale based on ODP Site 677. *Transactions of the Royal Society of Edinburgh: Earth Sciences* 81:251–261.

Shackleton, N.J., M.A. Hall, and E. Vincent. 2000. Phase relationships between millennial-scale events 64,000–24,000 years ago. *Paleoceanography* 15(6): 565–569.

Shackleton, N.J., R.G. Fairbanks, T. Chiu, and F. Parrenin. 2004. Absolute calibration of the Greenland time scale: implications for Antarctic time scales and for $\Delta^{14}C$. *Quaternary Science Reviews* 23(14–15): 1513–1522.

Shakun, J.D., S.J. Burns, P.U. Clark, H. Cheng, and R.L. Edwards. 2011. Milankovitch-paced Termination II in a Nevada speleothem? *Geophysical Research Letters* 38: L18701.

Skinner, L.C. 2008. Revisiting the absolute calibration of the Greenland ice-core age-scales. *Climate of the Past* 4:295–302.

Snelling, A.A. *Earth's Catastrophic Past*, volume 2. 2009. Institute for Creation Research, Dallas, TX.

Snelling, A. 2012. 10 best evidences that confirm a young earth: #1 very little sediment on the seafloor. https://answersingenesis.org/geology/sedimentation/1-very-little-sediment-on-the-seafloor/

Sosdian, S., and Y. Rosenthal. 2009. Deep-sea temperature and ice volume changes across the Pliocene-Pleistocene climate transitions. *Science* 325(5938): 306–310.

Sosdian, S., and Y. Rosenthal. 2010. Response to comment on "Deep-sea temperature and ice volume changes across the Pliocene-Pleistocene climate transitions." *Science* 328(5985): 1480d.

Stuiver, M., P.J. Reimer, E. Bard, J.W. Beck, G.S. Burr, K.A. Hughen, B. Kromer, G. McCormac, J. Van der Plicht, and M. Spurk. 1998. INTCAL98 radiocarbon age calibration, 24,000–0 cal BP. *Radiocarbon* 40:1041–1083.

Vardiman, L. 1996. The sands of time: a biblical model of deep sea-floor sedimentation. *Creation Research Society Quarterly* 33:191–198.

Voelker, A.H.L., P.M. Grootes, M.J. Nadeau, and M. Sarnthein. 2000. Radiocarbon levels in the Iceland Sea from 25–53 kyr and their link to the earth's magnetic field intensity. *Radiocarbon* 42:437–452.

Waelbroeck, C., J. Jouzel, L. Labeyrie, C. Lorius, M. Labracherie, M. Stiévenard, and N.I. Barkov. 1995. A comparison of the Vostok ice deuterium record and series from the Southern Ocean core MD 88–770 over the last two glacial cycles. *Climate Dynamics* 12:113–123.

Winograd, I.J., T.B. Coplen, J.M. Landwehr, A.C. Riggs, K.R. Ludwig, B.J. Szabo, P.T. Kolesar, K.M. Revesz. 1992. Continuous 500,000-year climate record from Vein Calcite in Devils Hole, Nevada. *Science* 258(5080): 255–260.

Wright, J.D. 2010. Cenozoic climate—oxygen isotope evidence. In Steele, J.H. (editor), *Climates and Oceans*, pp. 316–327. Academic Press, Amsterdam, Netherlands.

Yu, J., and W.S. Broecker. 2010. Comment on "Deep-sea temperature and ice volume changes across the Pliocene-Pleistocene climate transitions." *Science* 328(5985): 1480c.

Creation Research Society Quarterly 2015. 51:165–176.

Erosion of the Weald, Southeast England

Part I: Uniformitarian Mysteries

Michael J. Oard and John D. Matthews*

Abstract

The Weald, covering ~10,000 km² (3,900 mi²) of southeast England, is composed of a heavily eroded east-west anticline. It features a surface sometimes capped by gravel called "clay-with-flints," water and wind gaps through the chalk ridges on its flanks, and a local silcrete duricrust with eroded sarsen stones. Although uniformitarian scientists have offered several hypotheses to explain the geomorphology of this classical area, they all have major difficulties. We analyze these explanations and draw the following conclusion: The Weald's geomorphology, like many other areas of the world, remains a uniformitarian mystery. It is better explained by rapid Genesis Flood runoff, not erosion over millions of years.

Introduction

Geomorphology is a "gold mine" for Flood geology. It provides a reasonable explanation for Earth's landforms using the mechanism of Flood runoff, while uniformitarianism/actualism has great difficulty (Oard, 2008, 2013a). Flood runoff can explain large-scale erosion evident from a number of features such as far-transported resistant rocks, tall erosional remnants (inselbergs), coastal Great Escarpments, planation and erosion surfaces, water and wind gaps, submarine canyons, vertically walled canyons, and pediments. The lead author's area of study has been North America, especially in the western United States. However, similar features found worldwide suggest a similar cause—the global Genesis Flood.

Geomorphology first developed in England, especially southeast England. The Weald, as it is called, is a classical area of study dating back to the early 1800s, with a literature spanning over 200 years (Jones, 1980, 1999a, 1999b). In Part I, we will describe this classical region to demonstrate the failure of uniformitarian mechanisms. In Part II, we will provide a Flood geology explanation, suggesting that the Wealden anticline was rapidly uplifted and rapidly eroded during Flood runoff, leaving slightly dipping chalk limbs, very similar to the Colorado Plateau in North America. Channelized Flood runoff then carved water and wind gaps through the North and South Downs.

The Weald

The Weald is an area of southeast England approximately 200 km (125 mi) long from east to west, varying from 30 km (19 mi) wide in the west to 80 km (50 mi) wide in the east (Figure 1). It was once a forest but is now mainly an agricultural area with numerous small towns and only a few large ones. The

* Michael J. Oard, M.S., Atmospheric Science, Bozeman, MT, USA
John D. Matthews, PhD, Earth Science, Wool, Wareham, Dorset, U.K.
Accepted for publication December 23, 2014

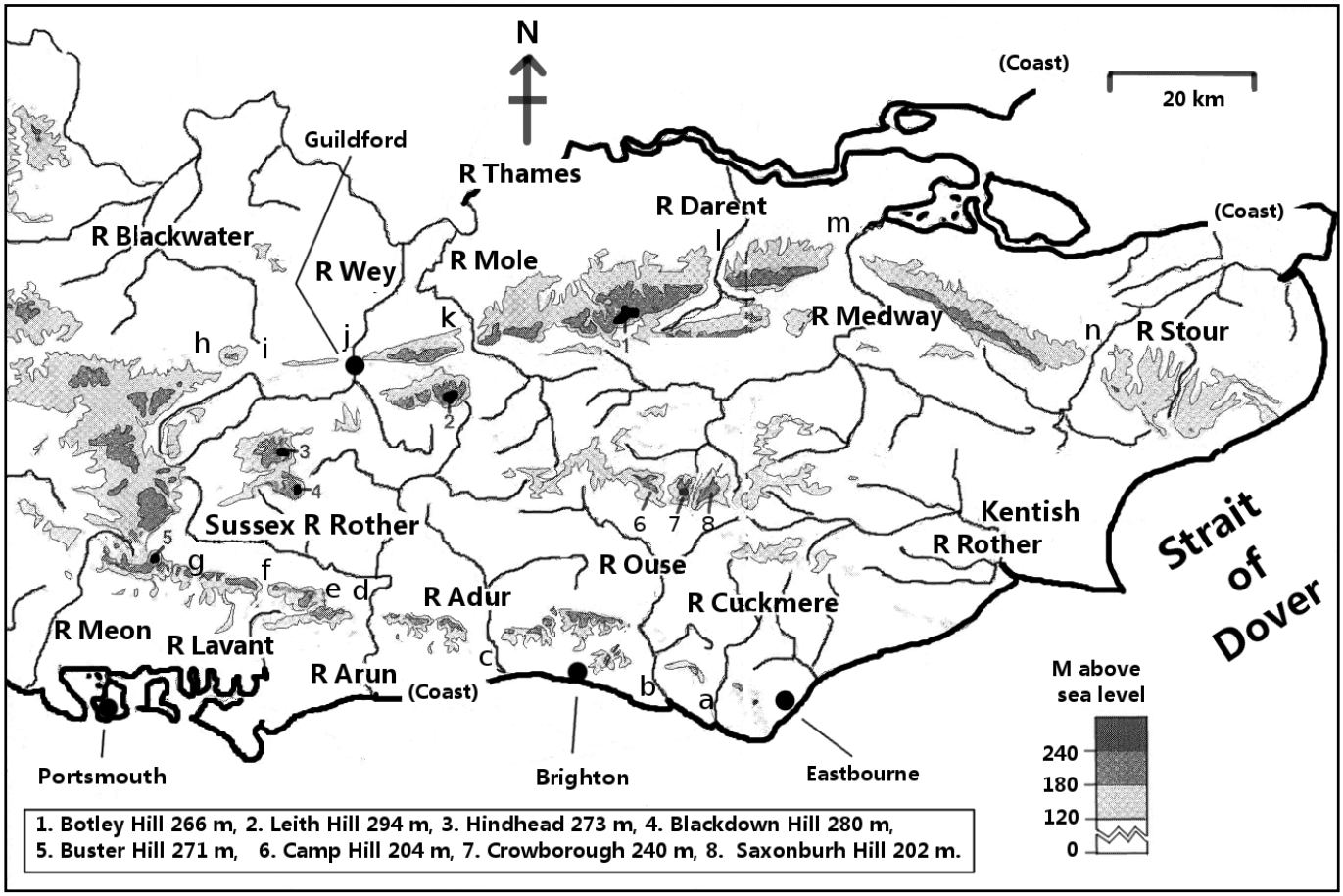


Figure 1. Map of the Weald by grayscale elevation above mean sea level with eight well-known high areas and showing important cities and rivers with water gaps denoted by letters (modified from Jones, 1999b, p. 27).

Weald is bounded on the north by the chalk ridges of the North Downs, just south of the London orbital motorway M25, and to the south by chalk ridges of the South Downs, roughly 10 km (6 mi) inland from the South Coast between Portsmouth and Eastbourne. In the east, the Weald terminates against the English Channel. The same eroded anticline continues east into northern France, being separated from the Weald by the 42 to 95 km (26 to 60 mi) expanse of the Dover Straits (Jones, 1999b). In the west, the chalk ridges largely disappear in the Winchester region, although the chalk strata continue well to the west.

The Weald remained unglaciated, which eliminates complications from glaciation in understanding its formation. The maximum southeastern edge of glaciation over the British Isles varies between 30 and 80 km (19 and 50 mi) north of the river Thames (Rayner, 1981). However, there are believed to be isolated permafrost features in the area (Goudie, 1990), but those features do not appear to affect the basic geomorphology of the Weald.

In terms of sedimentary geology, there is a broad similarity between the Wealden area and much of southern England, though its geomorphology is unique, thanks to variations in tectonic activity and erosion. Of particular interest is "the Jurassic Coast," designated a world heritage site in 2001. This area runs along the south-central coast, beginning about 100 km (60 mi) west of the Weald. Like the Weald, it has not been disturbed by glaciation. The stratigraphy of the Jurassic Coast is similar to that of the Wealden area. The Jurassic Coast is claimed to be a 185-million-year walk through earth history. Its visibility from tourism and an emphasis on millions of years and evolution (Figure 2), make the Jurassic Coast an interesting topic for creationist study (Oard et al., 2014).

The Geology of the Weald

The geological layers of the Weald are shown in Table I (Gallois and Edmunds, 1965). The exposed Weald layers start

Figure 2. The Jurassic Coast draws millions of tourists every year and teaches them millions of years and evolution.

from the "Cretaceous" chalk and move across the structure of the eroded anticline, which shows a small area of the Purbeck Beds at its center. Other famous formations include the Upper Greensand, the Gault Beds, the Lower Greensand, the Weald Clay, and the Hastings Beds. Deeper layers, which outcrop farther west, are known only from boreholes but are of no concern for this article. All of these layers of strata were deposited roughly horizontally over a period of approximately 100 million years of the uniformitarian timescale. The chalk is believed to have accumulated at a submarine depth of 300 m (1,000 ft) or more. Near the end of chalk deposition, the anticline started to form.

Weald Strata
Chalk
Upper Greensand
Gault
Lower Greensand
Weald Clay
Hastings Beds
Purbeck Beds

Table I. Strata in the Weald area.

The Geomorphology of the Weald

The subdiscipline of geomorphology was essentially developed at the Weald. It is a classic area with many mysteries. Catt and Hodgson (1976, p. 181) stated:

> Geomorphological studies of the Chalk landscape in south-east England have played an important role in the development of geomorphological thought in Britain. South-east England has been long regarded as a 'type area for British geomorphology.'

The Eroded Anticline

After the east-west anticline developed over this area, it was intensely eroded. A series of chalk ridges, the North and South Downs, are the residual limbs of this anticline. The chalk of the South Downs is orientated generally a little south of east, ~N100°, while the North Downs chalk is oriented a little north of east, ~N80°, as far as the water gap of the river Medway (Figure 1), and then ~N120° to the coast. The chalk ridges are typically 200 m (655 ft) above mean sea level (msl), though there are a few places exceeding 250 m (820 ft) msl. The chalk ridges are in the shape of a "cuesta," with a low slope corresponding to the dip of the sedimentary layers on the outer side and a cliff or steep slope on the inner side. In both the North and South Downs, the dips of the beds are generally between 1° to 5° away from the central area, while the escarpments face the central area. A simplified north-south cross section uses significant vertical exaggeration to show the structure of the anticline and the extent of subsequent erosion (Figure 3).

Within the eroded anticline, the "floor" has a typical height of less than 50 m (165 ft) msl, and nearby rivers may be less than 10 m (33 ft) msl. South of the North Downs, there is a partial secondary set of ridges that is more subdued. These ridges appear to be the result of faulting or local folding during the uplift. There is a narrow set of ridges and elevations in the west. In the east, the Weald is truncated by the English Channel. The precise relationship of this truncation is unknown, but it probably happened after the bulk of erosion of the Weald. Excluding the inner northern ridges, the middle of the Weald consists of a few erosional remnants. In places these can be higher than the North and South Downs, and they include Botley Hill, 266 m (873 ft), Leith Hill 294 m (965 ft), Hindhead 273 m (896 ft), and Blackdown 280 m (919 ft). These heights are numbered 1 to 4, respectively, on Figure 1.

The amount of erosion in the central anticline was roughly 1,300 m (4,260 ft). This estimate is based mainly on the thickness of the formations making up the Weald and the slopes of the anticlinal limbs. However, an unknown amount of chalk, possibly as much as 300 m (1,000 ft), was eroded along with some Tertiary sedimentary rock (Jones,

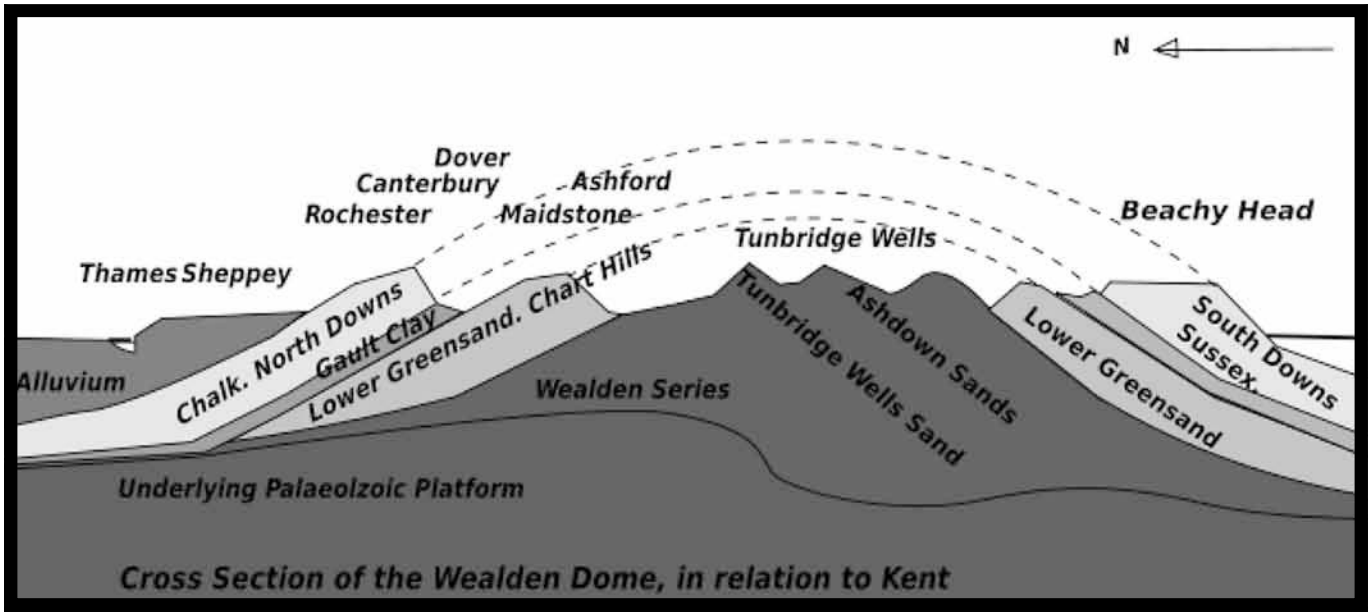


Figure 3. Uplifted, eroded Wealden Dome of southeast England (from Wikipedia). Total erosion in the center of the dome is more than 1,300 m (4,260 ft).

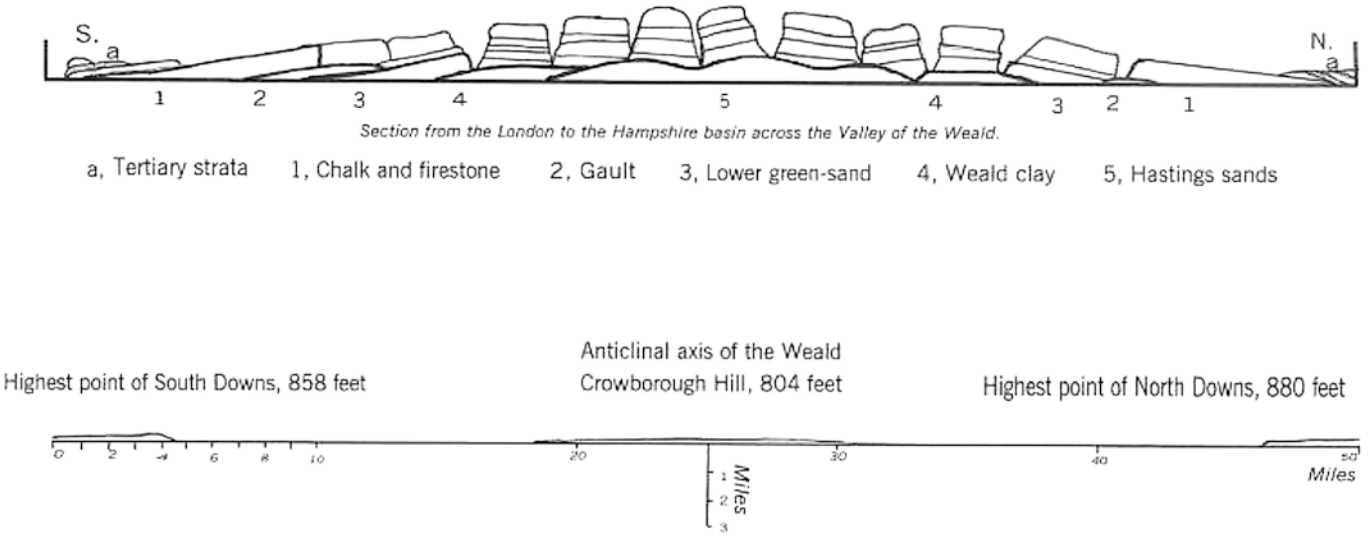


Figure 4. Charles Lyell's drawings of the Weald with high vertical exaggeration (top) and to scale (bottom) (from Lyell, 1991, p. 288).

1999b), suggesting that total erosion may have reached ~ 1,600 m (5,250 ft).

At ground level, the extent of erosion is barely detectible because of the distance and low slopes and the fact that the layers bow up in the middle of the anticline (Figure 3). The difficulty of seeing the extent of erosion is shown in the bottom panel of the north-south profile across the Weald in Figure 4 from Charles Lyell's (1991) *Principles of Geology*. The cross section shows a spatially

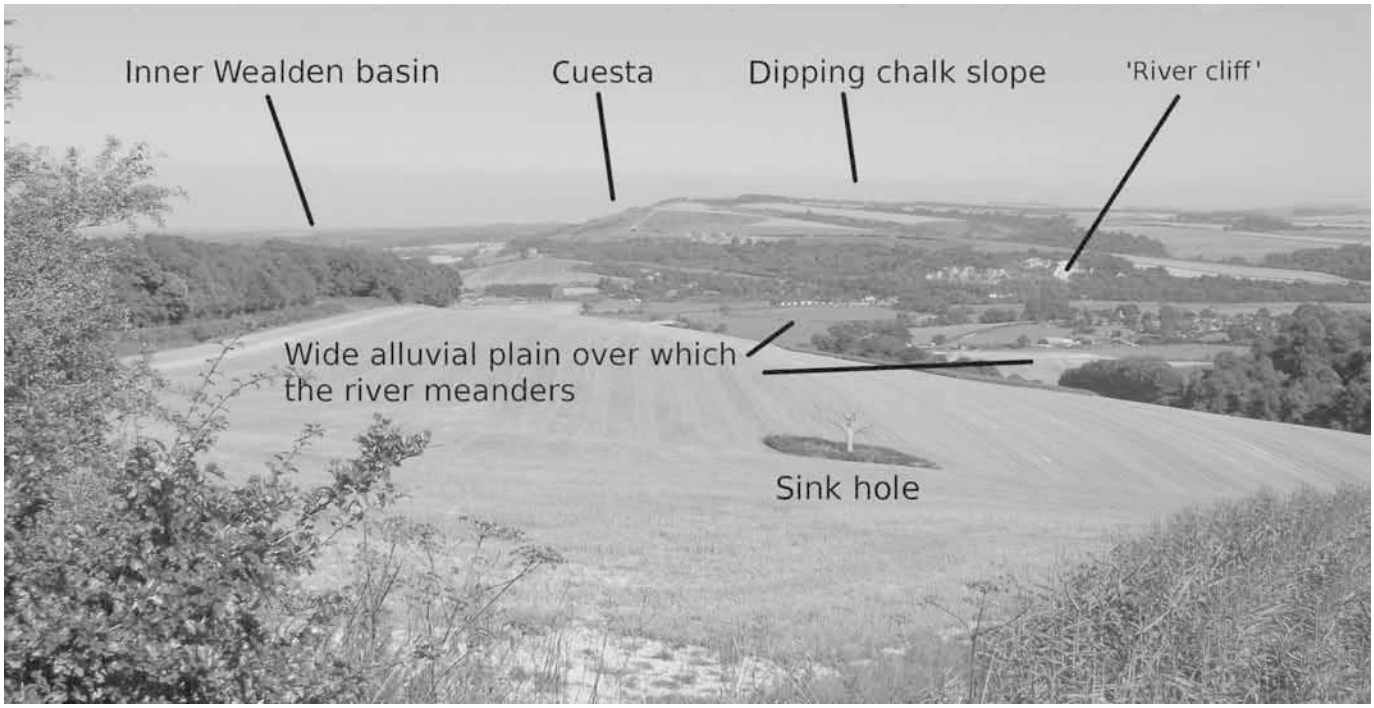


Figure 5. Erosion surface on the top of the South Downs on the dipping chalk slope. View east across the Arun water gap. Notice the shape of the South Downs on the other side of the water gap, showing the cuesta (steep slope) on the north side and the gently southward dipping erosion surface towards the south.

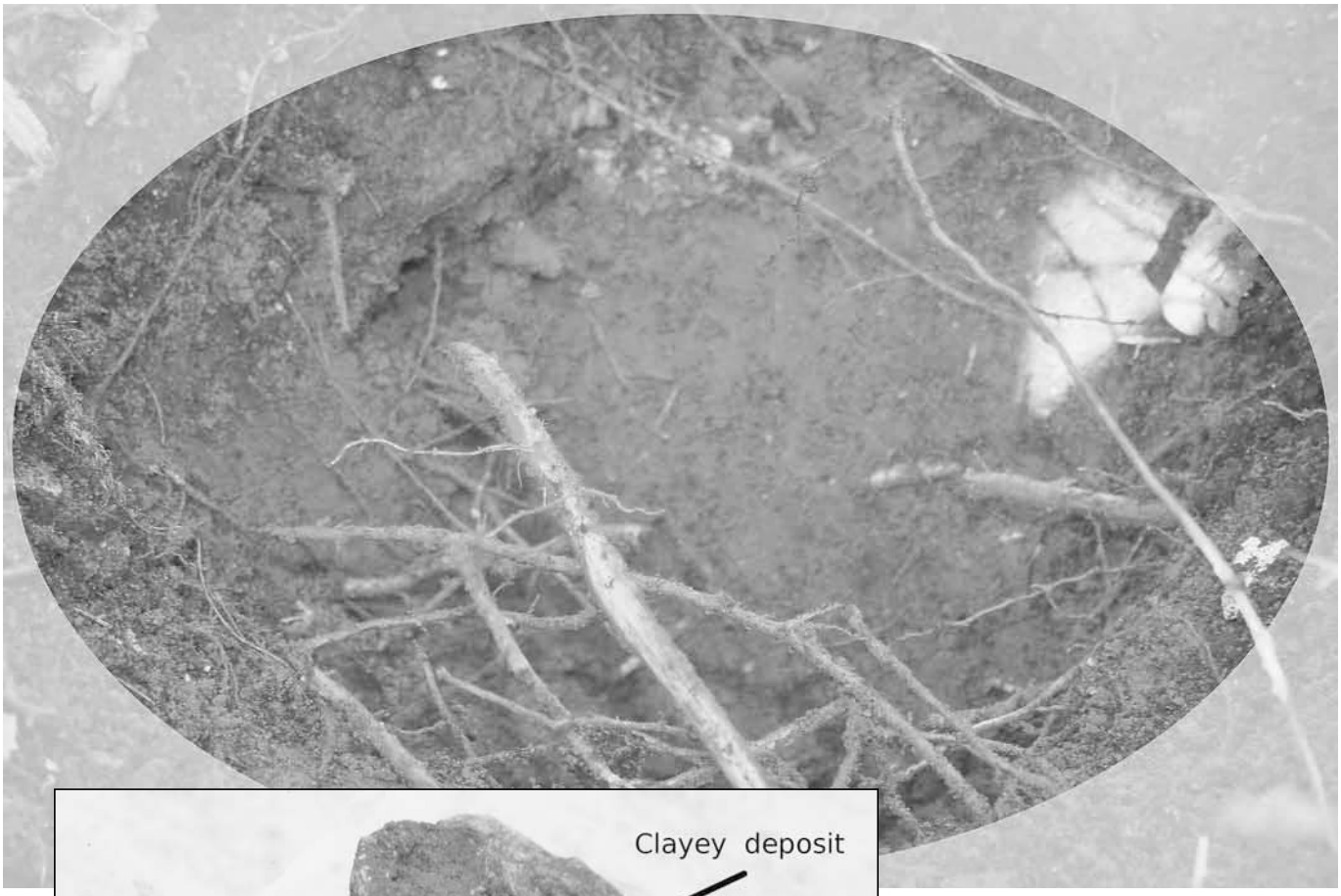
accurate cross section on the bottom, and one with vertical exaggeration that better shows the strata (top).

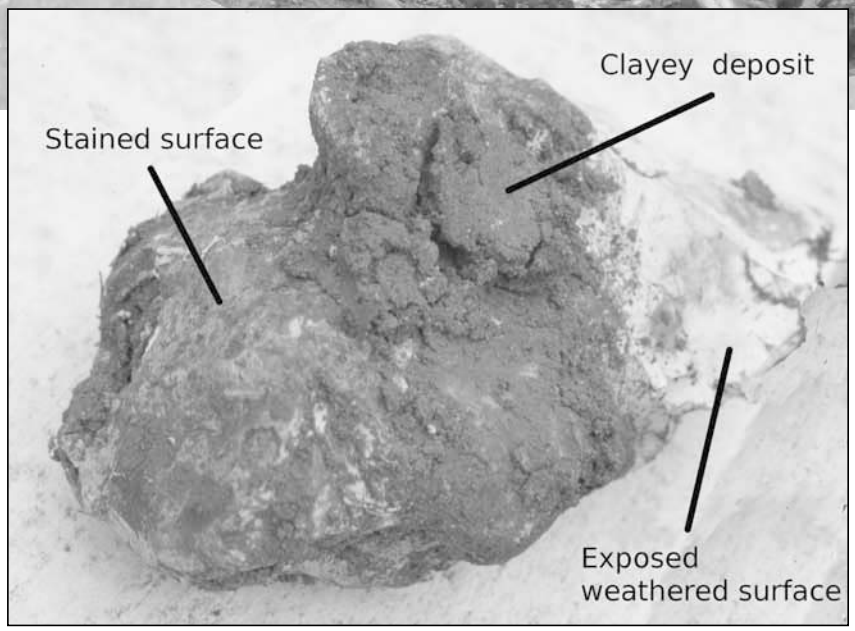
Gravel-Capped Erosion Surfaces

According to the *Glossary of Geology*, an erosion surface is "a land surface shaped and subdued by the action of erosion, esp. by running water. The term is generally applied to a level or nearly level surface" (Neuendorf et al., 2005, p. 217). An *erosion surface* is generally synonymous with a *planation surface*, except that an erosion surface is generally regarded as a rolling surface of low relief, while a planation surface is flat to nearly flat. The reason "running water" is in the definition is rocks rounded by running water commonly cap planation and erosion surfaces.

During the erosion of the Weald, planation surfaces were likely formed on the highest terrain, occasionally beveling the chalk ridges. Further erosion roughened and dissected these planation surfaces into erosion surfaces (Figure 5), leaving erosional remnants called *inselbergs*, *monadnocks*, or *bornhardts*. The erosion surface mainly forms an accordant summit on the Weald (Goudie, 1990, p. 22). According to uniformitarian geologists, this erosion surface is considered to be the same found in east Devon and west Dorset, about 190 km (120 mi) west of the western edge of the Weald (Jones, 1999a, p. 10). In fact, some uniformitarians think that most of southern England is one large, uplifted, dissected, and partially eroded planation surface (Jones, 1999a, p. 11). We shall return to this issue in a subsequent paper.

Gravel or conglomerate (cemented gravel) sometimes lies on top of the erosion surfaces and is more significant west of the Weald. The gravel is unlike that seen on planation surfaces in the western United States, which includes well-rounded quartzite cobbles and boulders. The coarse gravel on the Weald and elsewhere in south-central England is commonly angular and is generally called "clay-with-flints" (Figures 6a and b). This term, however, applies to a wide variety of deposits, including water-rounded flints and a matrix of sand (Loveday, 1962). The flints come from the erosion of the underlying soft chalk, which contains hard flint nodules, layers, and lenses, and so the clasts were not transported very far before being deposited. The matrix can be clay or sand, as Jones states, "To the west occur recognizable 'Clay-with-Flints,' angular chert rubble in a sandy matrix" (Jones, 1999a, p. 11). The differences between the sedimentary cover of the Weald and erosion surfaces in the western United States is due to the longer transport distances and possibly larger currents in





above: Figure 6a. "Clay-with-flints" from a pit dug on top of the North Downs east of Guildford.

left: Figure 6b. A flint from pit in Figure 6a.

the western United States, as well as the rock types. Shorter transport distances and possibly smaller currents led to the deposition of a fine-grained matrix on the Weald. But the differences between the "clay-with-flints" and the chalk suggest some distance of transport.

Water and Wind Gaps

One would expect that slow erosion over millions of years would cause tributaries from the North and South Downs to converge into one or two large trunk streams flowing east down the center of the Weald into the English Channel. This is because the anticline is both aligned and slopes slightly from west to east within the Weald basin formed by the North and South Downs.

However, many of the rivers and streams flow perpendicular to that expected direction: north through the

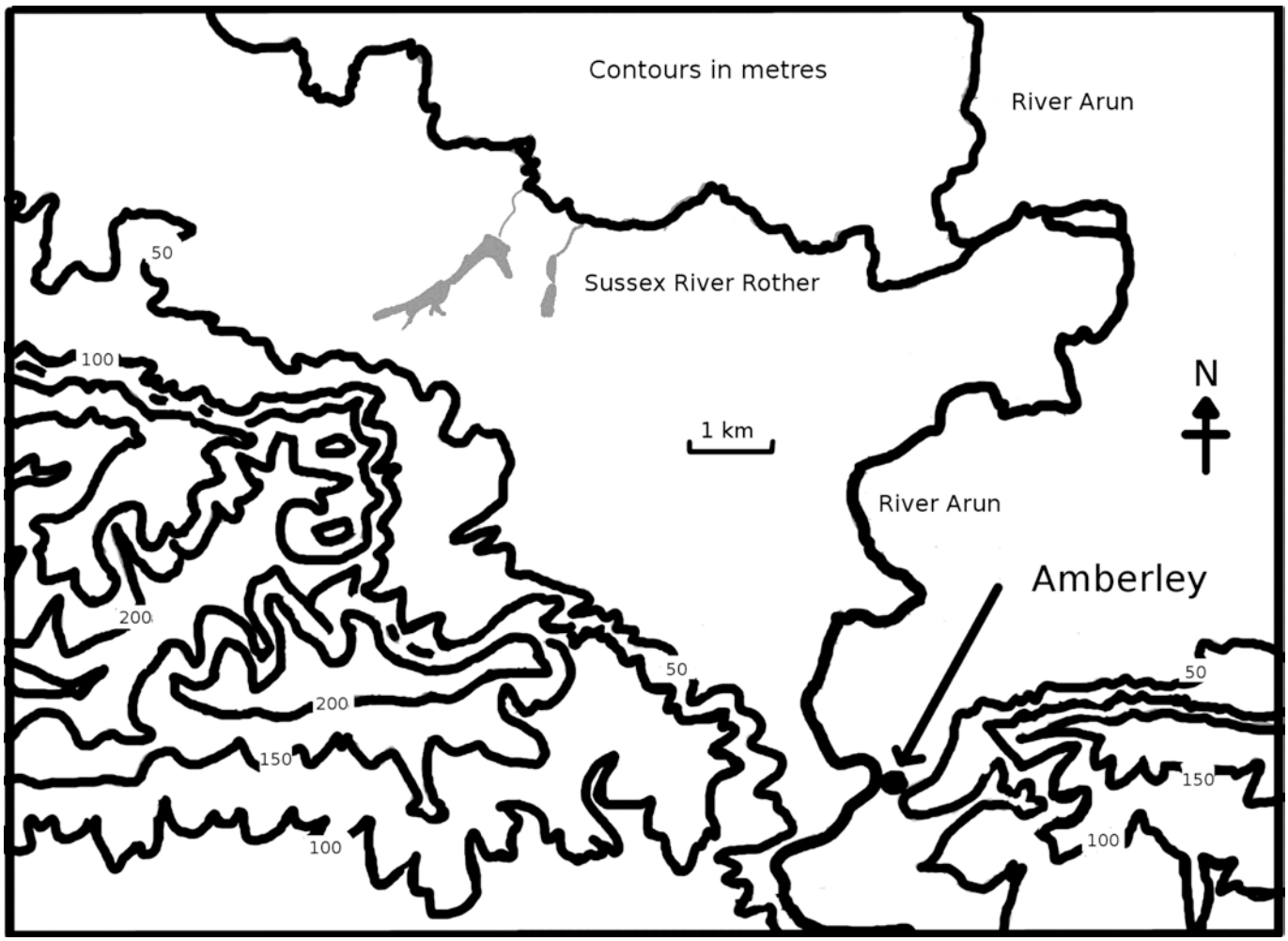


Figure 7. Contour map of the Arun water gap of the South Downs. The Arun River flows through the water gap around 10 m (33 ft) above msl while the top of the South Downs rises up over 200 m (656 ft) above msl.

North Downs and south through the South Downs in water gaps (Figures 5). See Figure 1 for a map of the rivers flowing through water gaps. A water gap is "a deep pass in a mountain ridge, through which a stream flows; esp. a narrow gorge or ravine cut through resistant rocks by an antecedent or superposed stream" (Neuendorf et al., 2005, p. 715). Figures 7 and 8 show contours along the Arun and Adur water gap, respectively, through the South Downs between the major towns of Chichester and Brighton, based on UK Ordnance Survey maps and the authors' supplementary surveying.

However, the *Glossary of Geology* definition is not strictly descriptive; it unfortunately includes two supposed mechanisms: antecedence and superposition. These are two of five possible hypotheses for the origin of water gaps. Ironically these two mechanisms have been largely eliminated as viable explanations for most water gaps. This definition is a case of two uniformitarian hypotheses intruding over strict observation. Also, this definition is too narrow. It states the gorge must cut through a "mountain ridge." But there are gorges that also penetrate ridges, plateaus, or even a series of plateaus. The ones in the Weald are cut through chalk escarpments. Therefore, a water gap should best be understood as a perpendicular cut through any structural barrier. To simplify the discussion, we will define a water gap as a gorge that cuts through any barrier of rock and has a stream or river flowing through it.

Wind gaps are also present across the North and South Downs. A wind gap is "a shallow notch in the crest or the upper part of a mountain ridge. Usually, it is at a higher level than a water gap" (Neuendorf et al., 2005, p. 723). To qualify as a wind gap, the gap has to be a notch *caused by substantial erosion*

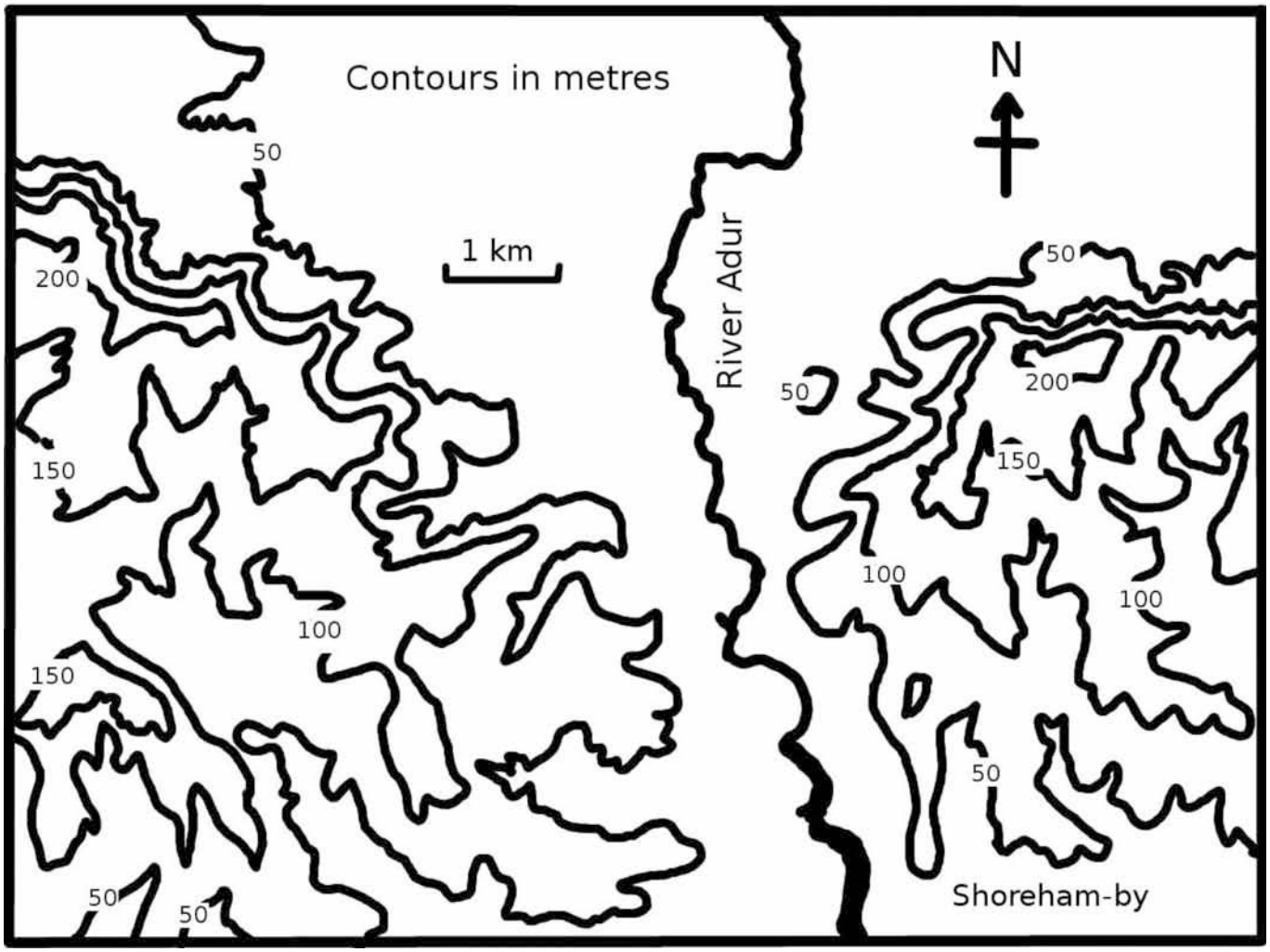


Figure 8. Contour map of the Adur water gap. The Adur River flows through the water gap around 10 m (33 ft) above msl while the top of the South Downs rises up over 200 m (656 ft) above msl.

and not solely by faulting or some other mechanism, as some early investigators thought for the Weald. In other words, the entire ridge was at one time near the same altitude, until the *notch was* eroded, aided possibly by easy removal of either local fault breccia or patches of less consolidated rock. The resulting notch was still perpendicular to the ridge, but erosion was not deep enough to capture a river or stream afterward. Being dry, they are "wind gaps," not "water gaps."

Silcrete and Sarsen Stones

An enigmatic feature on some erosion surfaces in southern England is a duricrust, defined as a hard crust on the surface generally found in a semiarid climate (Neuendorf et al., 2005, p. 197). There are generally four types of duricrusts: (1) ferricrete, an iron oxide crust; (2) silcrete, a silicon dioxide crust; (3) calcrete, a calcium oxide crust; and (4) bauxite, an aluminum oxide crust. The term "laterite" is often used for a crust that has oxides of iron or aluminum or both (Neuendorf et al., 2005, p. 363). Duricrusts are considered chemical sediments.

Duricrusts are found predominately in tropical and subtropical climates. They are common on the African Surface, a planation surface that covers much of Africa (Oard, 2011a), and planation surfaces in Australia but are less common elsewhere. However, they are also found in temperate climates, and an excellent example is the silcrete that sometimes caps erosion surfaces in

southern England, including the Weald (McFarlane 1983; Ullyott et al., 2004). Eroded silcrete boulders in southern England are called *sarsen stones*, some of which reach a length of over 4 m (13 ft) (Figure 9). Sarsen stones can be composed of sand (Figure 10) or larger clasts (Figure 11). The clasts are commonly rounded to angular flints. The origin of this once widespread silcrete cap is unknown (Anand et al., 1997; Summerfield, 1983), as is the origin of duricrusts in general.

The formation of duricrusts is not well understood by uniformitarian scientists. They believe duricrusts formed from an as-yet-unknown process.

> Many authors have declared the duricrusting is now in progress only to a slight extent (Walther; Woolnough 1927); others that most duricrust is fossil and assignable to an epoch when the climate was either wetter or drier and the processes more active. (King, 1967, p. 233)

The process remains unknown to this day (Oard, 2013a, chapter 57). Thus, scientists do not know if duricrusts are forming today, since their present-day formation is said to be slight at best. However, duricrusts are being eroded in the present (Woolnough, 1975). The origin of silcretes in particular is not well known: "The environmental parameters which control the formation and distribution of silcretes are poorly understood" (Isaac, 1983, p. 110). Duricrusts are another interesting exception to the principle of actualism. Uniformitarian scientists commonly debate whether duricrusts formed in wetter or drier climates. Perhaps neither is correct.

Many geologists simply believe duricrusts somehow developed chemically within ancient soils (De Swardt, 1964). Since many are found in the tropics, scientists posit similar climates for their formation, although some believe duricrusts are formed by groundwater and not by soil processes (Nash et al., 2004). This is supported by the fact that the chemicals needed to form duricrusts do not appear to come from underlying parent material or by upward migration of the chemicals (De Swardt, 1964; McFarlane, 1983). This problem is also true of the Weald; it is a silcrete formed on a chalk substrate. It appears that the duricrust is a chemical precipitate that collected on the planation surface soon after formation because some of the Weald's silcretes are folded, just like the underlying sedimentary rocks (Twidale and Campbell, 2005), and some duricrusts were found capping a bevelled planation surface cut on tilted sedimentary rocks (De Swardt, 1964; Twidale and Campbell, 2005).

Figure 9. Sarsen stones in the Valley of Stones, Dorchester, south-central England.

Figure 10. A sarsen stone of cemented sand at the Nine Stones stone circle 1.6 km (1 mi) west of the village of Winterbourne Abbas, Dorchester, south-central England .

Two Hundred Years of Fruitless Uniformitarian Study

Early studies of the Weald assumed a catastrophic explanation (Jones, 1999b). But during the past 200 years, geologists have attempted to explain the development of the Weald by the principle of uniformi-

Figure 11. Close-up of a sarsen stone with rounded to angular stones at the Nine Stones stone circle. Most stones are rounded to angular flint rocks with the one in the center limestone.

tarianism, and their hypotheses fail with further study. In spite of this, none have reconsidered the catastrophic paradigm.

Lyell's Marine Erosion

Charles Lyell (1991, p. 289), for example, was *certain* that what is now the inner basin of the Weald was eroded by the ocean:

> On the other hand, the quantity of denudation or removal by water of vast masses which are assumed to have once reached continuously from the North to the South Downs is so enormous, that the reader may at first be startled by the boldness of the hypothesis. But he will find the difficulty to vanish when once sufficient time is allowed for the gradual and successive rise of the strata, during which the waves and current of the ocean might slowly accomplish an operation, which no sudden diluvial rush of waters could possibly have effected.

Notice that Lyell rejected the Flood explanation (the sudden diluvial rush of waters) without review, like a lawyer seeking to present only one side in a court case. In his view, the escarpments of the North and South Downs are remnant sea cliffs, similar to the cliffs along large sections of the current south coast of England (Figure 12). The idea of marine erosion, which we will later resurrect in a different form, was finally abandoned in the late 1800s as a result of the work of Whitaker and Topley (Jones, 1999a).

Fluvial Erosion

Soon after Lyell, the fluvial, or river, erosion mechanism gained ascendancy (Jones, 1999b). In spite of several quite different models, all were seriously flawed. Most of these assumed that the Weald rose as an anticline, creating a

Figure 12. The white chalk cliffs of Dover (Wikipedia).

Weathering causes a rough surface, not a planation surface
Weathering will destroy an already existing planation surface
Weathered debris must be stripped from the area
Planation surfaces cut across both unweathered and weathered rock
Cannot account for exotic rounded rocks with percussion marks

Table II. Some problems with the weathering hypothesis and the formation of planation surfaces.

large island, which was later subaerially eroded, mainly by rivers, creating one or more erosion surfaces. The most popular model of the mid-1900s was that of Wooldridge and Linton (1955), who based their work on the "cycle of erosion" developed by William Morris Davis in about 1900. Davis's cycle began with uplift, which was followed by slow erosion over millions of years to a gently rolling surface called a peneplain (Summerfield, 1991).

Wooldridge and Linton's model was abandoned when Davis's cycle fell from favor. Even the term "peneplain" has been abandoned. However, the problem remains. Erosion and planation surfaces are common; workable models are not. One reason Davis's view was controversial was because of his insistence on rapid uplift. Newer models developed in the 1980s depend on pulsed tectonism and Paleogene (early Cenozoic) denudation (Jones, 1999a), but these models have not fared well in the field, either.

The Weathering Hypothesis

Jones (1999a) supports an alternative model: that weathering caused erosion surfaces sometimes capped with clay-with-flints. This idea developed in the early- to mid-1900s and is the most popular explanation today for erosion and planation surfaces (Oard, 2011b). It seems to have survived among geomorphologists because it fills a theoretical void (Thomas, 1994). In the hypothesis, erosion or planation surfaces form as the surface is chemically weathered downward with time. The weathered debris is removed by sheet wash, stream erosion, or other mechanisms. Both stages can occur simultaneously. The mechanism is believed especially effective in the humid tropics, where weathering is sometimes observed deeper than 100 m (330 ft).

There are a number of serious problems with the weathering hypothesis (Table II). The most serious is that weathering does not create planation surfaces but roughens and *destroys* them.

The Weald Is a Uniformitarian Mystery

Hypotheses for the origin of the Weald have come and gone, although the weathering hypothesis is currently popular. But after two centuries of intensive study, the explanation for the Weald's geomorphology remains as remote as ever:

> The evolution of the Weald has been the subject of continuing controversy over nearly two centuries of investigation. … The Weald is one of the best known examples of denuded anticline landscape yet its evolution has remained controversial despite numerous studies. (Jones, 1999b, p. 25)

This is compounded by the lack of robust explanations for water and wind gaps. Uniformitarian geology seems to have failed on both counts.

Summary

The Weald is formed by an erosion surface across an uplifted anticline in southern England. The crest of the anticline was eroded, leaving cuestas, known as the North and South Downs on the northern and southern limbs of the anticline, respectively. During erosion, surfaces were cut on the chalk ridges, sometimes beveling the layers. Erosion surfaces are capped locally by a gravel layer called "clay-with-flints," which consists of flint nodules eroded from the chalk and a fine-grained matrix, commonly sand. Later, water and wind gaps formed perpendicular to the North and South Downs, leaving an anomalous drainage that extends north and south, not east along the sloping axis of the anticline. Finally, a silcrete duricrust formed atop some erosion surfaces and was then eroded into large boulders called sarsen stones.

Although the Weald is a classical area for the origin and study of geomorphology, no satisfactory theory has been found. Many hypotheses have been proposed, but all have serious problems. These include Lyell's marine erosion hypothesis, the fluvial erosion model that mimicked Davis's "cycle of erosion," and today's weathering hypothesis. It is fair to say that the Weald remains a geomorphologic mystery.

In Part II, we will show that runoff from the Genesis Flood offers a reasonable explanation for the origin of the Weald, despite being dismissed from scholarly thinking by secular geologists since the late 1700s.

Acknowledgments

We thank the Creation Research Society for a grant to study the Weald and the geology of southern England.

References

CRSQ: *Creation Research Society Quarterly*

JofC: *Journal of Creation and Technical Journal*

Anand, R.R., C. Phang, J.D. Wildman, and M.J. Lintern. 1997. Genesis of some calcretes in the southern Yilgarn Craton, Western Australia: implications for mineral exploration. *Australian Journal of Earth Sciences* 44:87–103.

Catt, J.A., and J.M. Hodgson. 1976. Soils and geomorphology of the chalk in southeast England. *Earth Surface Processes* 1:181–193.

De Swardt, A.M.J. 1964. Lateritisation and landscape development in parts of equatorial Africa. *Zeitschrift für Geomorpholgie* 8:313–333.

Gallois, R.W., and F.H. Edmunds. 1965. *British Regional Geology, the Wealden District*, 4th edition. Her Majesty's Stationery Office, London, UK.

Goudie, A. 1990. *The Landforms of England and Wales*. Basil Blackwell Ltd, Oxford, UK.

Isaac, K.P. 1983. Tertiary lateritic weathering in Devon, England, and the Palaeogene continental environment of South West England. *Proceedings of the Geologists' Association, London* 94(2): 105–114.

Jones, D.K.C. 1980. *The Shaping of Southern England*. Institute of British Geographers Special Publication No. 11, London, UK.

Jones, D.K.C. 1999a. Evolving models of the Tertiary evolutionary geomorphology of southern England, with special reference to the Chalklands. In Smith, B.J., W.B. Whalley, and P.A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, pp. 1–23. Geological Society of London Special Publication No. 162, The Geological Society, London, UK.

Jones, D.K.C. 1999b. On the uplift and denudation of the Weald. In Smith, B.J., W.B. Whalley, and P.A. Warke (editors), *Uplift, Erosion and Stability: Perspectives on Long-Term Landscape Development*, pp. 25–41.Geological Society of London Special Publication No. 162, The Geological Society, London, UK.

King, L.C. 1967. *The Morphology of the Earth—A Study and Synthesis of World Scenery*. Hafner Publishing Company, New York, NY.

Loveday, J.A. 1962. Plateau deposits of the southern Chiltern Hills. *Proceedings of the Geologists' Association, London* 73:83–101.

Lyell, C. (1833) 1991. *Principles of Geology*, volume III. Reprint, University of Chicago Press, Chicago, IL.

McFarlane, M.J. 1983. Laterites. In Goudie, A.S., and K. Pye (editors), *Chemical Sediments and Geomorphology: Precipitates and Residua in the Near-Surface Environments*, pp. 7–18. Academic Press, New York, NY.

Nash, D.J., S.J. McLaren, and J. Webb. 2004. Petrology, geochemistry and environmental significance of silcrete-calcrete intergrade duricrusts at Kang Pan and Tswaane, central, Kalahari, Botswana. *Earth Surface Processes and Landforms* 29:1,559–1,586.

Neuendorf, K.K.E., J.P. Mehl Jr., and J.A. Jackson. 2005. *Glossary of Geology*, fifth edition. American Geological Institute, Alexandria, VA.

Oard, M.J. 2008. *Flood by Design: Receding Water Shapes the Earth's Surface*. Master Books, Green Forest, AR.

Oard, M.J., 2011a. The remarkable African planation surface. *JofC* 25(1): 111–122.

Oard, M.J. 2011b. Origin of Appalachian geomorphology, part II: formation of surficial erosion surfaces. *CRSQ* 48:105–122.

Oard, M.J. 2013a. *Earth's Surface Shaped by Genesis Flood Runoff*, www.michael.oards.net/GenesisFloodRunoff.htm.

Oard, M.J. 2013b. Surficial continental erosion places the Flood/post-Flood boundary in the late Cenozoic. *JofC* 27(2): 62–70.

Oard, M.J. 2013c. Massive erosion of continents demonstrates Flood runoff. *Creation* 23(3): 44–47.

Oard, M.J., J.D. Matthews, and A. Sibley. 2014. The Jurassic Coast: evidence for the Flood. *CRSQ* 51:113–127.

Rayner, D.H. 1981. *The Stratigraphy of the British Isles*, 2nd edition. Cambridge University Press, Cambridge, UK.

Summerfield, M.A. 1983. Silcrete. In Goudie, A.S., and K. Pye (editors), *Chemical Sediments and Geomorphology: Precipitates and Residua in the Near-Surface Environments*, pp. 59–91. Academic Press, New York, NY.

Summerfield, M.A. 1991. *Global Geomorphology*. Longman Scientific & Technical, New York, NY.

Thomas, M.F. 1994. *Geomorphology in the Tropics: A Study of Weathering and Denudation in Low Latitudes*. John Wiley & Sons, New York, NY.

Twidale, C.R., and E.M. Campbell. 2005. *Australian Landforms: Understanding a Low, Flat, Arid and Old Landscape*. Rosenberg Publishing Pty Ltd, New South Wales, Australia.

Ullyott, J.S., D.J. Nash, C.A. Whiteman, and R.N. Mortimore. 2004. Distribution, petrology and mode of development of silcretes (Sarsens and Puddingstones) on the eastern South Downs, UK. *Earth Surface Processes and Landforms* 29:1,509–1,539.

Wooldridge, S.W., and Linton, D.L. 1955. *Structure, Surface and Drainage in South-East England*, Philip, London.

Woolnough, W.G. 1975. The influence of climate and topography in the formation and distribution of products of weathering. In Adams, G.F. (editor), *Planation Surfaces: Peneplains, Pediplains, and Etchplains*, pp. 329–338. Benchmark Papers in Geology 22, Dowden, Hutchinson & Ross, Inc., Stroudsburg, PA.

Creation Research Society Quarterly 2015. 51:177–185.

Battlegrounds of Natural History III: Historicism

John K. Reed and Peter Klevberg*

Abstract

In 1970, George Gaylord Simpson discussed six foundations of natural history. Although his understanding of each foundation was largely in error, the six foundations are important. The third foundation, historicism, again shows that misunderstandings among modern scientists spring from their worldview of naturalism and that those errors are corrected by biblical theology, which remains the ultimate foundation for truth in natural history.

What Is Historicism?

This is the third part in a series addressing the six foundations of natural history (Figure 1) proposed by George Gaylord Simpson (1970). After having affirmed a materialist worldview in his foundation of *naturalism* (Reed and Williams, 2011), and having affirmed his belief that natural history was firmly within the province of science through his belief in *actualism* (Reed and Williams, 2012), Simpson defined *historicism* as follows:

> The term historicism is here used, with some stretching, as a tag for various principles and problems that arise from consideration of the configurations of the earth and the observable universe in relationship to time. (Simpson, 1970, p. 66)

Broadly, historicism is the belief in an external, objective reality that progresses in a linear fashion irreversibly through time. It is quite different from Eastern ideas of illusion (*maya* of Hinduism) or endless cycles. Furthermore, it implies the existence of purpose, unlike the innate randomness of materialism and postmodern nihilism. Simpson's various "principles and problems" are derivative of his materialist and positivist worldview. By "configurations," he meant the geological evolution of the Earth and the cosmos, and the snapshots of that history found in the rock and fossil records.

However, his misimpression that the study of history is a scientific endeavor creates significant internal tensions for several reasons. First, the Western view of history is built on Christian theology (Reed, 1999). Second, Simpson's own view is inconsistent because his optimistic humanism cannot survive his bleak materialist determinism. This has become even more evident in the decades since Simpson. His views are largely outmoded in academic circles, and a more pessimistic nihilism threatens his confidence in truth being resident anywhere, even in science. This is not an isolated trend (Schaeffer, 1968; Rose, 2009).

But a review of Simpson (1970) is still profitable. His six foundations represent a keen insight into the modernist view of reality. Although postmodernism (contextualism, rejection of reason) is growing, there are still many people—especially in the sciences—who are operating with a modernist point of view. Many in the fields of geohistory or biohistory who are unaware of or reject recent philosophical developments

* John K. Reed, PhD, Birmingham, AL, Reed4004@gmail.com
Peter Klevberg, Great Falls, Montana, grebvelk@yahoo.com
Accepted for publication November 20, 2014

BATTLEGROUND	SIMPSON'S DEFINITION
naturalism	Basic postulate of science; supernatural excluded from scientific explanation by definition.
actualism	Synonym of "uniformitarianism" in Lyellian sense. Present processes only options for past explanation.
historicism	Problems and procedures coming from consideration of state of Earth and cosmos over time.
evolutionism	"historical model or theory of life as changing directionally and irreversibly in the course of descent."
mode of history	Fuzzy gradualism; catastrophes occur, but not sudden, great, and worldwide.
methods of scientific history	Historical inferences are scientific as long as they are based on actualism, naturalism, and evolutionism.

Figure 1. "Historicism" is the third of Simpson's (1970) six foundations of natural history.

share Simpson's view. We will, therefore, address his concept of historicism here and discuss more recent developments in a later paper.

Why Historicism is Important

For many centuries, the nature of time and history was a subject of intense interest to thinkers, from Plato to Kant. Historians generally addressed the contents of records and artifacts of the past, while philosophers dealt with context questions of time and existence. But the advance of secularization brought the growth of positivism—the idea that science was a superior source of truth compared to philosophy and theology. Development of scientific histories followed—politically and economically with ideas such as Marxism, and biologically and geologically with natural history.

The Enlightenment dream has largely been acheived. Near the turn of the nineteenth century, Cuvier had waxed rhetorical: "Would it not be glorious," he said, for geologists to "burst the limits of time" just as Newtonian astronomers had "burst the limits of space?" (Rudwick, 2005, p. 1). Cuvier had more in mind than a legitimate knowledge of the past. He and his secularized peers were primarily interested in "bursting" history's connection with God. Deep time was an important step, removing the act of Creation (and its Creator) into a distant, fuzzy past. It is best understood in the context of Romans 1; secularists repressed the truth by pushing God so far away in time that He held little relevance to man. Many Christians went along for the ride (Mortenson, 2004), in spite of Paul's assertion in Acts 17:27 that the Creator is near to every man.

Historicism matters to modern scientists because modern biology, geology, and astronomy have come to play prominent roles in the philosophical understanding of the nature of time and history. But scientists who dismiss theology and philosophy are poorly equipped to address its problems and puzzles. Their refusal to face the fact that their understanding of history is linked to their naturalistic belief system has compounded their error. Attempts to answer those kinds of questions scientifically distorts both history and science (Reed and Klevberg, 2014a).

Historicism matters to historians because in their attempts to make their discipline "scientific," they got the worst of science while losing the best of history. For a false sense of certainty, they have ceded almost all of Earth's past to geologists and biologists, and most of mankind's past to anthropologists. Also, having lost the Christian moorings they enjoyed for centuries, "revisionism" has become rampant.

Historicism *should* matter to Christians because God chose to reveal Himself on the stage of history. Much of the Bible is historical narrative, and Christianity has learned to its detriment that the surrender of that part of revelation ultimately means the surrender of it all. The "blessed hope" of the space-time return and rule of Christ on a new Earth is a hope rooted in the reality of all the historical events leading to it, just as His incarnation was the culmination of millennia of historical events. One cannot divorce Christian theology from Christian history.

But this is a lesson not all Christians have learned. Positivism has crept into the church and even bled into creationism (Reed and Klevberg, 2014b). Many theologians have been beguiled by the

supposed certainty of science, thinking it can bolster revelation. They forget that science itself cannot be justified apart from revelation. Few seem to realize how deeply this error has penetrated. It is seen in every dismissal or diminution of biblical truth, particularly the acceptance of the geologic timescale and theistic evolution, which lead to rejection of God's continued providence. The common denominator is the substitution of human knowledge for revelation or its subordination to science. This has serious consequences. For unbelievers, a fetish for science leads to inevitable disappointment when meaning is lost. This has led to postmodern skepticism. The absolute science of Simpson (1970) today cannot even be defined (Hogan, 2010; Laudan, 1983; Rose, 2009).

In less than 200 years, Cuvier's vision was achieved. By the mid-twentieth century, a confident modernism reigned, with outspoken atheists enjoying the benefits of the Christian West while dismissing God. Typical of that age was George Gaylord Simpson (1902–1984), perhaps the most prominent exponent of secular natural history of his day. In his later life, he saw the beginnings of the collapse of his worldview and was forced to defend the neo-Darwinian/Lyellian consensus against scientific creationism, and against neocatastrophism and punctuationism. In an extended essay (1970), he described six foundations of natural history in an attempt to stem the tide of opposition. They revealed the heart of secular natural history—positivist, materialist, evolutionist, and gradualist. Though his confidence is less acceptable today, his outline of natural history's foundations sheds light on how Christianity lost science and history, and that is worth untangling.

Modern Historicism

Simpson (1970) thus is a useful milepost in our understanding of historicism. He reflected the stark materialist view that matter and energy evolving through time were sufficient to explain reality. This reductionist metaphysic was accompanied by an equally reductionist view of knowledge; science was the measure of truth, and it could be applied to unobserved billions of years with confidence. Its adherents were equally confident that they could dismiss the millenia of theology and philosophy that had informed the Christian West during its development and rise to power. This bleak materialism existed in tension with an optimistic humanism. In the decades since Simpson, it is the former that has dominated.

Simpson's simple view is reflected in the points he addressed. He limited his discussion of historicism, excluding many weighty issues debated by philosophers for millennia. Instead, he focused on debates over the nature of uniformitarianism (cf. Reed, 2010). He simply assumed scientific materialism was true. He skipped over the nature of time and reality, and how they interact, to critiques of Reijer Hooykaas and Stephen J. Gould, the merits of a steady-state model for Earth's geological history, and the entropic (yet still evolutionary) progression of Earth and life.

A firm believer in naturalism, Simpson was thus a positivist—he believed in science (and historical speculation masquerading as science) in the way Martin Luther believed in the Bible. In this, he was doubly deceived—first in the materialistic content of his faith, and second, in his inability to see that his "rational science" was built on a faith-based belief system of naturalism. This latter blindness remains common; most secularists today refuse to admit their worldview. For them, as for Simpson, their opinions are simply "science" and thus true by definition.

Since Simpson

For Simpson, history was a reductionist exercise in materialism directed by Lyell and Darwin. Unfortunately, many scientists today, unfamiliar with recent advances in the philosophy of history, share his outmoded view. But developments since Simpson have reopened some of the questions he ignored.

Simpson did not discuss Kuhn's (1962) contribution to the nature of science and its knowledge, but many others have. Kuhn appears more and more to have been a milestone in the understanding of science, using secular sociology to undermine the pristine positivism carried forward from the Enlightenment. He reminded us that science is performed by people who are imperfect and driven by motives other than a rarefied desire for truth. In a sense, Kuhn (1962) pulled science off its twentieth-century pedestal.

Without its historic Christian underpinnings, there was nothing to arrest that fall. Despite confident arguments in the creation trials of the 1980s, scientism was crumbling. In response to the McLean vs. Arkansas (1982) decision, Laudan (1983) noted that science could not be adequately defined, and by 2000 Meyer noted that such questions have largely ceased to be of interest.

Another recent trend in natural history has been the change from *scientists* like Simpson (1970) carrying the philosphical load to professional philosophers becoming more interested in the workings of that discipline. The recent Geological Society of America Special Paper's publication, *Rethinking the Fabric of Geology* (Baker, 2013), celebrated the fiftieth anniversary of the 1963 symposium, *The Fabric of Geology*, in which Simpson and other scientists discussed emerging problems with uniformitarianism. In the new volume, the three lead articles are authored by professional philosophers, not geologists. Two, Carol Cleland and Derek Turner, have written extensively on the subject since the turn of the century. The third, Gadi Kravitz, noted:

> It can therefore be said that the geologists' knowledge of the past is

> based on pretheoretical assumptions, often of a metaphysical nature, not susceptible to logical or empirical proof. In a certain sense, *they are the products of the geologists' imagination*. (Kravitz, 2013, p. 21, emphasis added).

Simpson would likely have been quivering with rage had he read this.

Critique of Simpson

Simpson's (1970) view of historicism was profoundly and unconsciously influenced by his worldview, yielding an arrogance that *knew* it was nothing more or less than pure scientific truth. His positivism blinded him to the issues outside of science involved in time and history, resting as it did on his prior foundations of naturalism and actualism. He gave no thought to the Christian basis for history and its meaning that had infused the West for centuries, and so he had no explanation for the linear, progressive view of time or of the purposeful significance that has always been present in Western views of the past. Thus, any analysis of Simpson (1970) must begin with his positivism.

Problems with Postivism

Positivism is the elevation of science to being the basis for true knowledge, commonly at the expense of philosophy and theology. More technical definitions can be found, but the essence that exists as an underlying meme in our culture is not so much a technical theory as it is an unconscious presupposition. Positivism exercised profound influence in the past two centuries, carrying with it a scientific arrogance that has only begun to diminish in recent decades. People have begun to realize that science and engineering cannot answer the deepest questions of the human condition and that the human condition should make us cautious when scientists and engineers claim to have those answers.

As pointed out by Reed (2001) and Reed et al. (2004), positivism derives from the prior metaphysical assumption of materialism. If ultimate reality is matter and energy, then it only makes sense that disciplines that study matter and energy would be able to provide ultimate answers. This is in contrast to the Christian worldview, in which God is the ultimate reality, and ultimate truth rests on His revelation and the exploration into its content from the perspective of human experience, as creatures created in His image.

Both Lyell's uniformitarianism and Darwin's evolution are inherently materialistic, and so are inherently positivistic. That influence can be seen by reading the works of almost all of their apologists, and Simpson (1970) was no exception. Although Lyell and Darwin were more circumspect for societal reasons, their twentieth-century followers became bold, openly asserting the irrelevance of Christianity and the nonexistence of its God. In all cases, a pronounced positivism is present, usually assumed and not argued.

That is why Simpson (1970) addressed natural history as a branch of *science*. If reality is matter and energy, the path to truth must be found in human knowledge, the most certain of which is science. He displayed the confident positivism of the mid-twentieth century, not realizing that it would soon be eclipsed by a postmodern relativism. It was a time when advertisers could sell a product simply by noting that "four out of five scientists" liked it. Any branch of knowledge wanting to achieve truth transformed itself into a "science" of some sort. Adler (1965) discussed this fetish for science and how it affected disciplines traditionally considered distinct from science, particularly philosophy and history:

> I know that there are enough varieties of positivism to permit the professors to retain their individuality, but I insist that behind the multiplicity of technical jargons there is a single doctrine. The essential point of that doctrine is simply the affirmation of science, and the denial of philosophy and religion. (Adler, 1992, pp. 31–32)

Foundation Damage

Reed and Williams (2011, 2012) demonstrated that Simpson's (1970) foundations of naturalism and actualism failed to stand rigorous inspection. Philosophical naturalism is self-refuting, because it must incorporate axioms that are justified only by the Christian theology that it opposes. Actualism (whether used as a synonym for uniformitarianism per Simpson, or used to define a *part* of uniformitarianism per Gould, 1965) fails because naturalism cannot justify the causal continuity on which it rests. Even recent attempts to do so (Kravitz, 2013), based on a link to the second law of thermodynamics, end up using circular reasoning (Reed and Klevberg, 2014a) and so fail.

The failures of both naturalism and actualism are contrasted to points where Christian theology provides answers that its opponent cannot (Lisle, 2009; Reed, 2001; Reed and Williams, 2011, 2012). Christians cannot accept either naturalism or actualism, even with theological window dressing. For example, *methodological naturalism*, vigorously advocated by many Christian thinkers (e.g., Poe and Mytryk, 2007) is not, as they believe, a prerequisite to science; it is rather an attempt to devalue the original *Christian* scientific method with an *a priori* and circular definition of science. Likewise, *actualism* rests on uniformity, which in turn rests on an unbroken chain of cause and effect, which in its turn can be justified only by an infinite, eternal God.

Sins of Omission

Simpson (1970) failed to address a philosophy of history: a reason for its importance, the basis for the structure of

time, or a justification for understanding the past. He should have taken to heart the truth expressed by Clark (1994) that history presupposes a *philosophical* context. These failings are most likely tied to his materialist view of reality, a positivist view of knowledge, and the corresponding uniformitarianism that saw history as an extension of science. That point of view cannot be supported without a series of Christian presuppositions (Reed, 2001; Reed et al., 2004) that invalidate it as an opponent of Christian history. Furthermore, his reductionist views are an abberation in thinking about history for millennia, from Moses to Aristotle to Kant.

For example, Sproul et al. (1984) followed a richer tradition, recognizing origins as a *metaphysical* question. They noted that the basic question of origins—"why is there something instead of nothing?"— was clearly outside of science. There are only four possible answers, all also outside of science. The first—phenomena are illusory—destroys science. The second—the universe created itself—violates the principle of noncontradiction and thus destroys the logic that underlies science. The third—matter and/or energy are eternally self-existent—is invalidated by the observed existence of anything that is not eternally self-existent by any beginning, such as the big bang. This leaves only one possible answer: phenomena were created by something else that is itself eternally self-existent. That option saves science but, by inserting God, invalidates its autonomy.

Simpson (1970) merely assumed the absence of God and revelation without addressing that metaphysical question or the logic of its possible answers. In doing so, he simply smuggled biblical elements, such as the intelligibility of nature and time, in through the back door (Glover, 1984). Geologically, Simpson could not justify linear time, a beginning and end of the universe, or the idea of progress in history. He could not even justify uniformity as the basis for uniformitarianism, though his faith in that view of history never wavered. He distinguished "geohistory" from "biohistory" in an attempt to save the former from his own evolutionary nonuniformity, even though materialism provides no real basis for distinguishing between living matter and nonliving matter in this manner:

> The question of directionalism in biohistory will be discussed as an aspect of evolutionism. Directionalism in geohistory in either of its extreme forms is not now tenable. It is now clear that such processes as orogeny, vulcanism, and glaciation have varied greatly from time to time and place to place. At particular places and times in the past they have been both more and less active than at present. There is no evident regular progression either of decrease or increase in their force. To that extent, Lyell's contention of configurational uniformity is confirmed. (Simpson, 1970, p. 67)

Of course, directionalism in time is not a separate empirical issue for either biology or geology. It is an *assumption* that underlies both. This is demonstrated on Simpson's playing field simply by the empirical data collected since 1970 that contradict his assertions about past rates. To get around that problem, today's uniformitarians admit that geologic processes, such as volcanism (Reed, 2012), occurred at far greater intensities in the past. It is ironic that it is this empirical evidence that struggles so hard against the straitjacket of the philosophical overlay of uniformitarianism. Today's uniformitarians try to mask these discontinuities with an assumed "regularity" at a deeper level; manifested in plate tectonics, which has become the new static-earth model. Catastrophic eruptions, earthquakes, floods, etc. are all simply details of the overarching regularity of plates soaring out of, across, and into the mantle over time.

Sins of Commission

Despite an inability to admit a belief system, Simpson's (1970) ideas were permeated by his materialist metaphysic. A vocal denial of metaphysics by materialists cannot undo their practice of the same, even if they want to call it all science. Simpson was no exception:

> The term historicism is here used, with some stretching, as a tag for various principles and problems that arise from consideration of the configurations of the earth and the observable universe in relationship to time. (Simpson, 1970, p. 66)

To fully understand the quote, one must understand Simpson's special use of the term "configurations." He drew a dichotomy between *immanence* and *configuration*. By the former, he meant the laws of nature that he assumed (philosophically) were intrinsic properties of matter. By the latter, he meant the historical outworking of natural law over time via geological phenomena. Attributing these two terms to science, however, did not really allow him to escape Clark's dictum: "History requires philosophy" (Clark, 1994, p. 21).

Simpson simply represented a loss of awareness of the importance of philosophical thinking, brought on by decades of positivism. That is why when we look at similar geological explanations from the eighteenth and nineteenth centuries (when the public was more attuned to philosophical thinking), we see that Simpson's carelessness was not tolerated. Instead, Enlightenment geotheorists danced around origins. Hutton, for example, appeared to flirt with eternalism in his famous quote about the beginning and end of Earth, but a careful reading of his larger work shows that he tied it to a definite *deistic* theology, which implies creation (Reed, 2008). Lyell and his peers simply ignored the issue, and Simpson (1970) seems to have thought it was no longer relevant. He treated the topic as nothing more than the relatively trivial issue of heat

loss over time, making sure to include the *de rigueur* celebration of radioactivity's "victory" over Kelvin.

Simpson then reveals uniformitarianism as the faux-philosophy-of-history of naturalism. Thus the great philosophical problems of the past were now reduced to geological controversies of his day:

> The great virtue of the Hooykaas-Visotskii-Gould dichotomy of uniformitarianism is that it removes actualism from the arena of those foolish attacks. … It has also … clarified the usual but false alternatives of uniformitarianism *versus* catastrophism. (Simpson, 1970, p. 66)

He mentioned various uniformitarian alternatives: cyclic steady-state, statistical steady-state, and irreversible sequence changing in a constant direction. Unable to even arrive at an answer within his own truncated view of history, he found a mushy middle ground and affirmed that "the present consensus includes features of all three" (Simpson, 1970, p. 67).

But even the debates between Kelvin and the geologists run deeper than some heroic tale of geologists. The real issue is adroitly avoided—that thermodynamics demonstrates conclusively that either Earth had a beginning or that uniformity is invalid. Given the dependence of uniformitarianism on uniformity, and the dependence of the geologic timescale on uniformitarianism, it is not surprising that secularists largely continue to avoid the real issues. "Agnosticism" allowed them to successfully avoid the issue for many years. But it hangs over their head to this day, held up by the thread of public ignorance of philosophy. But if history is a continuum—if it is to make sense—then the link between the beginning and subsequent time cannot be avoided.

Simpson is firmly caught on the horns of Hume's dilemma. His only justification for "historical" history is evolution, and the evidence he adduced to support it is empirical. But that evidence fails to be conclusive because (1) actual human observation is severely limited relative to deep time, and (2) empirical evidence in the rock and fossil records is amenable to other interpretations.

How to Make History Work

The philosophy of history is larger than uniformitarianism, even if our understanding of uniformitarianism had not changed significantly since 1970 (cf. Reed, 2010, 2011). Simpson's view is an interesting historical snapshot, but it is outworn. Gould's (1987) discussion of natural history revealed more of its complexity, recognizing that the nature of time is not Simpson's simple progression. Unfortunately, Gould was not able to take the next step that acceptance of "historical science" was a belief too, although Kravitz (2013) has finally made that point. Secularists like to trumpet empirical investigation as the hallmark of science, forgetting that empiricism is common to science, philosophy, the social sciences, and history. The issue is not empirical vs. nonempirical but the difference between science and history.

If history is difficult for secular thinkers, origins is impossible. That is why it is so often avoided. Science can say nothing about origins (Reed and Klevberg, 2014b). This presents a problem: if uniformity is true, it must apply everywhere, all the time, or scientific certainty is lost. Uniformity rests on causal continuity (Kravitz, 2013; Reed and Williams, 2012), which is contradicted by the big bang, invalidating a *materialist* uniformity. This is one more reason that Christianity routinely wins metaphysical arguments.

Secular faith and its flaws may elude the secularists, but they are evident to everyone else (Lisle, 2009, 2010; Mangalwadi, 2011; Reed, 1996a. 1996b, 1998, 1999). Their worldview of naturalism is self-refuting because it relies on Christian axioms. Despite assertions that science originated in Greece or in medieval Islam, its true origins lie in the Christian West (Glover, 1984; Stark, 2003, 2005) in spite of intellectual and societal advantages in other cultures:

> The Chinese monks and Hindu sages did not lack ability. They lacked the philosophical motivation. They looked for a psychological paradise, for bliss within their consciousness. Until the sixteenth century, the Western Christian mind also looked for psychological or spiritual salvation. *It was only when a major portion of Christendom could read the Bible and take it at face value that it began to understand the loss of Eden as a loss of earthly paradise.* (Mangalwadi, 2011, p. 221, emphasis in original)

From this thoroughly biblical structure comes a method. Biblical history is revelatory, comprised primarily of recorded eyewitness accounts. Other records mimic this template. Historical assertions also can be tested by forensic evidence. Although empirical, history lacks the reproducibility of experimental science. For that reason, it lacks the inherent certainty of science, the weakness that secularists have tried so hard to disguise with "scientific history." Inherent uncertainties in extrabiblical accounts are constrained by the infallible biblical framework of time and space. Man, created in God's image, possesses attributes that make history possible. He can apprehend truth. He lives in time and sees the importance of divine and human actions on that stage.

History is important because God expresses Himself in His works of creation and providence. A theological tension between transcendence and immanence facilitates the existence of a meaningful history. By transcendence we mean that God is a volitional being, free from time and nature. His existence depends on nothing but Himself, and He is governed by His own will. Despite this, He chose to create a world in time and space to bear witness to His charac-

ter. For that reason, He is continuously at work in time and space, and the past is a memorial to His glory. Made in His image, people experience God and His world in a limited, finite, but still true, personal, and volitional way. His transcendence gives history its broad sweep and purpose; His immanence means that He plays a significant role in each event. Thus there is meaning behind everything. The same God who oversees the rise and fall of empires cares for widows and orphans. Not a sparrow falls apart from God's involvement (Matthew 10:29). Therefore, history is a way for people to see and to glorify God (e.g., Deuteronomy 7:18). For these reasons, theology, not science, is the key to history.

> The biblical view is that history had a beginning and will have an end, and that both the beginning and the end are in God's hands. Therefore, what comes between them is invested with meaning and purpose; the creator is not the prime mover of ancient philosophy, and the terminator is not the bleak exhaustion of resources or the running down of the sun. Will and personality dominate everything and make of history a moral arena. (Schlossberg, 1983, pp. 27–28)

Scientific conclusions, because they are statements of largely invariable general principles of nature, depend on uniformity, but actually documenting what happened in the past is not the domain of science. It belongs to history. History, in turn, depends on philosophy (metaphysics, epistemology) for the existence, comprehensibility, and significance of a past that can be truly, if partially, known and can cast light on the present and the future. But a coherent and correspondent philosophy of history is entirely dependent on a theology that provides an adequate metaphysical and epistemological basis.

The Bible Is the Answer

Naturalism sees history as a branch of science. But the Bible, in addition to providing a basis for history (and science), also upholds history in a way that no other religion or philosophy can (Figure 2). History has always been a part of civilization, but man's historical self-awareness is unique to the Christian West, because of Christian foundations. The first foundation stone is that the Bible supplies a *reason* for history, as discussed above. History reflects God's glory, showing His will acting over the stage of time. Nothing is more important (Edwards, 1754). It also provides a *touchstone* for faith. Israel was reminded over and over of the Exodus as a reason to believe God for the present and future.

Second, Christianity provides a *structure* for history that points us toward a proper method. That structure is the linear, progressive time whereby God, man, and nature interact.

> An analysis of the Western sense of history reveals three aspects of it that are especially pertinent to this study: a linear, unidirectional sense of time… (Glover, 1984, p. 192)

Men on Earth have a beginning and an end. But God does not, and He promises an unending existence for men after death. That future existence brings significance to our present. A beginning (Creation) and end (Judgment Day) provide a coherent timeline. Even in the context of eternity, time has meaning and structure.

That linear, progressive structure is assumed by secularists like Simpson, but having rejected God, they cannot justify it. Simpson never tried. Kravitz (2013) attempted it but fell short (Reed and Klevberg, 2014a). Like Lyell and Darwin, Simpson was more Christian than he realized in his view of history.

Finally, Christianity provides the initial content of history. It includes an infallible framework of past events and sufficient detail to show God's interest in everything from humble genealogies to the sweep of empires. Jones (2005) demonstrates the superiority of the biblical accounts to Sumerian, Assyrian, or Egyptian histories. It is unfortunate that many scholars (including Christians who should know better) have needlessly increased uncertainty by rejecting that revealed framework.

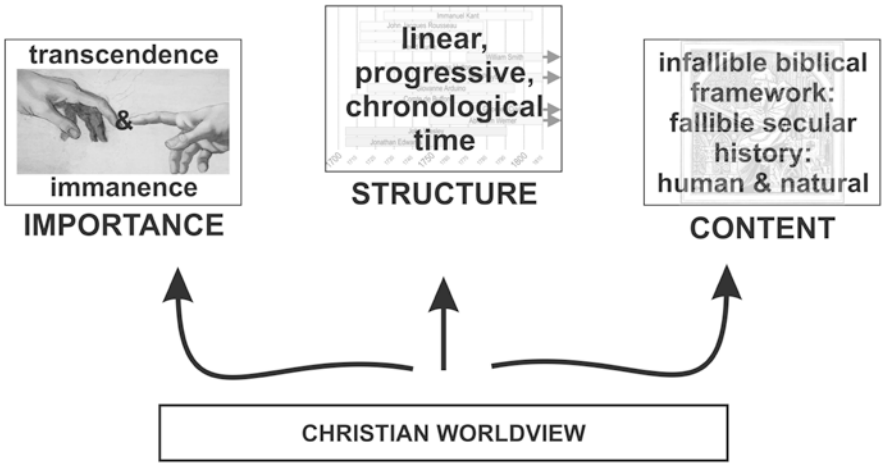


Figure 2. Only Christianity can support Western history in its purpose, structure, method, and content. Naturalism cannot justify history; it is random, assumes the nature of time, confuses the methods of science and history, and rejects the most reliable sourcebook in the world, the Bible.

Summary and Conclusions

When considering the scope of the topics of time and history, Simpson's treatment is stunningly anemic. His reductionist approach was guided by an absolute faith in naturalism; he was *sure* that the whole issue could be reduced to a few technical discussions about geological theory. But even his vaunted insights are largely outmoded among his academic children, in part from an explosion of knowledge about the Earth, and in part from the evolution of scientific modernism toward a postmodern nihilism. But many scientists still share the modernist belief system of Simpson (1970). Thus, it is worth grasping his view of uniformitarian geohistory as the zenith of history. Its logical and empirical shortcomings also can help guide critiques of more recent ideas.

Simpson (1970) asserted that "historicism" was nothing more than the materialistic understandings of various geological and biological configurations over deep time. In this, he ignores the necessary role of philosophy and theology in a view of ultimate origins that sets the initial conditions under which history is seen. Like his secular forefathers, Simpson unthinkingly assumed a biblical view of the foundation, structure, and importance of history.

The Bible addresses origins and history in a manner superior to Simpson and his academic children. It describes how an eternal, self-existent God created the universe from nothing and continues to govern it. These doctrines of creation and providence form the foundations of both science and history. History is meaningful because God values it. It proceeds along a linear, progressive timeline, just as described in the Bible, following the ultimate purposes of God. Great events, such as Creation, the Flood, and the Incarnation are described because they all show God working both through and beyond the uniformity-based natural order. Simpson's view of history leads nowhere. But his admission that the way we see history is important is true—it is straight out of the Bible.

Like his views of naturalism and actualism, Simpson's understanding of historicism was truncated and a path to further error. His subconscious idea of its importance and the ability of man to understand truth in history were remnants of the West's Christian heritage. Biblical theology justifies the aspects of history that Simpson could not (Figure 3). Like the previous two topics,

BATTLEGROUND	SIMPSON'S DEFINITION	ERRORS	BIBLICAL "FIX"
naturalism	Basic postulate of science; supernatural excluded from scientific explanation by definition.	1. equivocal 2. positivist 3. self-contradictory	Biblical theism; emphasis on Divine Providence in nature
actualism	Synonym of "uniformitarianism" in Lyellian sense. Present processes only options for past explanation.	1. equivocal 2. circular 3. arbitrary	Biblical foundation of natural history; emphasize Providence
historicism	Problems and procedures coming from consideration of state of Earth and cosmos over time.	1. positivist 2. origins problems 3. no axioms of history	Bible justifies history; natural history is a mixed question
evolutionism	"historical model or theory of life as changing directionally and irreversibly in the course of descent."		
mode of history	Fuzzy gradualism; catastrophes occur, but not sudden, great, and worldwide.		
methods of scientific history	Historical inferences are scientific as long as they are based on actualism, naturalism, and evolutionism.		

Figure 3. Biblical solutions to Simpson's (1970) problems. History is not science. It rests on Christian theology. Natural history is a mixed question that requires revelation and theology. The problem of origins illustrates the bankruptcy of naturalism.

Christians must look to the doctrines of creation and providence to find the antidotes to secular error.

References

CRSQ: *Creation Research Society Quarterly*

Adler, M.J. 1965. *The Conditions of Philosophy*. Athenaeum Press, New York, NY.

Adler, M.J. 1992. *A Second Look in the Rearview Mirror*. MacMillan, New York, NY.

Baker, V.R. (editor). 2013. *Rethinking the Fabric of Geology*. Geological Society of America Special Papers 502, Boulder, CO.

Clark, G. 1994. *Historiography Secular and Religious*. The Trinity Foundation, Jefferson, MD.

Edwards, J. 1754. A dissertation concerning the end for which God created the world. http://www.jonathanedwards.com/theology.htm

Glover, W. 1984. *Biblical Origins of Modern Secular Culture*. Mercer University Press, Macon, GA.

Gould, S.J. 1965. Is uniformitarianism necessary? *American Journal of Science* 263:223–228.

Gould, S.J. 1987. *Time's Arrow Time's Cycle: Myth and Metaphor is the Discovery of Geological Time*. Harvard University Press, Cambridge, MA.

Hogan, T. 2010. Some implications of the demise of the demarcation problem. *CRSQ* 46:167–176.

Jones, F.N. 2005. *Chronology of the Old Testament*. Master Books, Green Forest, AR.

Kravitz, Gadi. 2013. The thermodynamics time arrow and the logical function of the uniformity principle in geohistorical explanation. In Baker, V.R. (editor), *Rethinking the Fabric of Geology*, pp. 19–40. Geological Society of America Special Papers 502, Boulder, CO.

Kuhn, T. 1962. *The Structure of Scientific Revolutions*. University of Chicago Press, Chicago, IL.

Laudan, L. 1983. The demise of the demarcation problem. In Cohen, R.S., and L. Laudan (editors), *Physics, Philosophy, and Psychoanalysis*, pp. 111–128. Reidel, Dordrecht, Holland. Reprinted in Ruse, M., and R. Pennock (editors). 2009. *But Is It Science*? pp. 312–330. Prometheus Books, New York, NY.

Lisle, J. 2009. *The Ultimate Proof of Creation*. Master Books, Green Forest, AR.

Lisle, J. 2010. *Discerning Truth*. Master Books, Green Forest, AR.

Mangalwadi, V. 2011. *The Book That Made Your World: How the Bible Created the Soul of Western Civilization*. Thomas Nelson, Nashville, TN.

Meyer, S.C. 2000. The demarcation of science and religion. http://www.discovery.org/scripts/viewDB /index.php (accessed November 2013).

Mortenson, T. 2004. *The Great Turning Point*. Master Books, Green Forest, AR.

Poe, H.L., and C.R. Mytyk. 2007. From scientific method to methodological naturalism: the evolution of an idea. *PSCF* 59(3): 213–218.

Reed, J.K. 1996a. A biblical Christian framework for earth history research: part I—critique of the naturalist-uniformitarian system. *CSRQ* 33:6–12.

Reed, J.K. 1996b. A biblical Christian framework for earth history research: part II—foundation and method of historical analysis within the biblical Christian system. *CSRQ* 33:210–216.

Reed, J.K. 1998. Demythologizing uniformitarian history. *CRSQ* 35:156–165.

Reed, J.K. 1999. Historiography and natural history. *CRSQ* 37:160–175.

Reed, J.K. 2001. *Natural History in the Christian Worldview*. Creation Research Society Books, Chino Valley, AZ.

Reed, J.K. 2008. St. Hutton's hagiography. *Journal of Creation* 22(2): 121–127.

Reed, J.K. 2010. Untangling uniformitarianism, level I: a quest for clarity. *Answers Research Journal* 3:37–59.

Reed, J.K. 2011. Untangling uniformitarianism, level II: actualism in crisis. *Answers Research Journal* 4:203–215.

Reed, J.K. 2012. Three early arguments for deep time, part II: volcanism. *Journal of Creation* 26(1): 61–70.

Reed, J.K., P. Klevberg, C.B. Bennett, C.R. Froede Jr., A.J. Akridge, and T.L. Lott. 2004. Beyond scientific creationism. *CRSQ* 41:216–230.

Reed, J.K., and E.L. Williams. 2011. Battlegrounds of natural history, part I: naturalism. *CRSQ* 48:147–167.

Reed, J.K., and E.L. Williams. 2012. Battlegrounds of natural history, part II: actualism. *CRSQ* 49:135–152.

Reed, J.K., and P. Klevberg. 2014a. Historical geology's virtual past. *Creation Matters* 19(4): 1, 4–5.

Reed, J.K., and P. Klevberg. 2014b. Beyond "origin" and "operation" science, part I: critique of OS^2. *CRSQ* 50:237–251.

Rose, E. (Fr. Seraphim). 2009. *Nihilism: The Root of the Revolution of the Modern Age*. St. Herman of Alaska Brotherhood, Platina, CA.

Rudwick, M.J.S. 2005. *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution*. University of Chicago Press, Chicago, IL.

Schaeffer, F.A. 1968. *The God Who Is There*. InterVarsity Press, Downers Grove, IL. Also printed in Schaeffer, F.A. 1982. *The Complete Works of Francis A. Schaeffer: A Christian Worldview*, Volume 1. Crossway Books, Westchester, IL.

Schlossberg, H. 1983. *Idols for Destruction*. Thomas Nelson Publishers, Nashville, TN.

Simpson, G.G. 1970. Uniformitarianism. An inquiry into principle, theory, and method in geohistory and biohistory. In Hecht, M.K., and W.C. Steere (editors), *Essays in Evolution and Genetics*, pp. 43–96. Appleton-Century-Crofts, New York, NY.

Sproul, R.C., J. Gertsner, and A. Lindsley. 1984.*Classical Apologetics:* A *Rational Defense of the Christian Faith and a Critique of Presuppositional Apologetics*. Academie Books, Grand Rapids, MI.

Stark, R. 2003. *For the Glory of God*. Princeton University Press, Princeton, NJ.

Stark, R. 2005. *The Victory of Reason: How Christianity Led to Freedom, Capitalism, and Western Success*. Random House, New York, NY.

Creation Research Society Quarterly 2015. 51:186–200.

Extreme Information: Biocomplexity of Interlocking Genome Languages

Jeffrey P. Tomkins*

Abstract

People most often think of the genome as containing only the embedded protein-coding information carried in the DNA of chromosomes. However, there are a variety of other codes and language systems active in the genome that are only now beginning to be deciphered. This paper will discuss the amazing internetworked biocomplexity of these language systems that interactively control the way the genome functions. The systems that will be discussed are gene structure complexities, RNA transcript splicing codes, the microRNA binding code, circular RNAs, dual-use codons, antisense transcripts, and epigenetic language systems. The now debunked myth of junk DNA will also be briefly addressed in light of the ENCODE project and new research in genome-wide COT-1 DNA functionality. The interworking and interdependence of these complex and dynamic language systems unequivocally points towards an omnipotent and wise Creator.

Introduction

When people contemplate the language of the genome, they typically consider only the information encoded in the long strings of letters that symbolize the four nucleobases consisting of adenine (A), cytosine (C), thymine (T), and guanine (G). Indeed, even at this level, the complexity of DNA language systems is remarkable and dynamic.

Researchers have shown that the linear code in DNA/RNA responsible for synthesizing proteins engages all of the features required for a model of universal information and language/code (Gitt, 2011). These four distinguishing attributes include (1) cosyntics—an abstract code with syntactic rules; (2) semantics—which provides meaning (e.g., triplets of 3 bases in codons corresponding to amino acids); (3) pragmatics—the information expresses specific calls to action (e.g., stop/start sites, splice sites, protein-binding sites, processing signals, cellular address sites, etc.); and (4) apobetics—the information encodes a final purpose to be achieved (e.g., patterning, function, and replication of cells, organs, and whole organisms).

The universal information contained in the human genome consists of about 3 billion DNA letters (base pairs) in just one genome equivalent—6 billion when you consider both the maternal and paternal sets of chromosomes. Because DNA is a double-stranded molecule, the bases on one strand predict those on the opposite strand due to complementary base pairing (A pairs with T and C pairs with G). Despite this constraint, different information is encoded on both strands, running in

* Jeffrey P. Tomkins, Institute for Creation Research, Dallas, TX, jtomkins@icr.org
Accepted for publication January 13, 2015

opposite directions. Thus, you could expand the total amount of actual linear information in the human genome to about 12 billion bases. And within these letters are encoded a dizzying array of regulatory features, RNA products, and proteins.

Just as a computer system is composed of multiple software programs encoded by a wide variety of programming languages—all interacting together with the hardware of the system—so is the genome, only at a much higher level of complexity that is only beginning to be understood. This review will briefly highlight some of the better-understood language systems that interactively operate in the genome, demonstrating the many interlocking universal information systems.

The Unit of DNA Language—The Gene?

Perhaps the best place to start in explaining the diversity of complex information found in the genome is to begin the discussion of what is commonly referred to as genes.

According to the earliest genetic ideas that prevailed during the early part of the twentieth century, the classical view was that a gene was considered to be the smallest indivisible unit of transmission, recombination, mutation, and function, with all of these criteria being interdependent (Portin, 2002). For example, you cannot observe genetic recombination without transmission, and you cannot observe transmission without function (based on a phenotype). In light of these ideas, the term "gene" was introduced by Johannsen, who desired that it be free of any physical or chemical constraints and treated as an intact heritable unit that could be analyzed statistically (Johannsen, 1909). For several reviews on the history of the "classical view" of the gene beginning with Mendel's work, see Portin (2002) and Gerstein et al. (2007).

No sooner than the classical view that genes were distinct, single-unit heritable entities on chromosomes had matured in its paradigm in the late 1930s, the concept rapidly began to break down. This started with the discoveries of intragenic recombination in Drosophila in the early 1940s (Lewis, 1941; Oliver, 1940). A wide variety of other studies in a diversity of eukaryotes soon followed (Gerstein et al., 2007; Portin, 2002). Thus, the idea that genes were distinct, indivisible units was debunked using classical genetic tools of study prior to the onset of the use of advanced molecular technologies.

Interestingly, at the same time that elaborate genetic studies in eukaryotes were showing that genes did not always exist as distinct, single-unit entities, a wealth of biochemical studies in the late 1940s through the 1960s using bacteriophage and *E. coli* seemed to indicate that one gene controlled the synthesis of one messenger RNA molecule, which in turn encoded the synthesis of one polypeptide, an idea that some have termed the "neoclassical view" of the gene (Portin, 2002). In the genomics community, this now archaic paradigm is most often termed the "protein-centric" view of the gene (Gerstein et al., 2007).

With the advent of the use of new tools in molecular biology, the neoclassical, or protein-centric, view of the gene also broke down rapidly about as soon as it came to fruition. This was initially driven by the discovery in the late 1960s and early 1970s of restriction enzymes that cut DNA at specific sites (Portin, 2002). These new tools subsequently allowed for DNA segments to be dissected and cloned (Cohen et al., 1973), mapped (Southern, 1975), and eventually sequenced (Sanger et al., 1977). As a consequence of many early studies in the 1970s and 1980s using these tools, it slowly began to be realized that the protein-centric concept of the gene was grossly oversimplified. In fact, according to the most recent discoveries, the boundaries of what can be called a distinct gene unit, especially in eukaryotes, are becoming increasingly hard to define, along with a gene's complete set of known functions (Gerstein et al., 2007; Portin, 2009).

Immediately following the first drafts of the human genome (Lander et al., 2001; Venter et al., 2001), large-scale funding was directed toward deciphering the functional information contained therein in a project termed ENCODE (Encyclopedia of DNA Elements), which relied heavily on studying RNA transcripts produced in a variety of cell lines and tissues (Birney et al., 2007). In their first report, which targeted a test sample of just 1% of the total genome, the researchers stated, "First, our studies provide convincing evidence that the genome is pervasively transcribed, such that the majority of its bases can be found in primary transcripts, including non-protein-coding transcripts, and those that extensively overlap one another" (Birney et al., 2007, p. 799). In the second tier of ENCODE-related research, which targeted the entire human genome along with forays into other animal genomes using highly advanced high-throughput genomic technologies, it was unequivocally shown that entire genomes are a continuum of pervasive and overlapping transcription (Djebali et al., 2012a; Dunham et al., 2012; Liu et al., 2013).

These recent discoveries have also revealed that genes are not like single entities at all but instead are a mixture of genes within genes (nested genes) and genes that overlap each other (Clark et al., 2013; Portin, 2009; Sanna et al., 2008). See Figure 1 for a depiction of the various gene structures discussed in this section.

A nested gene is defined as having its entire coding sequence within the chromosomal region demarcated by the start and stop codons of a larger gene (Figure 1B). It should also be noted that nested genes are distinct from alternatively

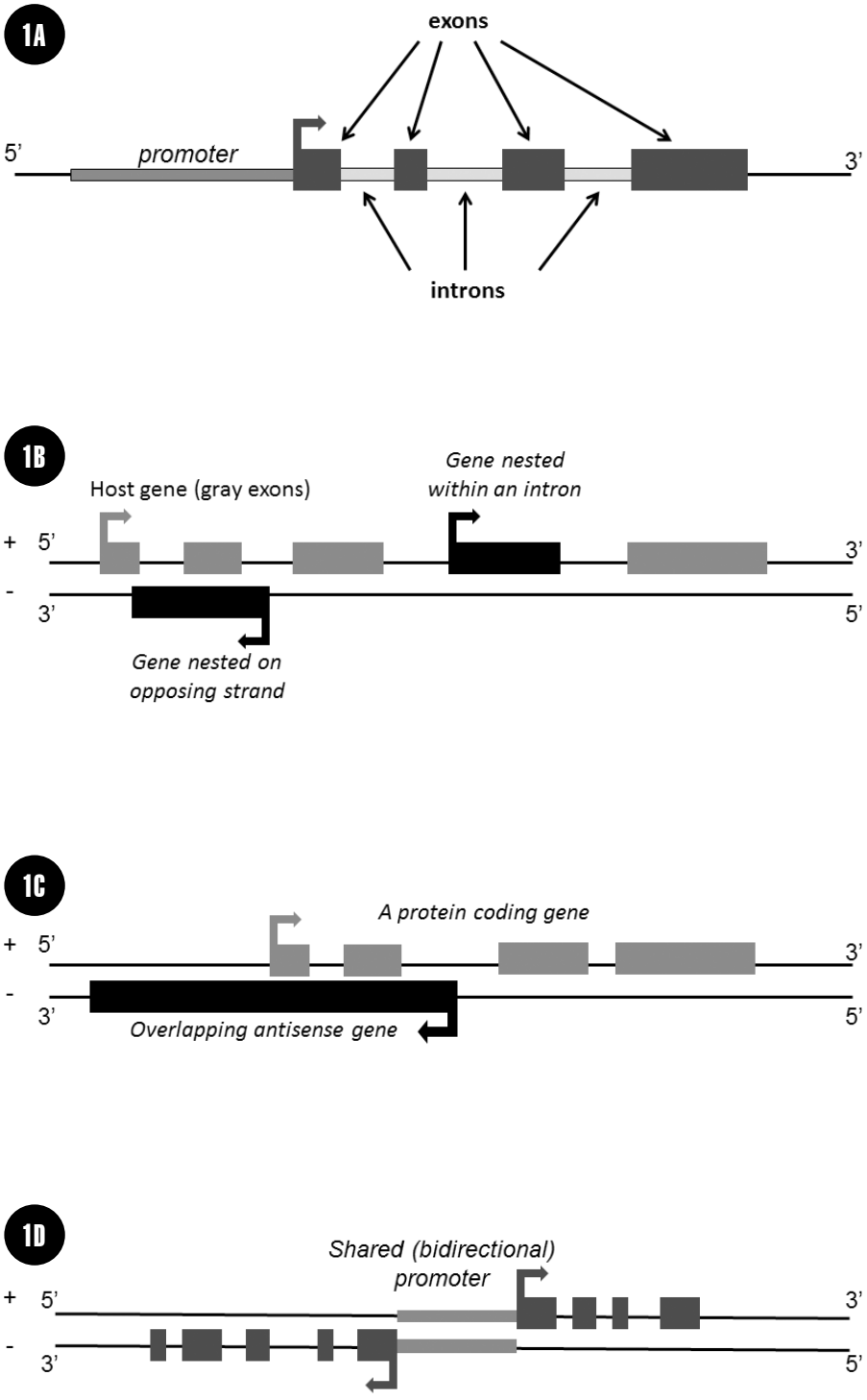


Figure 1. (A) The basic structure of a eukaryotic gene representing the "genes in pieces" concept. Arrow in first exon represents direction of transcription. (B) Depiction of two types of nested genes—one running in the same direction as the host gene within an intron, and one on the opposing strand. (C) Depiction of an overlapping gene—a protein coding gene and a corresponding antisense gene on the opposing strand. (D) Configuration of two neighboring genes on separate strands sharing the same bidirectional promoter.

spliced transcripts (discussed below) in that the nested gene and its host gene do not share transcriptional start sites. In most cases, the start site and promoter of the nested gene are located inside one of the introns of the host gene and are encoded on the opposite strand. In other cases the entire nested gene is situated in the same strand orientation of its host gene—typically inside an intron (Kumar, 2009; Lee and Chang, 2013). In fact, a recent study in Drosophila has shown that nearly 10% of its genes are organized in nested structures and that despite their integrated configuration, nested genes were less likely to display correlated expression and biological function than were neighboring non-overlapping genes (Lee and Chang, 2013).

Overlapping genes are now known to be common in both prokaryotes and eukaryotes (Sanna et al., 2008; Veeramachaneni et al., 2004). They are defined as two separate, distinct genes that overlap each other either on the same strand or, more commonly, on the opposite strand (Figure 1C). In the case where they are on opposite strands, they are now commonly referred to as sense-antisense pairs (Wood et al., 2013). In a study of 13,484 genes shared between human and mouse, about 10% of the genes were overlapping—mostly on different strands (Sanna et al., 2008). However, in a more recent study, it was shown that while human and mouse shared similar sections of certain genes (called *homologous*), the gene landscapes and sense-antisense pair configurations were completely different for these seemingly evolutionarily conserved regions (Wood et al., 2013).

Another variant of shared language between genes that are close to each other in the genome is revealed in the finding that some regulatory control regions, called *promoters*, can be shared, often in a coregulatory fashion (Figure 1D). The presence of pervasive bidirectional promoters was first documented

after the initial analysis of the first draft of the human genome, which showed the positioning of many genes arranged in a head-to-head divergent configuration—typically in the opposite strand configuration (Adachi and Lieber, 2002). Now it is known that greater than 10% of the total number of genes are controlled by bidirectional promoters in the human genome (Wang et al., 2013). One of the key findings with bidirectional promoters in humans is that their genes not only share similar categories of cell process involvement, but that they are highly enriched in functional classes important to DNA repair and genome maintenance (Trinklein et al., 2004; Wakano et al., 2012). This is why aberrations in these regulatory regions have been associated with cancer (Wang et al., 2013).

Yet one more characteristic blurring gene boundaries is the fact that some of the regulatory sequences controlling a gene can be located inside neighboring genes; researchers have determined that genes dynamically interact with each other in "gene neighborhoods" much more than previously believed (Lemay et al., 2012; Portin, 2009). One of the key regulatory features controlling genes is called *enhancer elements*. These are short, 50 to 150 base motifs that bind regulatory proteins and can be up to a million bases away from the gene they regulate (Dickel et al., 2013; Gerstein et al., 2012). Enhancers work as distinct modules that drive gene expression at particular time points and in particular tissues by integrating inputs (e.g., transcription factors, transcription activators, cell type information) in elaborate three-dimensional looping of the chromosomes, connecting them spatially in the genome to the transcriptional apparatus in the promoter of the gene (Dickel et al., 2013; Sakabe et al., 2012; see Figure 2). In fact, the arrangement of enhancers around a gene and the binding of transcription factors to them is itself a type of language referred to as the enhancer code (Weatheritt and Babu, 2013).

And finally, the most damaging concept for the protein-centric view of the gene is that compared to protein-coding genes, over twice as many genes in the human genome produce functional long, noncoding RNAs termed "lncRNA" (Hangauer et al., 2013; Managadze et al., 2013), and approximately two thirds of RNA binding proteins associate with nonprotein-coding transcripts (Gerstberger et al., 2014). These lncRNAs have the same types of promoters as protein-coding genes and often share bidirectional promoters with them, being situated on opposing strands (Sigova et al., 2013). In addition, lncRNAs also have the same type of intron and exon structures as protein-coding genes and undergo the same types of capping, splicing, and three-prime tail modifications as protein-coding genes (Rinn and Chang, 2012; Tomkins, 2014). Amazingly, these lncRNA genes are turning out to be the key factors in what controls and regulates protein-coding genes and in what specifically characterizes the transcriptomes of different kinds of cells, organs, and tissues (Clark et al., 2013; Ulitsky and Bartel, 2013). Characterization of lncRNA between different taxa reveals strong patterns of sequence discontinuity, which is proving to be an intractable problem for the evolutionary paradigm (Necsulea et al., 2014; Tomkins, 2014; Washietl et al., 2014).

The Splicing Code

In bacteria, the best-studied organisms in the early days of molecular biology, a typical gene corresponded to a single protein, although many bacterial genes that are functionally related are often linked together and transcribed under the control of a single regulatory region (Osbourn and Field, 2009). However, as discoveries increased in multicellular plants and animals, it was found that their "genes were in pieces," according to the memorable phrase of Walter Gilbert, who first popularized the amazing gene structure discoveries occurring at the time (Gilbert, 1978). This phrase referred to the fact that in the genomes of plants, animals, protists, and fungi, their protein-coding regions (called *exons*) are interrupted by noncoding sequences called *introns* (Figure 1A). In fact, the mystery of how this whole process of genes in pieces allegedly evolved is still one of the leading problems in explaining the evolution of genomes from bacteria and archaea that typically lack these features (Koonin et al., 2013).

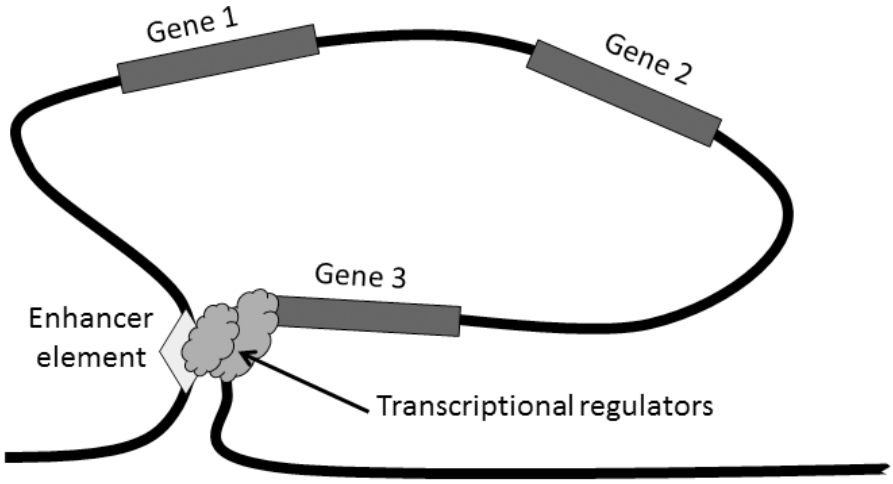


Figure 2. Simplified depiction of how a distant enhancer/regulatory element would interact with the promoter region of gene.

Not only are most plant and animal genes in pieces, but the exons can also be alternatively spliced together to form entirely new RNA products from the same gene (Figure 3). And if it is a gene that encodes the information needed for a protein, different proteins (called *isoforms*) with different functions can be produced—all from the same gene. In fact, the mRNAs and their resulting protein isoforms produced by the alternative processing of primary RNA transcripts can differ markedly in structure, function, cellular localization, and other properties (Wang et al., 2008).

This whole phenomenon, called *alternative splicing*, applies to both protein-coding and most long noncoding RNA genes. Also noted in Figure 3 are alternative promoter start sites for transcription that can affect what exons are included in the final transcripts and its overall final architecture. The use of alternative gene promoters associated with transcript variability is one the key drivers of gene output specificity based on cell-type, tissue-type, and developmental regulation (Gupta et al., 2010; Singer et al., 2008). In fact, it is common for genes in humans to have up to 10 different promoters, with some genes having 20 or more (Singer et al., 2008).

In humans, protein-coding exons represent less than 2% of the total genomic sequence, while introns occupy about 24% (Venter et al., 2001). It is the presence of this genes-in-pieces type of structure and its resulting capacity for alternative splicing that greatly expands the gene-coding lexicon in a language system termed "the splicing code" (Barash et al., 2010; Reddy et al., 2012). Obviously, a process like alternative splicing must be highly regulated and controlled. In fact, many human diseases, including cancer, are linked to a misregulation of alternative splicing, underscoring how important it is for this process to be tightly regulated (Orengo and Cooper, 2007; Ward and Cooper, 2010).

So, what is the language system or code used to determine which exons are included, skipped, doubled, or excluded from a final transcript variant? The ascertaining of such a code has been very difficult, and it is clear that many factors

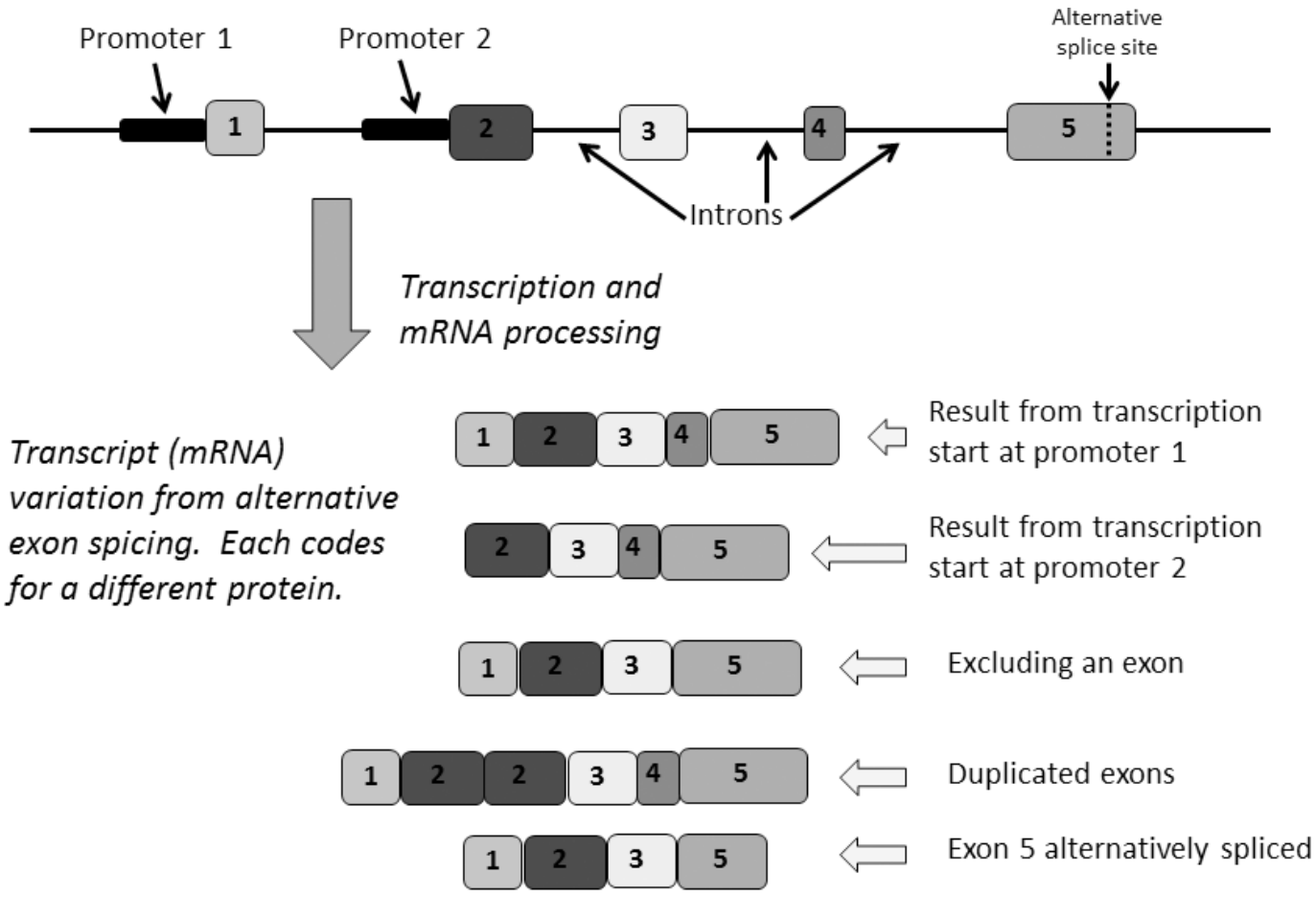


Figure 3. Depiction of different types of exon splice variants observed in the alternative splicing of mRNAs.

must be considered together. Researchers now believe they can predict splicing events for most genes in the human genome about 80% of the time using this code (Barash et al., 2010). One of the first things the researchers investigating the splicing code took into account was tissue type, which they placed in four broad groups: central nervous system, muscle, digestive system, and embryonic. Then they factored in about 2,000 different types of regulatory DNA sequence features found in and around genes that provide key signals needed to regulate the splicing events. Finally, they included important details about transcript structure, such as exon/intron lengths, probabilities of secondary structures forming in the RNA transcripts, and whether the transcripts contained variable signals for early termination of making a protein (called *translation*).

Another issue related to the amazing informational diversity that can be derived by the alternative spicing of exons in genes is the ability of some genes to produce chimeric transcripts with other genes—called *fusion genes* or *chimeric RNA transcripts*. This can occur in several different ways (Akiva et al., 2006; Parra et al., 2006). In one scenario, two genes that are located in tandem on the same chromosome can be transcribed together as one large mRNA and then processed as a single RNA. In another scenario, genes located on completely different chromosomes can have their exons spliced together to form completely new transcripts. At first it was questioned as to whether these mRNAs could produce viable functional proteins, but now it is proven that they do (Frenkel-Morgenstern et al., 2012). And just like transcripts from single genes, chimeric mRNAs are also alternatively spliced and the misregulation of this process is associated with cancer and disease (Djebali et al., 2012b; Greger et al., 2014; Hernandez-Torres et al., 2013).

What sort of complicated apparatus actually does all of the dicing and splicing of RNA transcripts in the nucleus? The answer is perhaps one of the most remarkable and complex machines in the cell—the spliceosome. The spliceosome is comprised of a large group of proteins that reads each RNA transcript copied from a gene and then splices it into the correct variants needed at that specific time. In animals, there are actually several types/variants of these spliceosomes with the major spliceosomal complex consisting of about 200 different proteins (Valadkhan and Jaladat, 2010; Wahl et al., 2009). In other words, to code for just the main protein apparatus involved in splicing, at least 200 different genes are required. In addition, the whole process of splicing occurs while the RNA is being transcribed (called *cotranscriptional*) such that the complex machinery of both transcription and splicing are dynamically connected and interacting with each other to produce just the right final product required for the cell (Bentley, 2014). In addition, these sites of transcription and splicing occur at unique locations in the nucleus called *transcription factories* (Figure 4), where the chromosomes are three-dimensionally maneuvered into position (Davidson et al., 2013; Van Bortle and Corces, 2012). The functional nature of these transcription factories helps explain how transcript fusions occur among genes situated on completely different chromosomes.

MicroRNA Binding Code

Yet another language system that interacts with the RNA products of the genome to control how genes are expressed is called the *microRNA binding code* (Salmena et al., 2011; Taulli et al., 2013). MicroRNAs (miRNA) are encoded by a wide variety of miRNA genes all over

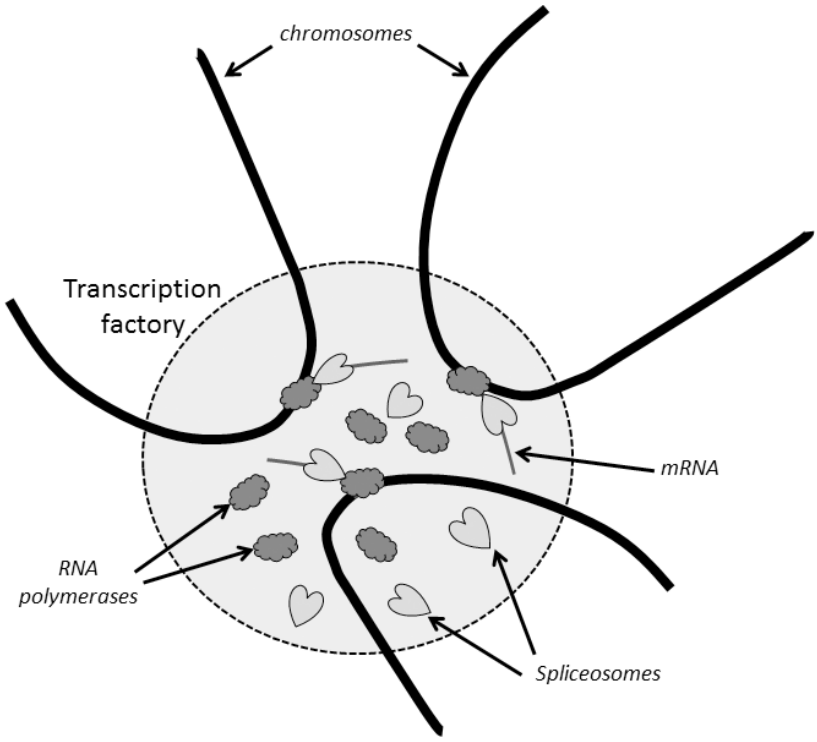


Figure 4. Simplified depiction of a transcription factory with three co-regulated genes from different chromosomes and/or chromosomal regions producing RNA products.

the human genome, some of which are nested inside protein-coding genes within their intron regions. According to the most recent count, there are about 2,555 different miRNA genes in the human genome (mirbase.org). After the RNA transcript from a miRNA gene is fully processed, it is about 22 to 25 nucleotides in length. It is then exported out of the nucleus, where it is further processed and combined with proteins to form a functional micro-machine that regulates the translation of mRNAs in the cell's cytoplasm (Pasquinelli, 2012).

These miRNAs function in gene regulation mostly by binding to specifically encoded sites in the noncoding tails of gene transcripts called *three-prime untranslated regions*. These highly specific sites are complementary with the sequence of the miRNA and are called *miRNA binding sites* or *miRNA response elements* (MRE; see Figure 5). The presence and specific ordering of these sites in the gene transcript is a specific type of RNA-based code that was previously unknown to scientists and is now only beginning to be understood. In fact, some are calling this emerging code the "Rosetta Stone" of a new cellular language that will help further unlock the mysteries of gene regulation in the cell (Salmena et al., 2011; Taulli et al., 2013).

Protein-coding gene transcripts that are ferried out of the nucleus for translation by the protein-making machinery will often have multiple and variable MREs that are in part determined by the process of alternative splicing in the nucleus. Just like the structure of exons in a transcript is determined through alternative splicing, so is the structure and content of MREs. In fact, while most MREs appear to reside in the tails of the gene transcript, to a lesser extent, other MREs are also found in the protein-coding exons (a type of dual code). All of this creates the formation of a specific sequence of sites for miRNA binding to occur, which also leads to various outcomes and types of regulation in the production of proteins.

Because many different genes will share a certain subset of MREs, it is believed that a complicated scenario of competitive binding occurs that helps to buffer and modulate the production of proteins. Many genes that are involved in this competitive binding are typically involved in the same types of cellular processes and are statistically highly co-expressed together (Pasquinelli, 2012; Taguchi, 2013; Wang et al., 2011). Thus, genes that share similar MREs are often coordinately and dynamically controlled together, and the interaction of their shared MREs has been termed "cross talk" (see Figure 5). Because miRNAs have been shown to be involved in nearly every cellular process studied, the importance of the miRNA binding code is key to understanding how the cell works.

Codes in Circles

Another amazing aspect of RNA transcript splicing of genes (both protein-coding and noncoding) is that exons are not only used to form mRNAs of variable content, but they are also selectively spliced into RNA circles. These exons of circular RNAs (circRNAs) are arranged in different orientations than the exons in linear mRNAs, which are produced from the same gene; this is accomplished through a process called *back splicing* (Vicens and Westhof, 2014). And these circRNAs are a fairly recent addition to the ever-increasing list of important functional noncoding RNAs, and now thousands of them have been reported in a variety of animal cells in recent years (Jeck et al., 2013; Memczak et al., 2013; Salzman et al., 2012). In fact, a recent study in humans identified over 7,000 different circRNAs that were estimated to account for at least 10% of the transcripts originating from the genes that were studied (Guo et al., 2014). And in addition to exons being circularized as part of the complexity of splicing, recent research has also shown that introns are circularized (Vicens and Westhof, 2014; Zhang et al., 2013).

While biologists have known of the existence of circular transcripts for over twenty years (Nigro et al., 1991), they were originally misdiagnosed as being nothing more than genetic accidents of aberrant mRNA splicing (Cocquerelle et al., 1993). Now it is known that some of these circRNAs act as an important functional component of the miRNA-mRNA posttranscriptional regulatory network, working as molecular sponges that sequester miRNAs in the cytoplasm (Hansen et al., 2013; Memczak et al., 2013; Vicens and Westhof, 2014). While most circRNAs have not been functionally characterized, researchers have speculated that in addition to acting as miRNA sponges, they are also involved in protein or RNA transport, assembled into functional RNA-protein complexes, or act directly as regulatory RNAs in the

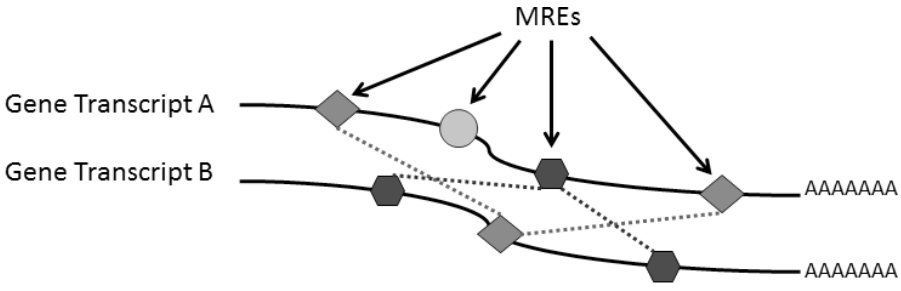


Figure 5. Depiction of miRNA response elements (MREs) in two different mRNA transcripts and "cross-talk" (dashed lines) between shared binding sites.

genome (Memczak et al., 2013; Vicens and Westhof, 2014).

The idea that circRNAs are functional is largely based on the fact that they are expressed in highly tissue-specific patterns (Guo et al., 2014; Memczak et al., 2013) and are generated interactively with their linear mRNA counterparts during splicing at regulated levels (Ashwal-Fluss et al., 2014). Another interesting point linked to the functional complexity of circular splicing involves the recent discovery of specific circRNA binding to the metazoan protein *muscleblind*, a factor that functions in the nucleus as part of the splicing apparatus (Ashwal-Fluss et al., 2014).

Further bolstering the idea of functionality is the fact that most circRNAs are actively transported out of the nucleus to specific destinations in the cytoplasm, where they are stably maintained due to their lack of free ends (Jeck et al., 2013; Memczak et al., 2013). Linear mRNAs are spliced, capped, adenylated (poly-A tail additions), and have specific transport factors and systems that recognize these features, bind to them, and ferry them out of nuclear pores to specific sites in the cytoplasm at ribosomes (Hocine et al., 2010; Wente and Rout, 2010). In contrast, circRNAs are circularized during splicing with no capping or three-prime tail modifications. Because circRNAs have a completely different posttranscriptional structure than linear mRNAs, this implies a specifically tailored recognition, cellular addressing, and transport system accommodating their unique features.

In contrast to exon-generated circRNAs, the circular RNAs encoded by introns function in the nucleus, not the cytoplasm (Zhang et al., 2013). In these newly discovered circular intronic RNAs (ciRNA), optimization of their levels in the nucleus was shown to enhance the transcription of the gene from which they were derived. This was proven when researchers were able to perturb the action of ciRNAs in cells by inhibiting their function and observing the effect on gene expression. It was also discovered that ciRNAs promoted optimal gene function by associating with the RNA polymerase II transcriptional machinery. Interestingly, these ciRNAs were also expressed specific to cell type, emphasizing that they are selectively controlled and functional.

One last piece of amazing evidence for functionality involves a recent discovery that both nuclear and cytoplasmic circular intronic RNAs are passed on to offspring in *Xenopus* (frog) oocytes (Talhouarne and Gall, 2014). This implies a role for these molecules in RNA-mediated inheritance and epigenetics—a newly emerging research field studying epigenetic regulation associated with heritable noncoding RNAs (Liebers et al., 2014).

Dual-Use Messages in Codons

One of the most amazing discoveries of the past few years has been that of dual-purpose codes in the same section of DNA within genes that code for proteins. The same stretch of DNA sequence containing different languages and having multiple purposes that are interpreted by complex cellular machinery in different ways is utterly defying evolutionary predictions.

In a gene's exons, three consecutive DNA letters form what is called a *codon*, and each codon corresponds to a specific amino acid in a protein. Long sets of codons in genes contain the protein-making information that ends up being translated into entire proteins that may be hundreds of amino acids in length.

It has been widely demonstrated that the protein-coding exon regions of genes contain a variety of signals (e.g., splice sites, miRNA binding sites) other than just the information delineating amino acids. It was also recently demonstrated in a genome-wide study that transcription factors commonly clamp onto exons inside genes (Neph et al., 2012). The previous belief was that transcription factors mostly latched onto the controlling regions (promoters) in front of genes—sections of the gene that do not actually code for protein. This finding was somewhat of a mystery because researchers originally thought that transcription-factor binding codes and the protein template codes containing the codons operated independently of each other.

In addition, more recent research is showing that these codes actually work both separately and together. They contain dual meanings (languages) for different types of cell machinery embedded in the same section of DNA. While one set of codons specifies the order of amino acids for a protein, the very same sequence of DNA letters also specifies where transcription factors are to bind to the gene to make the RNA transcript that codes for a protein (Stergachis et al., 2013). In fact, the researchers determined that about 14% of the codons inside 87% of human genes are occupied target sites for transcription factors. As a result of this new discovery, these dual-function code sites in exons have been labeled "duons."

The implications for the preponderance of dual codes providing yet another hurdle for evolutionary models to overcome immediately became obvious to the scientific community. Several researchers in a review recognize this in asking: "How widespread is the phenomenon of 'regulatory' codes that overlap the genetic code, and how do they constrain the evolution of protein sequences?" (Weatheritt and Babu, 2013, p. 1325).

Another interesting aspect of codons is that of apparent redundancy where the first two bases in the codon are nonnegotiable but the third base can vary. For example, the codons GGU, GGC, GGA, and GGG all encode the same amino acid called *glycine*. When scientists first discovered this phenomenon, they called the variation in the third

base "wobble" and simply relegated the variability as being redundant. In other words, they assumed that all different codon variants for a given amino acid were functionally equivalent.

When a mRNA transcript copy of a gene is ferried out of the nucleus and used to make a protein at cellular machinery sites called *ribosomes*, periodic pausing occurs during the process while the protein is being produced and directed out of a tunnel in the protein-making apparatus (O'Brien et al., 2014; O'Brien et al., 2010). The specific sequence and rate of pausing is critical to the folding of the protein into its proper three-dimensional shape, which occurs during the process of exiting the ribosome. Many different types of cellular machines aid in this folding process, including the ribosome tunnel itself. Because the translation (making of a protein from an RNA transcript) and the folding of the protein are linked together, the processes are called *cotranslational*.

Amazingly, researchers in a new study have shown that the variability in the third base of codons is not redundancy at all but a specific type of cellular language interpreted at the ribosome, telling it when to pause and how to regulate the rate at which the protein is being made, which ultimately has an effect on the folding of the protein into its functional, three-dimensional shape (D'Onofrio and Abel, 2014). Therefore, not only does a codon provide the information for which amino acid to add in the making of a protein, but it provides important information needed on how to regulate its folding. The researchers state, "These dual interpretations enable the assembly of the protein's primary structure while also providing important folding controls via pausing of the translation process."

What was once thought only to be meaningless redundancy has now been proven to be exactly the opposite. In fact, the researchers also stated, "The functionality of codonic [*sic*] redundancy denies the ill-advised label of 'degeneracy'" (D'Onofrio and Abel, 2014). The authors of the report also marveled at such ingenuity and unwittingly state their findings within the context of sophisticated intelligent design. They say, "Redundancy in the primary genetic code allows for additional independent codes. Coupled with the appropriate interpreters and algorithmic processors, multiple dimensions of meaning, and function can be instantiated into the same codon string." This type of jargon essentially describes a highly complex, interpretive, computerlike machine—something designed and engineered by a super-intelligent mind—certainly not the result of random processes.

Antisense Genome Languages

Antisense messages in the genome are obtained by the transcription of the double-stranded DNA from the strand opposite to that of the sense transcript of either protein-coding or nonprotein-coding genes (Grinchuk et al., 2010; Khorkova et al., 2014; Pelechano and Steinmetz, 2013). These antisense genes have their own promoters and are alternatively transcribed and spliced like protein-coding genes. Antisense transcripts operate by binding to sense-coding transcripts in the genome. The field of study surrounding gene regulation by antisense transcription is particularly intriguing because the genomic arrangement of the information directly indicates that the transcripts produced from opposing DNA strands act on each other in a regulatory manner (Grinchuk et al., 2010; Khorkova et al., 2014; Pelechano and Steinmetz, 2013). The amazing design of antisense RNAs inherently gives them unique properties that are different than other types of gene regulators (such as transcription factors) for integrating multiple kinds of regulatory signals, establishing on–off switches, and even "rewiring" and fine-tuning entire gene regulatory networks (Grinchuk et al., 2010; Khorkova et al., 2014; Pelechano and Steinmetz, 2013). Their methods of action are currently shown to include chromatin remodeling leading to differences in epigenetic states, regulatory masking of signals in RNA transcripts, assistance in alternative splicing of mRNAs, and regulation of the translation of mRNAs in the cytoplasm (Khorkova et al., 2014; Li and Ramchandran, 2010; Pelechano and Steinmetz, 2013).

The patterns of antisense expression in genes across the genome is highly complex and varies based on cellular processes, cell type, and environmental conditions and is even affected by neighboring genes (Khorkova et al., 2014; Pelechano and Steinmetz, 2013; Wood et al., 2013). Antisense genes have the same control features as other genes and can even share promoter regions with both protein-coding and noncoding RNA genes. They are also regulated in complex networks with these other types of genes. Thus, this is a yet another type of integrated language system that effectively acts in reverse to the normal forward sense messages contained in the genome.

Epigenetic Language Systems

Epigenetic changes involve the addition of chemical tags in an organism's genome without actually changing the genetic code. Both the DNA nucleotides and the proteins that DNA is wrapped around (called *histones*) can be chemically tagged by different types of molecules that ultimately determine how genes are turned on and off. Thus, the epigenetic regulation of the genome can produce marked differences in growth, development, physiology, and adaptive traits without actually being related to changes in the DNA sequence itself (Liebl et al., 2013; Skinner et al., 2014; Zhu et al., 2013). What is even more amazing is that these changes can also be inherited over multiple generations.

One of the most widely studied types of epigenetic modifications is that of DNA methylation, the process whereby a methyl group is added to cytosine residues. As a general principle, areas of the genome that are heavily methylated tend to be more genetically inactive, while areas that lack methylation are more transcriptionally active (Jones, 2012). For example, the promoter regions of actively expressed genes are typically significantly less methylated than those of inactive genes. However, this is not necessarily a hard and fast rule, as the relationship between methylation and transcription must be analyzed within a more complex information-rich combinatorial context. Indeed, while the promoter of the gene (where transcription factors bind) is often less methylated, the main body of the gene behind the promoter can be heavily methylated and both states are associated with increased transcription (Jones, 2012; Petty and Pillus, 2013). In fact, varying levels of methylation in the gene body are now also being shown to influence and play a role in the splicing code discussed above.

Plant and animal genomes are tightly wound around clusters of eight proteins (called *octamers*) that are referred to as core histones. Collectively, these DNA/histone clusters are called *nucleosomes* and form the basic unit of chromatin (a reference to DNA and its physically combined structure with proteins and RNA). These nucleosomes are densely packed and achieve an astounding 10,000 to 20,000-fold compaction needed to fit a human-sized genome into the tiny volume of a nucleus (Zentner and Henikoff, 2013). What is even more amazing is that these histone proteins that form the core of nucleosomes are highly dynamic and configurable features in the genome that control the access and activity of proteins involved in gene expression, DNA replication, and other regulatory activities.

Histone configuration is modified by adding methyl, acetyl, and crotonyl chemical groups to lysines, and the phosphorylation of serines and threonines in the amino acid histone tails that stick out from the nucleosomes (Cedar and Bergman, 2009; Zentner and Henikoff, 2013). In addition, protein variants of ubiquitins and SUMO (small ubiquitin-like modifier) can also be attached to these histone tails by a variety of sumoylation and ubiquitin-related enzymes (Cubeñas-Potts and Matunis, 2013; Pinder et al., 2013). Because all these types of histone modifications are comprised of different variants, many different chromatin configurations can be achieved to present a highly complex epigenetic language that controls and fine-tunes how the DNA is expressed and made available to the transcriptional machinery in the genome.

At present, well over 100 different histone modifications have been characterized with more being discovered at a rapid rate (Zentner and Henikoff, 2013). When one considers the combinatorial capacity of the histone code alone, and the necessity of systems to interpret, write, and replicate it over multiple cell divisions, developmental states, and organismal generations, the complexity involved is clearly mind-boggling, to say the least.

Both DNA methylation and histone modifications represent separate epigenetic languages that work in unison to regulate access of the regulatory and transcriptional machinery in the genome that extracts, copies, and utilizes information encoded in the DNA. The amazing complexity of these epigenetic language systems are interactively layered over the other languages present within the encoded bases of DNA.

Why Junk Is Bunk

Invariably, when the discussion of languages and information in the genome is brought up, the question of junk DNA arises. In the present sphere of debate, the term "junk DNA" is used in a broad sense to refer to any DNA sequence that does not function in development, physiology, or some other organismal trait (Palazzo and Gregory, 2014). Although not well documented, the idea originated as an answer to Haldane's dilemma, which proposed that only a small part of the genome could possibly be functional (Nei, 2013). While the first use of the term "junk DNA" is often attributed to Susumu Ohno in the early 1970s (who actually just used it in reference to pseudogenes), the idea of junk in the genome was popular throughout the 1960s (Graur, 2013; Palazzo and Gregory, 2014).

The whole idea of junk DNA is based on the concept of neutral evolution, which predicts that a large proportion of the human genome should be littered with freely evolving DNA that is not constrained and therefore nonfunctional. This is called the "neutral model" theory, and it seemed to provide solutions to selection problems uncovered in theoretical studies of population genetics (Kimura, 1983; Nei, 2013). Indeed, early discoveries in genomics seemed to lend support to this idea, as scientists found that only about 2% of the entire human genome codes directly for proteins [exons] (International Human Genome Sequencing, 2004). However, this statistic is deceiving because when the entire length of a protein-coding gene is considered (including introns and regulatory sequence), over 40% of the human genome is covered by protein-coding genes (Palazzo and Gregory, 2014).

Now we also realize there are many other genes that produce noncoding RNAs (discussed above), which are thought to outnumber protein-coding genes by at least two-to-one (Managadze et al., 2013). And variation in these types of long, intergenic, noncoding RNA genes has a significant impact on human health and disease, underscoring their functional importance despite the fact that most have not yet been functionally

characterized (Chen et al., 2013; Kumar et al., 2013).In addition to long, noncoding RNA genes, the other primary candidate for being labeled "junk DNA" has been the highly repetitive regions that, after years of study, seemed to have no discernible function, despite the fact they are found to be actively transcribed into RNA. This fraction of the genome is labeled COT-1, getting its name from early studies in DNA reassociation kinetics (Britten et al., 1974). The procedure involves heating or chemically treating genomic DNA until it denatures and becomes single stranded, and then allowing it to reassociate—with the more repetitive fractions coming together first. The COT-1 fraction of the genome would be that initial fraction that reassociates the most rapidly.

In a recent study, it was shown that these COT-1 RNA molecules are literally painted across the euchromatic areas—the functionally active regions of chromosomes (Hall et al., 2014). Hence, these molecules are called *euchromatin-associated RNAs*, or *ecRNAs*; and in contrast to the previously characterized *Xist* RNAs that shut down chromosome activity, specifically on the X chromosome (Engreitz et al., 2013), ecRNAs do exactly the opposite: they promote an active local environment of genetic functionality. In simplest terms, they help create an RNA matrix surrounding the chromosomes that promotes gene function and transcriptional stability.

Amazingly, these ecRNAs even persist in experiments when the underlying chromosomes are destroyed with DNases. Clearly, they are very stable and an important part of the chromosomal matrix in the cell nucleus. In fact, when the ecRNAs themselves are destroyed using RNase, the chromosomes rapidly condense and collapse. If it were not for the presence of the ecRNAs, chromosome stability and genome function would not even be possible. Furthermore, the ecRNAs specifically associate with the chromosomal segments from which they are derived, exhibiting regional specificity.Much of the research that has debunked the idea of junk DNA has come from the ENCODE project (as discussed earlier), which began in 2003 as an expansion of the Human Genome project. While the human genome had been largely sequenced by 2004 (International Human Genome Sequencing, 2004), researchers knew very little about what it all meant, except for about 21,500 protein-coding genes they initially identified—and most of those they knew very little about. After the first round of ENCODE research (Birney et al., 2007), it soon became apparent that the human genome was pervasively transcribed, an idea that led to the realization that the eukaryotic genome is "an RNA machine" (Amaral et al., 2008). This fact is continuing to be confirmed not only in humans, but also across the spectrum of metazoan life (Djebali et al., 2012a; Liu et al., 2013; Managadze et al., 2013).

The second phase of ENCODE funding resulted in 30 different research papers being published in 2012 and was no less spectacular in its discoveries than the first tier. In the lead research paper, the authors wrote, "These data enabled us to assign biochemical functions for 80% of the genome, in particular outside of the well-studied protein-coding regions" (Dunham et al., 2012, p. 57). In a media interview, Tom Gingeras, one of the senior scientists on the ENCODE project, said, "Almost every nucleotide is associated with a function of some sort or another, and we now know where they are, what binds to them, what their associations are, and more" (Yong, 2012).The areas of study in the ENCODE project are diverse and cover all the different genome codes that are discussed in this paper. In reality, the work of discovery for ENCODE-related researchers has only just begun. The inner workings of the genome are more complex than researchers ever imagined they would be. A brief summary of the most pertinent ENCODE findings are listed below:

- Over 80 percent of the human genome is actively involved in at least one or more biochemical reactions associated with gene regulation in at least one type of cell. Nearly all of the genome lies within close proximity to some sort of genetic regulatory event and, therefore, very little of the genome can be considered unnecessary or nonfunctional.
- The human genome can be classified into seven different, broadly categorized, genetically active states that enhance gene expression, mapped to 399,124 different regions.
- Although the human genome may contain only ~21,000 genes, scientists found 70,292 areas called *gene promoters* associated with the protein-coding areas of genes. This finding confirms the idea that genes are like molecular Swiss Army knives, providing a diversity of products and outcomes depending on how they are operated and controlled.
- Gene expression is controlled by a broad array of regulatory proteins, chemical marks in the DNA (epigenetic factors), gene promoter features (specific DNA sites), and enhancer sequences that are sometimes located thousands and millions of bases from a gene or set of genes. All of these features operate in concert with other genes and regulatory features in irreducibly complex and intricately coordinated networks.
- ENCODE-related genetic variation plays a large role in the observed variability among humans, perhaps more so than the variation observed within protein-coding regions. Many heritable human diseases are associated with variations or mutations in ENCODE regions and not in the actual protein-coding regions.

Summary

For the genome to function in all its complexity, many different codes and languages are used, and they all mesh and work interactively with one another. In addition, all of these language systems follow the rule of information theory discussed at the beginning of this paper and thus necessitate an information provider. In fact, the effective, interlocking and internetworking of these highly complex language systems speaks directly to a Creator of infinite wisdom and capabilities.

We are only beginning to decipher the true complexity of these different genetic languages; and as research progresses, it is likely more languages and codes will be revealed, and the codes we are now aware of will likely grow more complex in their mechanisms and scope. Taken together, the genome is an irreducibly complex network of interacting dynamic codes and languages that undeniably speak of an omnipotent and all-wise Creator as described in the Bible.

References

Adachi, N., and M.R. Lieber. 2002. Bidirectional gene organization: a common architectural feature of the human genome. *Cell* 109(7): 807–809.

Akiva, P., A. Toporik, S. Edelheit, Y. Peretz, A. Diber, R. Shemesh, A. Novik, R. Sorek. 2006. Transcription-mediated gene fusion in the human genome. *Genome Res* 16(1): 30–36.

Amaral, P.P., M.E. Dinger, T.R. Mercer, J.S. Mattick. 2008. The eukaryotic genome as an RNA machine. *Science* 319(5871): 1787–1789.

Ashwal-Fluss, R., M. Meyer, N.R. Pamudurti, A. Ivanov, O. Bartok, M. Hanan, N. Evantal, S. Memczak, N. Rajewsky, S. Kadener. 2014. CircRNA biogenesis competes with pre-mRNA splicing. *Molecular Cell* 56(1): 55–66.

Barash, Y., J.A. Calarco, W. Gao, Q. Pan, X. Wang, O. Shai, B.J. Blencowe, B.J. Frey. 2010. Deciphering the splicing code. *Nature* 465(7294): 53–59.

Bentley, D.L. 2014. Coupling mRNA processing with transcription in time and space. *Nature Reviews Genetics* 15(3): 163–175.

Birney, E., J.A. Stamatoyannopoulos, A. Dutta, R. Guigo, T.R. Gingeras, E.H. Margulies, Z. Weng, M. Snyder, E.T. Dermitzakis, R.E. Thurman et al. 2007. Identification and analysis of functional elements in 1% of the human genome by the Encode Pilot Project. *Nature* 447(7146): 799–816.

Britten, R.J., D.E. Graham, and B.R. Neufeld. 1974. Analysis of repeating DNA sequences by reassociation. *Methods Enzymol* 29:363–418.

Cedar, H., and Y. Bergman. 2009. Linking DNA methylation and histone modification: patterns and paradigms. *Nature Reviews Genetics* 10(5): 295–304.

Chen, G., C. Qiu, Q. Zhang, B. Liu, and Q. Cui. 2013. Genome-wide analysis of human snps at long intergenic noncoding RNAs. *Human Mutatation* 34(2): 338–344.

Clark, M.B., A. Choudhary, M.A. Smith, R.J. Taft, and J.S. Mattick. 2013. The dark matter rises: the expanding world of regulatory RNAs. *Essays in Biochemistry* 54: 1–16.

Cocquerelle, C., B. Mascrez, D. Hetuin, and B. Bailleul. 1993. Mis-splicing yields circular RNA molecules. *FASEB Journal* 7(1): 155–160.

Cohen, S.N., A.C. Chang, H.W. Boyer, and R.B. Helling. 1973. Construction of biologically functional bacterial plasmids in vitro. *Proceedings of the National Academy of Sciences USA* 70(11): 3240–3244.

Cubeñas-Potts, C., and M.J. Matunis. 2013. Sumo: a multifaceted modifier of chromatin structure and function. *Developmental Cell* 24(1): 1–12.

Davidson, S., N. Macpherson, and J.A. Mitchell. 2013. Nuclear organization of RNA polymerase ii transcription. *Biochemistry and Cell Biology* 91(1): 22–30.

Dickel, D.E., A. Visel, L.A. Pennacchio. 2013. Functional anatomy of distant-acting mammalian enhancers. *Philosophical Transactions of the Royal Society of London B: Biological Sciences* 368(1620): 20120359.

Djebali, S., C.A. Davis, A. Merkel, A. Dobin, T. Lassmann, A. Mortazavi, A. Tanzer, J. Lagarde, W. Lin, F. Schlesinger et al. 2012a. Landscape of transcription in human cells. *Nature* 489(7414): 101–108.

Djebali, S., J. Lagarde, P. Kapranov, V. Lacroix, C. Borel, J.M. Mudge, C. Howald, S. Foissac, C. Ucla, J. Chrast et al. 2012b. Evidence for transcript networks composed of chimeric RNAs in human cells. *PLoS One* 7(1): e28213.

D'Onofrio, D.J., and D.L. Abel. 2014. Redundancy of the genetic code enables translational pausing. *Frontiers in Genetics* 5:140.

Dunham, I., A. Kundaje, S.F. Aldred, P.J. Collins, C.A. Davis, F. Doyle, C.B. Epstein, S. Frietze, J. Harrow, R. Kaul et al. 2012. An integrated encyclopedia of DNA elements in the human genome. *Nature* 489(7414): 57–74.

Engreitz, J.M., A. Pandya-Jones, P. McDonel, A. Shishkin, K. Sirokman, C. Surka, S. Kadri, J. Xing, A. Goren, E.S. Lander et al. 2013. The xist lncRNA exploits three-dimensional genome architecture to spread across the x chromosome. *Science* 341(6147): 1237973.

Frenkel-Morgenstern, M., V. Lacroix, I. Ezkurdia, Y. Levin, A. Gabashvili, J. Prilusky, A. Del Pozo, M. Tress, R. Johnson, R. Guigo et al. 2012. Chimeras taking shape: potential functions of proteins encoded by chimeric RNA transcripts. *Genome Research* 22(7): 1231–1242.

Gerstberger, S., M. Hafner, and T. Tuschl. 2014. A census of human RNA-binding proteins. *Nature Reviews Genetics* 15(12): 829–845.

Gerstein, M.B., C. Bruce, J.S. Rozowsky, D. Zheng, J. Du, J.O. Korbel, O. Emanuelsson, Z.D. Zhang, S. Weissman, and M. Snyder. 2007. What is a gene, post-encode? History and updated definition. *Genome Research* 17(6): 669–681.

Gerstein, M.B., A. Kundaje, M. Hariharan, S.G. Landt, K.K. Yan, C. Cheng, X.J.

Mu, E. Khurana, J. Rozowsky, R. Alexander et al. 2012. Architecture of the human regulatory network derived from encode data. *Nature* 489(7414): 91–100.

Gilbert, W. 1978. Why genes in pieces? *Nature* 271(5645): 501.

Gitt, W. 2011. *Without Excuse* Creation Book Publishers, Atlanta GA.

Graur, D. 2013. The origin of junk DNA: a historical whodunnit. http://judgestarling.tumblr.com/post/64504735261/the-origin-of-the-term-junk-dna-a-historical.

Greger, L., J. Su, J. Rung, P.G. Ferreira, C. Geuvadis, T. Lappalainen, E.T. Dermitzakis, and A. Brazma. 2014. Tandem RNA chimeras contribute to transcriptome diversity in human population and are associated with intronic genetic variants. *PLoS One* 9(8): e104567.

Grinchuk, O.V., P. Jenjaroenpun, Y.L. Orlov, J. Zhou, and V.A. Kuznetsov. 2010. Integrative analysis of the human cis-antisense gene pairs, miRNAs and their transcription regulation patterns. *Nucleic Acids Research* 38(2): 534–547.

Guo, J.U., V. Agarwal, H. Guo, and D.P. Bartel. 2014. Expanded identification and characterization of mammalian circular RNAs. *Genome Biology* 15(7): 409.

Gupta, R., P. Wikramasinghe, A. Bhattacharyya, F.A. Perez, S. Pal, and R.V. Davuluri. 2010. Annotation of gene promoters by integrative data-mining of chip-seq pol-ii enrichment data. *BMC Bioinformatics* 11 Supplement 1: S65.

Hall, L.L., D.M. Carone, A.V. Gomez, H.J. Kolpa, M. Byron, N. Mehta, F.O. Fackelmayer, and J.B. Lawrence. 2014. Stable c0t-1 repeat RNA is abundant and is associated with euchromatic interphase chromosomes. *Cell* 156(5): 907–919.

Hangauer, M.J., I.W. Vaughn, and M.T. McManus. 2013. Pervasive transcription of the human genome produces thousands of previously unidentified long intergenic noncoding RNAs. *PLoS Genetics* 9(6): e1003569.

Hansen, T.B., T.I. Jensen, B.H. Clausen, J.B. Bramsen, B. Finsen, C.K. Damgaard, and J. Kjems. 2013. Natural RNA circles function as efficient microRNA sponges. *Nature* 495(7441): 384–388.

Hernandez-Torres, F., A. Rastrojo, and B. Aguado. 2013. Intron retention and transcript chimerism conserved across mammals: Ly6g5b and csnk2b-ly6g5b as examples. *BMC Genomics* 14:199.

Hocine, S., R.H. Singer, and D. Grunwald. 2010. RNA processing and export. *Cold Spring Harbor Perspectives in Biology* 2(12): a000752.

International Human Genome Sequencing. 2004. Finishing the euchromatic sequence of the human genome. *Nature* 431(7011): 931–945.

Jeck, W.R., J.A. Sorrentino, K. Wang, M.K. Slevin, C.E. Burd, J. Liu, W.F. Marzluff, and N.E. Sharpless. 2013. Circular RNAs are abundant, conserved, and associated with alu repeats. *RNA* 19(2): 141–157.

Johannsen, W. 1909. Elemente der exakten erblichkeitslehre. *Jena: Gustav Fischer*: 143–145.

Jones, P.A. 2012. Functions of DNA methylation: islands, start sites, gene bodies and beyond. *Nature Reviews Genetics* 13(7): 484–492.

Khorkova, O., A.J. Myers, J. Hsiao, and C. Wahlestedt. 2014. Natural antisense transcripts. *Human Molecular Genetics* 23(R1): R54–63.

Kimura, M. 1983. *The Neutral Theory of Molecular Evolution*. Cambridge University Press, Cambridge, UK.

Koonin, E.V., M. Csuros, and I.B. Rogozin. 2013. Whence genes in pieces: reconstruction of the exon-intron gene structures of the last eukaryotic common ancestor and other ancestral eukaryotes. *Wiley Interdisciplinary Reviews: RNA* 4(1): 93–105.

Kumar, A. 2009. An overview of nested genes in eukaryotic genomes. *Eukaryotic Cell* 8(9): 1321–1329.

Kumar, V., H.J. Westra, J. Karjalainen, D.V. Zhernakova, T. Esko, B. Hrdlickova, R. Almeida, A. Zhernakova, E. Reinmaa, U. Vosa et al. 2013. Human disease-associated genetic variation impacts large intergenic non-coding RNA expression. *PLoS Genetics* 9(1): e1003201.

Lander, E.S., L.M. Linton, B. Birren, C. Nusbaum, M.C. Zody, J. Baldwin, K. Devon, K. Dewar, M. Doyle, W. FitzHugh et al. 2001. Initial sequencing and analysis of the human genome. *Nature* 409(6822): 860–921.

Lee, Y.C., and H.H. Chang. 2013. The evolution and functional significance of nested gene structures in drosophila melanogaster. *Genome Biology and Evolution* 5(10): 1978–1985.

Lemay, D.G., W.F. Martin, A.S. Hinrichs, M. Rijnkels, J.B. German, I. Korf, and K.S. Pollard. 2012. G-nest: a gene neighborhood scoring tool to identify co-conserved, co-expressed genes. *BMC Bioinformatics* 13:253.

Lewis, E.B. 1941. Another case of unequal crossing-over in drosophila melanogaster. *Proceedings of the National Academy of Sciences USA* 27(1): 31–35.

Li, K., and R. Ramchandran. 2010. Natural antisense transcript: A concomitant engagement with protein-coding transcript. *Oncotarget* 1(6): 447–452.

Liebers, R., M. Rassoulzadegan, and F. Lyko. 2014. Epigenetic regulation by heritable RNA. *PLoS Genetics* 10(4): e1004296.

Liebl, A.L., A.W. Schrey, C.L. Richards, and L.B. Martin. 2013. Patterns of DNA methylation throughout a range expansion of an introduced songbird. *Integrative and Comparative Biology* 53(2): 351–358.

Liu, G., J.S. Mattick, and R.J. Taft. 2013. A meta-analysis of the genomic and transcriptomic composition of complex life. *Cell Cycle* 12(13): 2061–2072.

Managadze, D., A.E. Lobkovsky, Y.I. Wolf, S.A. Shabalina, I.B. Rogozin, and E.V. Koonin. 2013. The vast, conserved mammalian lincRNome. *PLoS Computational Biology* 9(2): e1002917.

Memczak, S., M. Jens, A. Elefsinioti, F. Torti, J. Krueger, A. Rybak, L. Maier, S.D. Mackowiak, L.H. Gregersen, M. Munschauer et al. 2013. Circular RNAs are a large class of animal RNAs with regulatory potency. *Nature* 495(7441): 333–338.

Necsulea, A., M. Soumillon, M. Warnefors,

A. Liechti, T. Daish, U. Zeller, J.C. Baker, F. Grutzner, and H. Kaessmann. 2014. The evolution of lncRNA repertoires and expression patterns in tetrapods. *Nature* 505(7485): 635–640.

Nei, M. 2013. *Mutation-Driven Evolution*. Oxford University Press, Oxford, UK.

Neph, S., J. Vierstra, A.B. Stergachis, A.P. Reynolds, E. Haugen, B. Vernot, R.E. Thurman, S. John, R. Sandstrom, A.K. Johnson et al. 2012. An expansive human regulatory lexicon encoded in transcription factor footprints. *Nature* 489(7414): 83–90.

Nigro, J.M., K.R. Cho, E.R. Fearon, S.E. Kern, J.M. Ruppert, J.D. Oliner, K.W. Kinzler, and B. Vogelstein. 1991. Scrambled exons. *Cell* 64(3): 607–613.

O'Brien, E.P., P. Ciryam, M. Vendruscolo, and C.M. Dobson. 2014. Understanding the influence of codon translation rates on cotranslational protein folding. *Accounts of Chemical Research* 47(5): 1536–1544.

O'Brien, E.P., S.-T.D. Hsu, J. Christodoulou, M. Vendruscolo, and C.M. Dobson. 2010. Transient tertiary structure formation within the ribosome exit port. *Journal of the American Chemical Society* 132(47): 16928–16937.

Oliver, C.P. 1940. A reversion to wild-type associated with crossing-over in drosophila melanogaster. *Proceedings of the National Academy of Sciences USA* 26(7): 452–454.

Orengo, J.P., and T.A. Cooper. 2007. Alternative splicing in disease. *Advances in Experimental Medicine and Biology* 623: 212–223.

Osbourn, A.E., and B. Field. 2009. Operons. *Cellular and Molecular Life Sciences* 66(23): 3755–3775.

Palazzo, A.F., and T.R. Gregory. 2014. The case for junk DNA. *PLoS Genetics* 10(5): e1004351.

Parra, G., A. Reymond, N. Dabbouseh, E.T. Dermitzakis, R. Castelo, T.M. Thomson, S.E. Antonarakis, and R. Guigó. 2006. Tandem chimerism as a means to increase protein complexity in the human genome. *Genome Research* 16(1): 37–44.

Pasquinelli, A.E. 2012. MicroRNAs and their targets: recognition, regulation and an emerging reciprocal relationship. *Nature Reviews Genetics* 13(4): 271–282.

Pelechano, V., and L.M. Steinmetz. 2013. Gene regulation by antisense transcription. *Nature Reviews Genetics* 14(12): 880–893.

Petty, E., and L. Pillus. 2013. Balancing chromatin remodeling and histone modifications in transcription. *Trends in Genetics* 29(11): 621–629.

Pinder, J.B., K.M. Attwood, and G. Dellaire. 2013. Reading, writing, and repair: the role of ubiquitin and the ubiquitin-like proteins in DNA damage signaling and repair. *Frontiers in Genetics* 4:45.

Portin, P. 2002. Historical development of the concept of the gene. *Journal of Medicine and Philosophy* 27(3): 257–286.

Portin, P. 2009. The elusive concept of the gene. *Hereditas* 146(3): 112–117.

Reddy, A.S., M.F. Rogers, D.N. Richardson, M. Hamilton, and A. Ben-Hur. 2012. Deciphering the plant splicing code: experimental and computational approaches for predicting alternative splicing and splicing regulatory elements. *Frontiers in Plant Science* 3:18.

Rinn, J.L., and H.Y. Chang. 2012. Genome regulation by long noncoding RNAs. *Annual Review of Biochemistry* 81:145–166.

Sakabe, N.J., D. Savic, and M.A. Nobrega. 2012. Transcriptional enhancers in development and disease. *Genome Biology* 13(1): 238.

Salmena, L., L. Poliseno, Y. Tay, L. Kats, and P.P. Pandolfi. 2011. A ceRNA hypothesis: the rosetta stone of a hidden RNA language? *Cell* 146(3): 353–358.

Salzman, J., C. Gawad, P.L. Wang, N. Lacayo, and P.O. Brown. 2012. Circular RNAs are the predominant transcript isoform from hundreds of human genes in diverse cell types. *PLoS One* 7(2): e30733.

Sanger, F., S. Nicklen, and A.R. Coulson. 1977. DNA sequencing with chain-terminating inhibitors. *Proceedings of the National Academy of Sciences USA* 74(12): 5463–5467.

Sanna, C.R., W.H. Li, and L. Zhang. 2008. Overlapping genes in the human and mouse genomes. *BMC Genomics* 9:169.

Sigova, A.A., A.C. Mullen, B. Molinie, S. Gupta, D.A. Orlando, M.G. Guenther, A.E. Almada, C. Lin, P.A. Sharp, C.C. Giallourakis et al. 2013. Divergent transcription of long noncoding RNA/mRNA gene pairs in embryonic stem cells. *Proceedings of the National Academy of Sciences USA* 110(8): 2876–2881.

Singer, G.A.C., J. Wu, P. Yan, C. Plass, T.H.M. Huang, and R.V. Davuluri. 2008. Genome-wide analysis of alternative promoters of human genes using a custom promoter tiling array. *BMC Genomics* 9: 349.

Skinner, M.K., C. Gurerrero-Bosagna, M.M. Haque, E.E. Nilsson, J.A. Koop, S.A. Knutie, and D.H. Clayton. 2014. Epigenetics and the evolution of Darwin's finches. *Genome Biology and Evolution* 6(8): 1972–1989.

Southern, E.M. 1975. Detection of specific sequences among DNA fragments separated by gel electrophoresis. *Journal of Molecular Biology* 98(3): 503–517.

Stergachis, A.B., E. Haugen, A. Shafer, W. Fu, B. Vernot, A. Reynolds, A. Raubitschek, S. Ziegler, E.M. LeProust, J.M. Akey et al. 2013. Exonic transcription factor binding directs codon choice and affects protein evolution. *Science* 342(6164): 1367–1372.

Taguchi, Y.-H. 2013. MicroRNA-mediated regulation of target genes in several brain regions is correlated to both microRNA-targeting-specific promoter methylation and differential microRNA expression. *BioData Mining* 6(1): 11.

Talhouarne, G.J., and J.G. Gall. 2014. Lariat intronic RNAs in the cytoplasm of xenopus tropicalis oocytes. *RNA* 20(9): 1476–1487.

Taulli, R., C. Loretelli, and P.P. Pandolfi. 2013. From pseudo-ceRNAs to circ-cerRNAs: a tale of cross-talk and competition. *Nat Structural & Molecular Biology* 20(5): 541–543.

Tomkins, J. 2014. Comparison of the transcribed intergenic regions of the hu-

man genome to chimpanzee. *Creation Research Society Quarterly* 50:212–221.

Trinklein, N.D., S.F. Aldred, S.J. Hartman, D.I. Schroeder, R.P. Otillar, and R.M. Myers. 2004. An abundance of bidirectional promoters in the human genome. *Genome Research* 14(1): 62–66.

Ulitsky, I., and D.P. Bartel. 2013. LincRNAs: Genomics, evolution, and mechanisms. *Cell* 154(1): 26–46.

Valadkhan, S. and Y. Jaladat. 2010. The spliceosomal proteome: at the heart of the largest cellular ribonucleoprotein machine. *Proteomics* 10(22): 4128–4141.

Van Bortle, K., and V.G. Corces. 2012. Nuclear organization and genome function. *Annual Review of Cell and Developmental Biology* 28:163–187.

Veeramachaneni, V., W. Makalowski, M. Galdzicki, R. Sood, and I. Makalowska. 2004. Mammalian overlapping genes: the comparative perspective. *Genome Research* 14(2): 280–286.

Venter, J.C., M.D. Adams, E.W. Myers, P.W. Li, R.J. Mural, G.G. Sutton, H.O. Smith, M. Yandell, C.A. Evans, R.A. Holt et al. 2001. The sequence of the human genome. *Science* 291(5507): 1304–1351.

Vicens, Q., and E. Westhof. 2014. Biogenesis of circular RNAs. *Cell* 159(1): 13–14.

Wahl, M.C., C.L. Will, and R. Luhrmann. 2009. The spliceosome: design principles of a dynamic rnp machine. *Cell* 136(4): 701–718.

Wakano, C., J.S. Byun, L.J. Di, and K. Gardner. 2012. The dual lives of bidirectional promoters. *Biochimica and Biophysica Acta* 1819(7): 688–693.

Wang, E.T., R. Sandberg, S. Luo, I. Khrebtukova, L. Zhang, C. Mayr, S.F. Kingsmore, G.P. Schroth, and C.B. Burge. 2008. Alternative isoform regulation in human tissue transcriptomes. *Nature* 456(7221): 470–476.

Wang, G., K. Qi, Y. Zhao, Y. Li, L. Juan, M. Teng, L. Li, Y. Liu, Y. Wang. 2013. Identification of regulatory regions of bidirectional genes in cervical cancer. *BMC Medical Genomics* 6 Suppl 1: S5.

Wang, Y., X. Li, and H. Hu. 2011. Transcriptional regulation of co-expressed microRNA target genes. *Genomics* 98(6): 445–452.

Ward, A.J., and T.A. Cooper. 2010. The pathobiology of splicing. *Journal of Pathology* 220(2): 152–163.

Washietl, S., M. Kellis, and M. Garber. 2014. Evolutionary dynamics and tissue specificity of human long noncoding RNAs in six mammals. *Genome Research* 24:616–628.

Weatheritt, R.J., and M.M. Babu. 2013. Evolution. The hidden codes that shape protein evolution. *Science* 342(6164): 1325–1326.

Wente, S.R., and M.P. Rout. 2010. The nuclear pore complex and nuclear transport. *Cold Spring Harbor Perspectives in Biology* 2(10): a000562.

Wood, E.J., K. Chin-Inmanu, H. Jia, and L. Lipovich. 2013. Sense-antisense gene pairs: Sequence, transcription, and structure are not conserved between human and mouse. *Frontiers in Genetics* 4: 183.

Yong, E. 2012. Encode: the rough guide to the human genome. *Discover Magazine*, http://blogs.discovermagazine.com/notrocketscience/2012/09/05/encode-the-rough-guide-to-the-human-genome/#.VLwmuy6zkVM.

Zentner, G.E., and S. Henikoff. 2013. Regulation of nucleosome dynamics by histone modifications. *Nature Structural & Molecular Biology* 20(3): 259–266.

Zhang, Y., X.O. Zhang, T. Chen, J.F. Xiang, Q.F. Yin, Y.H. Xing, S. Zhu, L. Yang, and L.L. Chen. 2013. Circular intronic long noncoding RNAs. *Molecular Cell* 51(6): 792–806.

Zhu, J., M. Adli, J.Y. Zou, G. Verstappen, M. Coyne, X. Zhang, T. Durham, M. Miri, V. Deshpande, P.L. De Jager et al. 2013. Genome-wide chromatin state transitions associated with developmental and environmental cues. *Cell* 152(3): 642–654.

Creation Research Society Quarterly 2015. 51:201–206.

Copernicus, Heliocentricity, and the Catholic Church: What Really Happened

Jerry Bergman*

Abstract

The history of the Copernicus controversy is reviewed, noting that it is far more complex than is often presented in the press or the popular literature. Copernicus's main problem was not the church but that the case for the heliocentric model lacked scientific evidence, and the Ptolemy model was then widely accepted. For this reason, much resistance existed to the heliocentric model from both the scientific and religious establishments. Actually, a significant source of Copernicus's support was from the church. This case is another example of the secular establishment oversimplifying, as well as occasionally distorting, history. The goal of this paper is to provide some light on this important historical event.

Introduction

In discussions of our solar system and its origin, the Catholic Church's putative historical opposition to a heliocentric solar system (i.e., the belief that the earth and planets revolve around the sun) and support of the geocentric (earth-centered solar system) is often used in an attempt to document the harmful influence of Christianity on scientific progress. Typical is a claim by astronomer David Levy, who wrote that when Nicolas Copernicus proposed his heliocentric model, "Not surprisingly, it met with great hostility from the church, which held that God had created a universe with the earth at its heart" (Levy, 1994, p. 20).

Ganeri, et al., went further, claiming that when Copernicus documented his idea in his 1543 book, the "problem was, the Church stated that God had put the Earth at the center of the Universe. You could be put to death for saying the Earth went round the Sun." They added, "Few scientists were brave enough to say that they agreed with Copernicus' finding that the Earth went round the Sun. The Italian astronomer Galileo was [brave enough]—and was put on trial for his ideas in 1634" (Ganeri, et al., 2007, p. 116).

Author Richard G. Bozarth added that Christianity seriously impeded "the progress of science" and the best-known example is the church's "fight against the Copernican heliocentric theory" (Bozarth, 1992, p. 52). An editorial in *Omni* magazine claimed that "once a religion becomes politically powerful, it suppresses all 'heretical' teachings. Galileo was silenced by the Roman Catholic Church. ... Robert A. Heinlein predicted three decades ago that the United States would be ruled by a religious dictatorship in the twenty-first century" (Bova, 1981, p. 6).

* Jerry Bergman, Northwest State College, Archbold, Ohio, jbergman@northweststate.edu

Accepted for publication January 15, 2015

Obviously, Heinlein's prediction was way off. In fact, the opposite is true. The Copernican affair may not only be one of the most quoted claims in the long history of "persecution" of science by religion, but it is also one of the most misunderstood events in history. It is also widely believed that the eventual acceptance of the heliocentric position was one of the many triumphs of science over religion (Repcheck, 2007, p. 11). This view, immortalized by Andrew White, president of Cornell University in the late 1800s, has been uncritically and widely repeated by academics, politicians, and the media ever since (White, 1896; Harris, 1973). This is true despite the fact that both White's thesis and book have now been thoroughly refuted by many scholars (Brooke, 1991).

It has even been falsely claimed, or implied, that those persons who supported Copernicus's heliocentric model invariably got into trouble with the church. An example is the claim by Charles Darwin's great-great grandson, Matthew Chapman, in his book about the Scopes trial, where he states that for

> supporting Copernican theory in the mid-1600s, Galileo was tried by the Roman Catholic church and put under house arrest for the last eight years of his life. He was not 'pardoned' until 1988 when Pope John Paul II finally conceded that the church had made a 'mistake'. *1988!* Over three centuries to concede a scientific point that every man of reason had accepted two hundred years before. (Chapman, 2000, pp. 136–137).

As we will document, "every man of reason" did not accept heliocentrism in Copernicus's day or until sometime after; actually the situation was quite the opposite. The fact is, in Galileo's day "no one had yet come up with a convincing proof that earth really flew around the Sun at great speed, as Copernicus' proposal required" (Moy, 2001, p. 44).

From the twenty-first-century secular, scientific, and materialistic perspective, and in view of the atheism that is often intertwined with science today, it is easy to dismiss this seventeenth-century controversy as incontrovertible evidence of the church's antipathy to the results of scientific research that conflicted with religious dogma. In fact, Seeger concludes it is "merely an instance of the perpetual clash between an individual's freedom of thought and society's establishment of authority" (Seeger, 1981, p. 168).

A Short History of the Heliocentric Revolution

The reactions of sixteenth-century Europeans to the heliocentric theory can be understood only by evaluating the entire Copernican-Galileo situation in its historical context (Kesten, 1945). Throughout history, most civilizations believed the earth was located at the physical center of the universe and existed primarily for our benefit. The stars guided us at night and revealed information about our lives. The moon helped to light up our night. The sun warmed us and lighted our way during daylight, and the rain clouds were created to water our crops.

The geocentric worldview—that the sun, planets, and stars all circled the earth—was accepted by most of humanity until the sixteenth century. In Copernicus's day, moving from the earth outward, the moon was believed to be the first heavenly body, next was Mercury, followed by Venus, and, last, was the sun and mars, all traveling in perfect circles around the earth. Farthest out were the fixed stars that were attached to a celestial sphere, which was the outer extent of the universe. Beyond this was nothing but empty space (Singh, 2004).

For generations, the common people took this view for granted because it fit into a simplistic, straightforward view of the earth-sun relationship. It was also believed for most of human history that the entire physical heavens consisted of only about 6,000 stars, all of which were very much alike, and a few planets (meaning "wanderers," based on their movement in contrast to stars). The stars were arranged into constellations, which the ancients saw as having meaning beyond their simple arrangement (Berry, 1961). Aside from this, the ancients knew very little about the heavens, believing many things that today we recognize as nonsense. The fact recognized today that the earth is but a "speck," whizzing around the sun at 66,600 mph in our solar system, which is but a "dot" in the Milky Way galaxy, stands in vivid contrast to the worldview of ancient mankind.

Few scientists since Aristotle challenged geocentrism, and since Augustine few churchmen had questioned the theory until Copernicus. It was also the established scientific view, defended by the eminent astronomer Claudius Ptolemy (c. AD 85–165) who wrote the highly respected astronomical scientific text titled *Almagest*, which was based on his research and extensive scientific observations (Repcheck, 2007, p. 13). Ptolemy was a "scholar of prodigious talent—incredibly ingenious and prolific … the most significant [of his many works] being the *Almagest*, which surveyed everything then known about the universe" (Repcheck, 2007, p. 13). His scientific authority was unquestioned for over 1500 years.

It seemed obvious to anyone who had the blessing of vision that the sun rises and sets and that the earth is stationary (Bentley, 1966). Since it was axiomatic that the sun moves around the earth, it was argued that anyone who denied this obvious fact was not only wrong, but also ignorant, or even crazy. Even today using the expression "the sun rises in the east and sets in the west" implies geocentrism.

Seventeenth-century scientists and nonscientists alike argued that if the

earth moved around the sun, the wind would constantly blow at a uniform speed and intensity and would eventually blow away the earth's atmosphere (Draper, 1957). If the earth moves, why do we not feel its movement as we feel the wind when riding a horse? The ancients were unaware that the earth is blanketed by an atmosphere that moves with the earth and used their experience of traveling on horses against the atmosphere to conclude that they should, likewise, feel the wind as they rode on an earth traveling in space.

Also, if the earth were traveling around the sun, what prevented everything from flying off the earth, and what prevented the earth itself from falling into the sun due to its enormous gravity? Since the ancients had no understanding of centripetal force or gravity, the new heliocentric idea was viewed as blatantly foolish to most everyone, even the most learned men of the time (Walsh, 1911). The earth's place in the center of the physical and psychological universe was a belief taken for granted for centuries (Gingerich, 1993). No significant reason existed to view the universe in any other way until Nicholas Copernicus (1473–1543) published his thesis *On the Revolution of the Heavenly Bodies* in 1543.

Although Copernicus was the person first widely credited with the scientific development of the modern heliocentric theory (Leith, 1973), several clergymen-scientists proposed theories of a geokinetic worldview long before Copernicus. One example was the French priest and scientist John Burdan (c. 1300–1358). Another example is Nicole Oresme (1320–1382), who effectively refuted many of the proofs for geocentrism (Hannam, 2009, pp. 186–190). No evidence exists that these heliocentric theorists faced problems from the church (Hannam, 2009, pp. 181–210). Copernicus's work is also judged today as marking the beginning of the modern scientific revolution. Copernicus was a priest, a student of canon law, and later, a professor of astronomy. His research on the sun, moon, and planets eventually culminated in his 1543 work *On the Revolution of the Heavenly Bodies*, wherein he proposed two radical changes to our conception of the structure of our solar system (Nash, 1929).

Copernicus's Claims

Copernicus's first claim was heliocentrism, meaning the sun was in the physical center of our universe. His second was geokineticism, specifically referring to the earth's diurnal motion around its axis and its annual motion circling around the sun. These two ideas were in direct contradiction to the scientifically orthodox Ptolemaic-Aristotelian geocentric cosmos, which placed the earth at the exact center of the solar system and was geostatic, meaning that the earth did not move (Principe, 2006, p. 70) and that the sun, and all of the then-known planets, moved around a stationary earth.

Copernicus had been working on this idea for about 30 years. Finally, in 1514, Copernicus wrote a short summary of his conclusions titled *Commentaniolus* (little commentary), which he circulated widely. In this work Copernicus called the geocentric-heliocentric issue "this very difficult and almost insoluble problem" (Freely, 2012, p. 224). As a result of his short work, he established his reputation as an astronomer to the extent that, in 1515, Pope Leo X invited him to journey to Rome to help work on the calendar reform project that was then a pressing issue. Copernicus declined because he felt that the existing measurements for a year's length were not yet accurate enough to complete a new calendar.

The Opposition's Claims Are False

Claims that "Copernicus … famously refused to publish his revolutionary work until he was on his deathbed, for fear of ecclesiastical repercussions" are clearly false (Kaufman, 2011, p. 179). In fact, Copernicus actually published his ideas in response to "the nagging of several fellow churchmen" (Principe, 2006, p. 71).

Copernicus also received much support from the church and its popes, especially Clement VII (Hagen, 1908). Cardinal Schönberg and Protestant clergyman Andreas Osiander both helped Copernicus to publish his revolutionary work (Koestler, 1959). They even arranged for its printing, and the work was dedicated, with permission, to Pope Paul III (Hoyle, 1973). Some religious opposition did exist, but the main concern, as we will explain, was scientific:

> Copernicus … hesitated for decades before publishing his only scientific work, *On the Revolutions of the Celestial Spheres*, perhaps because he knew it would stir religious fury as well as scientific opposition. Legend has it that he was handed the first copy of his masterpiece on his deathbed, on May 24, 1543, although by that point he may have been too weak to recognize it. (Dolnick, 2011, p. 98)

At this early date, the *opposition was primarily from the academic community*. Gingerich (1981) notes that Copernicus's book was highly regarded in Lutheran circles and extensively studied throughout their university system. Fear of exposing himself to the ridicule of common people was a major reason why Copernicus's work was not published until shortly before he died. The reason most opposed the theory was because it proposed a radically new view of the universe that contradicted the commonsense worldview of most common people. Copernicus was then a canon of the cathedral in Krakow, Poland, largely an administrative position. Once Copernicus's theories were published, his theory at first found little acceptance for many reasons (Principe, 2006, p. 71).

Opposition by Leading Astronomical Scientists

A major reason for Copernicus's rejection by scientists was the absence of evidence and that "scientists are highly resistant to new scientific ideas." In addition, the most celebrated astronomer of the day, Tycho Brahe, strongly opposed Copernicus's ideas for his entire life and had mustered several powerful, scientific arguments to support his opposition (Brooks, 2012, p. 95). It was not just Copernicus who had these problems, but "Isaac Newton and Friedrich Gauss … both waited twenty years for recognition and acceptance of their radical ideas. A full thirty-five years passed before Newton's own university was willing to teach his work (Brooks, 2012, p. 169). Brooks added that, although scientists today "hold up Copernicus as a researcher who was obviously right, his golden idea—that the earth goes round the Sun—was widely rejected by his scientific peers" (Brooks, 2012, p. 169).

Ironically, the Catholic Church's response probably encouraged many people who otherwise would not have examined the heliocentric view, resulting in many scientists' eventual acceptance. Although the heliocentric revolution had begun with Copernicus, most universities still taught geocentricity years after Galileo died (Spielberg and Anderson, 1987). In fact, when Harvard was founded in 1636, the faculty was committed to the Ptolemaic theory.

The facts reviewed here are widely known among science historians. Dolnick writes that the scientific objections to heliocentrism "were enormous. If Copernicus was right, the earth was speeding along a gigantic racetrack at tens of thousands of miles an hour, and none of the passengers suffered so much as a mussed hair. The fastest that *any* traveler had ever moved was roughly twenty miles an hour, on horseback" (Dolnick, 2011, pp. 98–99). These arguments were not made by the church but by

> the most esteemed scholars, not from yokels. They knew, on both scientific and philosophical grounds, that the Earth does not move. … Aristotle had argued that the Earth rests in place because it occupies its natural home, the center of the universe, just as an ordinary object on the ground stays in *its* place unless something comes along and dislodges it. (Dolnick, 2011, pp. 98–99)

Furthermore, scholars pointed to the countless

> observations that all led to the same conclusion. We can be sure the Earth stands still, one eminent philosopher explained, "for at the slightest jar of the Earth, we would see cities and fortresses, town and mountains thrown down." But we don't see cities toppled, the skeptics noted, nor do we see any other evidence that we live on a hurtling platform. If we're racing along, why can we pour a drink into a glass without worrying that the glass will have moved hundreds of yards out of range by the time the drink reaches it? If we climb to the roof and drop a coin, why does it land directly below where we let it go and not miles away? (Dolnick, 2011, pp. 98–99)

The church invariably gets all the blame and science none, even though most of the blame falls on science. This is nothing less than deliberate anti-Christian propaganda.

In developing his model, Copernicus essentially rejected 2,000 years of coherent astronomical theory. A major reason his theory was rejected was because it subverted the fundamental principles of physics as illustrated by the everyday observation that when all heavy bodies are dropped, they are pulled toward the earth by the force of gravity. Aristotle had placed the earth at the center of the cosmos because, he reasoned, it was the heaviest substance he knew of, and, therefore, anything we drop falls toward this heavy center.

The common people wondered, if Copernicus's idea that the earth was suspended a large distance away from the sun's center was correct, why do heavy bodies still fall toward the earth? Why don't they fall upward toward the sun if the sun is at the center of our solar system? Another problem with Copernicus's theory included its prediction of stellar parallax, and stellar parallax was actually detected only in the nineteenth century (Principe, 2006, p. 71).

It is also important to remember that most people in the ancient world were not very concerned whether or not the sun was at the center of the solar system because, in Copernicus's day, the main goal of astronomy was not determining the position of heavenly bodies but rather to determining where the planets would be in the near future in order to make accurate astrological predictions.

The Influence of Others on Copernicus's Work

Copernicus also likely learned much from at least one of the leading astronomers of his era, Johannes Regiomontanus (1436–1476), who "wrote four books that became valued standard works well into Copernicus' time and beyond: The *Epitome of Ptolemy's Almagest*, *On Triangles of Every Kind*, The *Tables of Directions*, and The *Ephemerides*" (Repcheck, 2007, p. 24). Regiomontanus was a leading astronomer and a graduate of the University of Leipzig for both his BS and MS degrees (Freely, 2012, p. 211).

Copernicus's first disciple was Georg Joachim Rheticus, a mathematics prodigy from Wittenberg (Danielson, 2006). Rheticus worked for three years with his master, Copernicus. Rheticus faced opposition from his university, as did Copernicus. When Rheticus returned to the University of Wittenberg in early October after studying under Copernicus, the opposition to heliocentrism

> continued to dominate those who in less troubled times might have

> given the Copernican message the attention it deserved. In the absence of decisive empirical evidence, and unsupported by any mathematical proof confirming the heliocentric theory, Rheticus' enthusiasm seemed, in the strictest sense, impertinent. No one was about to accept a counterintuitive notion like that of a moving earth merely on the word of an idiosyncratic, long-truant twenty-seven-year-old. (Danielson, 2006, p. 91)

As a result, Rheticus's hopes for "a sympathetic reception of Copernican ideas were dashed, and so was his dream of getting a seventh consecutive semester off so that he could carry on to Nuremberg and begin publication of *The Revolutions* without delay. Instead, faced with an overeager faculty member bent on pursuing unsettling ideas, Wittenberg put him to work in administration" (Danielson, 2006, p. 91).

Significance of the Copernican Case for Science Today

Religion has no monopoly on intolerance. Intolerance is a characteristic of imperfect humans and a trait that all of us must work assiduously to overcome. Isaac Asimov concluded that if a

> heretic is himself a scientist and depends on some organized scientific pursuit for his living or for his renown, things can be made hard for him. He can be deprived of government grants, of prestige—filled appointments, [and] of access to the learned journals. (Asimov, 1977, p. 7).

Reports of terminations and other problems in academia based on minority beliefs now abound in the literature, forcing one to ask, "Have things changed much since Galileo?" The answer is, probably not very much. Harvard's Owen Gingerich concluded that "scientific censorship, remains in our world today, and it may well be far more effective and insidious than in the seventeenth century" during the time of Copernicus (Gingerich, 1981, p. 60). Sir Fred Hoyle, in an introduction to one of his books, concluded that the popular belief that the opposition to revolutionary ideas is a thing of the past is false:

> Human societies, it is claimed, have progressed beyond the stage when such outrages could happen again. In this book we show that the Copernican Revolution is far from over, and that society has not improved since the sixteenth century in any important respect. If anything the situation may have got worse, with the successes of the Industrial Revolution conferring upon human beings a degree of arrogance not seen before. (Hoyle, 1973, p. 1)

Today, more than ever before, we must insure that ideas in science are silenced *only* by empirical evidence that comes from experimentation and replication (Redondi, 1987; Langford, 1992). Since at its core origins science is history, and not directly based on empirical laboratory science, speculation is necessarily involved. It is unfortunate for science that there is not much more tolerance in this, the twenty-first century, than in Copernicus's day.

Conclusions

Our knowledge about science, even before the turn of the last century, was miniscule compared to what is known today. Although many of the basics taught at the high school level were known then, nonetheless, the word "revolution" is for good reason used to describe science progress today, all of which clearly renders Paley's watchmaker hypothesis infinitely more viable in our age than ever before in history. And, unfortunately, much misinformation exists about the relationship between science and Christian reactions to science.

The erroneous claim that the Christian church at one time "killed people who believed that the earth revolved around the sun" (Blinick, 2014, p. 10) is a prime example of a gross misrepresentation of history. University of Wisconsin science historian Ronald Numbers in a PBS interview on his research about Galileo stated that not only is there "no reason to believe that Galileo at any point faced the threat of death," but there also "was never any indication in the court records of death being a possible penalty, and no other scientists were put to death for their scientific views" (Numbers, 2006, pp. 2–3).

It is significant that the Scriptures do not specifically teach the ancient but incorrect view of the heavens; rather, they teach a view that allows for all of the discoveries discussed in the last few centuries to fit, without problems, into a biblical worldview. Even though we now have more evidence for design (and thus a Creator), ironically fewer scientists than ever before believe in God. Some scientists seem to learn more and more about less and less until they know almost everything about nothing of real importance. Unbelief among scientists, particularly those involved with academia, has much more to do with educational indoctrination than with the facts of science. The facts of science open both wonder and minds to the glory of the created universe.

Acknowledgments

I thank Theodore Siek, MaryAnn Stuart, Bryce Gaudian, Clifford Lillo, and several anonymous reviewers for their feedback and help with the revisions.

References

Asimov, I. 1977. The role of the heretic. In Goldsmith, Donald (editor), *Scientists Confront Velikovsky*, pp. 7–18. Cornell University Press, Ithaca, NY.

Bentley, E. 1966. *Galileo*. Grove Press, New York, NY.

Berry, A. 1961. A *Short History of Astronomy: From Earliest Times Through the Nineteenth Century*. Dover Publications, New York, NY.

Blinick, G. 2014. Catholics should remember the past. *Lake County Daily Herald*. October 4,

Bova, B. 1981. First word (Editorial). *Omni* 4(2): 6.

Bozarth, G.R. 1982. The failure of creationism's moral argument. *The American Rationalist*, 27(4): 52.

Brooke, J.H. 1991. *Science and Religion; Some Historical Perspectives*. Cambridge University Press, New York, NY.

Brooks, M. 2012. *Free Radicals: The Secret Anarchy of Science*. Overlook Press, New York, NY.

Chapman, M. 2000. *Trials of the Monkey*. Duckworth, London, UK.

Danielson, D. 2006. *The First Copernican: Georg Joachim Rheticus and the Rise of the Copernican Revolution*. Walker and Company, New York, NY.

Dolnick, E. 2011. *The Clockwork Universe: Isaac Newton, the Royal Society, and the Birth of the Modern World*. Harper Collins Publishers, New York, NY.

Draper, J.W. 1957. *History of the Conflict Between Religion and Science*. D. Appleton, New York, NY.

Freely, J. 2012. *Before Galileo: The Birth of Modern Science in Medieval Europe*. Overlook Duckworth, New York, NY.

Ganeri, A., J. Malam, C. Oliver, and A. Hibbert. 2007. *Earth and Space*. Parragon, New York, NY.

Gingerich, O. 1981. The censorship of Copernicus' *De Revolutionibus*. *Journal of the American Scientific Affiliation*, 33(1): 58–60.

Gingerich, O. 1993. *The Eye of Heaven: Ptolemy, Copernicus, Kepler*. American Institute of Physics, New York, NY.

Hagen, J.G. 1908. Copernicus. In Herbermann, C.G. (editor), *The Catholic Encyclopedia*, vol. 4, pp. 352–354. The Encyclopedia Press, New York, NY.

Hannam, J. 2009. *God's Philosophers: How the Medieval World Laid the Foundations of Modern Science*. Icon Books Ltd., London, UK.

Harris, R.L. 1973. Copernicus and the church. *Christianity Today*, 7(24): 4 (September 14).

Hoyle, F. 1973. *Nicolas Copernicus*. Harper and Row Publishers, New York, NY.

Kaufman, M. 2011. *First Contact: Scientific Breakthroughs in the Hunt for Life Beyond Earth*. Simon & Schuster, New York, NY.

Kesten, H. 1945. *Copernicus and His World*. Roy Publishers, New York, NY.

Koestler, A. 1959. *The Sleepwalkers: A History of Man's Changing Vision of the Universe*. MacMillan, New York, NY.

Langford, J. 1992. *Galileo, Science and the Church*. University of Michigan Press, Ann Arbor, MI.

Leith, T.H. 1973. Galileo and the church: tensions with a message for today. *Journal of the American Scientific Affiliation* 25(1): 21–24; 25(2): 64–66; 25(3): 111–113; 25(4): 154–157.

Levy, D. 1994. *Skywatching: The Bestselling Guide to Understanding the Night Sky*. Fog City Press, San Francisco, CA.

Moy, T. 2001. Science, religion, and the Galileo affair. *Skeptical Inquirer* 25(5): 43–49.

Nash, J.V. 1929. *How Galileo Was Gagged by the Inquisition*. Haldman-Julies, Girard, KS.

Numbers, R. 2006. PBS interview with Ron Numbers about Galileo. http://www.pbs.org/faithandreason/transcript/numframe.html

Principe, L. 2006. *Science and Religion*. The Teaching Company, Chantilly, VA.

Redondi, P. 1987. *Galileo Heretic*. Translated by Raymond Rosenthal. Princeton University Press, Princeton, NJ.

Repcheck, J. 2007. *Copernicus' Secret: How the Scientific Revolution Began*. Simon and Schuster, New York, NY.

Seeger, R. 1981. Galileo, churchman. *Journal of the American Scientific Affiliation* 33(3): 166–168.

Singh, S. 2004. *Big Bang: The Origin of the Universe*. Fourth Estate, New York, NY.

Spielberg, N., and B.D. Anderson. 1987. *Seven Ideas That Shook the Universe*. John Wiley, New York, NY.

Walsh, J. 1911. *The Popes and Science*. Fordham University Press, New York, NY.

White, A. 1896. *A History of the Warfare of Science with Theology in Christendom*. D. Appleton, New York, NY.

Notes from the Panorama of Science

Anadromous Fish "That Swam with Dinosaurs" Neither Extinct nor Extirpated

Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are "back," to the surprise of many, in the tributary rivers of the Chesapeake Bay (Blankenship, 2014). Although some ecologists infer a populational recovery or a recent populational immigration, others wonder if the Atlantic sturgeon ever "left" the bay in the first place. Nevertheless, they are there now. But why is this surprising in the first place?

In the *Chesapeake Bay Journal*, Karl Blankenship reports:

> A couple decades ago, a handful of scientists met to discuss the dismal state of the Atlantic sturgeon in the Chesapeake Bay. No researcher had seen a spawning sturgeon [there] in years. Some doubted whether a remnant population of the Bay's largest fish even remained. Finally, the scientists began to debate what to do if someone actually caught a spawning female. Some thought they should send her to a hatchery to preserve her unique Bay genetic makeup. Other thought they should tag and track her to see if she led to another sturgeon. (Blankenship, 2014)

Of course, the concern was not really "extinction," a term that means global disappearance. The proper term for a local or regional disappearance would be "extirpation."[1]

> "We went back and forth about what we would do with the 'last' sturgeon," recalled Dave Secor, a fisheries scientist with the University of Maryland Center for Environmental Science. Thought nearly extinct [i.e., extirpated] in the Chesapeake just two decades ago, sturgeon are turning up in surprising numbers and in surprising places.
>
> They're also doing surprising things, like spawning in the fall—unlike any other anadromous [i.e., beginning life in freshwater, then migrating to sea, then later returning to freshwater for reproduction] fish on the East Coast. (Blankenship, 2014)

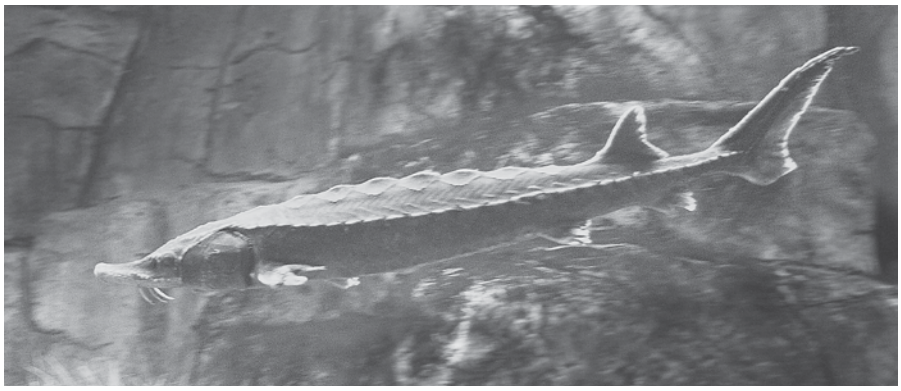


Figure 1. Acipenser oxyrinchus, Aquarium du Quebec, by Cephas. creativecommons.org/licenses/by-sa/3.0

Obviously, what was assumed to be true about the sturgeon of the Chesapeake Bay was not.

A few years ago "most biologists" would say only that the James River had a breeding (albeit small) population of

[1] Ironically, eyewitness reports from local fishermen were underappreciated, a repeat of ignored eyewitness fishermen reports during the heyday of Thomas Huxley's dismissal of declining population of Atlantic codfish, as noted in James J. S. Johnson, "Genesis Science Is Practical, Not Just Academic," *Acts & Facts* 43(3): 17 (March 2014), www.icr.org/article/7910/, *quoting* biologist Brian Thomas, "Huxley Error Led to Cod Calamity," *Acts & Facts*, 38(8): 17 (August 2009), www.icr.org/article/huxley-error-led-cod-calamity/), citing Mark Kurlansky's *Cod, A Biography of the Fish that Changed the World* (New York, NY: Penguin Books, 1998). For prior reporting on the Chesapeake Bay's Atlantic sturgeon population question, see Karl Blankenship, "Biologists Fail to Successfully Spawn Two Female Atlantic Sturgeon," *Chesapeake Bay Journal* (September 2007), http://www.bayjournal.com/article/biologists_fail_to_successfully_spawn_two_female_atlantic_sturgeon, as well as even earlier reporting in Karl Blankenship, "Concerns Raised that Criteria Might Not Help Sturgeon," *Chesapeake Bay Journal* (March 2003), http://www.bayjournal.com/article/concerns_raised_that_criteria_might_not_help_sturgeon_.

sturgeon. Yet now it seems that the James River has thousands of them. Moreover, the nearby Pamunkey (a York River tributary) is now sporting a spawning population, as is also the Marshyhope Creek (Blankenship, 2014).

> "The thing is, you've got to look and nobody was looking [for] sturgeon," said Albert Spells, Virginia fisheries coordinator with the U.S. Fish and Wildlife Service who, in the 1990s, was one of the few who argued that breeding populations remained in the James. (Blankenship, 2014)

As a large, jumping fish, the sturgeon should have been seen, if ecologists had used "best practices" of empirical science observation (Johnson, 2012, 2014). But why were the ecologists so surprised? Could it be that the fall spawning runs caught them off-guard, because they carelessly assumed that sturgeon should (and therefore would) spawn earlier in the year?

> It now appears that one reason adult fish were overlooked is that biologists were looking at the wrong time. … Initially, the biologists concentrated their search in the spring. (Blankenship, 2014)

So, what other assumptions—unsupported by actual eyewitness observations in the wild—might be misleading us, as we try to understand fish behaviors?

The lack of empirical knowledge about the Atlantic sturgeon, as a denizen of the Chesapeake Bay drainage basin of freshwater streams and rivers, may be compared to the lack of forensic science-based knowledge of that large fish's history on this planet.

> Sometimes called "the fish that swam with dinosaurs," they [i.e., Atlantic sturgeon] are remnants of an ancient species and they don't look much like other fish. They have long, pointed snouts and instead of scales, are covered with armor-like bony shields, called *scutes*.
>
> They are, by far, the largest and longest-lived species native to the Chesapeake. They reach maturity when they are 10 to 15 years old, and 5 feet or greater in length. They have been documented to live 60 years, and reach lengths of 14 feet and weights of 800 pounds. Like other anadromous species, they spawn in coastal rivers, but spend most of their lives in the ocean. Colonial accounts are filled with stories about their abundance. (Blankenship, 2014)[2]

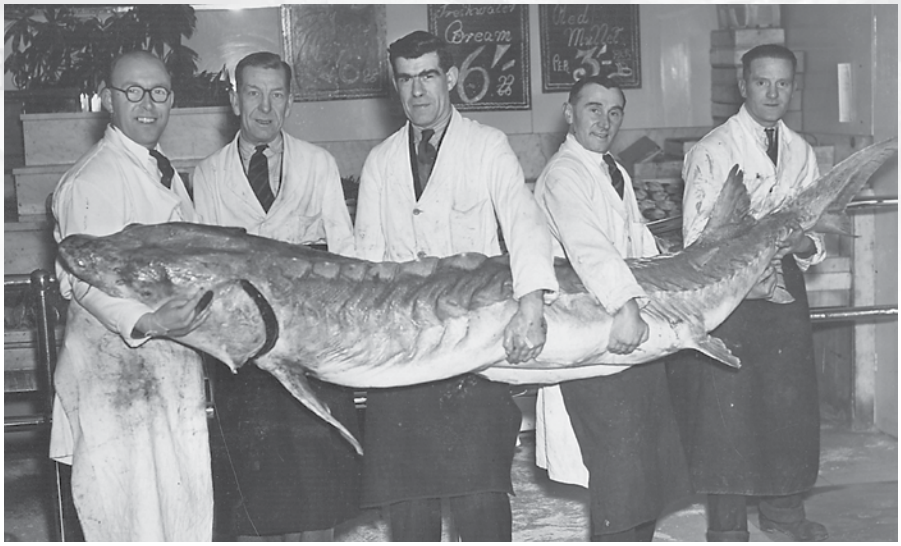


Figure 2. Sturgeon, public domain photo.

If it is so tricky for secular-minded professional ecologists to correctly report the spawning behaviors of a large jumping fish—the largest anadromous fish of America's East Coast—in relatively small rivers, should we be quick to accept their confident assertions about who swam (or did not swim) "long, long ago and far, far away" with the now-extinct dinosaurs? Shouldn't the "long-ago" speculations (Johnson, 2012, 2014) of secular-minded ecologists (and biologists), which involve no eyewitnesses (much less any support from the biblical record), be taken with a large grain of salt, perhaps a Chesapeake Bay full of salt? After all, other fish—or even humans—might have been swimming with plesiosaurs during autumn!

References

Blankenship, Karl. 2014. Atlantic sturgeon back in Bay, or did they ever leave? *Chesapeake Bay Journal*, December 8. http://www.bayjournal.com/article/atlantic_sturgeon_back_in_bay_or_did_they_ever_leave

Johnson, James J. S. 2012. What good are experts?" *Acts & Facts* 41(11): 8–10, www.icr.org/article/7073/.

Johnson, James J. S. 2014. Fishy science, *Acts & Facts*, 43(2): 17, www.icr.org/article/7890/.

James J. S. Johnson
Institute for Creation Research

[2] Evolutionists reject the idea that all dinosaurs and all fish coexisted after Creation Week, so evolutionists regard the sturgeon as a rarity for being contemporaneous with dinosaurs, assuming it is a surviving "remnant" from "millions" of years ago.

Letters to the Editor

The policy of the editorial staff of CRSQ *is to allow letters to the editor to express a variety of views. As such, the content of all letters is solely the opinion of the author, and does not necessarily reflect the opinion of the* CRSQ *editorial staff or the Creation Research Society.*

The Problem of Distant Starlight

I know that a number of creationists have wrestled with the problem of distant starlight, and I would like to suggest a possible solution that I have never seen offered.

Let me begin by saying that I am approaching this question as a theologian, not a scientist. And from a theological point of view, the words, "to give light upon the earth," require the light from the sun, moon, and stars to be present on the fourth day (Genesis 1:15). Some may speculate that the light was actually created when God said, "Let there be light," but it had to be present on the fourth day. That being said, let me quote a statement from the book *God at Ground Zero,* by Curt Sewell.

> The distance to most galaxies should probably be measured in billions of light years. So how can their light reach us in the limited time we believe the universe has existed? This is undoubtedly the most difficult question that creationists face.
>
> There have been several proposed answers, but they all have problems. These suggestions include: 1) starlight was created, in situ, distributed along the paths that we see today, … although this opens the door to charges that God is deceiving us by the appearance of events that happened long before creation—or conceivably may not have actually happened at all! (Sewell, 1997, pp. 215–216)

As I read that statement, the words, "events that happened long before creation" tell me that Mr. Sewell is assuming that if light was created en route that it was created to give the appearance of age. I believe that assumption is at the root of the problem, and I would like to suggest an alternative.

In order to make what I have to say easier to follow, I am going to speak of just one star, Alpha Centauri, and will speak of it as being four light-years from the earth, although I realize that distance is rounded off. The idea that I wish to propose is this:

If we were able to take a very powerful telescope back in time, back to the very day the stars were created, and focused it on Alpha Centauri, Mr. Sewell's statement assumes that what we would see would be Alpha Centauri as it might have appeared four years before it was created. However, what if God created the light to reveal Alpha Centauri as it actually appeared at that time, so that one hour later, or one day later, we would see it just as it was at that moment, etc. If that were the case, then four years after Creation, as the actual light of the star began to reach the earth, Alpha Centauri would look exactly as it did on the day of creation.

If that were the case for all of the stars, then today we would actually be seeing any stars that are over approximately 6000 light-years' distance from the earth exactly as they appear.

I can even make a prediction on the basis of this idea. If evolution is true, then stars that are a great distance from earth should appear to be younger than stars that are not so far away. However, if the idea I have proposed is true, while various stars may appear older or younger according to our current theories, distance should not make any difference in the age.

That still leaves us with the problem of stars that have gotten brighter and then ceased to give light. However, since death is the result of sin, I believe that part of the problem has to with the fact that we speak of it as the "death of a star." Technically speaking, a star cannot die since it is not alive. The stars that have disappeared are still there—at least the matter/energy they were composed of is still there. So, I believe that we have two possible solutions: (1) God created the light to reveal exactly what the star would look like even though He knew that because of sin it would cease to give light, or (2) the disappearance of some stars does not reveal the result of sin but the fact that God never intended for the universe to be eternal. Concerning that second possibility: if neither Adam nor any of his descendants had sinned, it is possible that at some point God would have translated everyone to a higher plane of existence, as he did Enoch. I realize that is speculation. However, if it were the case, then the disappearance of some stars would not be a problem.

Sincerely,
Gary Ray Branscome
www.branscome.org

References

Sewell, C. 1997. *God at Ground Zero.* Master Books, Green Forest, AR.

The Eden Model

> "At the conclusion of God's six days of creation and making of all things, He placed it all under man's dominion. … There was, therefore, nothing bad in the created world, no hunger, no struggle for existence, no suffering, and certainly no death of animal or human life anywhere in God's perfect creation (plant 'life,' created as food for men and animals does not 'die' in the Biblical sense)" (Morris, 1998).

In order to preserve this lack of physical death as well as to provide for a strict ordering for the six creation days, a new creationary model has been proposed. This model employs GGU-model mechanisms (Herrmann, 2014c, 2014d, 2013) and includes application of the rapid-formation model (Herrmann, 2014b).

The Eden Model (Herrmann, 2014a), relative to the pre-Fall period at least, requires no human death and the everlasting aspects of the supporting biblically stated physical systems. By allowed deductive implication, for human life, at the least, to continue as indicated, various aspects of the pre-Fall Eden are designed to have no termination in any manner whatsoever. They simply continue without ceasing. One of these physical systems is an "everlasting" or "eternal" cosmology. Hence, consistent with their stated purposes, the original earth, sun, moon, and stars are everlasting.

"Cursed is the ground because of you" (Genesis 3:17 NIV). At the moment this is pronounced, alterations in the physical existence of Adam and Eve begin to occur. It is then that physical systems begin to acquire a "death" feature. As predicted, a rapidly forming post-Fall cosmology can be any cosmology that is describable in meaningful language, satisfies observable evidence, and develops relative to observer time.

Obviously, when compared with the physical regulations observed today that imply a degenerating physical universe that is hostile to biological life and filled with destruction, the actual Eden existence satisfies a different set of physical laws from those we apply today to predict physical behavior. Indeed, tracing the figures of speech as they appear in Genesis 3:24, it is likely that we are barred from having any detailed knowledge of the Eden physical regulations. The GGU-model is capable of modeling such circumstances since technically it is independent from any detailed description for how physical systems develop.

The GGU-model mechanisms allow for many different modes for physical development. There have been various specific creationary models proposed that apply present-day, accepted physical laws or speculate relative to modified versions. Then there are various atheistic-inspired models, and especially cosmologies, proposed. However, the GGU-model, when fully applied to a strict biblical interpretation, can be generally described as displaying processes that transform God's thoughts into a physical reality. For this reason, I find it unnecessary to speculate as to which post-Fall cosmology is the most appropriate.

Robert A. Herrmann, Ph.D.,
South Riding, VA
drrahgid@hotmail.com

References

Herrmann, R.A. 2014a. The Eden model, http://vixra.org/abs/1409.0239 (accessed December 5, 2014).

Herrmann, R.A. 2014b. The rapid-formation model, http://vixra.org/abs/1409.0240 (accessed December 5, 2014).

Herrmann, R.A. 2014c. The GGU-model and GID-model processes and their secular and theological Interpretations, http://vixra.org/abs/1404.0421 (accessed December 5, 2014).

Herrmann, R.A. 2014d. An alteration in the foundations of the theory of ultralogics, http://vixra.org/abs/1406.0100 (accessed December 5, 2014).

Herrmann, R.A. 2013. Nonstandard ultralogic-systems applied to the GGU-model, http://vixra.org/abs/1308.0125.

Morris, H. 1998. The Fall, the Curse, and evolution, *Back to Genesis* (April) No. 112, Institute for Creation Research, Cajon, CA.

Healthy Competition?

Reading the Fall 2014 article "Phanerozoic Animal Tracks: A Challenge for Catastrophic Plate Tectonics" (CPT), I was impressed (not in the awestruck sense) with the weakness of the CPT explanation for the global flood. The article implied (correctly) that CPT is precariously "adapted or adopted" (via computer simulations) from the naturalistic plate tectonics model, which is based on the standard geologic timescale/column, which is interwoven with uniformitarian and evolutionary assumptions applied to interpretations of the "supporting" data. I've read many of the numerous articles on CPT published in *CRSQ* and the other prominent technical journal, *Journal of Creation* (*JOC*) and have always been underwhelmed by the idea. As the *CRSQ* article concludes, CPT "is an impressive computer and conceptual model, but … it uncritically accepts the standard geologic column" and as of the present "must be seen as a flawed theory."

It has seemed to me that CPT has somehow gained a stranglehold upon the Creation Research Society (CRS) and other major, like-minded organizations and, not unlike the evolutionary-dominated secular journals, has forced out all competing theories. Recently there have been some references or critiques of some specific aspects of another theory, known as the hydroplate theory (Brown, 2008), but I get the impression these may only have appeared for the purpose of stamping it out before it can gain enough popularity or momentum to prompt researchers to develop the hydroplate theory as a serious CPT competitor. As with evolutionists, whose livelihoods or reputations are tied to their theory, I wonder if there is a recent growing concern that the hydroplate theory could divert funding away from CPT researchers or become a threat to CPT as a prevailing theory. Nothing I've read in *CRSQ* or *JOC* critiquing the hydroplate theory even hinted at the idea that maybe it should be pursued by some so as to provide a healthy competitive environment for scientific research into the global flood. So, my question to the CRS (of which I am a voting member) is, will the CRS support research into the hydroplate theory explanation of the global flood so as to promote healthy competition within the Creation and Flood research community—especially given the problems with the CPT theory, such as those noted in the aforementioned *CRSQ* article?

David Guyon, North Huntingdon, Pennsylvania, USA
guyonde@earthlink.net

References

Brown, W. 2008. *In the Beginning: Compelling Evidence for Creation and the Flood*. Center for Scientific Creation, Phoenix AZ.

Editors' Response

The sentiment of Mr. Guyon's letter has swirled around for years, so we are pleased to have this opportunity to respond to it in print. We are not in a position to comment on the content of the *Journal of Creation*, but as the editor and former editor of the *CRSQ*, we certainly can address this journal's content in the past decade.

Six coauthors presented the CPT model at the Third International Conference on Creationism (Austin et al. 1994), not in the *CRSQ*. Looking over the past decade of the *CRSQ*, we did not find any articles by five of those six coauthors. There were a few articles by one of the six coauthors, but none of his articles addressed CPT. Within the past decade, there is only one article in the *CRSQ* that directly addressed CPT, and it was the negative one that prompted Mr. Guyon to write the letter (Froede et al., 2014). So, we do not know what to make of Mr. Guyon's comment about the "numerous articles on CPT published in *CRSQ*." The three authors of the recent *CRSQ* article, along with their frequent coauthor, Michael Oard, are critical of CPT, so their conclusion was not surprising.

Recently, one of those authors (Reed, 2013) surveyed 50 years of earth science in the *CRSQ*. This study

showed that the three most prolific authors of articles on earth science in the *Quarterly* have been, in order, Froede, Oard, and Reed. Again, all three of these authors clearly oppose CPT. The inescapable conclusion is that contrary to Mr. Guyon's statement, few, if any, articles favorable to CPT have been published in the *CRSQ*. Furthermore, while one coauthor of the ICC paper serves on the CRS board of directors, two of the aforementioned CPT critics also serve on the board. Faced with these facts, we are at a loss to understand how Mr. Guyon can conclude that CPT has a "stranglehold" on the CRS.

Mr. Guyon also mentioned recent critiques of some specific aspects of the hydroplate model. Mr. Guyon probably had in mind at least one article that one of us has written (Faulkner, 2013), so we understand how some might believe that the editorial board is biased. However, Dr. Faulkner did not critique the geology of the hydroplate model (because he is not a geologist). Instead, as an astronomer, the article was restricted to astronomical aspects of the hydroplate model. It was not the focus of the article to deal with any particular geology model but rather the problems with the manner in which some astronomical data had been handled.

As editors of the *CRSQ*, we have not seen ourselves as using the journal to defend a specific geology, astronomy, or biology model. As long as the view being promoted does not conflict with the Society's statement of faith, countering viewpoints can be (and have been) published in *CRSQ*. In fact, we submit that a review of past issues of the *CRSQ* reveals a remarkable diversity of topics and viewpoints (some of these even spurring critical comments that we should not allow such diverse views). Even we, as editors, do not always agree with the specific viewpoint of articles published in the *CRSQ*. But that is the point—we are not attempting to be a gatekeeper for specific creation ideologies.

Even if pro-CPT articles were to vastly outnumber anti-CPT articles (which they clearly do not), it would be more a reflection of the number of articles submitted, not any attempt on the part of the editors to stamp out competing models. Nor do we think that those within CRS who disagree with the hydroplate model have that motivation. Furthermore, comparing supporters of CPT to evolutionists who are motivated by protecting livelihoods, reputations, and funding is an unnecessary criticism and serves no productive purpose for creation science. We also strongly disagree with the implication that CPT is some sort of baptized naturalism. We should all refrain from impugning the motives of those with whom we disagree. Instead, we ought to recognize that there may be profound differences between various ideas, but we all serve the same Creator and King.

As editors, our single goal has always been to make the *CRSQ* the best journal it can be. Normally, submitted manuscripts are assigned to various area editors with the full intention that they be given a fair evaluation. In the brief time between the recent change of editors, one submission presented a conflict of interest, so Dr. Faulkner recused himself entirely from the process. That practice will be maintained.

Of course, when an article is submitted, there is no guarantee the paper will make it through the review process. Many submissions do not. However, we cannot publish articles that are not submitted. The *CRSQ* has published few papers supportive of either CPT or the hydroplate model, because few, if any, have been submitted. In scientific discourse, controversy actually can be very positive, stimulate critical thinking, and promote even more careful study. We encourage recent creationists of all viewpoints to submit more papers to the *CRSQ*.

Danny Faulkner, Ph.D.
Editor (2013–present)

Kevin Anderson, Ph.D.
Editor (2003–2013)

References

CRSQ: *Creation Research Society Quarterly*

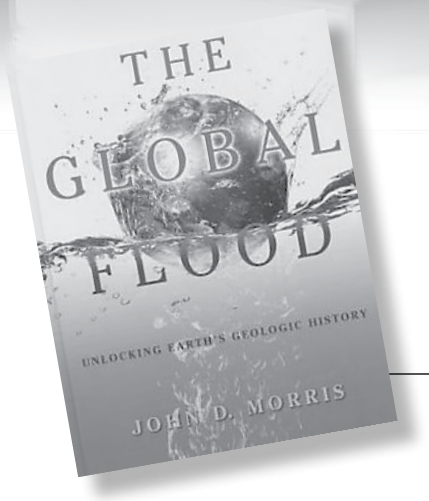
Austin, S.A., J.R. Baumgardner, D.R. Humphreys, A.A Snelling, L. Vardiman, and K.P. Wise. 1994. Catastrophic Plate Tectonics: A Global Flood Model of Earth History. *Proceedings of the Third International Conference on Creationism* (edited by R.E. Walsh), pp. 609–621.

Faulkner, D.R. 2013. An Analysis of Astronomical Aspects of the Hydroplate Theory. *CRSQ* 49:197–210.

Froede, C.R. Jr., A.J. Akridge, and J.K. Reed. 2014. Phanerozoic animal tracks: a challenge for catastrophic plate tectonics. *CRSQ* 51:96–103.

Reed, J.K. 2013. Fifty Years of Earth Science in the Creation Research Society Quarterly. *CRSQ* 50:96–101.

Media Reviews



The Global Flood

by John D. Morris

Institute for Creation Research, Dallas, 2012, 175 pages, $20.00

This large-size book (8½ x 11") is available in both print and Kindle editions. John Whitcomb writes a short foreword, and author John Morris describes his book as an update to the 1961 creationist classic, *The Genesis Flood*. *The Global Flood* is an attractive book with dozens of color photos, maps, and data tables. One such table lists 42 distinct references documenting soft tissue found in fossils (p. 126).

Regarding the worldwide flood of Noah's day, Morris writes, "Indeed, if Scripture records truth, no effort to understand the past that denies what it claims can succeed" (p. 17). A basic conclusion is that "Earth doesn't really look old, but it does look flooded" (p. 103). This firm defense of biblical authority characterizes the life of John Morris and the Morris family.

Earth science details are informally and clearly reviewed in depth. Topics include the Creation Week (p. 33), Babel (p. 46), the Gilgamesh Epic (p. 8), salt deposits (p. 127), and the Grand Canyon (p. 144). Further detailed geologic discussion includes catastrophic plate tectonics (p. 80), erosion of the Glen Canyon Dam (p. 101), bioturbation of sediment (p. 106), the Chattanooga Black Shale Enigma (p. 108), and the 1980 Mount St. Helens eruption (p. 103).

Some of Dr. John Morris's personal views are shown in the following quotes:

The Galapagos finches "are not separate species at all, merely separate communities or varieties" (p. 27).

Regarding the vapor canopy theory, "Creationist research has tried every conceivable variable of today's conditions to make the canopy stable, with inconclusive results. … Yet hints in Scripture remain of a radically different environment at the beginning" (pp. 34, 55).

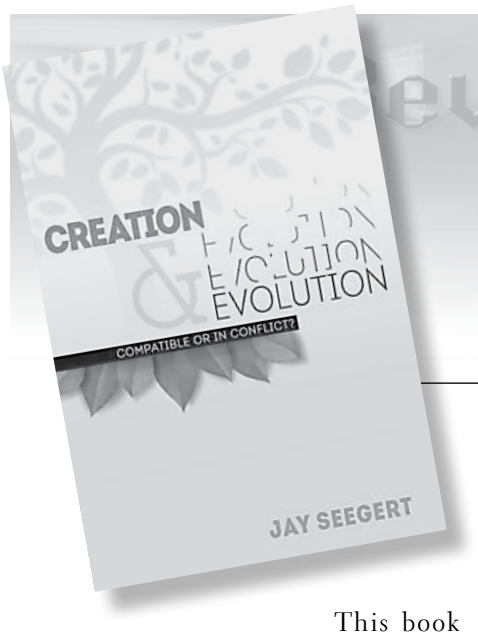
During the great Flood, "the length of the day, the length of the year, and the tilt of the [earth's] axis could all have changed" (p. 51). To further explain the complex pattern of sedimentary flood deposits, "the rupturing 'fountains of the deep' would have caused rotational instability in the earth's 'gyroscope,' abruptly altering its rotation … able to cause [rotational and magnetic] 'polar wandering' and even rapid flipping of the poles" (p. 122).

"Presumably, Day Three is also the day when insects were created. … Insects share biological life, but not true biblical or 'soulish' life" (p. 39).

"There may have been billions of people alive in the tenth generation—Noah's generation" (p. 60).

Two minor items will be mentioned for future editions of this helpful book. First, some of the photos are not clearly focused. This readily happens during fieldwork; however, clear images are available. Second, in the discussion of the Northwest Channeled Scablands, involving the name J Harlan Bretz (1882–1981), the J is not an abbreviation and does not have a period (p. 100). Dr. Bretz was adamant about this minor but personal point.

Don B. DeYoung
DBDeYoung@Grace.edu



Creation & Evolution: Compatible or in Conflict?

by Jay Seegert

Master Books, Green Forest, AR, 2014, 298 pages, $14.99

This book was written for Christians struggling with the evolution issue, and also for those who defend the creation worldview. Seegert reviews the major evidences for Darwinism and finds them wanting. He briefly covers details ranging from the lack of fossil record evidence to the problem of the origin of biological information in the genome. For example, the vast majority of mutations, over 99.9 percent, are near-neutral, mildly deleterious, or clearly harmful. As a result, the genome will in time be swamped with harmful mutations, eventually causing mutational meltdown and extinction. Thus, evolution or change is true, but trending in the wrong direction of increasing disorder.

One factor that motivated Seegert was a college experience that helped to set the stage for his ministry. As an engineering student at John Brown University, he preferred pure science and so transferred to the University of Wisconsin-Whitewater (located near his parents' home). For the first time, he encountered the reality that all of his science professors were evolutionists and some were very vocal about their anti-Christian views (p. 9). It was then that he realized he knew what he believed but not why.

For one class Jay decided to do his required presentation on the creation/evolution controversy, and he soon discovered that neither the university nor the public library had books supporting the creation position. Fortunately, he knew a creationist at his church who was glad to loan him literature. While preparing for his talk, Jay asked his science professors for the best evidence for evolution. First, he asked his physics professor, who told him he accepted evolution because it was the science consensus, and recommended that he interview his geology professor. This man openly promoted evolution in his classes and often ridiculed the biblical position. The geology professor likewise explained that he accepted evolution because it was accepted science and suggested he talk to the biology professors.

In the biology department, Seegert met several biologists. When he asked for the best evidence for evolution, one faculty member replied, "Why do you want to know?" After explaining that he was preparing for a presentation on the creation/evolution issue, they soon realized he was an evolution skeptic. After the professor who helped Seegert locate the biologists asked the professors if they could at least answer the question, one of the professors replied, "We have nothing more to say to you," and they turned away to continue on their deskwork (p. 12).

One section I have not seen covered in similar books involves Seegert's failed attempts to arrange speaking events. A common response from ministers and pastors is, "We focus only on Jesus in our church" or "We preach Jesus died for our sins and want to avoid controversy" (p. 23). This Jesus-only message is often meaningless to today's educated youth. Seegert noted that studies have found that 50 to 70% of young people reared in the church eventually leave the church, often mentally in high school and then physically when they leave home (p. 270). Young educated people want hard evidence that an intelligent Creator exists, especially in view of the anti-theist, anti-Christian messages they often get in school, both in high school and college. A large number of Christians accept evolution partly because they are exposed to it nearly everywhere, including school, print publications, the Internet, and television. Seegert's ministry is designed to provide evidence against evolution and in favor of creation. From those I know who have heard his presentations, he succeeds with this approach.

Many Christians openly oppose creation because they believe that rejection of evolution will discredit the Christian message (p. 283). Another problem Seegert relates is the case of an atheist who became convinced that evolution

has been falsified, causing him to accept theism and Christianity. He then began attending a church and soon learned that many attendees, and in some cases even the minister, were evolutionists. The result in the case Seegert cites was that the young man became disillusioned (p. 283). For these reasons, Seegert is now focusing his ministry on those persons within the church. The acceptance of Darwinism by so many churches, which is often the doorway to atheism, is one more reason we now live in a post-Christian era with a rapidly hemorrhaging church that, in much of the West, is slowly dying.

Seegert relates examples, such as a high school teacher who openly indoctrinated his students in Darwinism, explaining to them that when they completed his class, they would be evolutionists (p. 270). Jay stresses that we need to encourage students to learn more, not less, about evolution, but we also need to understand why Darwinist arguments are scientifically invalid. College students are "often under the impression that they are embarking on a journey in which they will now learn about the real world from professors who actually know what they are talking about, as opposed to the simple and naïve wisdom of their parents and church leaders" (p. 271).

Furthermore, some young people are "looking for reasons to reject their parents' authority, and frequently use what they learn from their humanist and liberal professors to argue with their parents and justify their confrontational attitude" (p. 271). In addition, much peer pressure exists in school "to accept a more humanistic worldview along with its associated lifestyle and morals (or lack thereof)" (p. 271). Lastly, in college the "attack on their faith will be much more direct, dogmatic, intimidating, and potentially devastating" than in high school (p. 271). Seegert documents the all-too-common anti-Christian agenda of many professors (p. 272).

In a summary statement on his 26-plus-year ministry, Seegert stresses that we "need to focus on showing the weakness of the evolutionary-naturalistic worldview if we are going to make any headway in overcoming the Darwinian impediment to creationism" (p. 280). From his experience, Seegert also finds that speaking with atheists is rarely productive (pp. 182-183). The same is true of many college students, and Seegert now focuses on Christians within the church.

Jerry Bergman
Jerrybergman30@yahoo.com

Amazing Insects: The Secret World of Invertebrates

by Jean-Henri Fabre

New Holland Publishers, London, 2009, 191 pages, $24.99

Jean-Henri Fabre (1823–1915) is universally considered one of the greatest of all entomologists. His studies of insects were based on tireless observations and clever experiments. In addition, his writings on the subject were highly popular in his lifetime. A recent informative summary of his life is available (Bergman, 2014).

Having immensely enjoyed *Fabre's Book of Insects* (Fabre, 1998), I ordered *Amazing Insects* in the hope of not only having the opportunity of being inspired by Fabre's captivating writing, but also viewing outstanding examples of modern photography that accompany the text. This oversized book's many larger-than-life portraits of insects are indeed astounding and are worthy of accompanying Fabre's picturesque descriptions.

It is sad that modern readers of *Amazing Insects* who are unfamiliar with Fabre may most likely be given the incorrect impression that he was an evolutionist. Henry Morris describes Fabre as a "lifelong and vigorous opponent of the idea of spontaneous generation and of the entire theory of evolution" (Morris, 1988, p. 62). Though most of the text of *Amazing Insects* simply deals with descriptions of insects and their behaviors, there are some passages that lead one to conclude that Fabre was in the evolution camp. On page 14 is a statement, ostensibly by Fabre, which mentions "evolutionary devices." If this statement was indeed quoted from him, I doubt if it is a reliable translation of the original French. Though this is the only place in the book where it appears Fabre even referred to evolution, there are other statements of a definite evolutionary nature. For some reason the publishers decided that Fabre's words were insufficient and therefore included some comments by astrophysicist Hubert Reeves. In fact, the first passage in the book is not by Fabre but by Reeves. He tells us, "It is through nature's artistry that we have gained this incredibly rich biodiversity" (p. 5). Surely this is just a figurative reference to evolution. Reeves also comments, "Are we in a position to coexist with our own power? If the answer is no, evolution will continue without us" (p. 115). He also declares that should mankind proceed to extinction, arthropods could "develop their intelligence and rediscover technology" (p. 121). In addition to Reeves' comments, the inside of the back of the dust jacket refers to Fabre as a humanist.

Perhaps the only theistically oriented passage in the book, other than calling the praying mantis "the creature that prays to God" (p. 87), is on page 31, where Fabre hints at God's responsibility for the insect design: "The enigma which is the world can certainly find interpretation outside of the small truths of our laboratories." But sadly, this is only a hint that is overshadowed by other blatant evolutionary statements. A better example of Fabre's creationist perspective can be found in *Fabre's Book of Insects*, where he states:

> There must be something to make the matter of the wing shape itself into a sheet of gauze, into a labyrinth of meshes. There must be an original plan, an ideal pattern which gives each atom its proper place. The stones of our buildings are arranged in accordance with the architect's plan; they form an imaginary building before they exist as a real one. In the same way a locusts's wing, that sumptuous piece of lace emerging from a miserable sheath, speaks to us of another Architect, the Author of the plans which Nature must follow in her labours (p. 153).

In spite of the deplorable misrepresentation of Fabre by juxtaposing his statements with evolutionary comments, the book includes numerous examples of his engaging prose. The spectacular photography gives glory to our great Creator, regardless of the photographer's perspective, whatever it may happen to be.

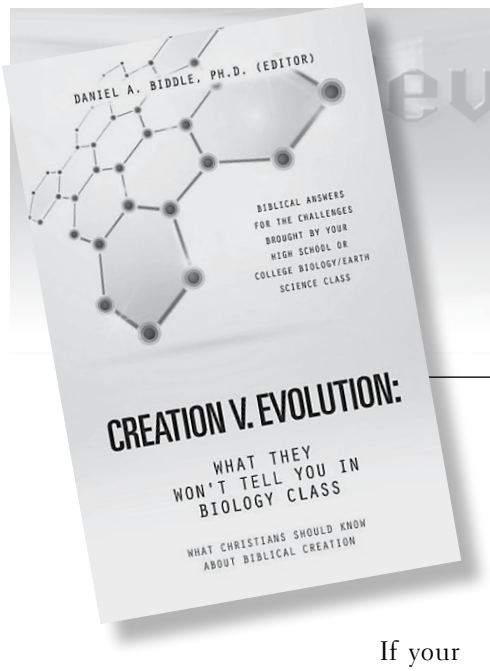
Arthur Manning
mtc@juno.com

References

Bergman, J. 2014. Jean-Henri Fabre: anti-evolutionist French scientist. *Acts and Facts* 43(7): 18–19.

Fabre, J.H. 1998. *Fabre's Book of Insects*. Dover Publications, Inc., Mineola, NY.

Morris, H.M. 1988. *Men of Science, Men of God*. Master Books, Green Forest, AR.



Creation v. Evolution: What They Won't Tell You in Biology Class

edited by Daniel A. Biddle

Xulon Press, Maitland, FL, 2014, 240 pages, $15.99

If your goal is to convince an audience of the validity of a position, you will present the strongest evidence that supports your case. Secular scientists are certainly no exception to this rule, as clearly seen in the origins/evolution chapters of life-science textbooks. While some of the evidence has changed over the decades, there are some key arguments for the origin of life through gradual evolutionary processes that are frequently presented. Some of these include deep-time ages of samples via radiometric dating, the existence and abundance of fossils, and cited examples of evolution in action (including Darwin's finches, the origin of whales, the ancestry of man, the 98% similarity between chimps and man at a genetic level, and the presence of vestigial organs in the human body). These proofs of macroevolution are the subject of Dr. Biddle's book, which serves to present "the rest of the story" in these areas to readers who are willing to hear both sides of the origins debate.

Rather than relying solely on his own expertise, Biddle recruited a number of experts in different fields to address these issues. These include David Bassett (biblical veracity, fossils), Cornelius Van Wingerden (Noah's Flood), Roger Sigler (age of the earth), Roger Patterson and Jonathan Sarfati (examples of evolution), Jay Wile and Jeffrey Tomkins (genetic similarity between humans and chimps), and Jerry Bergman (vestigial organs). At the beginning of each chapter, these authors present the importance of their topic and an overview of the evolutionary position presented to students of biology from their high school life-science classes through their advanced biology courses in college, a very helpful format. The remainder of the chapter then provides details that counter the evolutionary statements. These arguments are supported extensively by 282 endnotes, most of which cite recent scientific literature.

Biddle's underlying purpose is to help Christian high school and college students solidify their beliefs and counteract the 40% of students who say evolution caused them to abandon their faith (p. 15). Biddle and his coauthors approach this with solid examples and explanations, including a convincing listing of manuscript evidence for the reliability of the New Testament (pp. 37–40), examples of polystrate fossils that challenge long-age deposition of geologic layers (pp. 63–65), assumptions made as part of radiometric dating and associated problems (pp. 87–88), categorization of a number of hominoid fossils as misidentified animals, fully human or deliberate hoaxes (pp. 121–131), and an evaluation of the proposed whale ancestors from an anatomical perspective (pp. 149–156).

One of the innovative approaches Biddle takes in this volume is in the handling of the quoted 98% genetic similarity between humans and chimpanzees. He and his coauthors refute this claim at three levels with basic, intermediate, and advanced sections written with increasing technical details. This allows the material to be understandable to the layman in the basic section, while providing in the advanced section impressive detail from Jeffrey Tomkins for the student with a strong background in genetics.

In all, this book is of solid value to Christian students in the life sciences, providing them a young-earth, creation-centered perspective of origin issues, bolstering their faith, and providing talking points for discussions with classmates. The chapters are well written at an appropriate technical level and include numerous endnotes (although lacking an index). While some of the figures and photographs are not as clear or attractive in a grayscale format, by avoiding the use of expensive color figures and formats, the cost of the book is much more reasonable than the textbooks it seeks to counter.

Rick Roberts
rick.roberts@grace.edu

Yes: Young Earth Science and the Dawn of a New World View

by Jay L. Hall

IDEAS, Big Spring, TX, 2014, 218 pages, $8.88 paperback

The acronym *YES* stands for Young Earth Science, in contrast to the overused *YEC* for Young Earth Creation. Whether or not author Hall originated the *YES* term, he is to be commended for using it, just as he is to be commended for much else in this book.

I did not realize until I received the book that this assistant professor of mathematics is a Native American, part of the Choctaw Nation. This is all the more reason I would like to meet him, along with the common bond we have in mathematics and in affirming young-earth science.

The author bursts forth with much information and shares it with a mosaic approach. The pieces may appear somewhat disjointed, but the overall picture is coherent. A phrase much used is *evidentiary smorgasbord*.

Many illustrations add to reader interest and provide white space to pages. The author makes use of humor to illustrate his points. Regarding failed experiments to date rocks of known age, Hall asks, "Would you want someone who failed the CPA exam five times to be in charge of handling your taxes for your billion dollar company?" (p. 57). Regarding the radiocarbon dating procedure of asking what date is to be expected beforehand, Hall asks, "When you go to the butcher to have your meat weighed, you don't tell the butcher the weight—he/she tells you" (p. 58).

Ancient Lucretius is quoted as holding to a "newly made" world, based on poetry written before 1200 BC (p. 16). There is also the late Stephen Gould's quote that trilobite eyes "have never been exceeded for complexity or acuity by later arthropods" (p. 75). This finding challenges the notion of change from simple to complex.

A photograph of Ben Carson appears on page 83. Not only was Carson the only creationist in a panel including Richard Dawkins and Francis Collins, but my own son, Peter, was under the supervision of the skilled neurosurgeon before we adopted him.

I give the book high marks, not because it is perfect, but because the writer who teaches the language of science is willing to lead a Native American charge into Darwin's Empire.

Paul Humber
paulhumber@verison.net

Instructions to Authors

Submission

Electronic submissions of all manuscripts and graphics are preferred and should be sent to the editor of the *Creation Research Society Quarterly* in Word, WordPerfect, or Star-Office/Open Office (see the inside front cover for address). Printed copies also are accepted. If submitting a printed copy, an original plus two copies of each manuscript should be sent to the editor. The manuscript and copies will not be returned to authors unless a stamped, self-addressed envelope accompanies submission. If submitting a manuscript electronically, a printed copy is not necessary unless specifically requested by the *Quarterly* editor. Manuscripts containing more than 35 pages (double-spaced and including references, tables, and figure legends) are discouraged. An author who determines that the topic cannot be adequately covered within this number of pages is encouraged to submit separate papers that can be serialized.

All submitted manuscripts will be reviewed by two or more technical referees. However, each section editor of the *Quarterly* has final authority regarding the acceptance of a manuscript for publication. While some manuscripts may be accepted with little or no modification, typically editors will seek specific revisions of the manuscript before acceptance. Authors will then be asked to submit revisions based upon comments made by the referees. In these instances, authors are encouraged to submit a detailed letter explaining changes made in the revision, and, if necessary, give reasons for not incorporating specific changes suggested by the editor or reviewer. If an author believes the rejection of a manuscript was not justified, an appeal may be made to the *Quarterly* editor (details of appeal process at the Society's web site, www.creationresearch.org).

Authors who are unsure of proper English usage should have their manuscripts checked by someone proficient in the English language. Also, authors should endeavor to make certain the manuscript (particularly the references) conforms to the style and format of the *Quarterly*. Manuscripts may be rejected on the basis of poor English or lack of conformity to the proper format.

The *Quarterly* is a journal of original writings, and only under unusual circumstances will previously published material be reprinted. Questions regarding this should be submitted to the Editor (CRSQeditor@creationresearch.org) prior to submitting any previously published material. In addition, manuscripts submitted to the *Quarterly* should not be concurrently submitted to another journal. Violation of this will result in immediate rejection of the submitted manuscript. Also, if an author uses copyrighted photographs or other material, a release from the copyright holder should be submitted.

Appearance

Manuscripts shall be computer-printed or neatly typed. Lines should be double-spaced, including figure legends, table footnotes, and references. All pages should be sequentially numbered. Upon acceptance of the manuscript for publication, an electronic version is requested (Word, WordPerfect, or Star-Office/Open Office), with the graphics in separate electronic files. However, if submission of an electronic final version is not possible for the author, then a cleanly printed or typed copy is acceptable.

Submitted manuscripts should have the following organizational format:

1. Title page. This page should contain the title of the manuscript, the author's name, and all relevant contact information (including mailing address, telephone number, fax number, and e-mail address). If the manuscript is submitted by multiple authors, one author should serve as the corresponding author, and this should be noted on the title page.

2. Abstract page. This is page 1 of the manuscript, and should contain the article title at the top, followed by the abstract for the article. Abstracts should be between 100 and 250 words in length and present an overview of the material discussed in the article, including all major conclusions. Use of abbreviations and references in the abstract should be avoided. This page should also contain at least five key words appropriate for identifying this article via a computer search.

3. Introduction. The introduction should provide sufficient background information to allow the reader to understand the relevance and significance of the article for creation science.

4. Body of the text. Two types of headings are typically used by the *CRSQ*. A major heading consists of a large font bold print that is centered in column, and is used for each major change of focus or topic. A minor heading consists of a regular font bold print that is flush to the left margin, and is used following a major heading and helps to organize points within each major topic. Do not split words with hyphens, or use all capital letters for any words. Also, do not use bold type, except for headings (italics can be occasionally used to draw distinction to specific words). Italics should not be used for foreign words in common usage, e.g., "et al.", "ibid.", "ca." and "ad infinitum." Previously published literature should be cited using the author's last name(s) and the year of publication (ex. Smith, 2003; Smith and Jones, 2003). If the citation has more than two authors, only the first author's name should appear (ex. Smith et al., 2003). Contributing authors should examine this issue of the *CRSQ* or consult the Society's web site for specific examples as well as a more detailed explanation of manuscript preparation. Frequently-used terms can be abbrevi-

ated by placing abbreviations in parentheses following the first usage of the term in the text, for example, polyacrylamide gel electrophoresis (PAGE) or catastrophic plate tectonics (CPT). Only the abbreviation need be used afterward. If numerous abbreviations are used, authors should consider providing a list of abbreviations. Also, because of the variable usage of the terms "microevolution" and "macroevolution," authors should clearly define how they are specifically using these terms. Use of the term "creationism" should be avoided. All figures and tables should be cited in the body of the text, and be numbered in the sequential order that they appear in the text (figures and tables are numbered separately with Arabic and Roman numerals, respectively).

5. Summary. A summary paragraph(s) is often useful for readers. The summary should provide the reader an overview of the material just presented, and often helps the reader to summarize the salient points and conclusions the author has made throughout the text.

6. References. Authors should take extra measures to be certain that all references cited within the text are documented in the reference section. These references should be formatted in the current *CRSQ* style. (When the *Quarterly* appears in the references multiple times, then an abbreviation to *CRSQ* is acceptable.) The examples below cover the most common types of references:

Robinson, D.A., and D.P. Cavanaugh. 1998. A quantitative approach to baraminology with examples from the catarrhine primates. *CRSQ* 34:196–208.

Lipman, E.A., B. Schuler, O. Bakajin, and W.A. Eaton. 2003. Single-molecule measurement of protein folding kinetics. *Science* 301:1233–1235.

Margulis, L. 1971a. The origin of plant and animal cells. *American Scientific* 59:230–235.

Margulis, L. 1971b. *Origin of Eukaryotic Cells*. Yale University Press, New Haven, CT.

Hitchcock, A.S. 1971. *Manual of Grasses of the United States*. Dover Publications, New York, NY.

Walker, T.B. 1994. A biblical geologic model. In Walsh, R.E. (editor), *Proceedings of the Third International Conference on Creationism* (technical symposium sessions), pp. 581–592. Creation Science Fellowship, Pittsburgh, PA.

7. Tables. All tables cited in the text should be individually placed in numerical order following the reference section, and not embedded in the text. Each table should have a header statement that serves as a title for that table (see a current issue of the *Quarterly* for specific examples). Use tabs, rather than multiple spaces, in aligning columns within a table. Tables should be composed with *14-point type* to insure proper appearance in the columns of the *CRSQ*.

8. Figures. All figures cited in the text should be individually placed in numerical order, and placed after the tables. Do not embed figures in the text. Each figure should contain a legend that provides sufficient description to enable the reader to understand the basic concepts of the figure without needing to refer to the text. Legends should be on a separate page from the figure. All figures and drawings should be of high quality (hand-drawn illustrations and lettering should be professionally done). Images are to be a minimum resolution of 300 dpi at 100% size. Patterns, not shading, should be used to distinguish areas within graphs or other figures. Unacceptable illustrations will result in rejection of the manuscript. Authors are also strongly encouraged to submit an electronic version (.cdr, .cpt, .gif, .jpg, and .tif formats) of all figures in individual files that are separate from the electronic file containing the text and tables.

Special Sections

Letters to the Editor:

Submission of letters regarding topics relevant to the Society or creation science is encouraged. Submission of letters commenting upon articles published in the *Quarterly* will be published two issues after the article's original publication date. Authors will be given an opportunity for a concurrent response. No further letters referring to a specific *Quarterly* article will be published. Following this period, individuals who desire to write additional responses/comments (particularly critical comments) regarding a specific *Quarterly* article are encouraged to submit their own articles to the *Quarterly* for review and publication.

Editor's Forum:

Occasionally, the editor will invite individuals to submit differing opinions on specific topics relevant to the *Quarterly*. Each author will have opportunity to present a position paper (2000 words), and one response (1000 words) to the differing position paper. In all matters, the editor will have final and complete editorial control. Topics for these forums will be solely at the editor's discretion, but suggestions of topics are welcome.

Book Reviews:

All book reviews should be submitted to the book review editor, who will determine the acceptability of each submitted review. Book reviews should be limited to 1000 words. Following the style of reviews printed in this issue, all book reviews should contain the following information: book title, author, publisher, publication date, number of pages, and retail cost. Reviews should endeavor to present the salient points of the book that are relevant to the issues of creation/evolution. Typically, such points are accompanied by the reviewer's analysis of the book's content, clarity, and relevance to the creation issue.

Creation Research Society Membership/Subscription Application and Renewal Form

The membership/subscription categories are defined below:

1. **Voting Member** ....Those having at least an earned master's degree in a recognized area of science.
2. **Sustaining Member** ....Those without an advanced degree in science, but who are interested in and support the work of the Society.
3. **Student Member** ....Those who are enrolled full time in high schools, undergraduate colleges, or postgraduate science programs (e.g., MS, PhD, MD, and DVM). Those holding post-doctoral positions are not eligible. A graduate student with a MS degree may request voting member status while enrolled as a student member.
4. **Senior Member** ....Voting or sustaining members who are age 65 or older.
5. **Life Member** ....A special category for voting and sustaining members, entitling them to a lifetime membership in the Society.
6. **Subscriber** ....Libraries, churches, schools, etc., and individuals who do not subscribe to the Statement of Belief.

All members (categories 1–5 above) must subscribe to the Statement of Belief as defined on the next page.

Please complete the lower portion of this form and mail it with payment to CRS Membership Secretary, P.O. Box 8263, St. Joseph, MO 64508-8263, or fax for credit card payment to (816) 279-2312. Applications may also be completed online at creationresearch.org.

This is a ❑ new ❑ renewal application for the subscription year beginning Summer ❑ 2014 ❑ __________. *(Please type or print legibly.)*

Name ______________________ Address ______________________

City ______________ State ________ Postal/Zip code __________ Country ____________

Phone (optional) ______________________ Email ______________________

Degree ______________________ Field ______________________

Year granted ____________ Institution ______________________

Presently associated with ______________________

I have read and subscribe to the CRS Statement of Belief. Signature ______________________

For foreign orders, including Canadian, payment must be made in U.S. dollars by a check drawn on a U.S. bank, international money order, or credit card. *Please do not send cash.*

Indicate applicable category	*Indicate payment*			
	Paper**			
❑ Voting ❑ Sustaining	USA	Canada Mexico	Other countries	Paper-less‡
❑ Regular [per year]	❑ $38	❑ $58	❑ $75	❑ $31
❑ Senior [per year]	❑ $33	❑ $53	❑ $70	❑ $26
❑ Life member	❑ $500	❑ $500	❑ $500	❑ $500
❑ Student* [per year]	❑ $33	❑ $53	❑ $70	❑ $26
❑ Subscriber [per year]	❑ $41	❑ $61	❑ $78	❑ $34

* Student members are required to complete the bottom portion of this form.
NOTE: Student members may qualify for the *Future Leaders Sponsorship* program. See the CRS website at www.creationresearch.org for details.
** Rates for the paper option include postage for First Class Mail International

‡ **PAPERLESS option:** You may opt out of receiving paper copies of the CRS periodicals (*CRS Quarterly* and *Creation Matters*). By choosing this option you may register for access to the Premium Area of the website, where you may view or download electronic (PDF) versions of these publications. Of course, regular members and subscribers may also have access to the Premium Area. Only members, however, will have access to the Members Exclusive Area of the website.

Member/Subscriber	$______ per year
	x ______ years
SUBTOTAL	$__________
Optional contribution	+ $__________
Life membership	+ $__________
TOTAL	$__________

❑ Visa ❑ MasterCard ❑ Discover
❑ American Express ❑ Check/money order
Card number ______________________
Expiration date (mo/yr) ______________
Phone number (______) ______________
Signature ______________________

***Student Members* are required to complete the following:**

School or institution now attending ______________________

Your current student status: ❑ high school; ❑ undergraduate; graduate program ❑ MS ❑ PhD; ❑ other ____________

Year you expect to graduate or complete your degree ____________

Major, if college or graduate student ______________________

Signature ______________________

Order Blank for Past Issues

Cost of complete volumes (per volume): .....members (all categories) – $18.00 + S/H
nonmembers and subscribers (libraries, schools, churches, etc.) – $25.00 + S/H

Cost of single issues (per issue):.....members (all categories) – $5.00 + S/H
nonmembers and subscribers (libraries, schools, churches, etc.) – $7.00 + S/H

	Number					Number			
Volume	1	2	3	4	Volume	1	2	3	4
21	☐	☐	☐	☐	36	☐	☐	☐	☐
22	☐	☐	☐	☐	37	☐	☐	☐	☐
23	☐	☐	☐	☐	38	☐	☐	☐	☐
24	☐	☐	☐	☐	39	☐	☐	☐	☐
25	☐	☐	☐	☐	40	☐	☐	☐	☐
26	☐	☐	☐	☐	41	☐	☐	☐	☐
27	☐	☐	☐	☐	42	☐	☐	☐	☐
28	☐	☐	☐	☐	43	☐	☐	☐	☐
29	☐	☐	☐	☐	44	☐	☐	☐	☐
30	☐	☐	☐	☐	45	☐	☐	☐	☐
31	☐	☐	☐	☐	46	☐	☐	☐	☐
32	☐	☐	☐	☐	47	☐	☐	☐	☐
33	☐	☐	☐	☐	48	☐	☐	☐	☐
34	☐	☐	☐	☐	49	☐	☐	☐	☐
35	☐	☐	☐	☐	50	☐	☐	☐	☐

CREATION...in a Flash

Regular price – $90 (upgrade $65)

Member price – $75 (upgrade $50)

Includes volumes 1–47 of the *CRS Quarterly* and volumes 1–15 of *Creation Matters,* fully searchable, preloaded onto a USB flash drive.

Add 20% for postage (**for U.S. orders:** min. $6, max. $18; **for Canadian orders:** min. $10, no max.; **for other foreign orders:** min. $15, no max.) **Total enclosed:** $_____

Make check or money order payable to Creation Research Society. Please do not send cash. For foreign orders, including Canadian, please use a check in U.S. funds drawn on a U.S. bank, an international money order, or a credit card.

(Please type or print legibly)

Name _____ Address _____

City _____ State _____ Zip _____ Country_____

❏ Visa ❏ MasterCard ❏ Discover ❏ American Express Card number _____

Expiration date (mo/yr) _____ Signature_____

Mail to: Creation Research Society, 6801 N. Highway 89, Chino Valley, AZ 86323, USA

Creation Research Society

History—The Creation Research Society was organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (graduate degrees in science) and about 1000 non-voting members. The *Creation Research Society Quarterly* is a peer-reviewed technical journal. It has been gradually enlarged and modified, and is currently recognized as one of the outstanding publications in the field. In 1996 the *CRSQ* was joined by the newsletter *Creation Matters* as a source of information of interest to creationists.

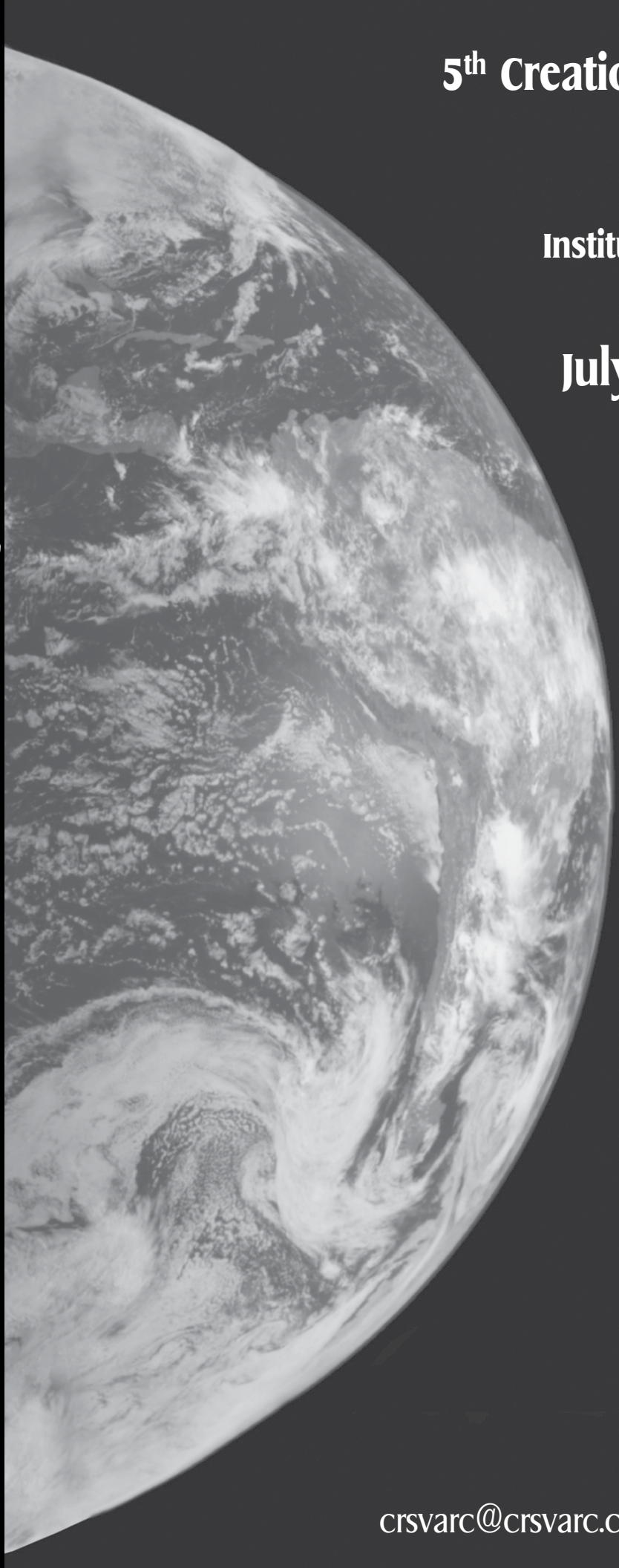
Activities—The Society is a research and publication society, and also engages in various meetings and promotional activities. There is no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund and research center are maintained to assist in such projects. Contributions to the research fund for these purposes are tax deductible. As part of its vigorous research and field study programs, the Society operates The Van Andel Creation Research Center in Chino Valley, Arizona.

Membership—Voting membership is limited to scientists who have at least an earned graduate degree in a natural or applied science and subscribe to the Statement of Belief. Sustaining membership is available for those who do not meet the academic criterion for voting membership, but do subscribe to the Statement of Belief.

Statement of Belief—Members of the Creation Research Society, which include research scientists representing various fields of scientific inquiry, are committed to full belief in the biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution) both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. *All members of the Society subscribe to the following statement of belief:*

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.
2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.
3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.
4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Savior. The act of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

Creation Research Society Conference



5th Creation Research Society Conference

(hosted by the Institute for Creation Research)

July 31–August 1, 2015

Pre-conference reception:
July 30 at 6pm

DoubleTree Hotel,
Farmers Branch, TX

Early Registration Deadline:
May 15, 2015
(Register early; limited seating available)

For more information visit
www.CreationResearch.org
or contact
crsvarc@crsvarc.com • Phone (928) 636-1153