



QUARTERLY

Volume 56 Winter 2020 Number 3

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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 56

Number 3

Winter 2020

Cover by Michael E. Erkel, Afton, Virginia

Design services by Cindy Blandon, cblandon@aol.com

Table of Contents background image from
rawpixel.com/casey

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
Tim Clarey, 1806 Royal Lane, Dallas, TX 75229.

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

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ISSN 0092-9166

Printed in the United States of America

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Cyclostratigraphy

Part III: Critique of the Milankovitch Mechanism

Michael J. Oard and John K. Reed*

Abstract

Cyclostratigraphy claims to rely on an accurate astronomical time scale and further on a clear imprint it supposedly makes on the sedimentary record. Grounded upon the Milankovitch theory, geologists first sought to apply this method to develop a timescale for Quaternary glacial/interglacial oscillations. But there are several glaring unresolved problems with this approach. Although solar radiation measurements at high latitude appear to lend support to the mechanism, the data are carefully selected, typically restricted to the summer solstice or the months of June or July. By contrast, the larger dataset for the warm half-year for the whole hemisphere shows the Milankovitch effect is very small. Moreover, geologists believe glacial episodes over the past 900,000 years have been controlled by the 100,000-year eccentricity cycle, but that cycle has a very small effect relative to other cycles. Further, glacial cycles should be out of phase between the hemispheres, yet they are not. Finally, proponents rely on correlation between Milankovitch cycles and deep-sea cores, but these appear to be the result of circular reasoning and the reinforcement syndrome.

Introduction

Cyclostratigraphy is a relatively new chronometric method. It is built on the idea that climate cycles are imprinted in the sedimentary record, and that such cycles are controlled by the predictable orbital mechanics of Earth and its solar

system (Reed and Oard, 2015, 2016). Developed in the latter half of the 20th century, the method was first applied to deep sea cores to create a time scale for the Pleistocene glacial/interglacial record and subsequently extended much further back into the sedimen-

tary record. Its popularity is driven by the promise of more precise dates than traditional dating methods can provide. Stratigraphers now believe they have an astronomical time scale, fully calibrated to 34 Ma, partly calibrated to a full eccentricity solution through the Cenozoic (~65 Ma), and calibrated via “floating” eccentricity time scales back through most of the Mesozoic (Hinnov and Hilgen, 2012).

Reed and Oard (2015) spelled out the three components of cyclostratig-

* Michael J. Oard, MS, Bozeman, Montana
John K. Reed, PhD, Birmingham, AL
Accepted for publication January 30, 2020

raphy (Figure 1). These include: (1) a reliable astronomical clock based on orbital perturbations of Earth and the solar system, (2) its accurate expression in orbitally-forced climate changes, and (3) its preservation in the sedimentary record. We leave the critique of orbital perturbations to physicists and astronomers. This paper will critique the second stage—the Milankovitch mechanism, especially its ability (or lack thereof) to produce the glacial/interglacial cycles (Oard, 1984a; 2005a). Uniformitarians see the Pleistocene climate fluctuations and resulting sediment record as an ideal example of glacial/interglacial control of sedimentation, and so this paper will focus on the Milankovitch mechanism relative to the “ice ages” of the recent past.

Superficially the Mechanism Seems Potent

It is easy to present the Milankovitch mechanism as a powerful control of climate. Graphs of solar radiation at 65°N (Figure 2), the latitude considered most sensitive to glaciation, show impressive time variations in solar radiation, from 440 W m⁻² to 560 W m⁻², a peak-to-peak fluctuation of about 20% (Berger et al., 2010; Paillard, 2001). These changes supposedly correlate with glacial and sta-

dial oscillations for the past million years. This 20% variation has caused many scientists to accept the Milankovitch mechanism as the primary control of Quaternary glacial oscillations, and even of older sedimentary cycles, back into the Precambrian. Locke (1997) stated that the Milankovitch theory was one of the three most significant paradigm changes of the 20th century—the others being plate tectonics and the proposed dinosaur-extinction impact.

Using Total Hemispheric Warm-Season Data

But appearances can be deceptive. Long term climate is *not* driven by solar radiation on one day, along one latitude, but rather by larger scale considerations, namely, the whole hemisphere and the whole caloric half-year. This is because extratropical, synoptic systems mix air from low to high latitudes, and the solar input at a single (e.g., 65°N) latitude is strongly averaged with contributions from the other latitudes in the hemisphere.

In terms of temporal averaging, Berger (1992, p. 572) did not use the warm half of the year because it muted the signal. Instead, he believed that the climate driving force could be derived from the “monthly” solar radiation

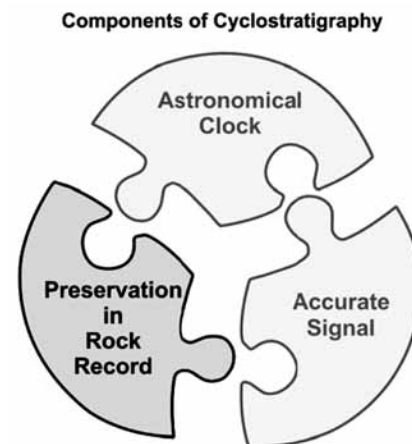


Figure 1. The components of cyclostratigraphy include a reliable clock based on orbital mechanics, the transmission of its “signal” through the Milankovitch mechanism, and its preservation in the sedimentary record. This paper critiques the Milankovitch mechanism.

change, or even that of one day—the summer solstice:

The long-term deviations from today-values of the caloric half-year insolation introduced by Milankovitch (1941) ... amount up to 3% to 4% at the maximum. However, if the monthly insolation values (Berger, 1978a) are used instead, important

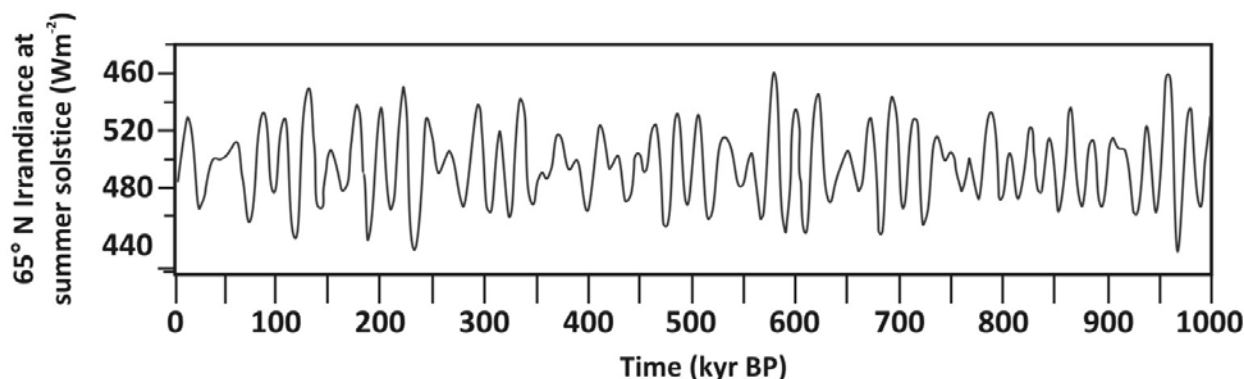


Figure 2. Change in solar radiation at 65°N for June 21st for the past million years. [Copyright 2010 by Berger et al., 2010, p. 1,976. Used in accordance with federal copyright (fair use doctrine) law. Usage by CRSQ does not imply endorsement of copyright holder.]

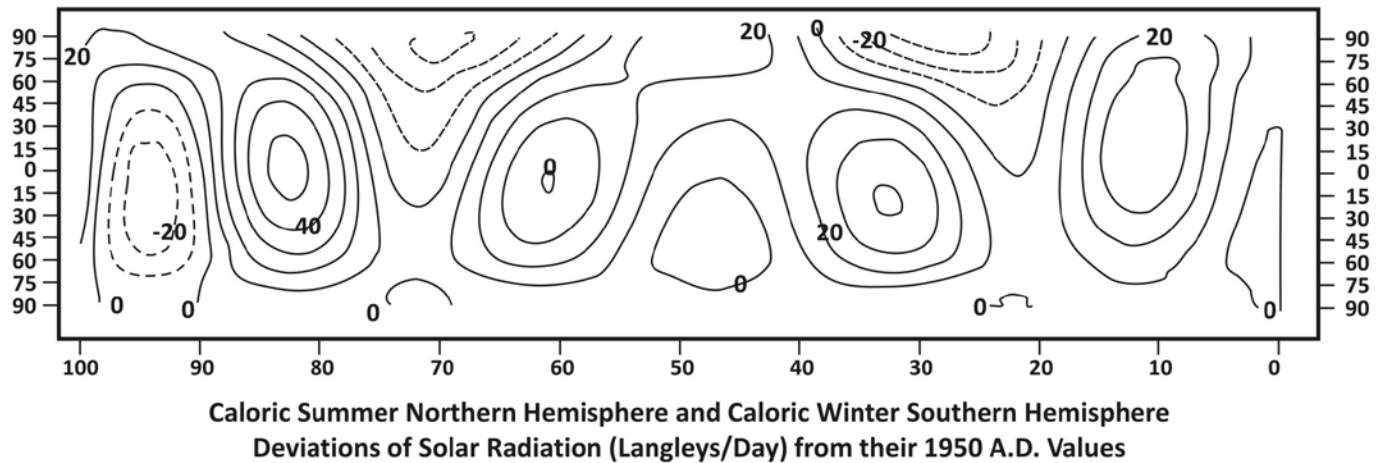


Figure 3. The Northern Hemisphere summer half-year and the Southern Hemisphere winter half-year for the past 100 kyr. [Copyright 1978 by Berger, 1978, *Quaternary Research*, p. 145. Used in accordance with federal copyright (fair use doctrine) law. Usage by CRSQ does not imply endorsement of copyright holder.]

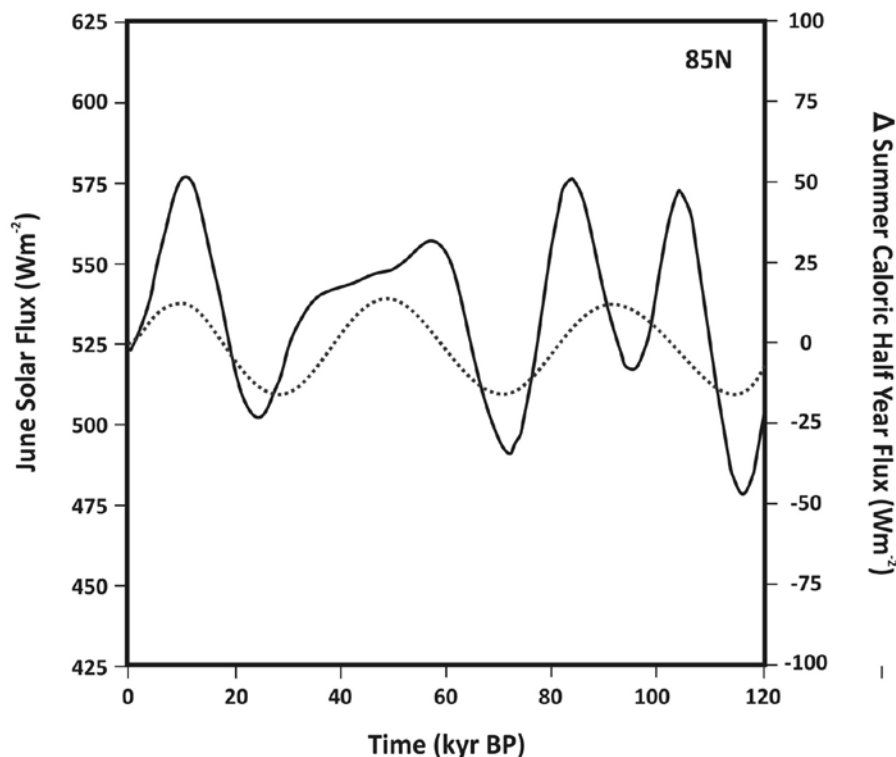


Figure 4. A comparison of June solar radiation at the top of the atmosphere (solid line) with the summer half-year (dashed line) over the past 120,000 years in W m^{-2} at the latitude of 85°N . [Copyright 1990 from Ledley, 1990, p. 145. Used in accordance with federal copyright (fair use doctrine) law. Usage by CRSQ does not imply endorsement of copyright holder.]

fluctuations masked by the half-year averaging method become easily recognizable.

When Berger used the summer half-year (warmest six months) to calculate the variation (Figure 3), he found that the insolation anomalies shrank to a maximum of 3% to 4%. Figure 4 shows a comparison of June solar radiation at 85°N at the top of the atmosphere (solid line) with the summer half-year (dashed line) over the past 120,000 years in W m^{-2} (Ledley, 1990). June variations for those criteria ranged over about 75 W m^{-2} , or 15% of the total. However, the comparative variation for the summer half-year was only about 25 W m^{-2} , about 5% of the total. This value would be even less for the entire hemisphere (Figure 3). Parameters used to model Earth's climate are quite sensitive to latitude and time.

Huybers (2006) emphasized that temperature changes sufficient to trigger glaciation could not be based on one day or month but had to account for all days when the average temperature exceeds freezing. For the middle and high latitudes, this is typically the warmest

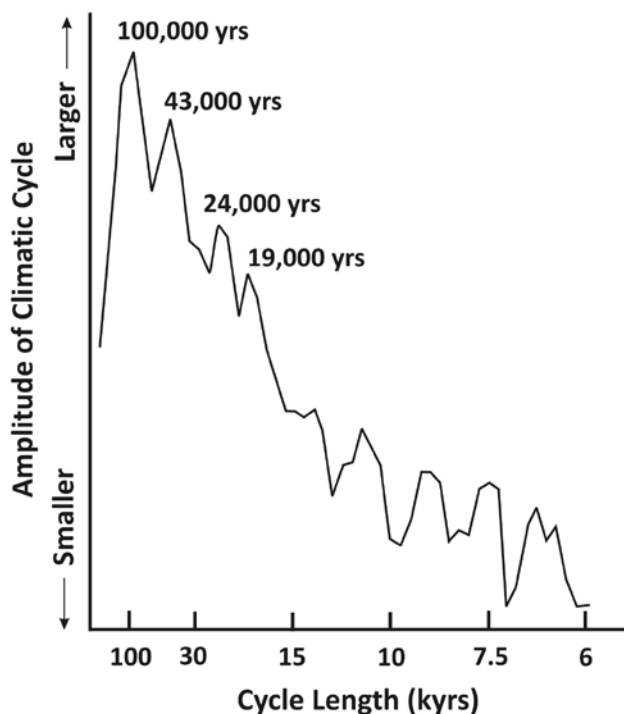


Figure 5. Power spectrum analysis of deep-sea core data used in Hays et al., 1976. Power spectrum analysis shows the strength of the frequencies that affect a time series. Notice that the strength just happens to match the Milankovitch cycles with the 100 kyr eccentricity predominating. [Copyright from Imbrie and Imbrie, 1979, p. 171. Used in accordance with federal copyright (fair use doctrine) law. Usage by CRSQ does not imply endorsement of copyright holder].

4–6 months; this is why earlier researchers used data for the entire summer half-year. Vernekar (1972) determined solar radiation changes at the top of the atmosphere for the whole Earth for the summer and winter half-years for the past two million years, as well as predicting the next 120,000 years.

These more extensive data showed that solar radiation is sensitive to latitude. Variations during the past 35,000 years were much less at 75°N and 65°N than at 85°N (cf., Figure 4). In fact, solar radiation was actually *above* normal in low and middle latitudes of the Northern Hemisphere at the same time (Berger, 1978, Figure 3)! Figure 3 shows the net solar radiation change, in langley's per day (langley: amount of solar radiation in calories absorbed

on a cm² in one minute) received at the top of the atmosphere in the Northern Hemisphere summer half-year (Southern Hemisphere winter half-year) for the past 100 kyr. Berger's (1978) calculations are similar to Vernekar's (1972). This compares with the current average solar radiation at 65°N, between April 1 and September 30 (close to the warmest 6 months), received at the top of that atmosphere. It was about 750 langley's/day (Anonymous, 1956). This shows why an entire hemisphere for the six warmest months must be used in calculating the climate.

Based on Figure 3, uniformitarians apparently believe the most intense recent glaciation, between 40 and 20 ka, was triggered by reduced forcing (cooling) of ~20 langley's/day at the polar

latitudes. This solar radiation anomaly for those *high latitudes* was only ~2% to 3%, which is small. Since climate is a function of the entire hemisphere, and since the key zones for glaciation are claimed to be the middle and high latitudes, insolation shifts in the small zone corresponding to latitudes between 65°N and 85°N is simply not representative. Furthermore, when the *above normal* low and middle latitudes are added to the analysis, the insolation anomaly drops to less than 1% of normal for the Northern Hemisphere, which is insignificant. If the Milankovitch mechanism is grossly insufficient for that intense cold pulse of the last ice age, how can it control climate all the time?

Moreover, the high-latitude cooler temperature anomaly around 35 ka was not long enough to trigger significant glaciation. Another major uncertainty is whether the insolation changes shown in Figure 3 actually translate into cooler temperatures. Compensating, or negative feedback, mechanisms would ameliorate reduced insolation at high latitudes. Given lower temperatures at high latitudes and warmer temperatures at middle latitudes, the resulting change in the temperature gradient would strengthen the jet stream, according to the thermal wind equation. The result would be more storms moving cold air southward and warm air northward. Overall, enhanced poleward transport of heat by both atmosphere and oceans (the main source of heat transfer north of 50°N in the winter) would tend to even out the temperature anomaly:

When the pole cools in winter, the north-south temperature gradient increases, tending to produce more northward heat transport which would counteract the cooling. A colder pole would also produce less outgoing IR [infrared] radiation which would also counteract cooling (Robock, 1983, p. 993, brackets ours).

Milankovitch Mechanism Far Too Weak

The fundamental problem with the Milankovitch theory is that Northern Hemisphere summer radiation variations for the past 35,000 years are simply too small to trigger or maintain an ice age. When all the relevant factors are considered, the apparent local, short time scale anomalies used to promote the theory shrink to yield a negligible effect on climate.

Since climate is a complex system with many negative feedback mechanisms to keep it stable, the Milankovitch mechanism would have to exert a considerable effect to initiate an ice age. Past scientists have long noted this profound challenge (Budyko, 1977; Paltridge and Platt, 1976; Simpson, 1940; Van Woerkom, 1953), as do a current minority today. It is ironic that the research which claimed otherwise (Hays et al., 1976) is now claimed to be invalid and worthy of retraction (Hebert, 2016a, b, c; 2017).

Radiation specialists Paltridge and Platt (1976, p. 60), stated: “However, Milankovitch’s proposition that the variability is sufficient to explain certain changes of the extent of polar ice is questionable to say the least...” Polar researcher Washburn (1980, p. 648) stated: “Yet the mechanism and quantitative adequacy of the effect pose major difficulties...” Sir Fred Hoyle (1981, p. 77) was more direct:

If I were to assert that a glacial condition could be induced in a room supplied during winter with night-storage heaters simply by taking an ice cube into the room, the proposition would be no more unlikely than the Milankovitch theory.

His “night storage heaters” represent the high latitude heat transport and decreased infrared radiation mechanisms, which would be enhanced during high latitude cooling caused by less solar radiation. The self-regulating work of the

atmosphere and ocean is a significant obstacle against orbital forcing.

Since uniformitarian scientists “know” the theory is correct, and since these insolation changes are small, they have concluded that our climate sensitivity to greenhouse gas increases must be high—regardless of the apparent self-regulation of the climate system. In other words, the Milankovitch theory leads secular scientists to believe that our climate is unstable, which eventually leads to public climate alarmism. Moreover, the “abrupt climate changes” seen in the glacial part of Greenland ice cores is also fueling the global warming alarmism. However, based on observations of greenhouse gas increases and temperature changes, the effect of carbon dioxide increase is rather small (Oard, 2011; 2017).

The Eccentricity Problem

Total insolation variation for the summer half-year (Figure 4) is caused primarily by the obliquity and precession cycles—the latter being the stronger (Reed and Oard, 2015). Geologists believe that recent “ice ages” occurred approximately every 100 kyr over the past 900 kyr, but cycled every 40 kyr prior to that time (Oard, 2005b), for a total of ~50 Quaternary glacial/interglacial cycles over the past 2.6 million years (Pillans and Gibbard, 2012). If true, the recent ice ages are linked to the eccentricity cycle, not the stronger precession and obliquity cycles. The effect of eccentricity on insolation is less than 0.17% (Berger, 1977), or about 1% to 2% of the strength of the obliquity and precession cycles! How could this very small effect override stronger ones, much less cause glacial cycles?

Moreover, glacial *maxima* correspond to eccentricity *minima* in insolation (Fischer and Bottjer, 1991). Scientists now talk about the “eccentricity problem” or the “100 kyr Problem.” Paillard (2001, p. 325) states:

Nevertheless, several problems in classical astronomical theory of paleoclimate have indeed been identified: (1) The main cyclicity in the paleoclimatic record is close to 100,000 years, but there is no significant orbitally induced changes in the radiative forcing of the Earth in this frequency range (the ‘100-kyr Problem’).

Carl Wunsch (2004, p. 1,001) of MIT equated the eccentricity cycle to chance:

Evidence cited to support the hypothesis that the 100 Ka glacial/interglacial cycles are controlled by the quasi-periodic insolation [solar] forcing is likely indistinguishable from chance...

As a result, climate scientists have worked over the past 40 years to find an amplifying factor or positive feedback mechanism to boost the effect of Hoyle’s “ice cube” and trigger an ice age:

The dominant 100,000-year response of ice sheets is not externally forced [from the Milankovitch mechanism], nor does it result from internal resonance. Internal forcing appears to play at most a minor role. The origin of this signal lies mainly in internal feedbacks (CO₂ and ice albedo) that drive the gradual build-up of large ice sheets and then their rapid destruction (Ruddiman, 2006, p. 3092, brackets ours).

Are CO₂ and albedo valid mechanisms? Ice albedo is a positive feedback: cooler temperatures result in snow cover that increases the albedo. However, CO₂ does not provide a significant “boost” for the Milankovitch mechanism (Posmentier and Soon, 2005). Scientists keep searching for other auxiliary hypotheses. Abe-Ouchi et al. (2013) proposed that ice sheets spread to lower, warmer latitudes by isostatic downwarping of the crust and upper mantle. But lower, thinner ice sheets would be more vulnerable to warming and rapid melting. They all beg the question of the inadequacy of the Milankovitch theory.

The Phase Problem

A third major difficulty is the “phase problem.” Precessional effects on insolation are more significant than eccentricity, but precessional changes trigger opposite effects between hemispheres. Although the 100 kyr eccentricity cycle supposedly caused the last nine ice ages, precession supposedly modulated it by controlling stadials and interstadials (shorter-period ice age fluctuations). Adhémar (1842) predicted that ice ages would vary on an 11,000-year cycle (half the precessional cycle), appearing first in one hemisphere and then the other, with a corresponding interglacial in the opposite hemisphere. His fundamental idea is still valid (Oard, 2014), just not what is actually seen in the uniformitarian interpretation of climate data. Major and minor glacial cycles should oscillate between hemispheres, but geologists claim that they were in phase, though they cannot explain the physics:

And we don't understand why ice ages occur in both hemispheres simultaneously when the changes in solar irradiance from orbital variations have opposite effects in the north and south (Schrag, 2000, p. 23).

Others note this problem in timing peak glaciation and warming in the two hemispheres:

A multimillennial LLGM [Local Last Glacial Maximum] for the APIS [Antarctic Peninsula Ice Sheet] and some sectors of the EAIS [East Antarctic Ice Sheet] and WAIS [West Antarctic Ice Sheet], with onset at ~28 to 29 ka and termination at ~19 ka, is remarkably similar to that established for NH [Northern Hemisphere] ice sheets, suggesting synchronization of the hemispheric ice sheets through a common forcing. It has long been recognized that local summer insolation is out of phase between the two hemispheres and hence cannot explain the synchroniza-

tion.... (Weber et al., 2011, p. 1267, brackets ours).

The in-phase relationship between the two hemispheres begs the question of the relationship between climate between north and south:

However, these findings [in-phase relationship] pose the question of how the Northern Hemisphere solar forcing is transferred to the Southern Hemisphere, and why Southern Hemisphere local insolation changes have no imprint on the Antarctic temperature record. Variations in greenhouse gas concentrations are too weak to explain the interhemispheric link; there exists no evidence that atmospheric dynamics can directly transfer the orbital signal to the Southern Hemisphere, and changes in the thermohaline [ocean] circulation are thought to favour an asymmetric pattern (Laepple et al., 2011, p. 91, brackets ours).

Why are the two hemispheres in phase? Warming in one should correspond with cooling in the other. Temperatures today are largely determined by the *local* solar radiation (Laepple et al., 2011), and there appears to be no mechanism for transferring the Northern Hemisphere orbital signal to the Southern Hemisphere.

Scientists are looking for solutions. Some propose that Antarctica is in synch with the Northern Hemisphere because of changes in the seasonal proportion of snow (Fujita, 2011; Laepple et al., 2011). Oxygen isotope ratios in ice cores are used as a proxy for temperature; lower ratios correspond to cooler temperatures. But if more snow falls in winter, the average annual oxygen isotope ratio will become more negative, suggesting cooler *temperatures* that may or may not have occurred (Oard, 2005a). Some researchers suggest that a Northern Hemisphere high-latitude solar radiation minimum—corresponding to an ice age and low oxygen isotope ratios in Greenland ice cores—would cause more winter snow

in the Southern Hemisphere and a lower oxygen isotope ratio. In this way, both hemispheres would show similar trends in their oxygen isotope ratios. However, it is difficult to prove a large change in the timing of annual snowfall (Oard, 2014), especially a long time ago.

Other Problems

There are other problems (Oard, 2007). Milankovitch theory cannot explain the onset of the first Pleistocene ice age (~2.6 Ma), and why there have not *always* been regularly cycling ice ages. Miall (2010) appeared to argue for this using sea level curves, supposedly driven by glacial cycles. Orbital mechanics have supposedly remained constant for at least tens of millions of years, and geologists claim to see orbital forcing of sedimentary cycles well back into the Phanerozoic and even the Precambrian. So, why did ice sheets suddenly appear in areas they had previously been absent? “How the glaciation in the north got started in the first place 2.75 million years ago is another enigma” (Kerr, 1999, p. 505). Although the beginning of the Pleistocene has been pushed back to 2.6 Ma, this is only an approximate starting date of the glacial/interglacial cycle. Besides the secular dating systems are not precise enough to start all ice ages at 2.6 Ma. Some ice age deposits are pushed back into the late Pliocene. Plate tectonics provides no help since the plates have generally been at the same latitude for tens of millions of years.

Furthermore, why did the 41 kyr obliquity cycle only drive glacial cycles between 2.6 Ma to 900 kyr? Why did the periodicity suddenly switch to 100 kyr? Many acknowledge the problem of switching cycles at 900 kyrs ago: “The timing of this transition and its causes pose one of the most perplexing problems in palaeoclimate research” (Rutherford and D’Hondt, 2000, p. 72).

Even though obliquity has a greater effect on insolation than eccentricity, it

is still not enough to trigger an ice age. In Hoyle's analogy, it merely brings a slightly larger ice cube into the room. Ironically, the precession cycle has the strongest effect on insolation, but glacial/interglacial cycles do not oscillate at that frequency:

But a major problem exists for the standard orbital hypothesis of glaciation: Late Pliocene and early Pleistocene glacial cycles occur at intervals of 40 ky ... matching the obliquity period, but have negligible 20-ky variability ... The origins of strong obliquity over precession-period glacial variability during the early Pleistocene remain unresolved (Huybers, 2006, p. 508).

Furthermore, all three Milankovitch mechanisms have multiple periodicities. Why have glacial cycles not followed all of them, if ice ages are driven by insolation changes?

Deep-Sea Cores

A primary reason scientists accept the Milankovitch theory is the apparent correlation with proxies like oxygen isotope ratios in deep sea cores (Figure 5), dating to Hays et al. (1976). Despite Hebert (2016a, b, c; 2017) having shown many problems with that paper, correlations between these curves at hundreds of deep-sea coring sites and in ice cores from Greenland have built up a large quantitative evidence set.

But if built on bad assumptions or methods, the quantity matters little. There are subjective elements in the process. First, absolute dates in the cores are questionable. The dating methods vary; some are radiometric, some based on biostratigraphy, and some on paleomagnetism. There are many reasons to reject these dating methods (Hebert, 2014; Oard, 2005a; Reed, 2013). Circular reasoning and the reinforcement syndrome are valid causes for dates, oxygen isotope excursions, and Milankovitch curves to "match." Subtle

manipulation is common (Hebert, 2014; Oard, 1984b; 1985). Even Antarctic ice cores have been manipulated to agree with deep-sea cores (Oard, 2005a).

Second, oxygen isotope curves are fraught with uncertainties (Oard, 1984b; 2005a). The equation that determines oxygen isotope ratios in foraminifera has two unknowns: temperature and the oxygen isotope ratio of the seawater when the shells formed. These dual variables make any solution an educated guess. Furthermore, different kinds of foraminifera exhibit distinct oxygen isotope signatures. Planktonic foraminifera calcify their shells at varying depths. Since temperature varies with depth, another variable is added. So do seasonal and local changes in temperature and salinity. Even deep ocean environments, where benthonic foraminifera live, show evidence of past temperature changes (Bowen, 1978, p. 67; Kerr, 1982). Bottom temperatures are determined by high latitude atmospheric temperatures that cool the water, which sinks. Within the uniformitarian paradigm, just glacial/interglacial temperature differences should cause changes in bottom temperatures. Furthermore, when foraminifera shells begin to dissolve, the ratio of oxygen isotopes can vary with the extent of dissolution. Sometimes the effect of dissolution is difficult to detect (Schrag, 1999; Oard, 2003). Once a shell reaches the bottom of the ocean, it is subject to dissolution, reworking from bottom currents, and bioturbation. Bioturbation will smooth out $\delta^{18}\text{O}$ ratios. Uniformitarian scientists believe that bioturbation just smooths out the "noise," and not the presumed glacial/interglacial $\delta^{18}\text{O}$ changes. However, this belief assumes a certain bioturbation depth and sedimentation rate.

Despite these uncertainties, the use of spectral analysis, which measures the strength of cycles in a time series, seems impressive, but it depends critically upon an accurate time series. If there is a hiatus caused by erosion or some other

process, or a change in sedimentation rate, the sampling times assumed by the spectral analysis procedure are no longer valid. Bailey and Smith (2009) noted that hiatuses are ubiquitous at *all* scales, and often undetected.

One potential explanation for the correlation of dates, ice ages, sedimentary series, and Milankovitch spectral peaks is subjectivity on the part of the investigator—circular reasoning and the reinforcement syndrome. Hebert (2014, p. 297) summarizes:

Uniformitarian scientists claim that chemical clues within the seafloor sediments tell a "story" of climate change over millions of years and that this "story" agrees well with expectations of the astronomical (or Milankovitch) theory of Pleistocene ice ages. Yet secular scientists routinely use the astronomical theory to date the seafloor sediments in a technique called "orbital tuning." Of course, this argument is circular, since the astronomical theory of ice ages is simply assumed to be correct and is used as a framework for interpreting chemical clues within the seafloor sediments.

Some scientists hint at this, for instance that the power spectrum results are very sensitive to *pre-processing* of the data: "A key problem with spectral analysis of [time] series of this type is that results are extremely sensitive to the methods used to pre-process the data" (Roe and Allen, 1999, p. 2260). Miall and Miall (2004) called it a "black box" technique, although Miall has since toned down his criticism.

Moreover, the spectra that purport to show "orbital tuning" rely on the overarching scaffolding of the geological time scale (Hebert, 2014). Since that framework is assumed to be valid, solutions are biased to agree with it. Pisias et al. (1984, pp. 841–842, brackets ours) write:

The first assumption [the time scale of the data series is known]

is a major problem in the study of paleoclimate records. With the exception of three-ring [sic] studies and annually laminated sediment [varves], there are no direct means of measuring time in a geological section. In studies of deep-sea sediments, samples can be taken at known depths in the sediment column but the ages of each sample are not directly measured. The assumption of constant sediment accumulation rates is often made so that depth in section can be related to time, but in many parts of the world's ocean this assumption has been shown to be false. Thus, much effort has been directed towards the establishment of a highly accurate geologic time scale for the last several hundred thousand years (Hays et al., 1976) ... These works have used the hypothesis of orbital forcing of climate change to adjust the time scale of geologic records to better "fit" the calculated orbital parameters. This approach [sic] reduces the independence of geologic records as verification of Milankovitch hypotheses...

Since the scientists that revived the Milankovitch theory in the 1960s and 1970s were strong supporters of the theory, we suspect a subjective bias that pushed data to fit the preconceived theory (Oard, 1984b). Bias is stronger than most think in scientific research and many published results cannot be reproduced (Bohannon, 2015; Nuzzo, 2015; Open Science Collaboration, 2015). In the case of Milankovitch cycles, the spectral analyses of the deep sea cores may have caused any spectral trends in the cores to be considered evidence that the theory was correct. Just as evolution is "seen" in the fossil record by its true believers, so also Milankovitch cycles are readily apparent to anyone with the correct "lens." Moreover, there are significant spectral peaks that show non-Milankovitch frequencies. (Elkibbi and Rial, 2001)

The Reinforcement Syndrome

In the 1950s and 1960s, dating methods for deep-sea cores were inaccurate, and likely are today. That problem is masked by confidence in the Milankovitch theory. Current interpretations may well be a form of circular reasoning called the reinforcement syndrome. It is a psychological phenomenon observed in scientific research when a concept or hypothesis is repeatedly reinforced by a quantity of data, even if it is not true (Oard, 1997; 2013a). For example, a junior scientist may work to develop the theory of a well-respected, senior scientist. People are biased towards obtaining and maintaining funding. Once a hypothesis becomes ingrained, it is difficult to dislodge. The hypothesis becomes an assumption. Then, investigations are designed, and data made to fit. That is where the Milankovitch mechanism stands today, after being rejected twice (Oard, 1984a).

Because cyclostratigraphy offers absolute dates that are orders of magnitude more precise than other methods, geologists are motivated to use it. Broecker (1984, p. 687) stated that he *had believed* in the mechanism since the early 1960s, and was convinced that statistical correlations with deep sea cores would prove it, *post hoc*:

The chronology of insolation maxima that is calculated from the known periodicities of the tilt and precession of the earth's axis and from the earth's orbital eccentricity can be compared with curves based on absolute dating of events in climate-controlled systems. Agreement of the two curves over several cycles would provide strong evidence for a cause-and-effect relationship (Broecker, 1966, p. 299).

Broecker went on to claim that the Milankovitch mechanism was verified by "accurate dating" of deep-sea cores. This was first done by the watershed research of Hays *et al.* (1976). However, Broecker found the *tilt and precession*

cycles predominated in the cores over the past few hundred thousand years: "Changes in climate occur in response to periodic variations in the earth's tilt and precession" (Broecker, 1966, p. 299). Although the tilt and precession cycles still show an influence in solar radiation curves of the past, the uniformitarian ice ages and the foundation of cyclostratigraphic dating in older sedimentary rocks is linked to the eccentricity cycle. Was his belief in the theory driving his data analysis? Does that subjective element continue to intrude? The rapid acceptance and expansion of the method and the confidence of geologists that they will eventually be able to use it to more precisely date rocks into the Precambrian suggests a bandwagon effect.

Geologists claim that they are able to see billions of years of evolution in the rock record. It should not be surprising that they can find elements of that same record that support their new method. And, of course, the new method will go on to prove the "effect" of orbital forcing on Earth's past climate.

Milankovitch Mechanism Now the Basis for High-Precision Dating

The Milankovitch mechanism has become the *ruling paradigm* in climate research, and is rapidly assuming that role in high-precision stratigraphic dating. All climate related data, as well as dating methods, are made to fit the theory (Oard, 1985). Scientists even "tune" data sets, such as deep-sea cores, to the cycles by adjusting the sedimentation rate (Kerr, 1983). This is circular reasoning:

However, interpreting results based on orbital tuning can lead to circular reasoning, because the presence of an orbital signal is commonly assumed before it is tested. Furthermore, the outcome depends on choosing an appropriate target curve and/or frequency for tuning. As a

result, astrochronology may provide multiple unconstrained orbital interpretations for a given stratigraphy... (Aswasereelert et al., 2013, p. 216).

Summary

The Milankovitch mechanism is claimed to be capable of driving major climate fluctuation, even to the degree of producing extreme glaciation episodes, which in turn is expressed in the stratigraphical record. But confidence that the Milankovitch mechanism can exert such influence comes primarily from data selection, by naively focusing on its effect over a tiny portion of the Earth's surface. The Earth's climate system is complex and involves major latitudinal heat transport. When all the data—a whole hemisphere for the summer half-year—is used, the Milankovitch driver is found to be extremely small. All three Milankovitch cycles have a limited effect on insolation, although that has not deterred the theory's advocates from correlating each of them to glacial/interglacial and stadial/interstadial cycles, particularly the 100 kyr eccentricity cycle. Those who acknowledge the embarrassing weakness of the signal have focused in vain on finding amplification mechanisms. Beyond this fundamental problem of the weakness of the signal, they offer no credible solution for other problems, such as the lack of opposite precessional cycles between the hemispheres. Further, no satisfactory reason can be given for the onset of Quaternary glaciation in the face of the same orbital mechanism back into deep time, or for the transition from 40 kyr precessional glacial cycles to the recent 100 kyr eccentricity cycle. As with other methods of natural history, circular reasoning is always a peril; "verification" of the astronomical curves by deep-sea cores requires a correct and independent time scale for those sediments, but such a time scale is not available. The revival of the astronomical theory of ice ages in

the 1960s and 1970s is therefore more a case study on the scientists who promote it than it is on natural history.

Finally, it is important to point out that God Himself in Scripture has revealed sufficient detail concerning the Earth's physical past to infer a time scale for the recent glaciation event. As previous publications have elaborated, an ice age lasting only a few centuries followed the Noahic Flood that itself occurred merely a few millennia ago (Oard, 2004; 2013b). This record of the Earth's past is anchored in the words and the authenticity of Jesus Himself and hence is unshakable. In this light the Milankovich time scale is yet another example of the foolishness to which human reasoning apart from God's revelation inevitably leads.

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A Little Flood Geology

Part II: Examples from Central Montana

Peter Klevberg*

Abstract

As argued in Part I of this series, floods are a key category of geologic processes. Common floods make important analogues to mega-floods, including the Deluge of Noah's day. This paper provides some examples of geologic work by floods and related processes in Central Montana as experienced by the author, and also provides ideas about how these may apply to the study of earth history.

* Peter Klevberg, Great Falls, Montana, grebvelk@yahoo.com
Accepted for publication November 21, 2019

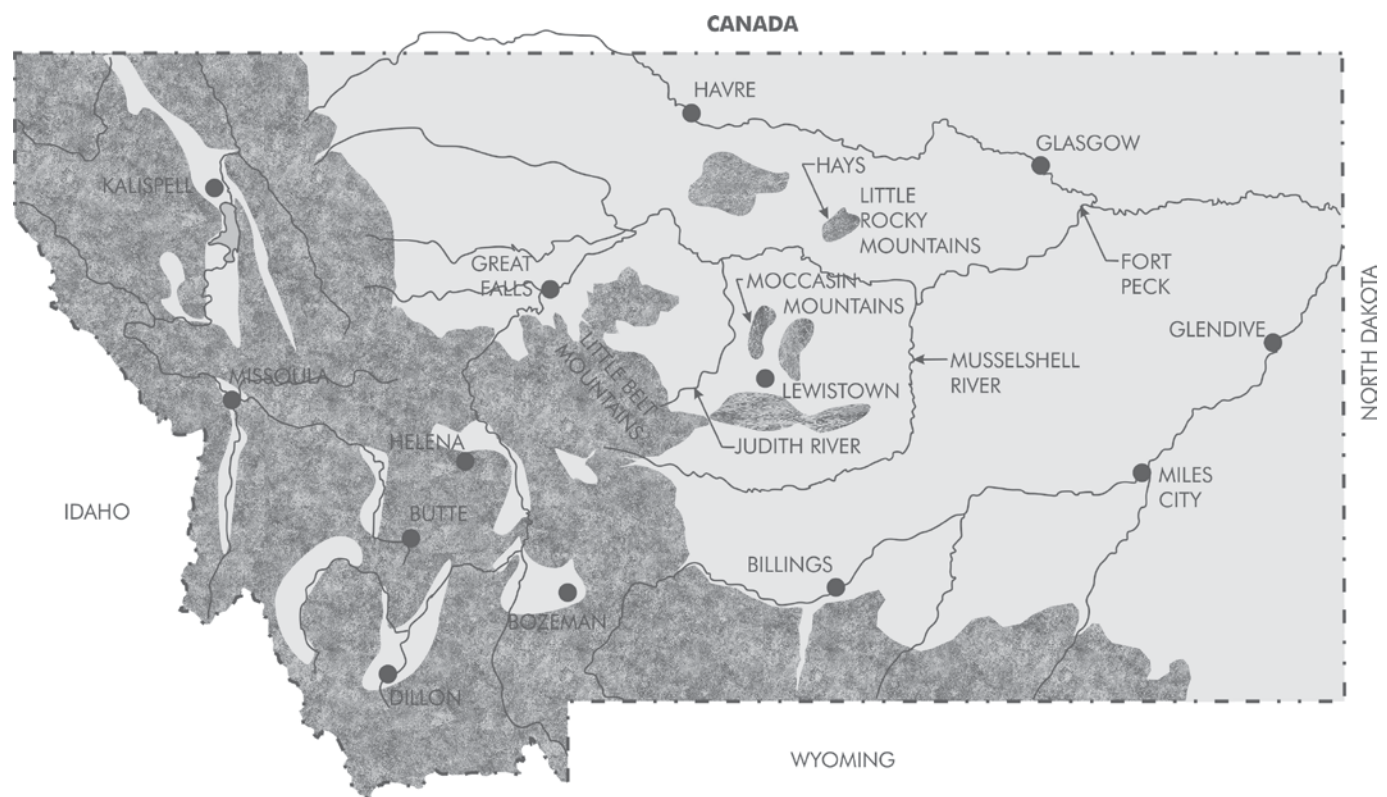


Figure 1. Map of Montana showing major rivers and mountainous areas (stippled).

Introduction

Geologists have begun to increasingly recognize that uniformitarianism falls flat when attempts are made to apply present process rates to natural history speculations. As introduced in Part I of this series, a great canyon or valley cannot be eroded sand grain by sand grain if the current is too weak to move sand grains. Bedrock cannot be eroded if the physical weathering processes are incapable of breaking it down. Geologic processes often resemble the adage about war: “Long periods of boredom interspersed with short periods of terror.” Nearly all geologic work by streams occurs during floods.

Central Montana in 2011

Montana has a semi-arid climate, but the relatively low temperatures and typical timing of precipitation allow much of the state to grow small grains and other crops. Snow pack normally melts in the early spring, and most of the year’s precipitation falls as rain from late April through early June. The early years of this century were largely characterized by late winters and cold, late springs. An above-average snow pack in 2011 combined with a late, cold spring to produce unusual flooding. Much of the snow did not melt until the spring rains arrived, and the results were a great educational experience for geologists and geotechnical engineers. Mass wasting and flood processes resulted in a remarkable amount of localized change in the landscape, along with some puzzling effects.

Many of these effects were widespread and not limited to Montana, as reported in the *Great Falls Tribune*, *Minot Daily News*, and many other news outlets of various media, but the regional effects are outside the scope of this paper. Flooding occurred on a larger scale outside the study area, e.g. shutting down Interstate 90 in southern Montana and the Burlington Northern Santa Fe



Figure 2. Images of 2011 flooding in Roundup, Montana. Top: looking east along highway on west side of Roundup. Center: aerial view from east with normal course of Musselshell River indicated by dashed line. Bottom: the Busy Bee Cafe. Photographs courtesy City of Roundup.

Table I. Musselshell River Peak Annual Discharge

Year	Peak Discharge in Cubic Feet Per Second			
	Martinsdale	Harlowton	Roundup	Mosby
1964	—	1,850	2,030	11,900
2011	4,800	5,400	15,000	26,000
2014	1,750	1,750	11,000	21,000
Average	1,028	1,316	2,253	5,346
Standard Deviation	1,148	1,154	2,699	5,138

mainline in Minot, North Dakota—even threatening a nuclear power plant in Nebraska—but my focus is on specific effects of geologic interest and personal knowledge in Central Montana.

Surficial Geology

The Musselshell and Judith Rivers (Figure 1) are diminutive, northward-

flowing tributaries of the Missouri. The Musselshell River drains the areas south and east of the Big Snowy, Little Snowy, and Judith Mountains, while the Judith drains the areas north and west of these ranges. Lewistown, an important Montana city, is tucked into the area between three mountain ranges on the east side of the Judith Basin. The Musselshell River

empties into the Fort Peck Reservoir, while the Judith River empties into the Missouri River upstream of the reservoir.

Musselshell River. At Roundup, the largest town on the Musselshell River, the degree of flooding was historic. The *Billings Gazette* (May 27, 2011) ran dozens of photographs of the flooding, as did many news outlets. The highway remained the main thoroughfare, though the vehicles using it were boats instead of automobiles. While the approaches were flooded, the highway bridge over the river was not damaged, and the deck remained above water level, facilitating efforts at stream gauging by the U.S. Geological Survey. Meals were served at St. Benedict's Church on high ground; they certainly could not be served any longer at the submerged Busy Bee Café (Figure 2). Roundup



Figure 3. Aerial view of Hanover Road west of Lewistown, Montana, showing large amount of earthwork necessary to relocate road away from edge of valley where 2011 flood seriously damaged the road. Photograph taken 2014, obtained from Google Earth.

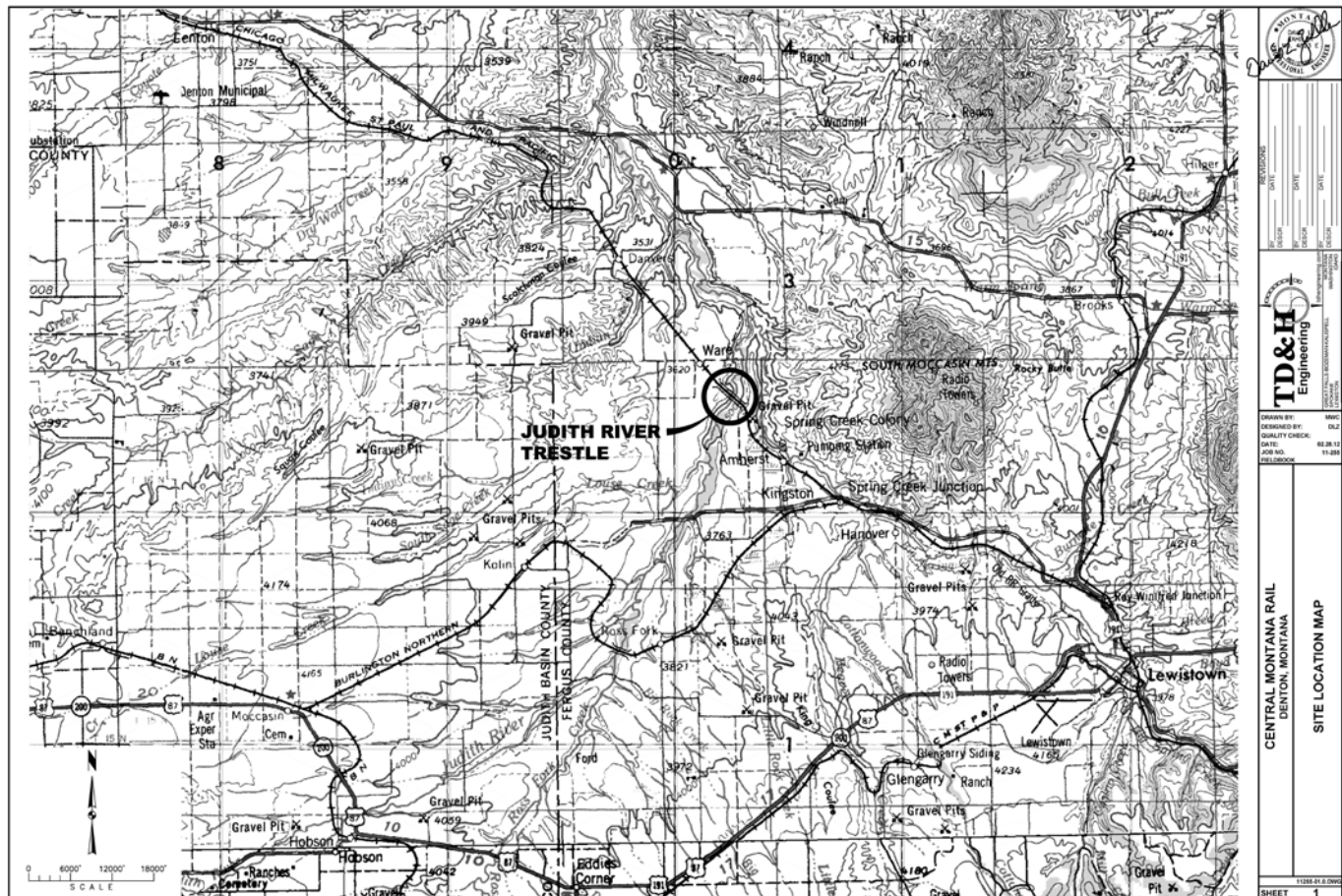


Figure 4. Map showing location of Hanover Road and Judith River Bridge northwest of Lewistown, Montana. Figure courtesy of TD&H Engineering.

had not experienced a flood of this scale. As shown in Table I, the 2011 flood at peak discharge represented most of five standard deviations above the mean annual peak discharge and was reportedly the equivalent of a “157-year flood” per U.S. Geological Survey data.

Judith River. The Judith Basin, the area between the Little Belt and Moccasin Mountains (Figure 1) drained by the Judith River, experienced localized mass wasting (slumps, landslides, etc.) and washouts. Many roads and bridges, including important bridges northwest of Lewistown, were damaged. The Hanover Road, connecting the areas east and west of the Ross Fork of the Judith River, was cut by a landslide, closing the

road for an extended time (Figure 3). I observed some of the geotechnical field work for its rerouting. Downstream of the road bridge is the dramatic Central Montana Rail steel trestle (Figures 4, 5). While data for the Judith River are

not as abundant as for the Musselshell, the same trends in peak flows for the important flood years of 1964, 2011, and 2014 are evident (Table II).

The Central Montana Rail Bridge (viaduct) over the Judith River was built

Table II. Judith River Peak Annual Discharge

Year	Peak Discharge in Cubic Feet Per Second		
	Utica	Estimate at Bridge	Mouth
1964	1,070	2,000	—
2011	4,960	10,000	15,300
2014	—	3,500	5,500
Average	627	—	4,226
Standard Deviation	666	—	4,071

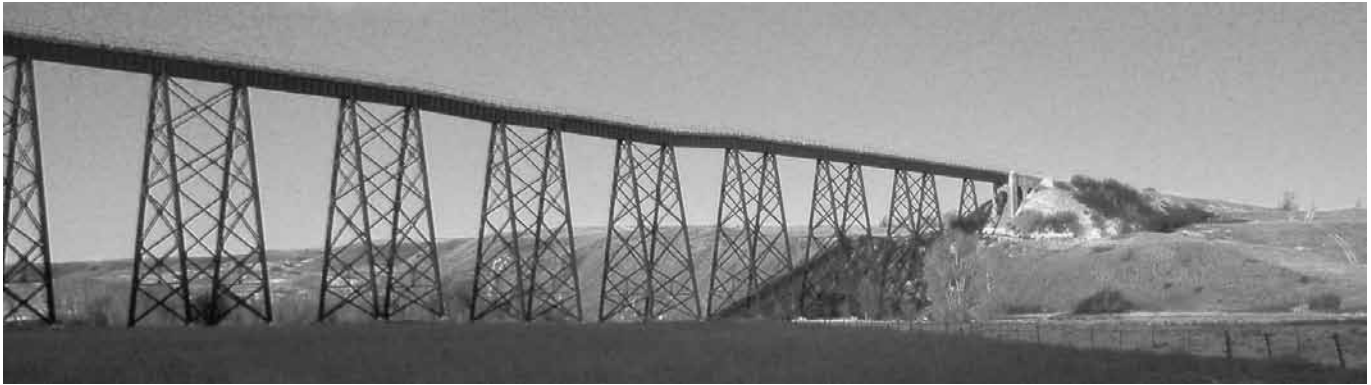


Figure 5. West half of Judith River trestle in 2011 after Judith River flooding damaged it (note misalignment of bridge spans).

by the Chicago, Milwaukee & Saint Paul Railroad and was designed to be supported by piers founded on bedrock. With 64 piers supporting the steel bents (towers), this was a considerable expense, and to cut costs, the railroad opted to found them on spread footings. For most of 99 years, this was satisfactory, though piers adjacent to the little river where it passed under the trestle had to be protected by driving sheet piling around them and filling the space with concrete. Flooding events through the bridge's history had not resulted in major erosion or deposition. The Judith River is a small, gravel-bed river with a gradient in the neighborhood of 0.5 percent in the study area. Like most streams in this region, the Judith is an *underfit* stream; in fact, this stream is like many others in occupying a valley capable of handling a flow many times its size. Over the Memorial Day weekend of 2011, the swollen Judith River, while still occupying only part of the valley bottom, changed course and moved east approximately 115 meters (375 feet). Just under the bridge, it encountered a low colluvial ridge that diverted it west. The river then swung slightly south and ran under the bridge lengthwise west-northwest to the original channel (Figures 6, 7). This put ten additional piers at risk, and the little river undermined some, resulting in sig-

nificant damage to the bridge (Figures 8, 9). The span was closed to traffic for 3½ years until repairs could be made (Figure 10).

The natural course of the river during normal flow was thus redirected northeast against the bank (Figures 6, 9). The channel formed between 1996 and 2011 was filled with gravel and a thick, flat-topped gravel bar was deposited over it the entire distance from the 1996 channel to the new channel (Figure 11). Any small flood would follow the east side of the new gravel bar and cut further into the unconsolidated material at the bend. I had suggested cutting a channel to speed this natural process so the river would immediately occupy its future course and leave most of the bridge unthreatened. However, the likely difficulty of obtaining the required environmental permits convinced the involved parties to simply armor all of the bridge piers and let the river continue to run lengthwise under the bridge. Ironically, the construction equipment during bridge repair managed to incidentally divert the river back toward its previous course. The indicated future course of the river is therefore less certain, but it may well be carved as shown by some future flood event. Relatively little change (at least, without large machinery!) occurs in the meantime.

Fort Peck. The Fort Peck Dam (Figure 1) was built 1933–1939, and the era of upper Missouri River navigation came to an end. The dam is an earth-fill structure with a reservoir capacity of 23.0 km³ (18,688,000 acre-feet). The penstocks are tunnels excavated in Bearpaw Formation shale. The penstock-turbine and bypass tunnels have a combined capacity of 1,840 m³/s (65,000 cfs). The emergency spillway is 2.3 miles (3.8 km) south of the dam, with the head in a saddle and the tail channel joining the Missouri River 8.3 miles (13.8 km) downstream of the dam. It was designed for a discharge capacity at maximum operating pool elevation of 6,513 m³/s (230,000 cfs). The maximum discharge per U.S. Geological Survey records was in 1953 at 3,880 m³/s (137,000 cfs). Only occasionally has water actually flowed over this spillway. I have worked on several projects at Fort Peck through the years, but I never saw water over the spillway before 2011. The dry years at the end of the twentieth century resulted in a much-reduced reservoir level, and I never expected to see the reservoir close to full. The remarkable runoff of 2011 filled the reservoir, and cottonwood trees at least thirty feet tall on the upstream side of the dam became a hangout for fish without a branch showing above the surface.



Figure 6. Aerial view of Judith River viaduct showing changes in course of Judith River over recent decades. Base figure courtesy of TD&H Engineering.

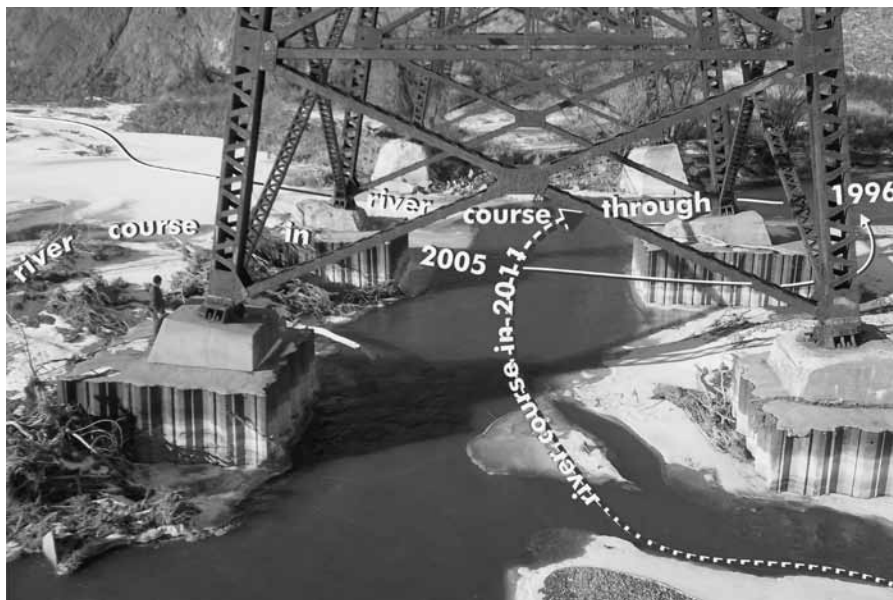


Figure 7. The four piers previously armored weathered the 2011 flood with only trivial damage. Channel movements are indicated from years their positions were recorded. Author (178 cm tall) stands on Pier 51. Note flood debris against upstream sides of armored piers. Sheet pile armoring protected these piers from being undermined by flood scour. Photograph from December, 2011.

When I saw the spillway in June of 2011, it was flowing approximately 1,866 m^3/s (65,900 cfs). The plunge pool was masked by a towering cloud of spray (Figure 12). Considerable damage occurred to the plunge pool where the flow eroded away the soft Bearpaw shale and undermined some of the concrete. An extensive reconstruction and reinforcement program was designed by the U.S. Army Corps of Engineers and included refilling the deepened plunge pool using roller compacted concrete. Such rapid flows (supercritical flow) elsewhere have been documented to remove hard rock and concrete, especially where cavitation has ensued (Holroyd, 1990).

Subsurface Geology

Hays is a small community nestled against the northwest side of the Little Rocky Mountains on the Fort

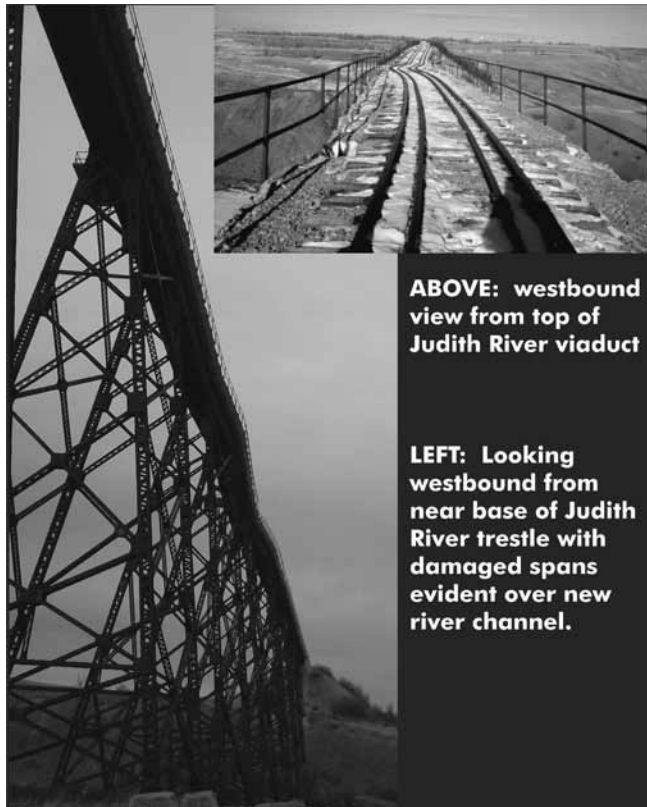


Figure 8. Bridge damage resulting from 2011 Judith River flooding.

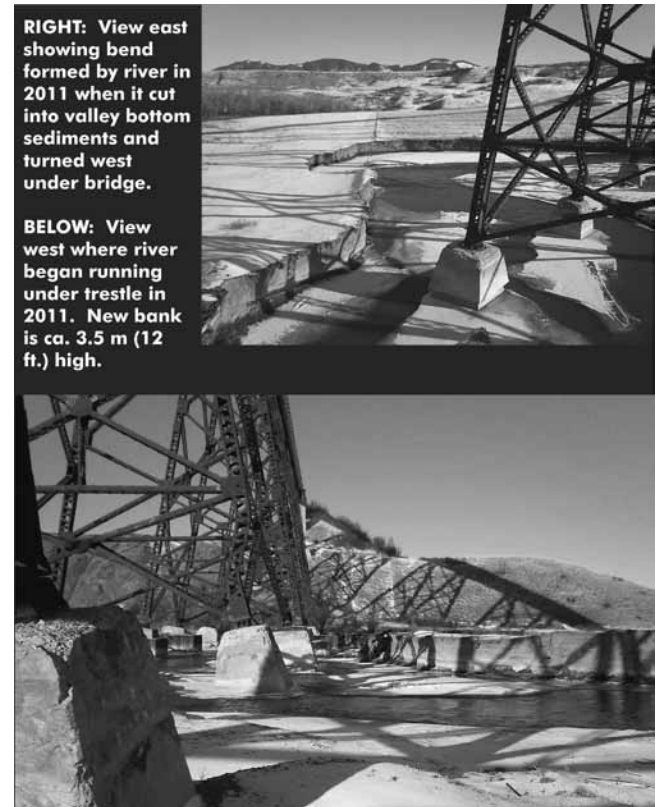


Figure 9. Formation of new river channel in May of 2011 resulted in scour that undermined piers and damaged the Central Montana Rail Bridge over the Judith River.



Figure 10. The first revenue train following repair of the viaduct was the *Charlie Russell Chew Choo* dinner train on November 21, 2014. Grain trains still had to wait for repair of the Ross Fork Bridge. Note the new piers supporting bents directly under the train. Photograph courtesy Central Montana Rail.



Figure 11. Wide gravel bar deposited by 2011 flood buried the pre-2011 river channel. Author (at right) provides scale.

Belknap Indian Reservation (Figure 1). The Jesuits founded the Saint Paul Mission in 1886, well before the formation of the reservation, and I have been called upon to work on several projects for the school and other buildings at the mission. Little Peoples Creek runs through the mission property. It emanates from Mission Canyon, the type locality for the Mission Canyon Formation of the Madison Group. The Madison Group hosts one of Montana's most important aquifers, and the Little Rocky Mountains acts as a recharge area (Figure 13).

A gravel road was built decades ago between the creek and the canyon walls. The Mission Canyon Formation is karstic limestone with an abundance of natural bridges (arches) and caves (Figure 14). In 2011, floods scoured the canyon and removed the road, leaving it accessible only by foot. In Hays, the



Figure 12. The spillway for Fort Peck Dam is located away from the dam in terrain eroded into Bearpaw Formation sedimentary rocks.

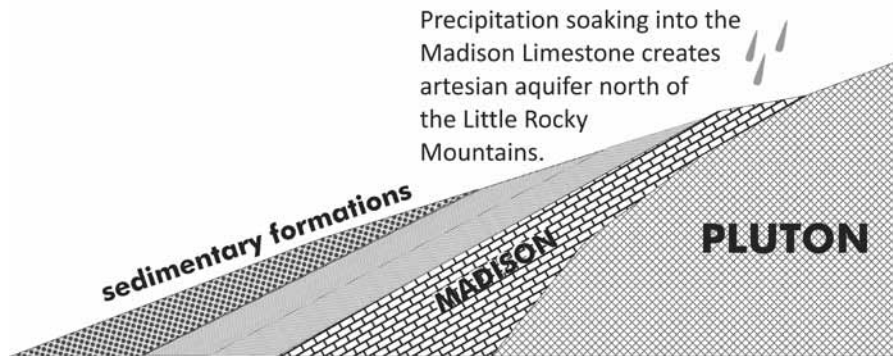


Figure 13. Cartoon cross section of the northwestern Little Rocky Mountains.

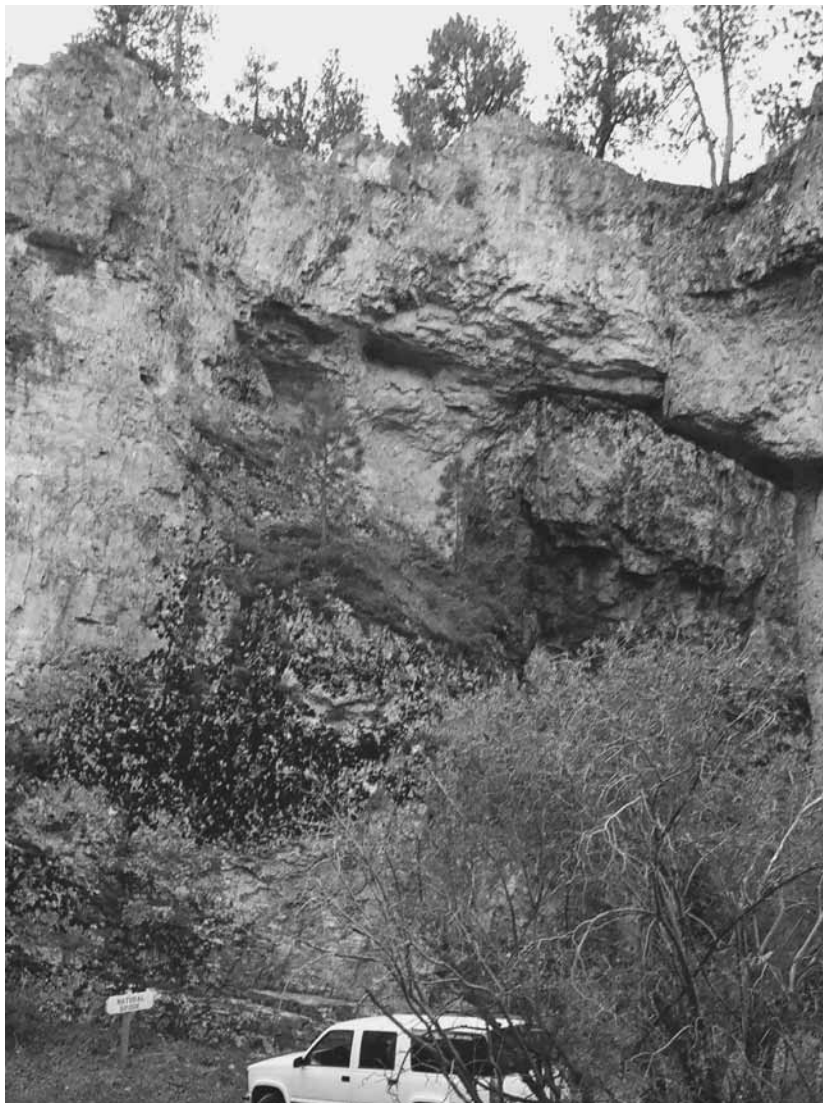


Figure 14. The best-known natural bridge in Mission Canyon, photographed in 1999.

flooding may have been the worst ever witnessed, certainly in recent memory. Slumps, earthflows, and various small landslides occurred on the valley walls, some of which blocked an irrigation ditch from the early 1900s (Figure 15). After the flooding subsided, Little Peoples Creek suddenly disappeared between the mouth of the canyon and Hays. At the same time, the mission water supply well began flowing. It had always been artesian, but had not had enough pressure head to flow at the surface, only enough to rise inside the casing. The well was not equipped to contain the increased pressure, and I was called back to Hays.

The solution to this mystery seemed straightforward enough. The flood had apparently scoured away low-permeability sediments and allowed the creek to sink into solution cavities in the limestone. This had increased the head to the well, causing it to flow. When I set about testing this hypothesis, it failed. The well was tapping into an aquifer below the Madison Group. The elevation at the wellhead was too high for the creek to provide the additional head. And walking the stream course, I found no evidence that fine-grained sediments had been scoured from the streambed. Diocese staff and I puzzled over this mystery for a considerable period of time. Then, in 2012, for no apparent reason, Little Peoples Creek began running again in its channel (Figure 16), and the well stopped flowing. Other hydrogeologists have found this as mysterious as I have, but the wet spring of 2011 obviously impacted both aquifers and streams.

Conclusions

Practical knowledge that has been gleaned from observation of floods and the geologic work they do include the following.

- These were “ordinary” effects in both type and scale but provided good

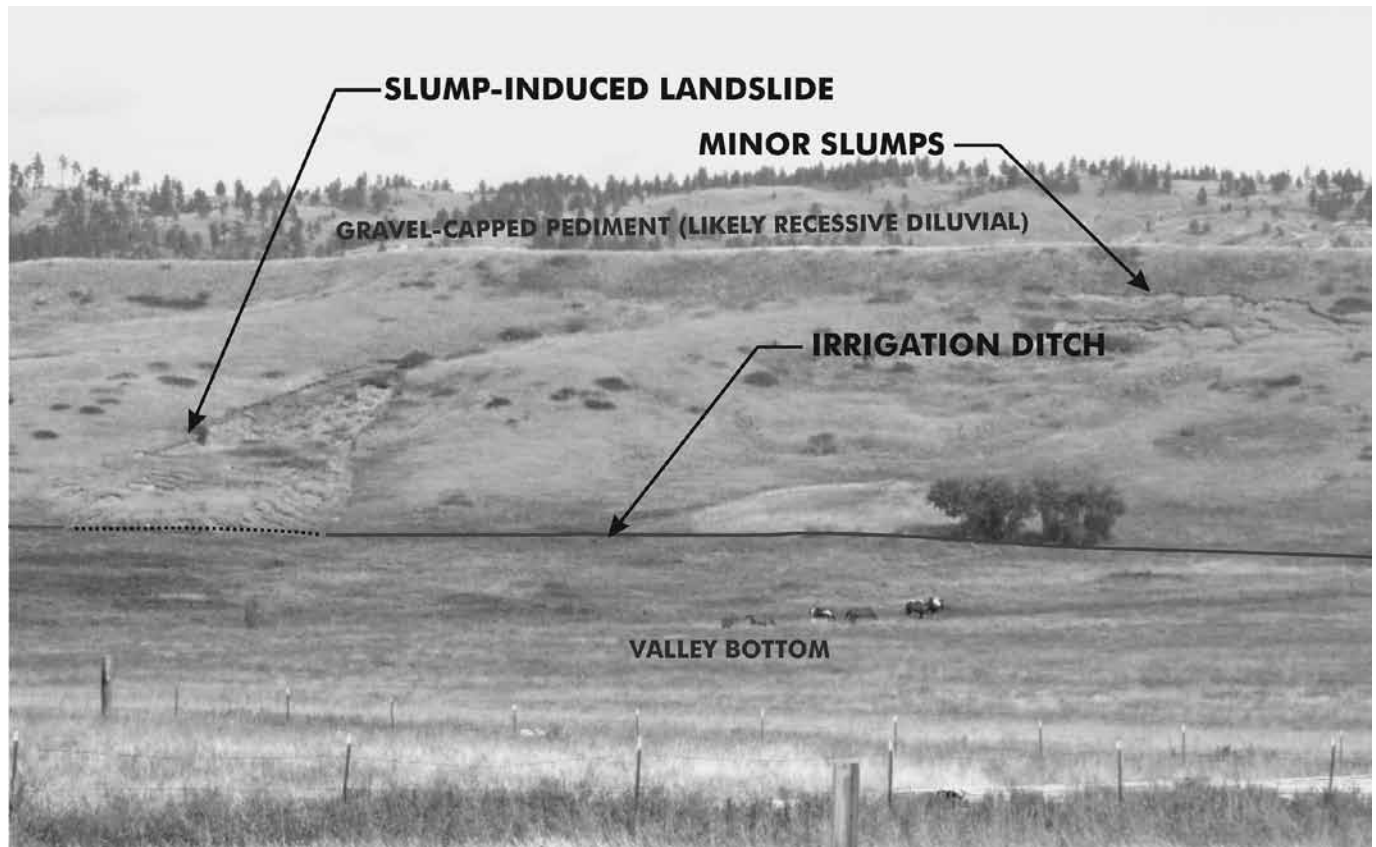


Figure 15. Mass wasting on valley slope east of Saint Paul Mission, Hays, Montana, in 2011 blocked an irrigation ditch from the early 1900s. Elevation difference between bench and valley floor is 48 m (160 ft.).



Figure 16. Little Peoples Creek at Saint Paul Mission after it began running again in 2012. Photograph courtesy Roman Catholic Diocese of Great Falls, Billings.

data for refinement of our understanding of flood-related geologic processes.

- The Judith River, a comparatively small and underfit stream, did considerable geologic work in 2011, including scouring to or nearly to bedrock (approximately 20 feet). The Judith River Trestle had been in operation for 99 years at that time with only four of the piers having been endangered by river scour previously.
- Large amounts of sedimentary bedrock were eroded from the spillway plunge pool at Fork Peck Dam in 2011. Similar rapid, flood-related erosion in soft and hard bedrock and in concrete has been observed elsewhere.

- Ground and surface waters often interact. A relatively straightforward hypothesis to explain sudden changes in ground water occurrence after the 2011 flood in Hays, Montana, was disproved. Ground water systems can be difficult to characterize, especially when interacting with floods or other catastrophic processes.

Acknowledgement

I thank Central Montana Rail, the Roman Catholic Diocese of Great Falls-Billings, and TD&H Engineering for permission to showcase these projects. They were fulfilling projects to work on. The City of Roundup permitted use of the 2011 flood images. Encouragement to become involved in paleohydrologic studies came particularly from creationist Michael J. Oard and anti-creationist

David Baker, along with job-related observations that piqued my curiosity. *Deum laudo* (Psalm 29:10).

Reference

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The Waters Above— A Comparison of Three Models

Mark McGuire*

Abstract

In Genesis 1:6–8 the Bible reveals to us that, on Day 2 of Creation, God made an expanse, called “Heaven” and separated the waters below the expanse from the waters above it. The nature and location of these “waters above” have been debated for some time. Further complicating the puzzle, the Bible speaks of three heavens. The first step is to define these “heavens.” Then we might know where the waters were located. Three models will be compared—the Vapor Canopy Model, the White Hole Theory model, and the Hartnett-Carmeli model. Each one locates the waters above differently—above the atmosphere, around the universe, and around the outer reaches of the solar system respectively. The strengths and weaknesses of each are compared in an attempt to come closer to the truth.

Introduction

The study of origins, the past, the future, or the purpose and meaning of life all fall outside the domain of science:

Contrary to impressions made by the news media, no one today can start from observed data and build up a cosmology by rigorous scientific deduction. (Humphreys, 1994, p. 53)

Science deals with present processes. The two most basic laws of science, the first and second laws of thermodynamics, are conservative and deteriorative, not

creative and integrative. Consequently, the origin of the universe must be derived from other sources. Most cosmologies are religious.

Christians should use all tools available to discover truth. Our primary source of truth is revelation (Scripture), but it also includes science—theoretical, experimental, observational, historical, forensic, etc., as a secondary source (Reed and Klevberg, 2014a, 2014b). The Bible describes the creation—its duration, date, order, and to a certain

extent, its processes no longer in operation. Several models combining science with scripture have been developed to explain certain phenomena. But creation presents many puzzles. One of them is God’s work on Day 2. Genesis 1:6–8 states that He divided the waters of earth using an “expanse;” some above, some below. The latter are the antediluvian oceans. What were the “waters above”?

Different models have addressed this puzzle in different ways. This paper will compare three of them:

1. The vapor canopy model (VCM) (Whitcomb and Morris, 1961)
2. The white hole cosmology (WHT) (Humphreys, 1994 as modified in 1998)

* Mark McGuire, mark.mcguire@memphistn.gov

Accepted for publication January 27, 2020

3. The Hartnett-Carmeli model (HCM) (Hartnett, 2007)

They all attempt to integrate scientific knowledge with revelation. Each has strengths and weakness, but it is almost impossible to prove (or disprove) any of the models simply because there are so many unknowns, and no one was there to observe the events.

One of the best clues to this puzzle is the Bible's description of three distinct "heavens." Understanding their identity can help us determine the nature and location of "the waters above."

The Heavens: how many and where are they?

To answer this question, it is first beneficial to look at the ideas of the early church and earlier. Apparently, the number of heavens depended upon the "science" or "philosophy" of the day. The early church was heavily influenced by Greek philosophy.

The Greeks believed that the earth was the center of the universe and everything revolved around it. There were four basic elements—earth, water, air, and fire with a possible fifth element of ether (Luther, c. 1536). These were arranged in order by weight with earth the heaviest and fire the lightest. There were also seven spheres or orbits of the planets and some thought as many as ten (Luther, c. 1536). These spheres or "heavens" were apparently crystalline in nature (Strahler, 1987). This philosophy was maintained until the modern Copernican system replaced it.

This philosophy had a tremendous influence on how commentators interpreted "the waters above." Josephus remarked that:

after this, on the second day, he placed the heaven over the whole world, and separated it from the other parts; and he determined it should stand by itself. He also placed a crystalline [firmament] round it, and put together in a manner

agreeable to the earth, and fitted it for giving moisture and rain and for affording the advantage of dews. (Josephus, c. 93 AD, p. 24)

Both Luther (c. 1536) and Calvin (1559) correctly interpreted the Hebrew word *rāqī'* (which is translated as "firmament" in the KJV) as an expanse. Calvin (1559, p. 79) wondered:

I know not why the Greeks have chosen to render the word [*rāqī'*] *stereōma* which the Latins have imitated in the term *firmamentum*; for literally it means expanse.

One possible explanation was that it was considered firm, not by material, but by the Word of God which makes something strong even though by nature it is soft (Luther, c. 1536). However, neither could explain what the "waters above" were, as it seemed opposed to common sense (Calvin, 1554–1559).

Luther (c. 1536, p. 30) showed his wisdom:

We Christians must, therefore, be different from the philosophers in the way we think about the cause of these things. And if some are beyond our comprehension (like those before us concerning the waters above the heavens), we must believe them and admit our lack of knowledge rather than either wickedly deny them or presumptuously interpret them in conformity with our understanding.

With this in view, an attempt will be made to define how many heavens and where they are.

In the first chapter of Genesis, God created the heaven and the earth. The Hebrew word for heaven is *shamayim* which is apparently in the dual form, but in reality is a plural (Koehler and Baumgartner [HALOT], 1999). It can be translated "heaven" or "heavens," depending on the context.

And God said, Let there be a firmament in the midst of the waters, and let it divide the waters from the waters. And God made the firma-

ment, and divided the waters which were under the firmament from the waters which were above the firmament: and it was so. And God called the firmament Heaven. (Genesis 1:6–8, KJV)

In modern translations, *rāqī'* is most often translated "expanse" which has the meaning of that which was spread out or stretched. It comes from the Hebrew word *rq'*, which means to hammer out (HALOT) and by analogy to spread out like thin plate metal that is hammered. In this passage, God calls the expanse "Heaven," i.e., He equates heaven with the expanse so that they can be considered interchangeable.

Brown's (2001) Hydroplate model (HPT) is not considered in this analysis, because he interpreted the "expanse" as a layer of the Earth's crust; the "waters above" being the oceans and those below a subterranean reservoir. But the word firmament (*rāqī'*) is used 17 times in the Bible. In all other cases outside of Genesis it refers to a heavenly expanse either connected with the heavens and the sun (Psalm 19), stars (Daniel 12:3), or the glory of God (Ezekiel 1:22–26, 10:1), but never with the crust. Brown argued that Psalm 24:2, 33:7, 104:3, 136:5–9, and II Peter 3:5 supported his theory, but these passages better fit the third day when God separated the oceans and dry land.

If it can be shown biblically that either the "heaven" or "expanse" has multiple parts, then the other does too. A primary passage to the possible meanings is found in II Corinthians 12:1–4:

I knew a man in Christ above fourteen years ago, (whether in the body, I cannot tell; or whether out of the body, I cannot tell: God knoweth;) such an one caught up to the third heaven... how that he was caught up into paradise...

Paul spoke of the third heaven, which implies at least two others. Since Paul was writing under divine inspiration, we can use this passage to under-

stand others. There are several passages in scriptures that also indicate multiple heavens.

Behold, the *heaven* and the *heaven of heavens* cannot contain thee; how much less this house that I have builded?" (I Kings 8:27, II Chronicles 6:18, emphasis added)

Wise Solomon understood that God could not be contained by His creation, as did Moses:

Behold, the *heaven* and the *heaven of heavens* is the Lord's thy God, the earth also, with all that therein is. (Deuteronomy 10:14, emphasis added)

These passages also suggest multiple heavens. This issue is discussed among the lexicons. HALOT (1997, p. 1561) says "it probably does not mean a number of different heavens but is an expression for the superlative...." Botterwork et. al., [TDOT] (2006) specifically says that it does not refer to multiple heavens. VanGemeren, [NIDOTTE] (1997) notes that other cultures thought there were multiple heavens (Babylonian), but did not think that this was the OT view, but was a call to praise God with other heavenly creations.

Jenni and Westermann, [TLOT] (2004) says that this is a special, not yet explained expression. They concluded that it "seems to indicate heaven in its totality not a (highest) region" (TLOT, p. 1370). However, only TDOT rules out the possibility of multiple heavens based on the reasoning of the JEDP theory. "Only with Deuteronomy and the literature of the exilic period (Deutero-Isaiah) did heaven become an important object of theological interest" (TDOT, p. 207). They do not believe that Moses or Solomon spoke these words, but that they were inserted by the P author at a much later date. Yet, this conclusion is flawed based on a faulty hypothesis. Furthermore, all these ignore the New Testament passage II Corinthians 12:1–4 which declares under inspiration of the Holy

Spirit that Paul was taken into the third heaven.

If there are three, does the Bible define them? Thirteen English words (e.g., sky, air, cloud, and firmament) were used in the King James Version to define and describe the heavens.

The Hebrew and Greek terms appear over 800 times (Table 1). There are eleven different words translated as "heaven," "heavens," or "heavenly" in both Old and New Testaments. In the Old Testament, out of 441 usages, the Hebrew *shamayim* (398) and its Aramaic equivalent *shamayin* (38) is by far the most prevalent. Similarly, in the New Testament the Greek word *ouranos* is used 269 out of 298 times.

The word "heaven" was used for different purposes depending upon the context. For example, it was used over 50 times as an identifier of the one true God—the God of *heaven* (Table 2) to differentiate Him from local pagan deities. It was also used by Jesus many times as "Our Father which art in heaven" (Table 2).

Some of these uses of "heaven" are listed below:

1. The usual word for the sky or the realm of the sky
 - a. Birds fly and wind (HALOT, TDOT, TLOT, NIDOTTE)
 - b. The area high above the ground but below the stars and heavenly bodies (TDOT)
2. Phenomena from and in the sky
 - a. From which come such things as dust, hail, rain (HALOT, NIDOTTE), snow, fire (TLOT), and frost (TDOT)
 - b. This realm is God's storehouse (TLOT)
3. The realm of the sun, moon, and stars (TDOT, TLOT, NIDOTTE)
4. The phrase "heaven and earth" may denote the entire creation (HALOT, TDOT, TLOT, NIDOTTE)
5. Heaven is the dwelling place of God
 - a. Another expression representing the dwelling place of God in

heaven (HALOT, TLOT, NIDOTTE)

- b. This does not indicate height, but a superlative (HALOT, TLOT)

These descriptions can be used to identify the three heavens: (1) atmospheric space, (2) interstellar space, and (3) the place of God's throne. We will examine these now in reverse order.

The Third Heaven

Paul was taken up into the third heaven and called it "paradise." The word "paradise" is used on only two other occasions; in the first, Jesus told the robber crucified with him "today shalt thou be with me in paradise" (Luke 23:43), and second, "To him that overcometh will I give to eat of the tree of life, which is in the midst of the paradise of God" (Revelation 2:7). Hebrews tells us that Jesus "is set on the right hand of the throne of the Majesty in the heavens" (Hebrews 8:1). Peter says

the like figure whereunto even baptism doth also now save us (not the putting away of filth of the flesh but the answer of a good conscience toward God,) by the resurrection of Jesus Christ: *who is gone into heaven, and is on the right hand of God;* angels and authorities and powers being made subject unto him. (I Peter 3:21–22, emphasis added)

The Bible tells us that the third heaven is the place where Jesus is today and where His people yearn to be.

There are over 130 references describing this third heaven (Table 3). This includes such descriptions as God's holy dwelling place or habitation, His throne, His Kingdom, and that He hears or looks down from heaven. There are over 55 Old Testament references and well over 70 in the New Testament (Table 3). These descriptions identify heaven as a *place*.

Where is it located? Apparently, it is the highest, often referred to as "the heaven of heavens." It is possible it was

Table 1. Words for Heaven in the Bible

Hebrew or Greek Word	Strong's Number	English word	#	English word	#	English word	#	English word	#	English word	#	English word	#	Total
galgal ¹	1534	heaven	1											1
arabah ²	6160			heavens	1									1
ariphim	6183			heavens	1									1
raqiya	7549											firmament	17	17
shachaq	7834	heaven	2					sky	2			clouds ³ / small dust	11, 1	16
shamyim	8064	heaven	289	heavens	109					air	21	astrologer ⁴	1	420
shamayin	8065	heaven	35	heavens	3									38
no word ⁵		heaven	1											1
aer	109									air	7			7
epouranios	2032	heaven	1			heavenly	16					high ⁶ / celestial	1, 2	19
mesour- anema	3321	midst of heaven	3											3
ouranios	3770					heavenly	6							6
oruranothen	3771	heaven	2											2
ouranos	3772	heaven	249	heavens	19	heavenly ⁷	1	sky	5	air	10			284
TOTAL		heaven	583	heavens	133	heavenly	23	sky	7	air	38	other	33	all 817

¹galgal is used a total of 11 times in the Bible most often translated as “wheel”

²arabah is used a total of 61 times in the Bible most often translated as “plain”

³the word “clouds” is used a total of 49 times in the Bible most often by the Hebrew word “ab”

⁴shamayim is translated astrologer only one time in the Bible and in combination with the Hebrew word “habar”

⁵the word “heaven” was added in translation and not in original manuscript

⁶the word “high” is used numerous times in the Bible and by many other Hebrew and Greek words

⁷ouranos is translated heavenly only one time in the Bible and in combination with the Greek word “ek”

described as the “firmament” over the cherubim Ezekiel saw in visions by the river Chebar (Ezekiel 1:22–28) (Morris, 2006). An alternate interpretation of these verses is that it may be translated as a “platform,” which may better fit in this context (Block, 1997). Either way, Ezekiel is describing a majestic scene where there was an expanse, a throne

above the expanse, and one, having the likeness of a man, was upon it.

The third heaven has been shut off from earth, and we do not know its exact location. We only know that it exists on a different plane at present. It is possible that this “heaven” will come down to earth as the New Jerusalem will be the location for the throne of the Lord Jesus Christ (Revelation 21).

The Second Heaven

There are over 60 references describing some aspect of the second heaven. This includes such descriptions as God multiplying Abraham’s descendants as the stars of heaven; the command not to worship the sun, moon, stars, and the host of heaven; and stars which can mean angels, shall fall from heaven (Table 4).

Table 2. Heaven as an Identifier of God

Description	#	Bible Verse
Old Testament		
God, possessor of heaven and earth	2	Genesis 14:19, 22
LORD God/God/King of heaven	29	Genesis 24:3; 24:7; Deuteronomy 4:39; Joshua 2:11; II Chronicles 20:6; 36:23; Ezra 1:2; 5:11; 5:12; 6:9; 6:10; 7:12; 7:21; 7:23 (2x); Nehemiah 1:4; 1:5; 2:4; 2:20; Job 22:12; Psalm 136:26; Lamentations 3:41; Daniel 2:18; 2:28; 2:37; 2:44; 4:37; 5:23; Jonah 1:9
He that sitteth in the heavens shall laugh	1	Psalm 2:4
New Testament		
Father which is in heaven	16	Matthew 5:16; 5:45; 5:48; 6:1; 6:9; 7:11; 7:21; 10:32; 10:33; 16:17; 18:10; 18:14; 23:9; Mark 11:25; 11:26; Luke 11:2
Heavenly Father	6	Matthew 6:14; 6:26; 6:32; 15:13; 18:35; Luke 11:13
God of heaven	2	Revelation 11:13; 16:11
Lord of heaven	1	I Corinthians 15:47
Total – New and Old Testament	57	

Modern science tells us that the place of the sun, moon, and stars is the vast expanse of interstellar space. This heaven is mentioned separately from the heaven of birds, clouds, and rain, indicating their separate nature. Furthermore, the passages that speak of stars falling from heaven, or the sun, moon, and stars losing their light refer to future events and are subject to much speculation and interpretation. There are only four cases in the Bible where a star actually falls to the earth. In some it refers to angels and to others a star or stars.

- And out of one of them came forth a little horn, which waxed exceeding great, toward the south, and toward the east, and toward the pleasant land. And it waxed great, even to the host of heaven; and it cast down some of the host and of the stars to

the ground, and stamped upon them. (Daniel 8:9–10)

- And the stars of heaven fell unto the earth, even as a fig tree casteth her untimely figs, when she is shaken of a mighty wind. (Revelation 6:13)
- And the third angel sounded, and there fell a great star from heaven, burning as it were a lamp, and it fell upon the third part of the rivers, and upon the fountains of waters; and the name of the star is called Wormwood: and the third part of the waters became wormwood: and many men died of the waters, because they were made bitter. (Revelation 8:10–11)
- And the fifth angel sounded, and I saw a star fall from heaven unto the earth: and to him was given the key of the bottomless pit. And he opened the bottomless pit; and there arose a smoke out of the pit as the smoke of

a great furnace; and the sun and the air were darkened by reason of the smoke of the pit. (Revelation 9:1–2)

Stars falling to the ground, possibly meteorites, such as the star “Wormwood” do not originate in the Earth’s atmosphere, but come from interstellar space. Therefore, the second heaven is interstellar space which contains sun, moon, stars, and the host of heaven.

The First Heaven

There are over 130 references describing some aspect of the first heaven, including lightning, smoke, fire, wind, birds, clouds, and rain (Table 5). These are never mentioned together with the sun, moon, stars, or the host of heaven.

It should be noted that although these phenomena appear to be separated in the scriptures, they do interact, primarily because clouds range from

Table 3. Verses which referred to the third heaven as a place are listed. Verses such as God looked down from or heard from heaven are considered the third heaven, because that is the place of God's throne and that is the place where Jesus Christ is now.

Description	#	Bible Verse
Old Testament		
God in heaven	5	Deuteronomy 3:24; I Kings 8:23; II Chronicles 6:14; Psalm 115:3; Ecclesiastes 5:2
hear thou from heaven	13	I Kings 8:32, 34, 36, 45, 49; II Chronicles 6:27, 30, 35, 39; 7:14; Nehemiah 9:27, 28; Psalm 20:6
God's throne in heaven/sitteth in heaven	6	I Kings 22:19; II Chronicles 18:18; Psalm 2:4; 11:4; 103:19; Isaiah 66:1
his holy habitation/dwelling place, in heaven	8	Deuteronomy 26:15; I Kings 8:30; 8:39, 43; II Chronicles 6:21, 33; 30:27; Psalm 123:1
Lord look down from heaven	8	Psalm 14:2; 33:13; 53:2; 80:14; 85:11; 102:19; Isaiah 63:15; Lamentations 3:50
came down/go up/ascend from/to heaven	8	Genesis 28:12; Deuteronomy 30:12; II Kings 2:1, 11; Psalm 139:8; Proverbs 30:4; Isaiah 14:12, 13
heavens cannot contain him	3	I Kings 8:27; II Chronicles 2:6; 6:18
witness, things, word, army, voice in heaven	5	Job 16:19; Psalm 113:16; 119:89; Daniel 4:31, 35
New Testament		
Kingdom of heaven	9	Matthew 5:20; 7:21; 8:11; 11:11; 13:11; 18:1, 3, 4; 19:23
rewards/treasures in heaven	6	Matthew 5:12; 6:20; 19:21; Mark 10:21; Luke 12:33; 18:22
swear not by heaven	2	Matthew 5:34; 23:22
thy will be done as in heaven	2	Matthew 6:10; Luke 11:2
exalted/received/ascended/carried/taken up to heaven	12	Matthew 11:23; Mark 16:19; Luke 10:15; 24:51; Acts 1:11; 2:34; 10:16; 11:10; Romans 10:6; II Corinthians 12:2; I Peter 3:22; Revelation 11:12
bound/loosed in heaven	4	Matthew 16:19 (2x); 18:18 (2x)
God/Master in heaven	3	Matthew 22:30; Ephesians 6:9; Colossians 4:1
angels in heaven	5	Matthew 24:6; Mark 12:25; 13:32; Luke 2:15; Galatians 1:8
fall from heaven	1	Luke 10:18
names written in heaven	1	Luke 10:20
descended/came down from heaven	15	John 3:13; 3:31; 6:33, 38, 41, 42, 50, 51, 58; Act 11:5; Revelation 3:12; 18:1; 20:1; 21:2; 21:10
heaven is thy throne	2	Acts 7:49; Revelation 4:2
voice from/in heaven	2	Acts 11:9; Revelation 19:1
house in heavens	1	II Corinthians 5:2
sat Him at his right hand in heavenly places	3	Ephesian 1:20; 2:6; Hebrews 8:1
pattern, inheritance, silence, war, temple, armies of heaven	8	Hebrews 9:23; I Peter 1:4; Revelation 8:1; 12:7; 14:17; 15:5; 16:17; 19:14
Total – New & Old Testament	132	

Table 4. Verses which refer to lights, sun, moon, and stars are listed. Verses concerning God stretching out the heavens are included with the second heaven as they appear to verify the evidence for an expanding universe.

Description	#	Bible Verse
Old Testament		
lights in firmament of heaven	3	Genesis 1:14; 1:15; 1:17
sun, moon, stars, planets, constellations, host of/in heaven	30	Genesis 15:5; 22:17; 26:4; Exodus 32:13; Deuteronomy 1:10; 4:19; 10:22; 17:3; 28:62; Joshua 10:13; II Kings 17:16; 21:3; 21:5; 23:4; 23:5; I Chronicles 27:23; II Chronicles 33:3; 33:5; Nehemiah 9:23; Psalm 8:3; 89:37; Isaiah 13:10; 34:4; Jeremiah 8:2; 19:13; 33:22; Ezekiel 32:7; Joel 2:10; Nahum 3:16; Zephaniah 1:5
heaven for height/high/measured above earth	5	Job 22:12; Psalm 103:11; Proverbs 25:3; Isaiah 55:9; Jeremiah 31:37
stretcheth/spreadeth out the heavens	13	Job 9:8; 37:18; Psalm 104:2; Isaiah 40:22; 42:5; 44:24; 45:12; 48:13; 51:13; Jeremiah 10:12; 51:15; Ezekiel 1:22; Zechariah 12:1
shine as the brightness of the firmament	1	Daniel 12:3
heavens had no light	2	Jeremiah 4:23; Ezekiel 32:8
spread out the sky	1	Job 37:18
New Testament		
stars fall from heaven	5	Matthew 24:29; Mark 13:25; Revelation 6:13; 8:10; 9:1
powers of heaven shaken	3	Matthew 24:29; Mark 13:25; Luke 21:26
host of heaven	1	Acts 7:42
heavens departed as a scroll	1	Revelation 6:14
stars of the sky	1	Hebrews 11:12
Total – New & Old Testament	66	

the surface to over 60,000 feet (Bryson, 1981). Similarly, birds fly from near the ground to over 25,000 feet (Parkes, 1981). This overlap between clouds and birds helps define the location of the first heaven. It is atmospheric space.

Psalm 148

Psalm 148 is one of the best passages describing the three heavens. It is one of the greatest Psalms of praise. It can be divided into three sections: verses 1–2 refer to the abode of God and His angels, verses 3–6 are praises from the celestial heavens, and verses 7–12 are praises from the earth. It appears to progress from the highest heaven down to earth.

The first praises (1–2) are offered from the “heavens” (the third heaven) and the “heights,” the Hebrew word “*mārôm*” which means “a highly placed location” or “place on high” (HALOT). It is in the plural form which, in this case, indicates a superlative “the highest height” or an elative “an extremely high height” suggesting the “highest place.” Next the angels praise him and all his hosts. Angels are often depicted in the presence of God (I Kings 22:19–22; Job 1:6–12; 2:1–6, Ezekiel 1:4–8; Isaiah 6:1–9) in the third heaven. The Hebrew word for hosts is *šābā’* and can be translated as an army of angels (Psalm 103:21) or stars (Deuteronomy 4:19) (HALOT).

In this case it seems to be referring to the angels.

In the next section, the celestial heavens praise Him as the sun, moon, and stars offer praise. But in verse 4, we see the term “heavens of heavens.” Although this is translated “highest heaven” in a number of translations, in context, it most likely refers to the realm of the sun, moon, and stars—the second heaven. Humphreys proposes that “heavens of heaven” can be interpreted in this manner (Humphreys, 1994), and it seems to fit better here. Then the waters above the “heavens” (or “heaven”) praise Him.

In a rare mention outside Genesis 1, verse 4 calls for praise from “the wa-

Table 5. Verses which refer to atmospheric phenomena are listed. Most are listed separately, but through our knowledge of science, we know that they interact together. It should be noted that these phenomena are never mentioned with the heaven of the sun, moon, and stars.

Description	#	Bible Verse
Old Testament		
fowls fly in firmament of heaven	1	Genesis 1:20
fowls/birds of heaven/air	47	Genesis 1:26; 1:28; 1:30; 2:19; 2:20; 6:7; 7:3; 7:23; 9:2; Deuteronomy 4:17; 28:26; I Samuel 17:44; 17:46; II Samuel 21:10; I Kings 14:11; 16:4; 21:24; Job 12:7; 28:21; 35:11; Psalm 8:8; 79:2; 104:12; Proverbs 23:5; 30:19; Ecclesiastes 10:20; Jeremiah 4:25; 7:33; 8:7; 9:10; 15:3; 16:4; 19:7; 34:20; Lamentations 4:19; Ezekiel 29:5; 31:6; 31:13; 32:4; 38:20; Daniel 2:38; 4:12; 4:21; Hosea 2:18; 4:3; 7:12; Zephaniah 1:3
windows/doors of heaven	6	Genesis 7:11; 8:2; II Kings 7:2; 7:19; Psalm 78:23; Malachi 3:10
rain from heaven	15	Genesis 8:2; Deuteronomy 11:11; 11:17; 28:12; 28:24; Judges 5:4; II Samuel 21:10; I Kings 8:35; 18:45; I Chronicles 6:26; Psalm 68:8; Isaiah 55:10; Jeremiah 10:13; 14:22; 51:16
brimstone/fire out of heaven	9	Genesis 19:24; II Kings 1:10 (2x); 1:12 (2x); 1:14; I Chronicles 21:26; II Chronicles 7:1; Job 1:16
dew of heaven	10	Genesis 27:28; Deuteronomy 33:13; 33:28; Daniel 4:15; 4:23; 4:25; 4:33; 5:21; Haggai 1:10; Zechariah 8:12
rain bread from heaven	4	Exodus 16:4; Nehemiah 9:15; Psalm 78:24; 105:40
hail/hailstones/great stones from heaven	2	Joshua 10:11; Psalm 18:13
thunder from heaven	4	I Samuel 2:10; II Samuel 22:14; Psalm 18:13; 77:18
clouds of heaven	3	Job 35:5; Psalm 147:8; Daniel 7:13
winds in/of heaven	6	Psalm 78:26; Jeremiah 49:36; Daniel 7:2; 8:8; 11:4; Zechariah 2:6
snow/ice	2	Job 38:29; Isaiah 55:10
New Testament		
fowls/birds of heaven/air	11	Matthew 6:26; 8:20; 13:32; Mark 4:4; 4:32; Luke 8:5; 9:58; 13:19; Acts 10:12; 11:6; Revelation 19:17
clouds of heaven	3	Matthew 24:30; Mark 14:62; I Thessalonians 4:17
winds of heaven	1	Matthew 24:31
rain from heaven (or lack of it)	4	Luke 4:25; Acts 14:17; James 5:18; Revelation 11:6
fire from heaven	3	Luke 9:54; Revelation 13:13; 20:9
bread from heaven	2	John 6:31; 6:32
hail from heaven	1	Revelation 16:21
sign from heaven	4	Matthew 16:2; 16:3 (2x); Luke 12:56
Total – New & Old Testament	138	

ters above the heavens.” This may be a transition point; the waters are below the stars but above the earth. In other words,

they would be the waters of Genesis 1:7, which refers to the atmosphere or first heaven. The NIV lends credence

to this idea when it translates “heavens” as “skies” in this passage. The English word *sky* comes from the Scandinavian

word *skei* which can mean the celestial heavens, but most often refers to a cloud or the upper region of the air (Murray, et.al. [OED], 1970). In this case it appears to refer to the atmosphere.

Next, there is a summation of the first four verses of Psalm 148 as asking that all things in the celestial heavens are to praise the Lord because He created them. Apparently, these created things are to remain forever (see also Daniel 12:3), with the exception that they will no longer be under the curse (Revelation 22:3).

Verses 7 and 8 begin the final section of praise which transitions from the heavens to the earth. The verses mention dragons (tannin), oceanic depths, fire, hail, snow, vapors (clouds), and stormy wind. The latter are atmospheric phenomena associated with “heaven” as noted in Table 5. Two points are to be highlighted from these verses. First, there is the mention of dragons which most likely includes dinosaurs from the dragons of the deep such as plesiosaurs, to the beasts of the fields, and possibly flying reptiles such as the pterosaurs as well. The only dragon mentioned by name is Leviathan (Isaiah 27:1), which may have been alive at that time, but apparently is extinct now. Second, these verses cover the entire earth from the lowest places of the deep oceans to the highest point in the sky. These phenomena are never mentioned in conjunction with the sun, moon, and stars. This separation indicates that these are located in a different space, i.e. the atmosphere, and what would be the first heaven.

In 9–12, praise moves from the height of the mountains, hills, and trees continuing down to all living creatures and finally to people. All these things are to praise God for his name and his glory.

From this great psalm, we see the outline of the three heavens—the highest of all the heavens, interstellar space, and Earth’s atmosphere.

Is the first heaven interstellar space?

Humphreys’ WHT proposes that the first heaven is interstellar space and the atmosphere is the “face” of the expanse. He bases this on Genesis 1:20b

...and fowl that may fly above the earth in the open firmament of heaven.

He prefers the translation:

...and fowl that may fly above the earth *on the face of the expanse of the heavens*. (emphasis added)

The implication is that birds “fly only in the lower reaches of the vast spaces of the heavens” (Morris, 2006 p. 11).

Birds can fly as high as 25,000 feet...at which point they are above two-thirds of the atoms of the atmosphere. So most of the atmosphere is merely at the surface of the expanse. Therefore the expanse itself must be something much bigger—such as interstellar space. (Humphreys, 1994, p. 61)

However, most birds fly at or near the Earth’s surface. Those at high altitudes are exceptions:

Most songbirds, for example, fly at between 500 and 2,000 feet and most waterfowl stay between 200 and 4,000 feet. (Whiteman, 2000)

These include migratory and soaring birds. But this assumes the present atmosphere and present topography of the earth. It does not consider potential differences of the antediluvian earth, including a potential vapor canopy and lower relief (Whitcomb and Morris, 1961).

1. Three of the top five high altitude sighting of birds were those migrating over the Himalayan Mountains (Wikipedia, 2019). Mt. Everest is over 29,000 high. If Earth’s topography were much less, say only 8,000 feet, these birds would not have to fly at such high altitudes to migrate. Even these high-altitude sightings show birds near the surface.

2. The antediluvian climate could have been milder. If it was uniformly temperate and productive, perhaps due to a vapor canopy, birds might not have migrated at all. The main reason birds migrate is for food (Kerlinger, 1995). Another reason is seasonal variations, but that is also tied to food. If the climate was milder and seasonal change not as great as today’s, migration would be less likely.
3. Wind patterns might have been different. Soaring birds do not flap to attain high altitude; it is too exhausting. Instead, they rely on warm updrafts. Besides these thermal currents, soaring birds can use “obstruction currents” such as winds flowing over mountains, cliffs, or tall buildings to reach altitude (Kerlinger, 1995). Migrating birds use prevailing winds at high altitudes. These wind patterns would have been drastically different on the pre-Flood earth due to the more uniform climate (Whitcomb and Morris, 1961).
4. In the present atmosphere, temperature generally decreases with altitude. This would not be the case with a vapor canopy. Vardiman (2001) estimated that the base of the canopy would be approximately 23,000 feet (7 km) above Earth’s surface. The temperature would increase 10° C (18° F) every 3,300 feet (1 km), assuming a base temperature of 30° C at the surface (Vardiman, 2001). Birds do not do well in high temperatures. They have a high body temperature of 105° F (40° C) and a high metabolic rate and active lifestyle (Mayntz, 2018). They do not have sweat glands and rely mainly on high respiration rates to cool their bodies. In a study of Sonoran Desert doves and quails, Gambel’s quail could tolerate temperatures around 50° C (122° F) while mourning doves and white-winged doves could tolerate temperatures as high as 60° C (140° F)

(Smith et al., 2015). These birds live in the desert; however, most birds do not tolerate such high temperatures. Finally, soaring birds can go to great altitudes and in so doing reach cooler air (Mayntz, 2018), but this would not be the case for a vapor canopy. A vapor canopy would have limited high-altitude flight.

For these reasons, birds would indeed stay at, or near, the surface of the earth under the vapor canopy model. So Genesis 1:20b would be applicable under the proposal that the first heaven is the atmosphere and birds fly on the surface of the earth.

Moreover, Humphreys (1994) proposed that empty space outside the bounded universe is the second heaven (Humphreys, 1994). Yet, this empty space is never mentioned in the Bible. Psalm 148 is a psalm of praise where everything that was created praises God from the highest heaven to the dragons of the deep, but this empty space was not mentioned here or anywhere else in the Bible.

Finally, if the waters above are above the sun, moon, and stars then the location of the “waters above the heaven” in Psalm 148 should be placed between verses 2 and 3 and not between 4a and 8. The preponderance of evidence indicates that the three heavens are the atmosphere, deep space, and the place where Christ is now (Morris, 2019).

Were the “Waters Above” Liquid?

The waters above the expanse mentioned in Genesis 1:6 were likely liquid water, not vapor or ice.

Waters (mayim). The word means a liquid water, not a vapor or solid. Had the water in Genesis 1:6–8 been a vapor, cloud, mist, or ice, other Hebrew words would have been more appropriate. For example, ancient Hebrew has six words for “cloud.” (Brown, 2001, p. 263)

The word *mayim* is used 580 times in the Old Testament and most often refers to liquid water, but not as vapor or ice (HALOT). None of the models reviewed propose that the “waters above” remained liquid, but all three propose it was initially, before turning through natural processes, into vapor (Dillow, 1982) or ice (Hartnett, 2007; Humphreys, 1994).

The Three Models

A brief description of each model will include supporting scriptural and scientific evidence, and an evaluation of strengths and weaknesses. In addition, we will note their relationship to the Flood and current Flood models.

The Vapor Canopy Model

The modern vapor canopy model (VCM) was proposed by Whitcomb and Morris (1961), and later defended in the many writings by Morris. Dillow (1982) also defended it, and the model was debated in some depth in the *Creation Research Society Quarterly* (Dillow, 1977, 1978a, 1978b, 1979, 1980, 1983; Kofahl, 1976; Morton, 1979, 1980; Rush and Vardiman, 1992; Smith, 1980; Walters, 1991). It was questioned by creationists after that debate, although Dr. Larry Vardiman (2001, 2003) continued to perform research on the issue. The essential points of the original model included:

1. The creative process was most likely an instantaneous event; i.e., God spoke and it happened (Psalm 33:9), but does not rule out other possibilities and is not essential to the model.
2. Water was moved above the atmosphere, or first heaven, in the form of a vapor canopy.
3. Meteorological conditions were different before and after the Flood.
4. The canopy collapsed during the Flood, supplying part of the rain.
5. Geologic formations were caused by vertical uplift due to isostatic

readjustment after the Flood.

The strength of the vapor canopy model is three-fold. First, it explains an enigmatic passage in Genesis 2:5–6:

And every plant of the field before it was in the earth, and every herb of the field before it grew: for the Lord God had not caused it to rain upon the earth, and there was not a man to till the ground. But there went up a mist from the earth, and watered the whole face of the ground.

The VCM interprets this to mean that there was no rain before the Flood and today’s hydrologic cycle began after the Flood.

This verse [Genesis 2:6] is applied specifically to the initial completed creation, but there is no mention made of any change in this meteorological phenomenon after the Fall, so it evidently continued until the time of the Deluge. This inference is supported also by the fact that the rainbow is mentioned as a new sign from God to man after the Flood, implying strongly that rain as we know it and the subsequent rainbow were experienced for the first time then (Genesis 9:11–17). (Whitcomb and Morris, 1961, p. 241, brackets added)

The existence of rain before the Flood has been much debated (Sarfati, 2015; Snelling, 2009), though there is little evidence either way. The plant or herb of the field (Genesis 2:5) did not grow until there was a man to till the ground. Before the Fall, Adam and Eve tended Eden. After the ground was cursed, Adam was to toil and eat from his labor. But that says nothing about rain. Did rain appear as a result of the curse? It is not mentioned in that context and was considered a blessing after the Flood (Deuteronomy 28).

Furthermore, the Hebrew word *’ed* for “mists” (Brown, et al. [BDB], 1906) has also been translated as “springs.” HALOT supports the idea of subterranean stream of fresh water which appears to be influenced by Albright

(Mowinckel and Albright, 1939). But either interpretation does not demand rain on the earth before the Flood.

The second strength of the VCM is that it supports God's benediction on the sixth day. If a vapor canopy was a part of this, it should have persisted until the Flood, unless it can be shown that it was replaced at the curse (Genesis 3). Under our present conditions, rain is necessary for us to live. In fact, it is considered a blessing from God (Deuteronomy 28:12), and its absence is a curse (Deuteronomy 28:23–24).

The third strength of the VCM is in providing rain for the onset of the Flood. This rain has been the cause of great debate among creationists.

It needs to be confirmed what were "the fountains of the great deep" and "windows of heaven," and whether the fountains and the rainfall from the "windows" were both stopped on the one hundred fiftieth day... (Boyd and Snelling, 2017, p. 747).

It is being investigated by Boyd and Snelling as a sequel to their first book on the Genesis Flood (Boyd and Snelling, 2017). It will be interesting to hear their conclusions on this important issue.

The greatest weakness of the VCM are the numerous atmospheric problems cited in the debates beginning in the 1970s which were not resolved by later work extending up to recent years. Nevertheless, the models show that a metastable thick canopy could supply enough rain for 40 days and night, but under present conditions, such a canopy would make Earth's surface too hot to support life (Vardiman, 2001). However, such a canopy could cover a livable earth if heat from the sun was 25% of its present output (Vardiman, 2003).

The idea that the intensity of the sun has increased is possible once the straitjacket of uniformitarianism is abandoned. The Bible predicts that an increase in solar output will happen in the future:

Moreover the light of the moon shall be as the light of the sun, and the light of the sun shall be sevenfold, as the light of seven days, in the day that the Lord bindeth up the breach of his people, and healeth the stroke of their wound. (Isaiah 30:26)

Even evolutionists talk about a "faint young sun paradox" problem (Oard, 2011b). This proposes that the output of the sun was about 70% of current values in the early earth and is used only to explain an "old-age" problem. This is an area that requires further investigation.

The RATE group showed through several lines of research that accelerated nuclear decay took place in the past, specifically during the Creation Week, the Fall, and the Flood. In their study, they suggested that small changes in the strength of the nuclear force can lead to large changes in half-lives (Vardiman, et. al., 2005). Other areas of further research proposed by the RATE group included meteorites, which are used as standards to date the earth and the rest of the solar system (Vardiman, et al., 2005). It is possible that accelerated nuclear decay affected more than just the earth, but perhaps the entire solar system. However, the RATE group did not consider if this affected the sun. Whether this caused an increase in the sun's heat at the time of the Flood is a matter for future study.

Another problem arises from Psalm 148, which clearly states that the waters above the heaven were there at that time, and that they will exist forever. Caution is required, because the psalmist could be using a figure of speech called an "apostrophe":

A figure of speech, by which a speaker or writer suddenly stops in his discourse, and turns to address pointedly some person or thing, either present or absent. (OED, pp. 392–393)

In the VCM model, the vapor canopy was created on the second day and was declared "good." It collapsed during the Flood and provided the 40

days and nights of rain. Morris (2006) proposed its restoration at the re-creation of the New Earth.

The White Hole Cosmology Model

Humphreys (1994; 1998) derived a cosmological model in response to the problem of starlight and time. Evolutionists (Nye and Ham, 2014) argue that our ability to see starlight from objects billions of lightyears away invalidates a recent creation. Humphreys used Einstein's general theory of relativity, which has been well-established experimentally, to answer them. He notes the discontinuities between the work of the Creation Week (which were miraculous) and those after (which were preservational). Humphreys asserted in his white hole cosmology (WHT):

1. The universe is bounded (finite).
2. The universe expanded.
3. The earth is at or near the center of the universe.
4. The universe is young per Earth time.
5. The original matter was water.
6. God transformed the water into the various elements during the creation week.

The greatest strength of the WHT is it supplies a "scientifically satisfactory explanation of the large-scale phenomena we observe in the heavens" (Humphreys, 1994, p. 84). It appears to follow secular science and the current "Big Bang Theory" with its expansion/inflation ideas. It explains the following:

1. Light from distant galaxies. We see light from galaxies which are billions of light-years away, measured by a variety of techniques. Light traveling such great distances at today's speed would take billions of years to reach us.
2. Galactic red shifts. The wavelengths of light from each galaxy are shifted toward the red side of the spectrum by a factor roughly proportional to the distance of the galaxy from us. There are some exceptions, but the

overall trend is very clear and must be explained.

3. Cosmic microwave background. The earth is immersed in low-power microwave (centimeter to millimeter wavelength) electromagnetic radiation whose spectrum is exactly like that of the thermal radiation (heat waves, black-body radiation) found within a cavity whose walls are very cold, at 2.74° K. After correction for the earth's motion through space, this radiation is very uniform, having variations with direction no greater than one part in 100,000. (Humphreys, 1994, pp. 84–85).

In addition, Humphreys (1994, 1998) found support in many verses that describe the heavens as being “stretched out.” These include Isaiah 40:22 and Jeremiah 10:12 (Table 4). However, these verses may not be referring to the mechanism God used to create the heavens, but simply referring to the vastness of space.

The greatest weakness of the WHT is that it depends on the assumptions of a 4-dimensional and bounded or finite universe. These contingencies are conceptual, speculative, and currently unverifiable. WHT cannot explain star formation, nor does it predict/explain dark matter/energy (which is also speculative). Furthermore, it places the Genesis 1 waters above the heaven outside of intergalactic space, at the edge of the universe, which he interprets as the first heaven. But this would not appear to match the location as described in Psalm 148, as noted above.

But Humphreys has continued to defend his model against all objections. It may never be proved, but it has not yet been disproved. WHT seems to work well in conjunction with Catastrophic Plate Tectonics (CPT) to explain the rain during the Flood. This is not surprising, as Humphreys is one of the co-authors of CPT (Austin, et al., 1994). Finally, it gives a plausible scientific answer for the starlight-time problem.

The Hartnett-Carmeli Model

Hartnett (2007) also relies on relativity to explain the starlight-time problem, but as modified by Moshe Carmeli (2002). The Hartnett-Carmeli Model (HCM) uses time-dilation to explain distant starlight in a young universe. It, too, relies upon an “economy of miracles” during the Creation Week events. HCM can be summarized as follows:

1. Universe can be either infinite or finite and is isotropic, but not homogeneous. HCM goes with finite.
2. Universe expanded during Creation.
3. Earth is at or near the center of the universe.
4. Universe is young per Earth time.
5. Universe is three-dimensional but has a fourth velocity dimension (*spacevelocity* model) as proposed by Carmeli's Cosmological Relativity (Carmeli, 1996, 2002, 2006).
6. The waters above are in the outer reaches of the solar system.

Like WHT, the greatest strength of this model is that it gives a “scientific satisfactory explanation” for the universe and the problem of starlight and time. The universe can be theoretically finite or infinite, but Hartnett (2007) chooses the former.

In contrast to WHT, it does not depend on the highly controversial idea of a 4-dimensional universe, nor does it need dark matter/energy to shore up the model. It seems to have a plausible explanation for particle production (star formation) as a natural consequence of energy conversion in the Carmeli cosmology.

The waters of Genesis 1:6 existed as ice in the outer solar system. They collapsed during the Flood and provided the water for the 40 days and nights of rain. Only remnants of the “waters above remain.” This seems to be in line with the Impact Flood Model as proposed by Oard (2011a). Although Oard proposed that the rain was caused by impactors hitting the oceans and blasting up water into the air, he may

not have considered this option as a possibility.

Its greatest weakness is biblical; locating the waters above in the outer reaches of the solar system does not appear to match the Bible's descriptions. Also, it does not try to explain the events occurring on Days 1–3 (Hartnett, 2016). Furthermore, the Carmeli cosmology lacks supporters in the secular world and has questions and potential inconsistencies (Hartnett, 2016). Like the other two models, it cannot be verified.

Even though the Bible does not place the waters above in the outer reaches of the solar system, there appears to be evidence of water, or remnants of it, at this location. Hartnett did not claim this to be a definitive answer but only a sketch; it is an ongoing endeavor, and objections could be worked out upon further research. Moreover, the Carmeli cosmology may not be mainstream science, but that does not mean that it is invalid, as further research may discover answers to its inconsistencies. One of the advantages of this model is that it demonstrates other possibilities to the light-time travel problem, and that the present theories of the Universe which requires dark matter/energy to shore up the model can be explained otherwise.

Carmeli's model is able to describe the Universe without dark matter and dark energy. That is very appealing, but it does not make it the correct cosmology because other models have been developed that claim something similar. (Hartnett, 2016, p. 2)

Related Questions

There are several questions which are related to the models above and to creation in general. Is the universe infinite or finite? Also, is the universe four or three dimensional? Finally, is time dilation the only way to explain the starlight-time problem, or are there other solutions? The answers to these questions may be

able to help us determine which model best fits the data, and consequently, identify a possible Flood model.

Is the Universe Infinite or Finite?

It is impossible to tell by direct observations whether the universe is finite or infinite.

The choice of cosmology, then, is ultimately personal preference, not a requirement dictated by the data. (Hartnett, 2007, p.87)

Hartnett (2007) pointed out that the universe could be infinite with the earth at the center, if matter was isotropically (but not homogeneously) distributed around us. Many maps of the universe show this to be the case, but the many assumptions required leave it an open question.

Both Humphreys (1994) and Hartnett (2007) model the universe as finite and bounded, with Earth near its center, citing biblical support:

But will God indeed dwell on the earth? Behold, the heaven and heaven of heavens cannot contain thee; how much less this house that I have builded? (I Kings 8:27)

Humphreys (1994) claims that this verse alone should convince creationists that the universe is finite. However, the verse does not state that: simply that the heavens (universe) cannot contain God. It does not exclude the possibility that the universe could be infinite, but even if it were, it could not contain the God who created it. This is a great mystery.

[Heaven] includes all space...and extends from the air we breathe...to the firmament or expanse that contains the innumerable stars. This it includes, and exceeds for where our intellect ceases to operate, and fails to find a limit to the extension of space, there faith comes in. (*Strong's Hebrew Dictionary*, p. 284)

Hartnett (2007) takes a different tack, asserting that these verses imply a finite universe.

He telleth the number of the stars; he calleth them all by their names. (Psalm 147:4)

I will bless thee, and in multiplying I will multiply thy seed as the stars of the heaven, and as the sand which is upon the seashore. (Genesis 22:17)

Again, these verses are not explicit about the finitude of the universe. Hartnett (2007) claims they assert a finite number of stars, which implies a finite universe.

Other scriptures indicate infinite heavens:

Thus saith the Lord; If heaven above can be measured and the foundations of the earth searched out beneath, I will also cast off all the seed of Israel for all that they have done, saith the Lord. (Jeremiah 31:37)

This verse is a comparison of what God will do (or never do) concerning His promises to Israel and His mercy to those who fear Him. This implies an immeasurability of the heavens which implies an infinite amount of time.

For as the heaven is high above the earth, so great is his mercy toward them that fear him. As far as the east is from the west, so far hath he removed our transgressions from us. (Psalm 103:11-12)

It is interesting that the Bible uses the phrase "as far as the east is from the west," which is literally an unmeasurable dimension, instead of "as far as the north is from the south," which is not (i.e., the north to the south poles). Thus there is a point on the globe which is the South Pole, but there is no point on the globe which is "the west." This also implies that the heaven above the earth is also unmeasurable.

For as the heavens are higher than the earth, so are my ways higher than your ways, and my thoughts than your thoughts. (Isaiah 55:9)

This, too, implies an infinite distance, as there is no searching out the ways and thoughts of God. We barely

know the physical world in which we live, much less the spiritual world that is to come.

Morris (1984, p.173) sums up the infinite universe position as follows:

Since God is infinite in power, it is reasonable that the universe He would create would be a universe of boundless space and endless time. In fact, our minds are so constituted (by creation) that we cannot even conceive of anything else. That is, what could be outside the boundaries of space, except more space? What could be after time, but more time? Relativistic mathematics may involve such things as curved space and warped time, but the real world of human experience and observation is one of unbounded three-dimensional space and unending one-dimensional time.

Recent creationist cosmologies disagree. Humphreys' (1994) model requires a finite, bounded universe. If the universe is infinite, then his model fails.

4-Dimensional or 3-Dimensional Space

The debate of whether we live in a 4-dimensional (4-D) or 3-dimensional (3-D) space has been around since the 1800s (Franklin, 1981). 4-D space is conceptual and unverifiable. At the same time, neither has it been disproved, as numerous experiments have been unable to falsify it. 3-D objects used to describe 4-D space, such as the tesseract cube (the tesseract cube is a four-dimensional analogue of a cube), or a balloon, require visualization to see another dimension. Does the Bible support a 4-D universe? Humphreys cites these verses:

And Thou, Lord in the beginning hast laid the foundations of the earth; and the heavens are the works of thine hands: They shall perish, but thou remainest; and they all shall wax old as doth a garment; And as vesture shalt thou fold them up, and

they shall be changed; but thou art the same, and thy years shall not fail. (Hebrews 1:10–12)

And all the host of heaven shall be dissolved, and the heavens shall be rolled together as a scroll: and all their host shall fall down, as the leaf falleth off from the vine, and as a falling fig from the fig tree. (Isaiah 34:4)

And the heaven departed as a scroll when it is rolled together, and every mountain and island were moved out of their places. (Revelation 6:14)

These verses are pointing to future events which the prophets were describing, either through prophetic utterance or divine vision, using highly metaphorical terms which the hearer/reader could understand. One interpretation is as follows:

This suggests that (1) there is some dimension in which space is thin, (2) space can be bent, and (3) there exists a direction it can be bent toward. Thus these verses could be hinting that a fourth spatial dimension exists, even though we can't perceive it. (Humphreys, 1994, p. 67)

This is based on a very literal interpretation of these passages. However, no observations have detected this “thin” dimension. The universe is always described with a radius. It has been estimated as 13.5 billion light-years (Hartnett), 20 billion light-years (Humphreys, 1994), and as high as 46 billion light-years (Sarfati, 2015). As far as we can tell, there is no “thin” dimension.

Furthermore, these verses can be interpreted in several ways; e.g., as a cloud that blots out the stars of the sky (Morris, 2006). The Bible uses complex imagery to describe persons, places, and events. They can sometimes be interpreted literally, metaphorically, or figuratively. How these verses are to be interpreted is subjective, so we cannot be dogmatic. Someday it may be revealed to us either through science or by experience.

Physically, the created order has always been a 3-D universe. Biblical examples include Noah's Ark, the Ark of the Covenant, the tabernacle, the temple, Ezekiel's future temple complex, and the New Jerusalem. Moses' tabernacle used a divine plan (Exodus 25:9, 40; Hebrews 8:5).

His earthly tabernacle was patterned after the heavenly tabernacle. New Jerusalem is described as an equidimensional cube (Rev. 21:16). There is not a fourth dimension. On a more speculative note, God presents Himself as a triune being; perhaps the physical dimensions of the created reality mirror that. 4-D space is therefore speculative and unobserved. More importantly, there is no clear biblical indication that it exists.

Time Dilation

Modern physics has shown observationally that space is vast, with stars and galaxies billions of light years away. Once, the “mature creation” theory, with light created in place, seemed to be the best explanation for distant starlight. But variations, including supernovas, and other phenomenon post-dating the creation week are yet billions of light years away. This light could not reach a 6,000-year old Earth.

Time dilation (Hartnett, 2007; Humphreys, 1994) solves this problem. Distant starlight could travel much faster than our frame of reference. It can also explain supernovas and other phenomenon that occurred after the creation week. This is the greatest strength of these models. However, Psalm 33:6–9 appears to say otherwise: “For he spake, and it was done.” This seems to imply that the stars were created instantly only a few thousand years ago.

The Anisotropic Synchrony Convention (ASC) model (Lisle, 2010) suggests that light reaches earth instantaneously in a young creation. ASC maintains that the round-trip speed of light is constant, but the speed of light is a function of

direction. It varies relative to the observer by the equation $c_\theta = c/(1-\cos\theta)$, where $\theta = 0^\circ$ is the direction toward the observer (is instantaneous), and $\theta = 180^\circ$ for the direction away from the observer (is $c/2$), so that the average measured speed of light is c . This appears to solve many biblical starlight problems as God spoke “and it was so” (Genesis 1:15).

The time when a celestial event is seen was considered to be simultaneous with the time in which the event happened. (Lisle, 2010, p. 202)

Thus, in the ASC model the stars are only thousands of years old and not billions, as in the time-dilation models. Either way, these models can give satisfactory explanations for the time-travel problem.

One final possibility is that space itself was stretched out in some miraculous fashion during the creation week, carrying light along with it (Faulkner, 2013). This is a new concept and would be outside our current concepts of physics.

Summary

The creation of the universe falls beyond the realm of science. Consequently, some type of religion or faith must be used to describe its origin. The Bible gives us just such a description as God created the heaven and the earth in six days and rested on the seventh. Although it doesn't tell us every detail, it does give us a general order, duration, and to a certain extent, its methods (e.g., God spake...and it was so) using processes no longer in operation.

For Christians, interpretation is very important, especially with nebulous passages not directed at cosmology construction. In this paper an attempt was made to determine the three heavens as revealed to us by Paul (II Corinthians 12:1–4). It is proposed that they are the atmosphere, interstellar space, and the Kingdom of heaven where Christ is now.

One of the many mysteries of creation was what the waters above the expanse (heaven) were and where they were located. Three models have been compared, the Vapor Canopy Model, the White Hole Theory model, and the Hartnett-Carmeli Model. The VCM, the WHT, and the HCM place the waters above the atmosphere, interstellar space, and the outer reaches of the solar system respectively. Each of these models have their strengths and weaknesses, and it seems that at this time they are all unverifiable simply because there are too many unknowns, and no one, besides the Lord, was there to observe the events.

That there are such disagreements is not necessarily a bad thing. In fact, it is how good science is done as it helps us to study further, and to eventually discover the truth, even the mind of God.

Acknowledgements

I would like to thank Gene Chaffin, John Reed, and the anonymous reviewers for their many corrections, suggestions, and comments to help make this a better paper. I would also like to thank my mom for her faithfulness and my Sunday school class for their encouragement and many prayers. Last, I would like to thank God for His guidance and being with me all my life to this day.

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Minutes of the 2019 Creation Research Society Board of Directors Meeting

The 56th annual CRS board of directors meeting was held at the La Quinta Inn & Suites in Denver, Colorado, from Thursday 30 May through Saturday 1 June 2019.

Board members were busy and accomplished many tasks in full board meetings and smaller committee meetings over the weekend. The Lab committee held an extended meeting Thursday afternoon. The entire board met Thursday evening to consider preliminary matters. All standing CRS committees met during the day on Friday. The entire board met on Saturday to finalize the year's business and planning.

The following board members attended: Jerry Bergman, Rob Carter, Gene Chaffin, Tim Clarey, Don DeYoung, Robert Hill, Mark Horstemeyer, Russ Humphreys, Jean Lightner, Gary Locklair, Michael Oard, Ron Samec, and Glen Wolfrom (via Skype). VACRC director Kevin Anderson and professional staff member Diane Anderson were also present.

Only selected highlights of board activities and actions are presented here.

The 2018 board minutes were approved as published.

171 ballots were received for the 2019 board of directors election. All three candidates (Don DeYoung, Gary Locklair, Ron Samec) were elected to a 3-year term on the board.

Recognition was given to Mark Horstemeyer (new board member) and Russ Humphreys (attending his final board meeting after 26 years of service).

President DeYoung challenged board members with a "board member report card."



Figure 1. CRS Board members. L-to-R back row – Russ Humphreys (emeritus), Bob Hill, Kevin Anderson*, Jean Lightner, Diane Anderson*, Rob Carter, Gene Chaffin.

L-to-R front row – Gary Locklair, Tim Clarey, Don DeYoung, Jerry Bergman, Mark Horstemeyer, Ron Samec, Mike Oard.

*CRS staff, not board members

The Society has no debts and our liability insurance is up-to-date.

Don DeYoung, VACRC committee chairman, reported that our research facilities in Chino Valley, AZ, are in good condition. The lab budget was increased by a modest 2% over the previous year.

The entire board discussed the possibility of moving the CRS headquarters.

Russ Humphreys led a devotion on Psalm 112. As scientists, we can see ourselves in this psalm. It's great to find delight in the works of God. We seek them out and research them, and we find enjoyment in that process as we honor the Creator.

Jerry Bergman reminded members about Amazon Smile. Users can sign up and designate CRS to receive a donation as a percentage of sales.

Gary Locklair, internet committee chairman, reviewed our current online presence (web site, Facebook page, CRSnet listserv email reflector). The committee recommended hiring an information technologist to deal with all phases of our online presence and focus especially on our website. The committee developed a vision statement for the website. Our volunteer webmaster, Fred Williams, was thanked for his work.

Gene Chaffin, periodicals committee chairman, shared information relat-



Figure 2. Board President Don DeYoung presenting (from L-to-R) achievement awards to Mike Oard for his 20 years of service to the board, Jean Lightner for her 10 years of service to the board, and Rob Carter for his 5 years of service to the board.



Figure 3. Rob Carter presenting membership information to the full board.

ing to the *CRSQ* and *Creation Matters* (CM). As Danny Faulkner's five year term as *CRSQ* editor is up, the committee recommended Tim Clarey for the editor position. The board thanked Danny for his years of service. There was discussion on how to move *CRSQ* publication back on schedule. The board thanked Glen Wolfrom for his work with CM for the past 24 years.

Mike Oard, publication committee chairman, presented information about book sales. He indicated that book sales are declining, and the committee is investigating means to reverse that trend.

Rob Carter, membership committee chairman, provided information on the state of the Society. He presented four projections for future membership growth in the Society. He noted a concern related to the aging membership of the Society. The CRS currently consists of 1653 members and subscribers, with 618 being voting members.

Gene Chaffin, research committee chairman, reported the Society is sponsoring a number of research projects funded by CRS grants. The committee recommended publicizing our sponsored research and soliciting donations specifically to fund research.

Don DeYoung, for the Executive Committee, formed an ad-hoc com-

mittee to explore a possible move of our research facility and headquarters.

Gary Locklair, constitution committee chairman, reported the committee considered plans to revise our constitution and bylaws. The committee authorized Kevin Anderson to seek advancement and marketing advice to assist the society with promotion. The committee recommended that our publications promote the Society.

Financial Secretary Bob Hill presented the financial situation of the Society. He challenged all committees to identify ways to increase revenue. Our income has been relatively flat, while our expenses have increased.

The board approved an expense budget of \$331,600 for the coming fiscal year. The board authorized Diane Anderson to withdraw up to \$20,000 of funds without executive committee action.

The board submitted the names of Rob Carter, Tim Clarey, Danny Faulkner, Bob Hill, Mike Oard, and Tichomir Tenev as candidates for the 2020 board of directors election. Board elections resulted in the following: President – Don DeYoung, Vice President – Gene Chaffin, and Recording Secretary – Gary Locklair.

The following officers were confirmed for the second year of their 3 year term (to be confirmed in year 3 of their service also): Financial Secretary – Bob Hill, Treasurer – Danny Faulkner, and Membership Secretary – Rob Carter

Mike Oard was honored for his 20 years of service to the board.

Jean Lightner was honored for her 10 years of service to the board.

Rob Carter was honored for his 5 years of service to the board.

The next annual meeting of the CRS board of directors will be 28–30 May 2020 in Phoenix, Arizona.

Respectfully submitted,

Dr Gary H Locklair

**Prof. Gary Locklair, PhD, FCRS
CRS Recording Secretary**

N.B. — One month after our board meeting, we received the news that current board member Dr. Glen Wolfrom and former board member Dr. George Howe passed from this life to eternal glory. They both will be sorely missed.

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Robert Mullin*

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July 26–27, 2019 • Mequon, WI

*On July 26–27, the Creation Research Society held its ninth conference on the campus of Concordia University in Mequon, Wisconsin. There were 145 Society members in attendance, plus vendors and CRS staff. Great fellowship was enjoyed by all attendees, especially during the opening reception on the evening of July 25. Dr. Don DeYoung delivered the Henry M. Morris Memorial Lecture the evening of July 26. His talk was entitled *Defending Our Faith with Grace*. The primary purpose of the meeting is to provide a venue where people can present preliminary research and gain valuable input from their peers. We hope that some of the research presented at these meetings will eventually be published in the *Creation Research Society Quarterly* as full papers. Since these are works in progress no attempt was made to record them. However, below are the abstracts from the 2019 meeting as submitted.*

Discovery of a Human Y Chromosome Molecular Clock

Nathaniel Jeanson & Rob Carter

The field of genetics records the timescale of human origins in several ways. One of the lesser known and indirect ways is by tabulating the growth and decline in ancestral population sizes. This inferred history can be compared to the known recent history—the last 3,000 years—of humanity. If genetics

records a total of only a few thousand years of history, then the shape of recent known population growth should match most of the inferred genetic growth and decline. Instead, if genetics records a total of hundreds of thousand years of history, then the shape of recent population growth should match only the tail end of the inferred genetic timeline. We analyzed Y chromosome sequences among modern humans, inferred population growth history from these sequences, and found strong confirmation of the recent origin of humanity.

Continuous Environmental Tracking: A Creationist Explanation for Biological Anticipatory Systems

Randy Guliuzza

Continuous Environmental Tracking (CET) is an engineering-based, organism-focused framework of biological adaptation developed by ICR. CET uses these assumptions: (1) The same engineering principles that underlie human-engineered tracking systems like cruise control apply equally to biological systems. (2) Organisms purposefully track environmental changes to deploy appropriate adaptable responses. CET expects a tight correlation between the elements in human-designed systems to those in biological systems performing similar functions. Given that human tracking systems may employ complicated anticipatory systems to forecast the weather or celestial motions, and if creatures are expected to continuously track changing conditions, then a design-based theory could predict that organisms also have innate anticipatory systems. This implies that some biological adaptations are not purely reactive. Rather, logic-based systems would give organisms foresight—both conscious and unconscious—of how they should preemptively self-adjust to predicted conditions. Literature investigations reveal stunning anticipatory systems in plants and animals. Currently, little is known about the circuitry that underpins the foresight of possible future states or problem solutions. Yet, a creationist framework could guide research by predicting elements to look for. Consider that weather forecasting models assimilate: (1) mathematical equations characterizing natural phenomena, (2) sensory data of current conditions, (3) stored data on weather trends, and (4) equations that “step forward in time” established “initial conditions.” The CET model predicts that biological anticipatory systems have key elements comparable to these four. After biological foresight emerges from anticipatory mechanisms, it’s then input data for other systems guiding developmental, physiological or behavioral actions.

“Nailing Down” the Details of a Biblical Cosmology: Possible Over-looked Scriptural Clues

Jake Hebert

Although much work on biblical cosmology has been done since Russell Humphreys’ seminal 1994 work, it seems that most creationist cosmological research remains preliminary and speculative. Biblical creationists have yet to “nail down” even the most basic details of a biblical cosmology, most

notably whether or not the universe is expanding. In two recent *CRSQ* papers, Jake Hebert and Jim Johnson suggested that (1) creationists are misunderstanding Isaiah 40:22, long seen as a “proof text” for a spherical Earth and that (2) Isaiah 40:22 and other passages of Scripture may provide important constraints for a truly biblical cosmology. Logical deductions about the *raqia’* and the “waters above” may provide Scriptural evidence against an expanding universe. The fact that the watery Earth was already spinning before God separated the “waters below” from the “waters above” on Day 2 of the Creation Week raises the possibility that the “waters above” may still be spinning. These deductions might allow for testable predictions. Incredibly, Scripture may even provide hints regarding the location of the “third heaven,” the abode of God. This presentation reviews the Scriptural evidence presented in those two *CRSQ* articles and discusses some additional considerations.

Preliminary Cephalopod Baraminology Study Based on Mitochondrial DNA and Morphology

Matthew Cserhati

Relatively few invertebrate holobaramins have been determined as of yet. Therefore, it would be very interesting to expand the list of known holobaramins in nature. In this study, three to five cephalopod holobaramins were determined based on three analyses of a total of 106 species.

First, an all-versus-all pairwise comparison of the whole mitochondrial genome sequence was performed for 47 cephalopod species. A heatmap was made based on the pairwise sequence similarity matrix. Here five holobaramins were delineated containing at least five species each, with statistically significant p-values. These include an octopus baramin with 12 species, a cuttlefish baramin with 11 species, two squid baramins with 5 and 11 species apiece, and a nautilus baramin.

Besides looking at the whole mitochondrial genome, two morphological character data sets were analyzed with the BDIST software. A first morphological dataset containing 60 cephalopod species with 86 characters compiled by Lindgren et al. resulted in three holobaramins. These include 14 species of octopods, 43 species of decapods, and 2 nautilus. A second morphological dataset containing 28 cephalopod species with 85 characters from Sutton et al. resulted in 22 decapod species, 5 octopod species, with *Vampyroteuthis infernalis* being undetermined.

While it is true that the genotype determines the phenotype, giving precedence to the DNA study, still, the mitochondrial genome is less than 0.01% of the whole genome.

Both the mitochondrial DNA study and the morphological character studies showed that nautilus and octopods form a holobaramin, but the situation is inconclusive as per the decapod species.

Herbig-Haro Objects, T-Tauri Stars, and Angular Momentum Loss: Missing Components of Creationist Critiques of Star Formation Theories

Bob Hill

Creationist critiques of star formation in almost all instances use an outdated version of star formation. Critiquing an out of date model is not helpful to the creationist cause. A common creationist critique of evolutionary star formation models involves the conservation of angular momentum. Creationists point out that the angular momentum of the planets exceeds the angular momentum of the sun. That fact is then used to critique evolutionary star formation models.

The current evolutionary models of star formation have suggested mechanisms to shed angular momentum. These mechanisms involve Herbig-Haro objects and T-Tauri stars, as well as other mechanisms.

This presentation will present an accurate presentation of the current evolutionary model of star formation that involve Herbig-Haro objects and T-Tauri stars, as well as other mechanisms proposed. Suggestions for creationist research involving these mechanisms will be discussed.

Noah's Blood: Analysis of 1000 Genome Data from the HBB Gene

Marshall Jordan

Genetic variation of the human population can be explained by the Created Heterozygosity and Natural Processes model. To analyze variations in the gene HBB (hemoglobin beta subunit) by this model, variant allele frequencies were downloaded from the NCBI website 1000 Genome browser and counted with custom Python scripts. The coding exons of this gene contain 17 rare variants (minor allele frequency <.05%), 1 uncommon variant (sickle cell trait, frequency 2.7%) and 1 common variant (a Synonymous mutation at the 3 Histidine position, frequency 21%). When the entire gene is analyzed, there are 64 rare, 3 uncommon, and 5 common variants. Based on the model, this pattern suggests: (1) The beta subunit of hemoglobin, common to 96% of people today, is identical to that of Noah and Adam. (2) The

common Synonymous mutation at 3 Histidine (common in all sub-populations) is likely a mutation present in Noah's family. (3) Distribution of the sickle cell trait confirms the natural process of selection. (4) Variants representing Created Heterozygosity are all found in the gene's introns and do not affect the protein's primary structure. Further research will show whether the common variants of Created Heterozygosity are limited to non-coding portions of other genes of high functioning metabolic proteins. The model explains the 1000 Genome data for HBB consistent with the descent of all people from Adam and Eve within a few thousand years.

Multiple Expansion Cosmology

Adrian Chira

It is proposed here a YEC cosmological model which aims to explain astronomical observations (distant starlight, redshift and CMB radiation) as well as answer theological questions about Creation (the pre-solar sequence of evening and morning, the light created in Gen. 1:3 and the meaning of the stretching of heavens in Isa. 42:5, etc.). The model starts with hermeneutically justified or biblically compatible postulates from which then predictions are drawn to match astronomical observations. These postulates include positing that God created the space-time metric so that the meter and the second decrease asymptotically as one moves away from the center of the universe (assumed to be close to Earth); that separation in Gen. 1 means creating new space in between, thus pushing the light away (with the most significant, inflationary "separation" having happened right after the creation of the stars) and that there has been an ongoing expansion of the metric of space. Further, conclusions drawn also predict new observations which could, in principle, test the model. The significance of the model lies in answering a major objection to YEC (the distant starlight) and, compared to other models, in providing new predictions and future tests as well as in the comprehensiveness of solution offered due to the number of astronomical observations and hermeneutical questions it addresses and integrates.

Baraminology Method Based on Comparisons of Whole Genome Motif Signatures

Matthew Cserhati

Different kinds of books use different vocabulary words based on their topic. For example, books on architecture use words

such as building, bridge, construction, or edifice. Books on sports use words such as score, game, baseball, or touchdown.

In a similar manner, baranomes (created genomes of kinds) have a set of characteristic functional sequence motifs (i.e. transcription factor binding sites). This characteristic suite of motifs is called a whole genome motif signature (WGMS). For the genome of an individual species one can enumerate and score each lexicographically possible motif of a given length (i.e. octamers), ranging from polyA to polyT. These motifs can be ranked according to their score, and this WGMS can then be compared with that of another species, and a Pearson correlation can be calculated to characterize their similarity.

In this analysis, the WGMS of 22 *Anopheles*, 30 *Drosophila* and 6 *Glossina* species were compared in an all-versus-all manner, and then clustered according to k-means clustering. These three genera formed distinct clusters (forming putative baramins), showing statistically significant discontinuity with all other species (*Anopheles*: $p = 0.0$; *Drosophila*: $p = 1.75 \times 10^{-277}$; *Glossina*: $p = 2.2 \times 10^{-26}$). In the heatmap below brighter colors represent Pearson correlation values closer to 1.0, whereas darker colors represent lower Pearson correlation values. Furthermore, based on their WGMS, two *Aedes* and one *Culex* species were categorized but did not fit into any of the putative clusters. These results show that the level of the baramin is as low as the genus in insects.

European Stratigraphy Supports a Late-Cenozoic Post-Flood Boundary

Tim Clarey

There is still considerable debate on the location of the post-Flood boundary in the stratigraphic record. Some have claimed that the K-Pg boundary marks the end of the Flood and also the end of marine deposition across the continents. These scientists have insisted that the massive volumes of post-K-Pg sediments observed globally are merely the result of local, post-Flood catastrophes. In contrast, other creation scientists have argued that the K-Pg was not the end of the Flood and that Flood processes continued through much of the Cenozoic rock record. In addition, they interpret much of the Cenozoic strata as the receding phase of the Flood.

To help settle this debate, we compiled nearly 450 stratigraphic columns using oil industry wells, outcrops, seismic data and published cross-sections across the European continent. At each location, we input detailed lithology data and the Sloss-type megasequence boundaries. These data were input into Rockworks (ver. 17), a commercial software program for geologic data.

Our results dramatically conflict with the K-Pg post-Flood boundary interpretation. The sedimentary rocks across much of Central Europe indicate marine depositional processes continued without interruption from the Cretaceous through the Upper Cenozoic. Many locations show continuous deposition of carbonate rocks across the K-Pg boundary, from the Cretaceous through Miocene. These results demonstrate that the European Cenozoic was not post-Flood, but most likely the receding phase of the Flood. Massive marine deposits across such vast areas of the world indicate Flood processes were still active well into the Upper Cenozoic.

Multifunctional Structures and Material: The Necessary Conditions for Optimized Autonomous Living Organisms and Man-Made Systems

Paul Kladitis

When engineers consider how best to build or optimize a system in terms of minimum size, weight, and power (SWaP), some will consider copying designs in nature (biomimicry). Most people can recognize the design optimization level in nature is superior to man-made systems. Usually biomimicry is equated at a superficial level to copying behavior or function at the system level, e.g. flying like a bird flies, swimming like a fish swims, locomotion like an insect, etc. However, at the most fundamental level, all living things seem to be designed with structures that perform more than one function besides a structural role: i.e. multifunctional structures. From hair to skeleton, every structure has more than one vital function. This talk will make the proposition that multifunctionality found in every part is the fundamental design principle allowing a living organism to be autonomous and optimum in SWaP. Furthermore, biological structures seem to be made from multifunctionality-enabling materials. This proposition, although helpful to, is different than the concept of irreducible complexity. Examples of translating this proposition to engineering will be presented. Furthermore, man-made structures with truly integrated multifunctionality must be manufactured using suitable methods. Advanced manufacturing methods that are most suitable today and forerunners to the future such as additive manufacturing will be discussed. Reasons why multifunctional structures don't have a more prominent emphasis in man-made designs, even though they are the key to ultimate optimization, will be addressed. Some reasons relate to design complexity, maintainability requirements, cost, manufacturability, and short term gain.

The Case for the Flood/Post-Flood Boundary being in the Late Cenozoic

Mike Oard

It is important for creation science to get the Flood/post-Flood boundary correct because if we postulate the wrong boundary, our deductions about the late Flood and the post-Flood period will very likely be wrong as well. Getting it wrong would hinder creation scientists from developing an accurate, sophisticated Flood model. Therefore, it behooves creation earth scientists to examine the issue of the Flood/post-Flood boundary carefully.

After examining this issue for about 20 years, and despite some difficult locations for determining the boundary, the evidence I have discovered strongly favors a boundary in the late Cenozoic, assuming the geological column as a point of reference. The late Cenozoic is defined as the Miocene, Pliocene, and Quaternary—the range is deliberately broad because we cannot take the secular dating of the late Cenozoic as precise time events in biblical earth history, as will be shown by the case of Miocene kangaroo fossils in Australia.

I will list seven evidences from sedimentology, seven evidences from organic remains, five evidences from tectonics, nine evidences from geomorphology, three evidences from climatology, and two miscellaneous evidences. Tim Clarey has amplified four of these evidences and added a new one of the huge Cenozoic Whopper Sand in the Gulf of Mexico. The total number of evidences from the earth sciences favoring the late Cenozoic boundary are 34. I will showcase only a few.

I have addressed many of the arguments that purport to favor the K/T boundary in the literature, but will briefly address three others I have not addressed, yet: (1) the idea that present-day and/or Ice Age mammals are found above their counterparts in the Cenozoic strata, (2) Cenozoic supergene mineralization, and (3) Miocene kangaroos in Australia.

Transitioning to Parasitism

Frank Sherwin

Prior to the Fall, God saw that everything was ‘good’ or ‘very good.’ Ecto and endoparasites would therefore have been free-living or perhaps had a neutral or even beneficial function. These ‘future parasites’ may have been beneficially associated (mutualism or commensalism) with man and animal before the Fall. Interestingly, some secular biologists see the transition of a free-living animal to a parasitic mode to be a 1-step process (e.g. Family Strongyloididae). The Curse would result in considerable loss of genetic information in

creatures and therefore loss of tissues, organs, and systems (e.g. Acanthocephala). In addition, the function and purpose of vectors and intermediate hosts (e.g. mosquitoes and tsetse flies) was transformed. At the cellular level (i.e. protozoa) making the transition from a free-living to a parasitic/disease relationship would involve signal rewiring mechanisms, networks and pathways. This conversion involves the study of ecological, zoological, behavioral, and social interactions.

Some Thoughts Regarding Possible Pre-Flood Human Artifacts

Jake Hebert

Creation supporters often seem troubled by the seeming absence of pre-Flood human fossils and artifacts. Granted, absence of evidence is not necessarily evidence of absence, but the “standard” creationist explanation for this phenomenon isn’t entirely convincing: Shouldn’t we expect to find some human fossils and/or artifacts in Flood sediments? Major creation ministries, embarrassed by previous “false alarms,” generally “steer clear” of the subject. Yet considerable eyewitness testimony for “out of place” artifacts exists, and a handful of extant artifacts could very well be antediluvian (the brass bell found in West Virginia coal is a good example). Eyewitness testimony, though not as compelling as an undisputed *in situ* artifact, has some evidential value. When answering this question, should we completely avoid this eyewitness testimony, or should we acknowledge it, while freely admitting that we do not yet have an airtight case? After all, a lack of indisputable evidence for the pre-Flood civilization is not quite the same thing as zero evidence for that civilization. Is the “accepted” creationist explanation for a lack of human fossils too quick to downplay the role of evolutionary bias? In light of the strong stratigraphic evidence for a high Flood/post-Flood boundary, is it possible that pre-Flood artifacts might be found in Cenozoic strata? Are there things we can do (such as obtaining affidavits, etc.) to strengthen the case that we do have? Should creationists be searching for such artifacts much more aggressively? And if so, where should we look?

Dinosaur Soft Tissue and Proteins: An iDINO Update

Kevin Anderson

The discovery of biomaterial in numerous fossils has posed a direct biochemical challenge to the standard assigned ages of

these fossils. All current biochemical studies demonstrate that the upper limit of bone protein survival is about two million years, even in ideal preservation conditions. Counter claims that this biomaterial is merely a bacterial biofilm or other misidentified contamination fail to address the observations of detailed cellular preservation or the detection of unique animal proteins. Yet, evidence that special environments will extensively enhance biological preservation have not been adequately evaluated. As part of its ongoing research, the Creation Research Society's iDINO project is currently seeking to analyze proposed mechanisms for a multi-million-year preservation. Bone was ground, placed into glass ampules, and heated at high temperatures (ranges of 80°C–90°C) for several weeks. Collagen decay rates of heated bone samples were determined using Fourier-Transform Infrared Spectroscopy (FTIR) and Second Harmonic Generation Imaging (SHG). Results demonstrated that this approach provides a precise means for conducting thermal kinetics of bone collagen. These kinetic studies can now be used to determine the effectiveness of various suggested preservation conditions, such as iron or certain metabolic end products (e.g., Advanced Glycoxidation and Lipoxidation End Products). By varying conditions, concentrations, etc., these studies will provide the analytical evaluation currently lacking for popular preservation models. Plus, thermal kinetics of other proteins (e.g., keratin) and carbohydrates (e.g., chitin) may be possible. These studies will greatly expand our understanding of biological decay rates, and may further challenge proposed preservation models.

The Cosmological Design Principle— A Cornerstone for a Sound Cosmology

Tichomir Tenev

We reason that the presupposition of design is essential for a sound cosmological theory, and we show how such presupposition could figure into the equations of said theory to yield useful results. By contrast, the popular Big Bang model, which fundamentally presumes the absence of design, is not a sound theory, because it lacks predictive power and relies on problematic notions, such as dark energy and dark matter, to explain observations. Design implies structure. We introduce a solid mechanics analogy of gravity as a helpful device to account for the possibility that cosmic space has inherent structure, and we demonstrate that the existence of such structure can be a viable and falsifiable explanation for the observed dark matter effect. Furthermore, we speculate

that inherent spatial structure may also explain observations currently attributed to dark energy, the existence of the so-called large-scale structure of the universe, and the spooky alignment of quasars.

A Gravitational Decompression Recompression Genesis Flood Geologic Model

Max Hunter

The Scriptural narrative of the Genesis Flood cataclysm, and the secular literature regarding the geophysical and geological history and structure of the Earth, reveal significant clues regarding processes that may have occurred during the Flood.

When correctly interpreted, the geophysical and geological data is considered consistent with a model in which, during the first forty days and nights of the Flood, the dominant geological processes on the Earth, were mantle melting and differentiation, which were initiated and temporarily maintained by a Universal reduction, by God, of gravitational force. Mantle melting and differentiation produced the waters of the oceans and all the components of the global geologic record.

The density distribution and phase changes in the Earth's mantle and transition zone, and Precambrian geology, are interpreted in light of the gravitational decompression-recompression model. Anomalous density reductions in the Transition Zone and Outer Mantle are considered to have resulted from gravitational decompression.

All of the Precambrian is revealed as comprising globally correlatable volcanosedimentary sequences which contain all of the same intrusive, volcanic and sedimentary lithologies and characteristic textures that occur in younger Flood deposited Phanerozoic strata. All of the Precambrian is thus interpreted as Flood deposited and contiguous with the underlying mantle.

The paucity of fossils in, and the source of, Precambrian sedimentary strata is discussed. Evidence of gravitational decompression in the Solar System, including volcanic cratering on all Solar System bodies, Lunar recession and asteroids and comets are discussed, as is evidence in the wider Universe. Indirect physiological evidence of decompression is discussed and a Flood geological column is presented.

Biomimicry: Practical Evidence for Biblical Creation

Don DeYoung

What do Velcro, fiber optics, and solar panels have in common? All three were copied from nature. Biomimicry explores similar practical ideas which are often assumed to arise over time by evolutionary fine-tuning. Four problems with this naturalistic approach will be given.

Several additional examples of biomimicry will be illustrated from plants, animals, people, and nonliving objects. Biomimicry provides a new approach to science: searching out the secrets embedded in creation for our eventual discovery and benefit.

Rapid Formation of Caves and Speleothems During the Ice Age

Mike Oard

The formation of caves appears to take millions of years if we assume the present is the key to the past. Present processes would indicate they were formed by carbonic acid, but it is very difficult to form the initial cave opening with just carbonic acid, even if we add millions of years. However, secular scientists have discovered that some caves, especially Carlsbad Caverns and other caves in the Guadalupe Mountains of southeast New Mexico, were excavated by sulfuric acid. More and more caves are now believed to have been formed by sulfuric acid dissolution, probably a majority of them. This presents the possibility that the cave openings were formed during continental uplift during the Recessive Stage of the Flood.

There was hundreds to thousands of meters of erosion as the continents uplifted out of the water during the Recessional Stage of the Flood. Since temperature increases downward in rock, the cave carbonate after the Flood likely would have been very warm. Since speleothems likely grow proportional to the temperature, rapid growth would be expected from this variable alone. The carbonate would cool slowly and the process of cooling would also aid in cave ventilation. Thus, many Flood and Ice Age variables would result in a very rapid speleothem growth after the Flood.

SHG Imaging of Collagen in Human and Dinosaur Bone

Brian Thomas

Biomedical researchers use second-harmonic generation (SHG) imaging to visualize collagen in situ, without pre-treatments like fluorophores. The application of this imaging technique to ancient bone remains largely unexplored. The known decay parameters of collagen in artificially decayed bone suggest a maximum longevity on the order of a million years. Therefore, direct detection of collagen in fossil bone samples would exclude their secular age assignments. Medieval, Roman Era, Pleistocene, and Mesozoic bone samples were imaged with SHG to explore the collagen content and decay characteristics in ancient bones from a variety of ages, settings, and taxa. The results generally show decreasing volumes of collagen in increasingly old samples, as expected. SHG imaging appears to capture traces of endogenous bone collagen too faint for extraction protocols to yield collagen. Taphonomic and diagenetic conditions seem to play a larger role than taxa in bone collagen preservation. Finally, small but detectable collagen fiber fragments in dinosaur bone samples imply an error in their secular age assignments. SHG imaging has the potential to detect faint collagen remnants in very old bone.

Climate Zones and Average Temperature Before the Flood

Brock Lee

Many creationists make mention of the Earth being warmer before the Flood, and several have speculated that the pre-flood world had a ubiquitous tropical climate from pole to pole. Specific numbers are scarce, and modelling and calculations are almost non-existent.

This paper takes Kurt Wise's previously published fossil climate indicators and uses them to determine the extent of pre-flood climate zones. The areal extent of pre-flood and modern climate zones was compared, and these extents were then weighted with representative temperatures to calculate the impact the change in extent would have on global average temperature. Matrices were created to compare all possible permutations of representative temperatures for each zone while eliminating invalid results.

The conclusion is that the polar zone covered 1.54% of the pre-flood world, compared to 13.4% of the planet at

present. The result was that the Antediluvian global average temperature was at least 4.2° F higher than at present, with conservative estimates ranging up to 6.7° F. The resulting dataset includes 11,806 valid permutations.

Insect Death Poses

Gabriela Haynes

Fossil insects are found very well-preserved in the fossil record. Most of them have their wings open. That is why they can be studied taxonomically. The veins and cells in their wings are diagnostic features for their identification.

The goal of this study is to undertake taphonomic experiments with all the taxonomic orders of winged insects, analyzing their poses from death to burial. This research aims to corroborate our understanding of how the death and fossilization of these organisms occurred during the Flood.

In previous experiments with live wasps and cockroaches, it was observed that their natural death poses are very different from how these insects are found in the fossil record. That demonstrates that they could not have died, been buried and fossilized gradually, thus confirming their catastrophic burial and fossilization during the Flood.

Two possibilities will be investigated. First, that those insects were in flight position when they got trapped and buried in sediments. And second, that they died in a watery environment, which could make their abdomen swell and force their wings and legs to open. These two hypotheses are plausible and confirm the Flood account.

When Did Accelerated Decay Occur?

Nathan Mogk

Radiometric dating is a powerful tool used by earth scientists to illuminate geological history. However, a simplistic interpretation of the measurements leads to “ages” that are far greater than the age of the Earth. The RATE initiative showed compelling evidence that decay rates have been higher in the past. Subsequently, some have proposed that the same techniques, interpreted relatively, might prove useful to an accurate understanding of the Young Earth. The conditions which are necessary for relative radiometric dating to hold are sufficient to guarantee the validity of an absolute dating scheme as well, if the decay rate history can be determined. I introduce the Radiometric Transfer Func-

tion, which represents accumulated radiometric age over time, relating measured to actual ages. The Radiometric Transfer function allows quantitative comparison of different models of decay history against each other and quantitative constraints inferred from observations. I examine a number of models and model families differentiated by Antediluvian decay history and acceleration termination time. Models are evaluated by the number of decay laws invoked as well as against constraints based on decay rate acceleration estimates, Flood radiometric range, and radiometric age spectrum. While not definitive, this analysis suggests that the correct Transfer Function is likely to be Flood anticipatory or Flood only, with pulse-like acceleration during the Flood. Post-Flood acceleration ramp down is unlikely to be significant, and decay acceleration may have terminated mid-Flood. These results strongly suggest that accelerated nuclear decay is related to the mechanism which initiated and sustained the Flood.

eKINDS Update

Jean Lightner

The Creation Research Society (CRS) began the eKINDS (examination of kinds in natural diversification and speciation) research project in 2016. Its purpose is to accelerate research on numerous unanswered questions related to the diversification and speciation of plants and animals. The research encompasses three broad topics: (a) identification (or verification) of created kinds, (b) identification of mechanisms that drive diversification and speciation within created kinds, and (c) detailed analysis of individual created kinds in an attempt to propose a robust natural history that delineates key events as organisms reproduced and filled the earth following the time of the Flood. The eKINDS project developed and uses a new statistical tool that compares expressed proteins, where sufficient data is available. This technique typically clusters organisms into discreet groups, suggesting members of a group may be from a single kind. Other lines of evidence are also being considered to more clearly delineated kinds. The founder effect was identified as one mechanism that likely has driven diversification and speciation within kinds. Other mechanisms, such as involvement of DNA editing enzymes, is also being explored. Finally, beginning with some avian taxa, more detailed analysis of created kinds is being used to propose a plausible natural history that accounts for their current biogeographical distribution. Our hope is that, by God’s grace, more researchers will be mobilized to

accelerate progress on addressing critical questions related to present day biodiversity. In this way, we as believers can make substantial contributions to science and demonstrate the robustness of the biblical creation model.

Thermoluminescence and its Use in Dating

Larry DeWerd

Thermoluminescence has been used to detect radiation for over 100 years. Madam Curie used it in her research. It has been used in the dating of pottery and the date of volcanic eruptions. The measurement of the amount of radioactivity in the vicinity of the sample has to be measured. This measurement is one of the potential sources of error, since any change of the radioactivity in the past can affect the proposed date. The dates obtained are dependent on the environment of the site and where the sample is located. The mechanism of thermoluminescence will be described using an alkali halide as an example. Alkali halides have been studied extensively in their use as a dosimeter in the medical radiation field. Examples of thermoluminescence will be given for samples, such as smoky quartz. The importance of the emitted spectra and its detection must be considered in the readout process; the spectral response of the photomultiplier tube must be considered. The criteria and assumptions necessary for the dating process and their potential problems will be described. Frequently when ^{14}C

is compared to thermoluminescent measurements, the thermoluminescence shows more recent dates, but in agreement with dendrochronology of the bristlecone pine. When conditions are known, generally the thermoluminescent dates are less than 6000 years. A review of the thermoluminescence process and its use show that this is a useful area of research for the creation scientist.

Professional Development Talk—

Writing a Scientific Abstract: Does, Don'ts, and Nevers

Kevin Anderson

Why Professional Development talks? The CRS Conference Committee seeks to help fellow creationists in writing and presenting their research. This year's development talk addresses many common errors made in writing abstracts. Abstract preparation is a necessary part of much scientific writing/speaking, and as scientists we are always learning and growing. In fact, submission of an inadequate abstract is a reason for rejection of some abstracts by the CRS Conference Committee. Thus, several frequent mistakes, misunderstandings, and bad habits in writing abstracts will be addressed. These include determining a proper title, proper abstract organization and format, and understanding what material is necessary for a quality science abstract.

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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.

This letter is a quick response to Dr. Jake Hebert's thoroughly insightful and enjoyable article, "Missing' Ice Age Forests: Evidence for the Flood?" [CRSQ, 56(1):48–51]. The evidence that post-Flood Ice Age lands were largely deforested (or, more accurately, "unforested") is posited as a potential difficulty (for creation ecologists) within his summary:

Secular scientists are clearly puzzled by an apparent dearth of thick Ice Age forests. This could be evidence in favor of [Michael] Oard's Ice Age model, but it may also present difficulties for creation researchers, since abundant precipitation early in the Ice Age would be expected to favor rapid plant growth. (Hebert 2019, p. 51)

Perhaps the climate research and analysis of Dr. Larry Vardiman—which is quoted on pages 13–14 of the same CRSQ issue (Johnson, 2019)—provides a helpful clue to answering this "puzzle." How? Because forceful power-washing (i.e., ground-scouring) erosion is caused by frequently occurring rainstorms and rain runoff drainages, especially if those rainstorms and rain runoff drainages are produced by horrendous hurricanes! Consider how the post-Flood hurricanes would have blasted the rebounding post-Flood lands, even far inland, for extended timeframes—at magnitudes that are multiples of our most severe hurricanes today! This pattern (which may have exceeded a century or more, immediately after the Flood) might explain why fragile new tree sprouts would be blasted (i.e., power-washed) out of the soil before their immature root systems could successfully anchor

the baby trees—and this problem would continue until Earth's weather patterns settled down to something that tree planters would deem sane conditions for growing baby trees.

Thankfully, the kind of hypercanes that would have been *not-so-unusual* in the first couple of centuries following the Flood are *not* likely to ever become frequent in our present world situation. Says Dr. [Larry] Vardiman:

In *Hypercanes* Florence [computerized extrapolation-based simulations] with a simulated sea-surface temperature of 45°C many variables increased dramatically compared to the actual values observed in [the historically real] Hurricane Florence [of 1988]. The horizontal wind speeds quadrupled to over 200 m/s, the vertical wind speeds increased to over 50 m/s, the vorticity increased by a factor of over four, the blowoff covered an extreme area over the Gulf of Mexico, and precipitation rates increased by a factor of ten over those observed in Hurricane Florence, to over 10 inches/hour. Warm sea-surface temperature can intensify hurricanes to hypercanes categories in [<18] hours. The size and intensity of such hypercanes would be devastating if they occurred today. They don't occur because the sea-surface temperature never reaches 45°C, rarely exceeding 30°C, which is the threshold for major hurricane development used by hurricane forecasters

As a "soon-after-the-Flood" weather-pattern scenario, hypercanes can explain a serious dynamic for changing Earth's geomorphology, not locally, but globally:

For every doubling of wind speed, the damage is quadrupled. Most damage and loss of life from hurricanes is actually caused by the storm surge, a buildup in water depth as a hurricane sweeps water toward a coastline. The flooding of coastlines by surges 20–30 feet deep from typical hurricanes could be increased many times over by hypercanes which would be many times larger and more intense. It seems likely that the presence of large regions of warm sea-surface temperature during and immediately following the Genesis Flood would have caused many hypercanes to have occurred over the oceans and to have made landfall on the eastern side of continents in the subtropics [e.g., the Mid-eastern lands would be overreached by Indian Ocean-born hypercanes]. These hypercanes have probably been particularly frequent and intense above mid-ocean ridges where significant quantities of heat would have been released. When these hypercanes made landfall, they would have dumped massive quantities of rain on as yet unconsolidated sediments and produced incredible amounts of erosion. Storm surges would be devastating to the coastal boundaries. The most likely location for hypercane landfalls and such erosion would have been on the eastern edges of continents between about 10° and 40° latitude [the "10–40 window"].... (Johnson 2019, quoting Vardiman 2003)

To appreciate how new baby trees need shelter from rough weather until they are successfully anchored by a suf-

ficient root system, consider how Pinyon Jay populations plant pinyon pine seeds in wind-sheltered locations, increasing the likelihood that those planted pinyon pine seeds will succeed in growing into the next generation of pinyon pine trees (Johnson, 1997).

Moreover, in many cases, the pooled up (i.e., undrained) post-Flood rainwaters (during the “Peleg” years immediately after the Flood) might fatally flood baby trees, effectively drowning all tree sprouts that are not inherently and heartily hydrophilic (Johnson et al., 1996).

This is not intended to give a full ecosystem analysis for why thick foresting is scarce, despite more-than-adequate rainfall, in Pleistocene Epoch places that match the first centuries of Earth’s rebound after the global Flood. Rather,

these thoughts are submitted to suggest that extremes of early Ice Age weather, including “hypercanes” (as Dr. Larry Vardiman has used that term) that “riverized” Earth immediately after the Flood, might help to explain such delayed forestation.

Respectfully,
James J. S. Johnson
jjohnson@icr.org

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The Masoretic Text and the Septuagint

Recently there have been efforts to put together lists of “arguments creationists should not use.” The purpose of those efforts is that although the conclusion (creation is true) is good, the arguments themselves are flawed to the extent that their use can bring discredit to the creation science cause. I felt much the same way when reading “Extensive Messianic Prophecy Corruptions and Flood-Related Chronology Errors Disqualify the Septuagint (LXX) as a Reliable Source for Creationist Research” by Tomkins, Daniels, and Johnson in the Summer 2019 *CRSQ* (56:40–47).

The article argues that the Hebrew Masoretic Text (MT) is a better text to use for creationist research and Bible translation in general than the LXX. I agree on that point, and it is unnecessary here to enumerate the reasons, other than to point out that all major translations of the Bible in the last 400+ years have used the MT in preference to the LXX. I also understand that there has been an unfortunate recent tendency to attempt to discredit the MT and advance the LXX in its place. Finally, the authors of the article did a good job analyzing the five Messianic prophecies that formed the article’s core.

However, there are two significant problems with the article. The first problem is the overall tone the article takes toward the LXX. The LXX was the first translation of the Bible. It was the primary Bible used by the early church, which is logical since Greek was the common language at that time. In cases where the New Testament quotes from the Old Testament and the LXX differs from the MT, the New Testament more frequently quotes from the LXX than from the MT. This also is only logical, as the apostles would find benefit in using a quotation that readers could find in their own Bible. These facts should lead us to

look favorably on the LXX. However, in this article, pejorative language was used throughout, with the LXX described with words like “corruption” and “plagiarism.” The article used unfortunate words like “nefarious Jew...seeking to alter scripture.” The three oldest, nearly complete manuscripts of the Bible, Codices Vaticanus, Alexandrinus, and Sinaiticus, are called “spurious.” Should Christians really call our oldest Bible manuscripts spurious? We are doing the atheists’ work for them!

The second problem is that the article made a demonstrably erroneous claim about when the LXX was translated. The article stated that “a thorough historical analysis of ancient documents indicates that what we call the Septuagint was most likely written during the first century AD (after some of the New Testament books were written...)” This claim can be falsified by multiple lines of reasoning:

1. The New Testament quotes from the LXX frequently, as previously mentioned.
2. The Septuagint is used by Josephus, another first century A.D. writer.
3. Philo of Alexandria (20 B.C.–50 A.D.) used the Septuagint.
4. Although the accounts of the origin of the Septuagint differ, all accounts of its origin place it well before the time of Christ.
5. There are multiple Greek manuscripts of portions of the Old Testament which are dated before the time of Christ. These manuscripts include the following Dead Sea Scrolls: 7Q1 Exodus, 4Q119 Le-

viticus, 4Q120 Leviticus, 4Q121 Numbers, and the Nahal Hever Greek Minor Prophets scroll. Other than the Dead Sea Scrolls, there are also the following manuscripts dated before Christ: Papyrus Fouad 266 and Papyrus Rylands Gk 458. This may not be an exhaustive list.

I realize that readers unfamiliar with Greek and Hebrew can feel intimidated by subjects like this and believe they are at the mercy of competing experts who do not agree. Therefore, I’d like to offer the following short study project that doesn’t require language expertise, and yet can lead to a compelling conclusion. In general, the Dead Sea Scrolls are far more likely to match the MT than the LXX, but there are a few exceptions (and there are some scrolls that don’t match either very well). There are several Dead Sea Scrolls, which although they are written in Hebrew, actually match the LXX more closely than the MT. The most prominent is scroll 4Q51 Samuel, which is dated to about 50 B.C. The reader does not need to be able to read Greek or Hebrew to verify this; one can look up any of several LXX translations on the internet, compare that with an English translation of 4Q51 Samuel (<http://dssenglishbible.com/scroll4Q51.htm>), and then compare the two to an English text of Samuel from any normal Bible. The normal Bible Samuel will have been translated from the Hebrew MT. It will be obvious that in this case, the Hebrew Dead Sea Scroll matches the LXX rather than the MT. This evidence points to an important conclusion about the origin of the LXX and why

it is different from the MT—the LXX wasn’t a part of any Jewish or Christian or anti-Christian conspiracy, it was just translated from a Hebrew original which differed a little bit from the MT.

Although the article pointed to five Messianic prophecies where the MT is more compelling than the LXX, the reader should be aware that there are some Messianic prophecies that go the other way. The very first one quoted in the New Testament, “Behold a virgin shall conceive...” (Matthew 1:23) is a verbatim translation from the LXX, and famously uses the LXX word for *virgin*, while the MT uses a word that can mean virgin but could also mean *young woman*. Another excellent example would be “They have pierced my hands and feet” (Psalm 22:16). This is the LXX reading, but the MT in this case has (unusually for the MT) some divergent readings, most of which do not say “pierced.”

Finally, it would be best to leave the reader with the big picture, which is that both the MT and the LXX are excellent sources of study for the Bible. The MT should generally be preferred, simply because it is almost always best to prefer an original to a translation, and the MT gives abundant evidence of being faithfully transmitted. Both the MT and LXX are scripture, and Greek readers can happily read many wonderful messianic prophecies in the LXX. Isaiah 53 is an incredible text in any language.

Craig Davis
Chdavis29@gmail.com

Septuagint Reply

Thanks for taking seriously our Septuagint-critique article (CRSQ, 56(1):40–48). In your letter to the editor, you raise several important topics.

Firstly, thank you for recognizing that the five selected Messianic prophecies, which are clear and informative in the Masoretic Text Hebrew, are garbled or trimmed (or worse) in the Greek translations of the Old Testament that are parts of Codices Sinaiticus, Vaticanus, and Alexandrinus (n/k/a “the Septuagint”).

Secondly, we recognize that you have no problem recognizing that chronology of Methuselah’s life makes biblical sense in the Masoretic Text’s Hebrew, in contrast to the corruptions within the Greek Septuagint translation.

Hopefully this reply can answer your other main points sequentially, as follows: (a) your introductory critique; (b) what you called the “first error;” (c) what you called the “second error,” with its “multiple lines of reasoning;” and (d) your “big picture” commentary.

A. Introductory Critique Commentary

The Letter to the Editor critique begins by comparing our LXX-critical article to “arguments that creationists should not use,” as if so-called “consensus science” is our best guide on controversial evidence topics.

However, we disagree that consensus is a good practice for “the creation science cause,” as well as the fact that the popular consensus on this LXX controversy has failed to apply sound forensic science principles (e.g., document-authenticating witnesses, chain-of-custody evidences, etc.) when analyzing a question that requires application of forensic evidence rules (Johnson, 2012a, 2012b, 2015a).

Regardless of whether we “felt much the same” about a popularly uncontroversial topic’s boat being rocked, we cre-

ation science advocates should carefully and rigorously examine documents (and other evidences) relevant for evaluating science-related controversies.

Next, the critique’s introduction misstates our article’s main conclusion, when it says our article “argues that the Hebrew Masoretic Text (MT) is a better text to use for creationist research and Bible translation *in general* [*emphasis added*] than the LXX.”

Rather, our article provides no such “in general” qualifier, because we have concluded that: (1) the providentially preserved Hebrew MT is the *only* relevant text standard for creationist research and Bible translation; and (2) the Greek translation texts, now collectively known as the “Septuagint” (which are largely a blend of the Old Testament in Greek translation, as appearing within Codices Vaticanus, Alexandrinus, and Sinaiticus), are *not* reliable translation texts, at all, for any creationist research or Bible translation purposes (Daniels, 2016, 2017a, 2017b; Cooper, 2016; Morris, 1996).

B. Reply To “First Error”

As a first major criticism, the critique faults our article’s “tone” (which is itself a subjective criticism), arguing that we should have accepted the assumption that what is today called the Septuagint (LXX) “was the primary Bible used by the early church.” But we reject that assumption. Rather, we doubt that today’s “LXX” existed in its current form during the first century A.D., and we conclude that today’s “LXX” was not produced until *centuries after* the early Church had already received and replicated what is now the New Testament’s Greek text. In other words, because Greek translations of the Old Testament changed frequently during the earliest centuries A.D., using the term “Septuagint” (or “LXX”) now unavoidably involved some

ambiguity, which is why our article referred to the LXX in its current forms.

It is far from proven that the text of the Rahlfs *Septuaginta* is the same as the original form of the Septuagint, or LXX. The earlier texts in Origen’s Greek *Hexapla* are these: Aquila (120–130 AD), Symmachus (170–200 AD), and Theodotion (170–200 AD). When the “LXX” of the OT matches a NT wording, they do not match in any of these three. They only match in Origen’s text (i.e., later than 220 AD).

Accordingly, we opine that it is because parts of the New Testament text were inserted into the Greek Old Testament (translation copies) no later than Origen’s lifetime, and this opinion accords with the Recent Fabrication Rule that is routinely applied today in forensic analysis contexts (Johnson, 2012b).

A perfect example of this is Romans 3:13–18, which took phrases from various OT passages under inspiration by Paul. They were later inserted into the Greek of Psalm 14:3 (LXX numbering, 13:3). This is admitted in Origen’s *Hexapla*, as is shown in *Did Jesus Use the Septuagint?* (Daniels, 2017, pp. 12–29), as well as in the Roman Catholic *Confraternity* and *New American Bibles* (1950–1970 editions).

Also, when evaluating questioned/questionable documents (such as Codices Vaticanus, Alexandrinus, and Sinaiticus, which we disbelieve contain the “oldest” Greek translations of the Old Testament), due diligence often includes considering intentional corruption as an optional provenance scenario.

Specifically, dating unique items or events are distinctively forensic science-involved inquiries, differing from typical research questions that are more suitable for empirical science methodology, for reasons that one of us has previously explained (Johnson, 2012a, 2015a, 2016, 2018).

Furthermore, when a series of changes are made to a document (or to a collection of related documents), it is needful to determine if the series of changes were randomly introduced (such as by sloppy translation habits) versus intentionally introduced (such as content changes that trend only in one direction, demonstrating an editorial agenda). Thus, if Septuagint differences show a directional pattern of changed meanings, that needs to be faced for what it is, evidence of deliberate editorial alteration.

What happens if someone seeks to investigate a translation's soundness yet is unwilling to consider deliberate alterations of the translated text (as can easily occur when someone has a mental block against recognizing translational "corruption")? What if LXX documents were mistranslated on purpose, to sabotage theological meanings of specific passages? Failing to consider the possibility (or probability) of translational sabotage is unjustified, if that is what the evidence shows, regardless of whether that explanation is popular. This requires distinguishing between a speculative conspiracy theory and forensic evidence of conspiratorial activities.

To illustrate, accidental-versus-intentional causation questions are routinely analyzed after fire events, because collecting insurance money sometimes motivates arson. Likewise, although rare, the same question should be considered when investigating the etiological cause of a disease disaster. Failing to do so can delay (or even derail) learning the truth, as was illustrated in the *Salmonella* food poisoning epidemic of The Dalles, Oregon, during autumn of 1984 (Török, et al., 1997). In that under-reported case, the infamous 1984 *Salmonella* epidemic's cause could not be identified until some of the public health science researchers (who weren't afraid of being labeled "conspiracy theorists") were willing to consider the possibility

of intentional group mischief as the epidemic's cause.

Similarly, because monetary outcomes sometimes depend upon whether controversy-related documents are authentic (vs. inauthentic), forensic analysis routinely includes investigating provenance facts and authenticating witnesses, as an indispensable component of determining a document's authenticity (Johnson, 2005, 2013, 2015b).

Therefore, it is not "pejorative" to use terms like "corruption" or "plagiarism" if and when the forensic evidence strongly supports such documentary characterizations. This is not an analytical factor that we took lightly in our article; in fact, one of us is a post-doc-credentialed forensic science practitioner who has belonged to the American Academy of Forensic Sciences for several years and who has handled many document authenticity/authentication problems as a litigating attorney (or as an adjudicating trial judge), applying the usual forensic evidence rules.

C. Reply To "Second Error" (with 5 "lines of reasoning")

As a second major criticism, the critique faults our article's conclusions regarding the timeframe when today's version of the Septuagint (as that appears in Codices Vaticanus, Alexandrinus, and Sinaiticus) was produced. The critique lists several points of protest, which now are sequentially answered below.

Specifically, what the critique assigns as the "second error" concerns the date that the Septuagint (in its current forms) was translated. The multiple allusions to an early origin of the LXX text are all dependent upon the "Letter of Aristeas" (Daniels, 2016, 2017). However, notice that the letter has numerous credibility-challenging historical errors (Daniels, 2017, pp. 93–98, etc.). Many scholars admit this, though it is the alleged witness upon which all other testimonies (including Josephus') hinge.

The earliest person who supposedly used the Septuagint was Philo of Alexandria. But as Daniels (2017) has shown in books and YouTube messages (Daniels, 2016), Philo is most likely the person with the motive, means and opportunity to underwrite the Septuagint, in the first century AD. Josephus followed Philo, as did all others who testified to the existence of the LXX (Daniels, 2017).

There are not multiple Greek portions of the Old Testament dated before the time of Christ. The only Greek that is dated to that period, such as the Nahal Hever of Micah 4–5, do not match any text today called the Septuagint (see pages 99–104 in Daniels, 2017). It's a translation of the Hebrew, but it doesn't match any known Septuagint text. As Carsten Peter Thiede wrote, "the Greek texts are the most recent of all manuscripts found in Qumran" (Thiede, 1995, p. 160). So even if a text had some similarities, it is the most recent of texts, not the most ancient.

Regarding the other "multiple Greek manuscripts," these are tiny little pieces of papyri, not full sentences in agreement with any version of the LXX.

*7Q1 Exodus: agrees with the Hebrew Masoretic Text (MT) and not the LXX.

*4Q119 Leviticus is a few words out of 16 verses that are similar to, but not the same as, any LXX text.

*4Q120 is tiny portions of Leviticus 1–5, though it's missing the LXX addition in Leviticus 2:4.

*4Q121 is tiny portions of 17 verses in Numbers 3–4. Just a word or two here or there.

*PFouad 266, according to Albert Pietersma, is similar to the LXX, but also has similarities to the MT. It was found near two Jewish synagogues in Faiyum, Middle Egypt. The dating is, to say the least, suspect.

*Rylands Papyrus Gk 458 is eight tiny fragments. The 8th has only 2 letters.

*4Q51 Samuel, to use the same web page that the critique's author suggested, is a mixed bag at best. Remember when reading it: (a) all those words in italics are not there. They were words added, using the World English Bible; (b) strike-through words are expected words that are missing; (c) underlined words are not in other texts but added; and (d) this scroll is only dated "about 50 BC." It is possibly part of what provoked the alternate, the Greek text made (we suggest) by Philo in the 1st Century AD, produced only years later. Philo lived about 20 BC to 50 AD.

Apparently no one claims that the Septuagint was composed in any place other than Alexandria, Egypt, and certainly not Israel, yet the Jewish people read and promoted Hebrew (Daniels, 2017, pp. 30–63).

Regarding Matthew 1:23 and Isaiah 7:14, we can look in the *Hexapla* of Origen and see whether "parthenos" was used by the three Jewish authors. It says, "(A. Σ. Θ. η νεανίς)," meaning Aquila, Symmachus, and Theodotion all chose the Greek for young woman, girl, or maiden. The 1875 edition by Frederick Field quotes both Irenaeus and Jerome to this effect, along with Origen's notes. Only Origen has παρθενος (parthenos, virgin). And it is no wonder: Origen had Matthew's Gospel *right in front of him*.

Psalms 22:16 does little to help the argument: there is no NT citation nor any clear NT reference to this OT verse. It is implied by John 20:25, but no use of the word "pierce" is in the Greek NT text. (For further clarification, see our article's analysis of "pierced" in Zechariah 12:10 with John 19:37, which analysis does not depend upon whether that verb appears within the Hebrew text of Psalm 22:16.)

Accordingly, we believe it is an understatement to say that the Masoretic Text is to be preferred. The MT is the

text that God preserved, providentially, through the Levites (Lev. 10:11; Deut. 17:18; 24:8; 31:24–26; 33:10; 2 Chr. 17:7–9; Neh. 8:7–8; Mal. 2:7; Rom. 3:2). As we saw in Nehemiah 8, the returning Jews, raised in Persia, were caused to understand the Hebrew. No modified Hebrew text was made to accommodate them. Only a Jew who was compromising with Greek philosophical culture, as those at Alexandria frequently did, would advocate for a foreign translation of the Hebrew scriptures. Apparently, such a man was Philo of Alexandria, as is laid out in Daniels (2017, pp. 57–61, 105–107).

In short, we conclude that what is called the Septuagint today is not what existed in the first century AD. The Hebrew text (MT) is what God commanded to be passed down (consistent with Romans 3:2). A look at numerous LXX passages will reveal the level of translational deviations, some due to carelessness, yet others due to deliberate design to change meaning. A look at any O.T. Hebrew text throughout history will show the opposite: order, meticulous detail, and reverence.

"Big Picture" Commentary

It is true that "Greek readers can happily read many wonderful messianic prophecies in the LXX." Similarly, God conveyed accountability-triggering truth to Belshazzar through the very fallible life witness of Nebuchadnezzar (Daniel 5:18–23), whose witness was what the apostle Paul would later call a "living epistle" (2 Corinthians 3:2–3) of God's truth. Even so, just because God can provide powerful truth through flawed vessels, like us, is not a good reason to rely upon a corrupted version (or paraphrase) when the original preserved text of the Old Testament is available.

James. J. S. Johnson
and David W. Daniels

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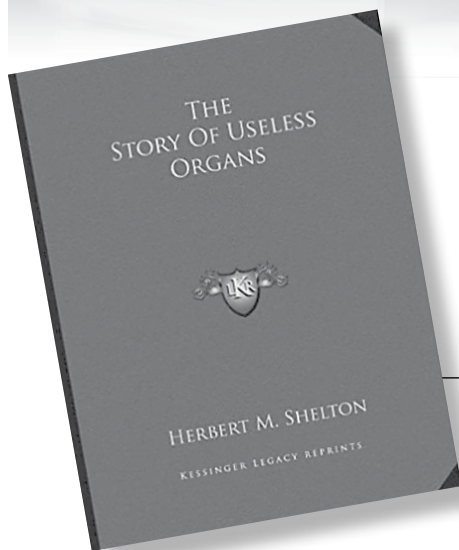
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Media Reviews



The Story of Useless Organs

by Richard M. Shelton

Reprinted from *Getting Well*, 1900, by Kessinger Legacy Reprints, Whitefish, MT, 248 pages, 2019. \$10.36

Author
Shelton was a century ahead of his time, as shown by his title, *The Story of Useless Organs*. Once evolution became dominant in science, a major support plank from Darwin's time forward was the useless organs claim. Biologists trained in evolution looked for what they thought were useless organs to support their worldview and soon "found" or, more precisely, so-labeled many—actually over 200 (p. 37.) Shelton explains, correctly,

that the so-called useless organs claim was bogus.

The evolutionary argument was that an intelligent designer, God, would not create 200 useless organs in the human body. Conversely, evolution explains these useless organs by claiming certain organs that once were fully functional in our remote evolutionary past are no longer functional (p. 35). This argument was also very important to Darwin, "who attached great importance" to it (p. 36).

My interest in this subject first began when I had doubts about the scientific basis of evolution. When examining the evidence for evolution, I looked at the

major pillars listed in biology books, one of which was vestigial organs. A half century ago, 'vestigial' was often defined as applying to organs that had no presently known function but were functional in the animal ancestor's evolutionary past. I felt this would be one of the easiest arguments to examine because all I had to do was review the medical literature and, if I found one or more uses for a specific organ, the useless claim for that organ or structure would be falsified. I found peer-reviewed, documented uses for every example I researched.

The "useless organ" belief, Sheldon correctly noted, has hampered prog-

ress in biology and anatomy. He also reviewed the research on the function of organs that were widely regarded in 1900 as useless. He included not just the appendix, but “that very puzzling organ—the thyroid body” and all the other ductless glands, including the thymus, the spleen, the pineal body, the adrenal glands, and many others (pp. 37–38). Sheldon added that these “useless rudiments” have all been shown in his day to have one or more functions (p. 39). He even discussed the false claim that we descended from fish as proven by the so-called “gill slits” in our body that were present when we existed as an embryo (p. 43).

The author defined vestigial as having those structures determined by Darwinists as having “no function... none exists” (p. 40). As I taught anatomy,

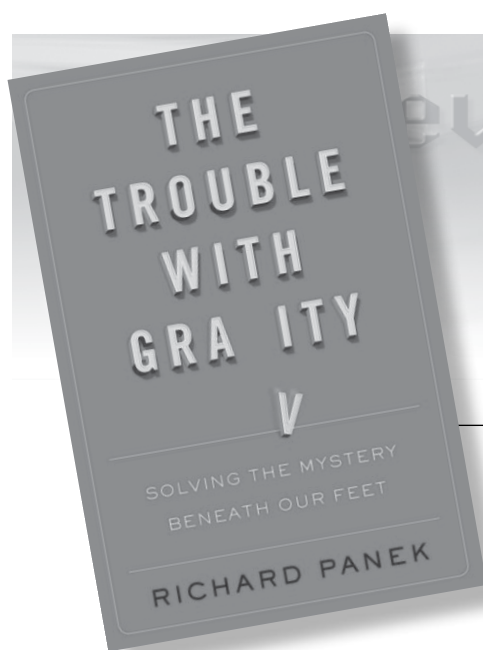
I observed that not one textbook claimed any organ was vestigial, and the word vestigial was not even in the index. Yet several examples were usually listed to illustrate this proof of evolution. It is clear that biologists are not keeping up with the literature, or they are (purposefully?) ignoring findings about these organs when their functions are discovered. Sheldon noted in 1900 that we do not know the function of many organs because of “the dogmatic assertions” of evolutionists which discourage attempts to determine their function (p. 45).

My only reservation about Sheldon’s book is that few references are listed to help me better understand the beliefs that existed over a century ago about this subject. For further help on this topic, see Bergman (1990, 2019).

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Jerry Bergman
jerrybergman30@yahoo.com



Reviews

The Trouble with Gravity

by Richard Penek

Houghton Mifflin Harcourt,
New York, 2019, 244 pages,
\$28.00

Author Penek is trained in journalism and serves on the literature faculty at Goddard College in Vermont. His writings popularize science, especially physics and astronomy. This book surveys the history and current thinking on the topic of gravity.

The book gets off to a rough start with 35 pages of science history and mythology, largely unrelated to the gravity topic. Penek freely brings in biblical references, although errors raise questions of overall scholarship. For example, the author refers to Elijah's translation to heaven by a whirlwind. As Penek describes the event, "The prophet Elijah was out for a walk with his wife when 'suddenly a chariot of fire appeared...'" (p. 22). Elijah had no wife as far as we know, and his companion during the whirlwind event was Elisha, Elijah's successor (2 Kings 1:11–12).

The book concludes that the universal law of gravity remains a mystery to the science world. We can measure gravity and mathematically describe it;

however, its cause is beyond us. Penek suggests that a true understanding of gravity would "give life meaning" (p. 7). He is correct, as stated at the end of this review.

The book provides less-known information on the life of Isaac Newton (1643–1727). For example, Newton kept two notebooks, one listing his science discoveries and the other notebook filled with confessions of his offences against God. Entries include making pies on the Lord's Day and having impure thoughts (p. 66). A further insight into Newton's style comes from his work as master of England's Royal Mint. He "donned disguises and frequented pubs in order to personally ferret out counterfeiters" (p. 93).

At age 44, Newton released the *Principia* (1687), financed by his friend Edmund Halley (p. 87). The second edition appeared three decades later when Newton was 71 years old. With his theological background, Newton was not troubled by contemporary philosophical questions regarding the nature of gravity. He saw God's fingerprint in the mathematical description of falling objects and planetary motion.

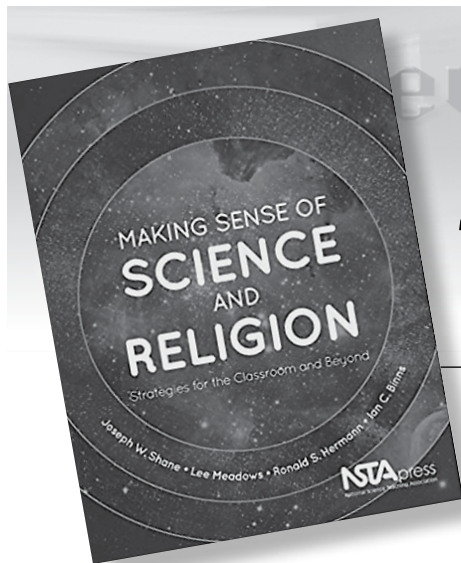
The book concludes with a quick overview of the big bang theory, rela-

tivity, dark matter, dark energy, gravity waves, and the multi-universe concept. On this latter point, Penek suggests the existence of 10^{500} other universes, a rather audacious idea lacking evidence (p. 202).

What is the author's conclusion regarding our understanding of gravity, the invisible attraction between all masses? "...nobody knows what gravity is, and almost nobody knows that nobody knows what gravity is except for scientists, and they know that nobody knows what gravity is because they know that they don't know what gravity is" (p. 215). This sentence merits an award for convolution.

Although author Penek shows some familiarity with scripture, he stops too soon and could well have mentioned Colossians 1:17, "Christ is before all things, and in him all things hold together." This verse declares that the physical universe interfaces closely with the spirit world. One might humbly suggest that it is the hand of the Creator that upholds the gravity attraction or "glue" holding the universe together.

Don DeYoung
DBDeYoung@Grace.edu



Making Sense of Science and Religion

by Joseph W. Shane,
Lee Meadows, Ronald S.
Herman, and Ian C. Binns

National Science Teachers
Association (NSTA), Arlington,
VA, 2020, 159 pages, \$27.25

In the current catalog of the National Science Teachers Association (NSTA), the description of this book reads, “If your lessons deal with evolution, genetics, the origin of the universe, or climate change, some students are bound to question whether they can reconcile what you teach with what they believe about religion. *Making Sense of Science and Religion* is the book that will help you anticipate and respond to their questions—and helps students learn science while maintaining their religious beliefs. Understanding that science and religion can co-exist can also make students more willing to learn, regardless of messages to the contrary that they may hear outside of your classroom” (NSTA Recommends, 2020).

It is odd that advocates of evolution, who earlier argued that religion must not be a part of a science classroom, now suggest that religion should be included. This NSTA book further suggests, “Interactions between science and religion are an inevitable part of teaching science in 21st-century America” (p. 3). NSTA has had great praise for the Next Generation Science Standards, which the

book points out “have been adopted by 20 states and the District of Columbia” (p. 34). One of the authors finds religion in these standards. Shane notes, “... science-religion themes can easily be gleaned from science standards at all levels. In particular, national and state standards unequivocally provide support for NOS [National Open School] instruction, the use of historical case studies, and attending to students’ prior beliefs and in so doing, justify the responsible inclusion of religion for strictly educational purposes” (p. 6).

Besides the four major authors, there are sixteen contributors to the book. Several of these were associated with the *Kitzmiller v. Dover Area School District* trial in 2005. Barbara Forest was a witness in the trial and was highly opposed to the teaching of intelligent design in Pennsylvania high schools because she believed it was religious. In this book she writes, “There is emerging evidence that the time spent discussing the interaction of science and religion may positively affect students’ views...The number of college students perceiving a conflict between religion and evolution at the start of instruction was cut in half by the end” (p. 42). Perhaps she is fine with teaching religion in the public schools as long as it is the “right” kind. Of course, opening the door to teaching religion in the

science classroom might cause students who believe in the Bible’s account to speak out in class in favor of their view. For this, Forest answers, “If students’ expressions are disruptive to your class and will interfere with the schoolwork or discipline of other students, those expressions can be suppressed” (p. 43).

In the 1968 *Epperson v. Arkansas* case, the Supreme Court was clear that “Government in our democracy, state and national, must be neutral in matters of religious theory, doctrine, and practice” (*Epperson v. Arkansas*, 1968). Justice Fortas declared the Arkansas law unconstitutional because “The overriding fact is that Arkansas’ law selects from the body of knowledge a particular segment which it proscribes for the sole reason that it is deemed to conflict with a particular religious doctrine; that is, with a particular interpretation of the Book of Genesis by a particular religious group” (*Epperson v. Arkansas*, 1968). *Making Sense of Science and Religion* also affirms this neutrality by stating, “...science has to stay neutral about the supernatural” (p. 11).

A closer examination of the religion these scientists want taught in the science classroom shows that it is “a particular interpretation of the Book of Genesis by a particular religious group.” Several of the NSTA books

present Genesis as a book of myths and fables, having copied such stories as the creation account and the Flood from the Babylonians. How can presenting one “particular religious doctrine” to the rejection of another one be neutral?

Near the time of *McLean v. Arkansas Board of Education*, a survey reported that “73 percent of the public polled agreed with the statement that ‘the Supreme Court and Congress have gone too far in keeping religious and moral values out of our laws, our schools, and our lives’” (Milliner, 2019). Evolutionists were quick to point out that we must consider the rights of the minority, not demand that we yield to the wishes of the majority.

In *Making Sense of Science and Religion*, the writers trumpet the idea that evolutionists are in the majority. Forest writes, “The majority of denomi-

nations—including mainstream Protestant, Catholic and Jewish groups—support teaching evolution. According to one recent Gallup poll, support for creationism is at its lowest point in 35 years...” (p. 34). Shane notes, “The MIT Survey on Science, Religion, and Origins...indicated that only 11% of religious groups openly and knowingly reject some aspect of science (e.g., evolution, Big Bang cosmology) due to the alleged inconsistencies with their interpretations of sacred texts” (p. 21). The view seems to be that since creationists are such a small number, one need not be concerned about their objections when presenting religion in the classroom.

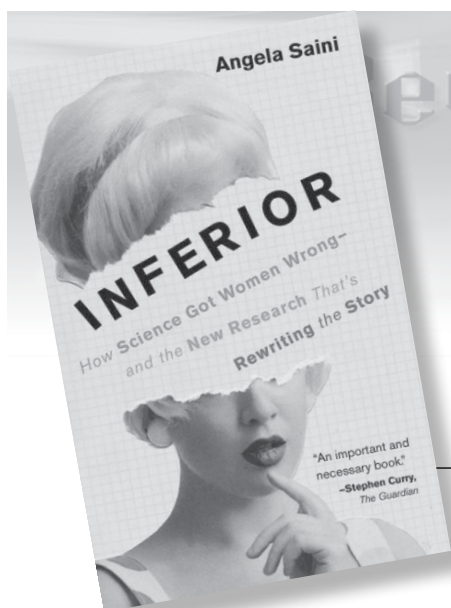
This paperback presents the current view of the NSTA and other organizations regarding the combination of religion and science in public education.

For science teachers not feeling comfortable with teaching this combination, it is suggested that they “provide guest lecturers from theology and philosophy” who can “speak about the different benefits and purposes of myth, science, truth, and fact” (p. 48). Theologians and philosophers who prefer the literal Genesis account of creation need not expect such an invitation.

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Ron Milliner
 ronmilliner@yahoo.com



Reviews

Inferior: How Science Got Women Wrong and the New Research That's Rewriting the Story

by Angela Saini

Beacon Press, Boston, 2017,
213 pages, \$16.00

MIT fellow and Oxford University graduate, Angela Saini, with access to the archives at Cambridge University on Darwin, has access to several important documents. This book, similar to her book on scientific racism, covers scientific sexism. The book is classified on Amazon in the evolution section. Indeed, much of the book covers this topic, especially past efforts to use science to keep women “in their place.” In the book’s introduction, author Saini writes, “For centuries, scientists have influenced decision makers on important issues...We believe that what science offers us is a story free from prejudice. ... Yet when it comes to women, so much of this story is wrong” (p. 1). I have also written on the subject (Bergman, 2014).

The connection of Darwin and women is central to the women’s movement because of “how women were viewed in one of the critical moments of modern scientific history, when the foundation of biology was mapped out” based on Darwinism (p. 13). This is illustrated by a letter from Mrs. Caroline Kennard (1827–1907) sent to Darwin in

December 1881 asking about Darwin’s views on women. Kennard, a prominent activist for the women’s movement, was then living in the outskirts of Boston, namely in a wealthy suburb of Brookline, MA. Due to her scientific achievements, she was listed in the 1885 *Scientist’s International Directory* as a specialist in the botany of ferns and mosses. Her interest in Darwin was due to claims from those who argued for the inferiority of women based on Darwin’s writings (p.13).

Kennard is today best known for her correspondence with Darwin himself in regard to his belief that women are biologically inferior to men. Her letter was about her concern that a genius like Darwin could not believe that women are biologically inferior, so she felt that surely those who believed women were inferior must have misinterpreted his work. Thus she wrote to Darwin to clarify his answer and elucidate his conclusions on this matter. Darwin wrote back to her to assure her that no mistake was made: “Women are inferior intellectually,” he reiterated (p. 14). Darwin thus, Saini writes, “rejected everything the women’s movement was fighting for” (p. 14).

Kennard need not have bothered to write to Darwin about his views on this matter. He made it clear in his *Descent of Man* book that evolution clearly shows women are inferior, and he explained in detail why this was true according to evolution. In short, thousands of years of the evolution of men had evolved him to attract females, and all females had to do was choose from the available men. Thus, men had to compete against other men to win the right to reproduce, as was true of other mammals. Darwin gave many examples from the animal world, and, as humans also evolved like other mammals, humans must have evolved with similar drives. To attract women, men must be warriors and thinkers, thus evolution “honed them into fine physical specimens with sharper minds. Women are literally *less evolved* than men.” (p. 15, emphasis in the original). Kennard replied to Darwin but Saini was not able to find Darwin’s further contact, if it occurred.

Darwin was not alone as a scientist with patronizing claims. Saini provides other examples including Darwin’s own cousin, Francis Galton (p. 17). She quotes Charlotte Perkins who argued that “half of the human race [females]

had been kept down at a lower stage of evolution by the other half [males]" (p. 18). Ironically, much of the book attempts to square male-female inequality with the evolutionary forces that created us and, therefore, we can find answers to the questions Saini raises only in evolution (p. 94). Much of the book reviews research that endeavors to find these answers, and it is obvious that even the science of Angela Saini is constrained by

the same ideas that constrained Darwin. Nonetheless, Darwin is recognized as a major force in the contemporary women's inferiority belief. As British cognitive researcher Gina Rippon observes, the idea of female inferiority "goes all the way back to Charles Darwin, who said that women are inferior because they have inferior brains" (Kluger, 2019, p. 68).

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Jerry Bergman
jerrybergman30@yahoo.com



Superior: The Return of Race Science

by Angela Saini

Beacon Press, Boston, 2019,
242 pages, \$27.00

This book discusses political forces that for centuries claimed science as a means to justify racism, inequality, and even sadistic cruelty, including Tasmanian genocide and the Nazi-era eugenics program. Author Saini's focus is on the use of science to justify racism, properly called scientific racism. By twisting science, scientists supported scientific racism in the past and still do today. MIT fellow and Oxford University graduate

Angela Saini wrote that in "1871, the naturalist and biologist Charles Darwin published *The Descent of Man*, sweeping away...religious creation myths and framing the human species as having one common ancestor many millennia ago and as having evolved slowly like all other life on earth" (p. 33).

Saini covers the major contribution of Charles Darwin to modern racism, including his damning statements about the Tierra del Fuego people which Darwin naively and uncritically demeaned in his writings. He accepted at face value certain verbal statements supposedly

made by the Tierra del Fuego Indians (also called the Yagan Indians). For example, Darwin uncritically accepted, without investigating the claim, that they were primitive ignorant cannibals, of which conclusion among others Darwin said he was "certain."

It turns out Darwin's conclusions about the Fuegians were wrong, but, nonetheless, they were uncritically accepted because they supported the racism that was already common in Europe: "In their native habitat, the Fuegians seemed to epitomize the Europeans' image of the brutal and degraded sav-

age.” Although Darwin was anti-slavery due to his cultural environment, he saw whites as the highest race and the Fuegians as the lowest race of savages (p. 34). Darwin made claims such as that children of savages have a stronger tendency to protrude their lips similar to chimps when they sulk, compared with European children, because they are closer to the ‘primordial condition’ of man’s early evolution (p. 34). As Saini documents, Darwin believed “in an evolutionary hierarchy. Men were above women, and white races were above others” (p. 34).

Chapter 2 covers the support of leading scientists for Nazism, showing how Darwinism entered Germany, namely through “Ernst Haeckel who taught zoology at the University of Jena... He liked to draw connections between black Africans and primates, seeing them as a kind of ‘missing link’ in the evolution chain that connected apes to Europeans” (p. 35). About half of the German nation’s “medical doctors were Nazi party members” and for over a decade German universities taught racial theory based on evolution as fact (pp. 38–39).

The author adds that scientists and academics played a key “role in devel-

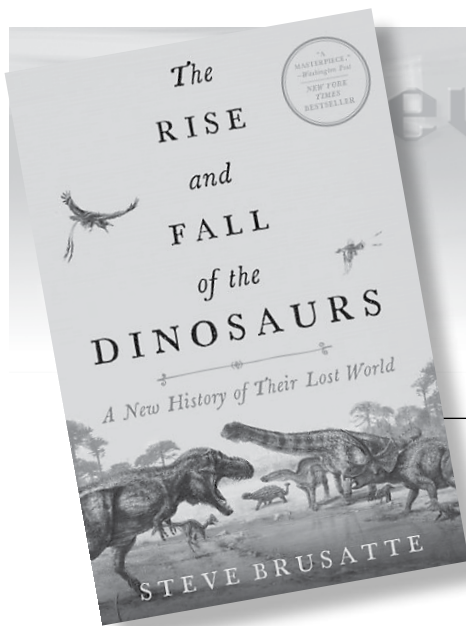
oping Adolf Hitler’s ideology of racial hygiene [purity] which argued that those persons of pure ‘Aryan’ racial stock should be encouraged to breed, while others were gradually eliminated—an ideology that culminated in the Holocaust” (p. 39). The Holocaust couldn’t have happened “without scientists, both to provide the theoretical framework for such an audacious experiment and to carry out the job itself” (p. 39).

The Max Planck Society is one of the most esteemed scientific societies in the world. Its current 14,000 scientists publish close to 15,000 papers per year, but its past was “dripping with blood” (p. 38). The common claim that the “Nazis were ignorant of or hostile towards science” was the exact opposite of reality. Germany’s leading scientists willingly cooperated with the Nazi state, marrying academic interest and political” goals of the Nazis (p. 39). Saini details facts about some of Germany’s leading scientists, many with international reputations, who “openly praised Hitler and believed in a biological solution to what he saw the Jews’ threat to racial purity” of the Aryan race (p. 40).

Also covered are the major problems of the Darwinian race theory. For example, there is no agreement on where to draw the lines between one race and another, and even how many races there are. There exists a wide variety of genes within each people-group population, and a vast overlap of genes among them. How to scientifically define the term “race” is another problem. Except for the Nazi doctors, medical researchers have always had problems in this area.

Author Saini concludes that theories of racial superiority are again on the rise all over the world. This is another example of using science to prove what people want to believe. Much of the rest of the book details scientists and academics in America, Western Europe, Bosnia, India (Saini’s background), and even China who are actively using scientific racism to bolster their cultural prejudices. My only book complaint is, although eighteen pages of references are provided, footnotes would have been helpful to document further many specific claims made.

Jerry Bergman
jerrybergman30@yahoo.com



The Rise and Fall of the Dinosaurs: A New History of Their Lost World

by Steve Brusatte

HarperCollins Publishers,
New York, 2018, 416 pages,
\$21.00

This paperback divides into three sections. Chapters 1–2 cover the origin and dawning of the Age of Dinosaurs (according to the evolutionary paradigm), and Chapters 3–7 their era. Chapters 8–9 discuss the evolution of birds and the demise of the non-avian dinosaurs. There are multiple black-and-white illustrations showing fossils, dinosaur sketches, cladograms, etc.

The author points out new scientific understandings gained from recent years. For example, by page 25 he corrects a common misunderstanding concerning early synapsids “that are often, annoyingly, and incorrectly, described as mammal-like reptiles (although they are not actually reptiles.” A paleontologist at the University of Edinburgh, Brusatte’s personal work figures prominently in the book. He has named 15 new species and pioneered dinosaur research on multiple continents.

One frustration I experienced in reading the book is how often the author makes sweeping statements on flimsy evidence. If there is anything we have learned from past theories about dinosaur life, it is that we should be cautious and tentative. But Brusatte confidently points to the creature that made Early Triassic trackways in Poland as the

“primitive dinosauromorph” that would evolve into true dinosaurs. Trace fossils are hardly rock-solid ancestors. On p. 65 Brusatte identifies *Coelophysis* as “one of the earliest members of the theropod dynasty that would eventually produce *T. rex*, *Velociraptor*, and birds.”

The book moves along comfortably in a narrative style. Different species of dinosaurs are presented while telling the stories and adventures of pioneering fossil hunters. The back story to the Cope and Marsh “Dinosaur Wars” is presented in some detail. The story of Barnum Brown, the world’s first celebrity paleontologist, is related as a way to introduce his famous discovery, *T. rex*. Fresh insight into the power of the king tyrant’s bite force and new evidence that the tiny front limbs were functional are presented. The author was personally involved with studying the petite, dog-sized tyrannosaur *Dilong* found in western China.

Brusatte introduces the Cretaceous Chinese dinosaur fossils containing feather impressions. “These are feathers. Not the quill-pen feathers that make up the wings of today’s birds but simpler ones that look more like strands of hair. These were the ancestral structures that bird feathers evolved from, and it is now known that many (and perhaps all) dinosaurs had them” (p. 183). Later he contradicts himself, describing how these Cretaceous species lived in a forest “alive with the chirps of primitive

birds” (p. 185). How can these hair-like structures in theropods be a preliminary step toward bird evolution if “primitive” birds were already flapping overhead?

I wish the book had been more transparently honest about the difficulties with the current dino-to-bird evolution story. For example, the Jurassic bird *Archaeopteryx* predates the very theropod dinosaurs that Darwinists point to as the most “birdlike.” Page 279 refers to *Archaeopteryx* as a “half-dinosaur half-bird.” This is imprecise at best and misleading at worst. Certainly this famous Jurassic bird has some unique features, but it is not half reptile. Even mainstream bird experts have concluded that it was arboreal (Fidducia, 2002). Moreover, by Brusatte’s own premise, that dinosaurs are birds, this is a nonsense statement.

On p. 286, the author discusses the paravians which he claims are “the immediate ancestors of birds.” But how does this square with a fully formed bird (*Archaeopteryx*) already living in the Jurassic? Brusatte never clearly informs his readers that “parrots, owls, penguins, ducks, loons, albatross, cormorants, sandpipers, avocets, etc.” are all found in layers identified as Cretaceous (Batten, 2011).

The author is unclear with his biology terms. On p. 153, he states, “Evolution causes change over time... The other thing evolution occasionally does is produce new things.” Evolution is defined as biological change over time so it

cannot also be the causal agent. Further equivocation on evolution occurs on p. 273. After discussing trivial variation in rabbit fur color, the author states, “Dark hair has been naturally selected, and the rabbits have evolved.” Two paragraphs later he states, “Evolution by natural selection is also what produced us.” The author incorrectly uses the word *integument* to describe only the primitive feathers (p. 292). Biologically, this term actually refers to the animal’s entire outer coating including skin and scales (Hickman, 214).

The author describes watching a living dinosaur: “The dinosaur I’m watching is a seagull...Seagulls and all other birds, evolved from dinosaurs. That makes them dinosaurs” (p. 270). This is nonsense. If birds are truly dinosaurs, then they couldn’t evolve from them. Evolutionary biologists do not use this type of rationale. By the same logic, we would have to say that humans are fish. In fact, every living thing is a bacterium! The term “non-avian dinosaurs” was coined because of the attempt to classify birds as dinosaurs. It may well be that

these terms eventually become accepted into the popular language, in which case creationists need to accept them to accurately communicate.

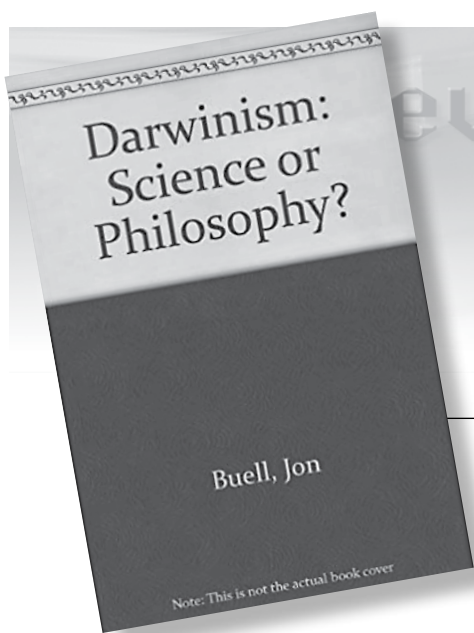
Since the author forcefully argues that birds are dinosaurs, one would expect a full treatment of birds in his book on the rise and fall of dinosaurs. However, he ends the book with a chapter entitled “Dinosaurs Die Out” and very little discussion about the “avian dinosaurs.” This points to the reality that the general public does not look at birds as dinosaurs and has not bought into the term “non-avian dinosaurs,” despite the increasing scientific consensus on this. Bird books are about birds and dinosaur books are about “non-avian dinosaurs.”

The Rise and Fall of the Dinosaurs is an enjoyable book, combining amusing stories, historical trivia, and the latest finds in a cohesive narrative. Brusatte’s personal stories and firsthand observations help make the book interesting for a popular audience even amidst detailed skeletal discussions and technical speculations about phylogeny.

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David Woetzel
DinoDave@genesispark.com



Darwinism: Science or Philosophy?

edited by Jon Buell
and Virginia Hearn

Foundation for Thought and
Ethics, Richardson, TX, 1992,
228 pages, \$37.50

In this classic collection of articles representing both the creation and evolution worldviews, ten Ph.D.'s and one J.D. review the key issues. Several conclude that, to do science an "*a priori* commitment to metaphysical naturalism is necessary" (p. 15). Phillip Johnson concludes that "although the scientists have won all the legal battles, there are still a lot of creationists around who are very much unconvinced by what the Darwinists are telling them" (p. 10).

Stephen Meyer argues that it is logically possible to conclude an outside agent designed or influenced the origin of life on Earth, and knowledge of such an agent could, in principle, be empirically accessible. The suggestion that such an agency is unscientific, an intrinsically unprovable position, is why science must *a priori* presuppose metaphysical naturalism (p. 34).

Johnson convincingly shows that those on both sides, from Michael Ruse to Henry Morris, realize that the controversy has profound implications in the areas of morality, behavior, social policy, and right and wrong judgments. Consequently, it is critical that Darwinism is debated in schools and society. The blind watchmaker thesis (the term

Johnson prefers for evolution) assumes that we "live in a purposeless cosmos that cares nothing for our sufferings" (p. 17). As Johnson argues, the presumption of philosophical naturalism in science has produced a bias that unjustifiably excludes a valid worldview. One example is the evolution prediction of a "cone of increasing diversity," while what is actually found in the fossil record is far greater diversity in earlier times, lost through extinction. The Burgess Shale fossils alone provide evidence for as many as twenty previously unknown phyla.

Peter Van Inwagen notes that the fossil record does not show species gradually shading into others as one moves backward in time (p. 182). The countless discontinuities in the fossil record that troubled Darwin have become increasingly evident as new fossil discoveries have shed more light on the past (pp. 182–183). Van Inwagen adds that he is not convinced by attempts by Gould, Eldridge, and others to explain the fossil record gaps. For one reason, the required intermediates are "anatomically and physiologically impossible," adding that "I am not sure that a true amphibian, say, could be descended from a true fish...by the small steps that Darwinism allows" (p. 183).

Among the most convincing arguments for the blind watchmaker thesis, Ruse concludes, is similarity of design, or homology. This is poor evidence because hundreds of cases exist which

deviate, sometimes significantly so, from what homology predicts. Similarity of design only proves similarity of function. Likewise, major problems exist with the other arguments Ruse uses, yet they caused him to conclude that Darwinism has been shown "beyond unreasonable doubt" and that, "it is not reasonable" to question evolution, although he admits "new evidence could lead one to reconsider even a verdict decided as 'beyond reasonable doubt'" (p. 25).

Phillip Johnson takes evolutionists to task for playing "Darwinist apologetics" by using the theological argument for atheism, such as, "God would not have done it this way." An example is Stephen J. Gould's argument that, if God had designed life, He surely "would not have used a collection of parts generally fashioned for other purposes" (p. 17). Likewise, Ruse argues, "how could there be a God with so much evil in the world," yet he states, "I am proud to be a human" (p. 27). Ironically, most evil today is caused by humans, both directly by evil persons and indirectly by good people who do nothing about evil.

Obviously, if it is invalid to use design to prove God, design likewise should not be used to prove the opposite. Gould's best example, the panda's thumb, can be effectively used to illustrate the incredible complexity, diversity, and intricacy of the natural world created by God. The panda's thumb is wonderfully designed for the panda's ecological niche, a

conclusion that evolutionists explain by arguing that “design” is only a result of fine-tuning by natural selection.

David Wilcox points out in his chapter that many conflicts between the two alternate viewpoints involve terminology, noting that evolution has been used to mean a paradigm, a worldview, a mechanism, and even any biological change, “more linguistic freight than any word can meaningfully carry” (p. 128). The word evolution literally means to “roll out,” and is often used to describe common phenomena, such as the development of flowers from seeds, humans from embryos, or 300 dog breeds from one dog type. Wilcox eloquently shows that the core of the creation-evolution controversy is the attempt to replace the divine with naturalism, thereby substituting atheism for theism, scientists for priests, and human fallibility for scriptural infallibility (p. 130).

A concern raised by Michael Behe is that life can tolerate some amino acid chain diversity. That is, fifteen or twenty amino acids can sometimes be changed and still produce a functional, properly-folded protein. At certain positions on the chain, however, more than three or four replacement amino acids results in the protein no longer functioning. In spite of the allowed diversity, an enormous amount of consistency exists, especially within a species, evidence for both a conserving force and a designer. The protein commonality in living things is not necessary for life to live, but nevertheless exists—the opposite of what evolution predicts.

The implications of this are profound. As Behe notes, “the laws of nature are insufficient to produce functional proteins and, therefore, functional proteins have not been produced through a nondirected search” as evolution postulates (p. 69). A huge gap exists between protein types, and no major functional

stepping-stones that can cross the chasm are possible. He adds that Darwinian selection can discriminate only on the basis of *function* and “with the exception of those found in living organisms, virtually all possible protein sequences are functionless.” An amino acid sequence can be replicated and mutated for centuries, and “the odds are still about one in 1,065 that a new functional protein class will be produced.”

Many of the contributors advocating evolutionary naturalism imply that science knows a lot more about the natural world than they do. For example, K. John Morrow notes that we understand the AIDS virus “down to the most fundamental molecular level,” even mapping it “to the point where we know every single molecule that composes it.” Although knowing the base sequences is an important first step, it is a long way from understanding how the virus works and how the amino acid chain sequence that it produces functions.

Morrow also observes that proteins having greatly different functions often contain very similar gene sequences. For example, a portion of the cholesterol receptor molecule contains a gene sequence close to identical to that found in the epidermal growth factor gene. He then makes an enormous mental leap, personifying natural selection, claiming it takes “advantage of whatever happens to be handy at the time” (p. 97). Good reasons often exist for structural similarities, and we are only beginning to understand protein function. As of 2020, the structures of only about 20,000 proteins are known—knowledge that has come from extensive study and research, plus the development of NMR and X-ray crystallography.

Morrow makes a further jump to theology, concluding a god who pulls miscellaneous items out of biological systems and puts them together, some-

times ineptly, Morrow adds, is a long way from an omnipotent Creator God, thus this God does not exist. Conversely, the many examples that do eloquently illustrate the design argument are rejected by evolutionists as simply examples of the precise fine-tuning produced by natural selection. As Johnson eloquently argues, one cannot have it both ways. If the design argument is invalid, it cannot be used to argue something about God.

Johnson points out the incongruence of the position held by many religious persons on the topic of origins, such as a Catholic school science teacher who stated that she did not teach creation, but atheistic evolution (p. 42). One might wonder about the school’s parents spending large amounts of money to send their child to a religious school only to be taught functional atheism. The teacher did not deny God’s existence, only that He was superfluous and had no role in Creation, at least related to the existence of life.

This collection of articles, including those by persons unsympathetic to the creationist worldview, are extremely useful for creationists. They show that the best evidence for evolutionary naturalism is weak and why Darwinists are adamantly opposed to teaching both sides of the controversy.

This book is valuable for anyone interested in the origins controversy. The articles by Michael Behe and David Wilcox alone are worth the book’s price. Ironically, even those on the blind watchmaker side of the debate are positive about the book, welcoming the opportunity to present their side to creationists. Easy to understand, yet informative for the specialist, this volume shows one way that the creation worldview can get past censors.

Jerry Bergman
Jerrybergman30@yahoo.com

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

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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.

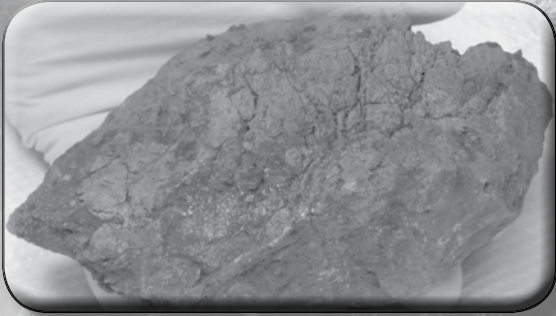
2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.

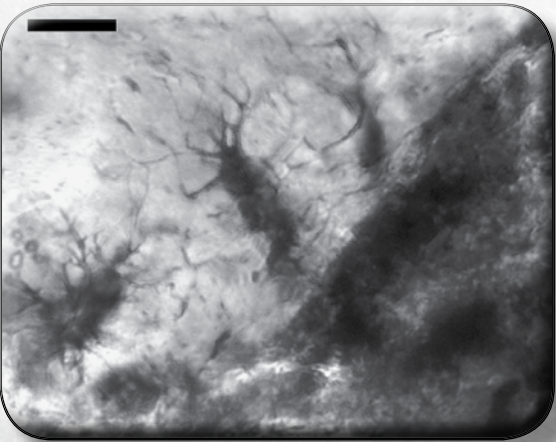
4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Savior. The act of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

iDINO II

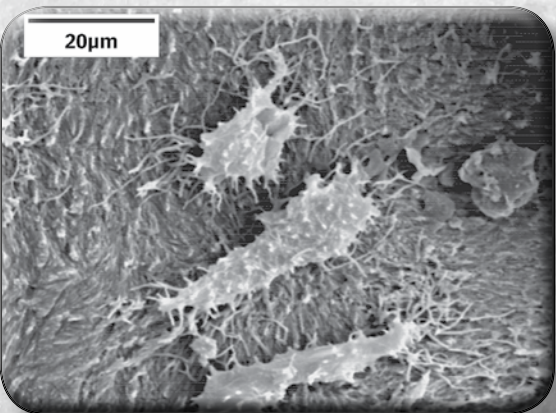
Investigation of Dinosaur Intact Natural Osteo-tissue



A fragment of the *Triceratops* brow horn.
Fragments, such as this one,
still contain tissue and cells.



Microscopic examination of tissue
extracted from a *Triceratops* horn
reveals bone cells still present.



Electron microscope picture of
intact bone cells still in tissue
extracted from a *Triceratops* horn.

How can pliable, stretchable tissue survive inside dinosaur fossils for over 65 million years?

How can this tissue still contain intact cells and even dinosaur proteins?

How can this fragile biological material survive for so long?

The answer to these questions directly challenges the current, evolutionary-biased, geologic timescale.

The Creation Research Society began its iDINO research initiative for the purpose of studying soft tissue in dinosaur fossils. The first phase of the project detected pliable, unfossilized tissue in a brow horn of a *Triceratops*. Within this tissue were intact osteocytes (bone cells). Some results from the iDINO project have been published in a technical microscopy journal and presented at an international microscopy conference. The Spring 2015 issue of the *Creation Research Society Quarterly* also features a special report of the iDINO project. Plus, to further spread the important information about soft tissue, the Society is developing a video (Echoes of the Jurassic).

The **second phase** of the project (iDINO II) will look more extensively at the process of tissue preservation. Evolutionists have offered various theories of how this tissue could survive for millions of years. iDINO II will methodically investigate these preservation claims, assessing their plausibility.

The iDINO results have already provided a strong challenge to the evolutionary worldview. More extensive and detailed examination may provide even stronger evidence that the age of dinosaur fossils is far less than 65 million years. To this end, the Society continues to seek those willing to fund this project with either one-time gifts or monthly donations.

For more information contact us at (928) 636-1153 or crsvarc@crsvarc.com.

Also visit <http://tinyurl.com/nphm2c4> for project updates and details.

