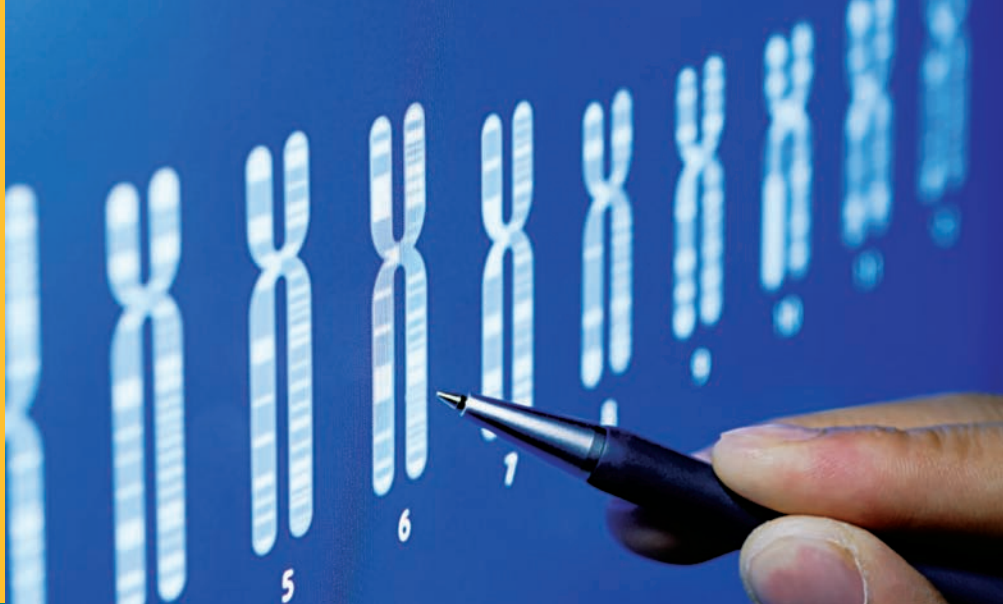


CREATION RESEARCH SOCIETY



QUARTERLY

Volume 46 Summer 2009 Number 1



GENE DUPLICATION

CAN EVOLUTION MAKE NEW SOFTWARE?

HARDGROUND ORIGINS

Creation Research Society Quarterly

Volume 46

Summer 2009

Number 1

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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

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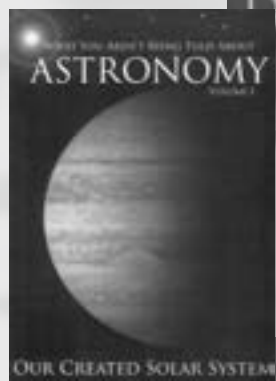


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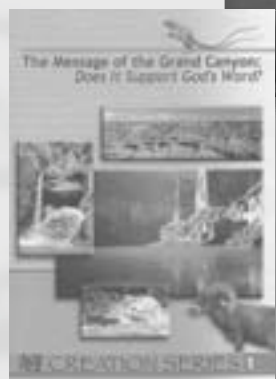


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Gene Duplications and Nonrandom Mutations in the Family Cercopithecidae: Evidence for Designed Mechanisms Driving Adaptive Genomic Mutations

Jean K. Lightner*

Abstract

Historically, creationists have explained the diversity in created kinds primarily in terms of initial created variability, Mendelian inheritance, chance deleterious mutations, and natural selection. Baraminology research suggests that some animal kinds represented by a single pair on the ark less than 4500 years ago have diversified significantly and are now represented by entire families. This suggests that other mechanisms are present that generate diversity to allow animals to adapt. Research on the RNASE gene in Old World monkeys suggests that programmed adaptive genetic changes were involved in gene duplication and subsequent nonrandom adaptive mutations.

Introduction

Historically, many creationists have explained the diversity in baramins (created kinds) primarily in terms of initial created variability, Mendelian inheritance, chance deleterious mutations, and natural selection. Baraminology research has found that species believed to belong to a single baramin often consist of families and sometimes several families of organisms (Wood, 2006). The degree of phenotypic diversity present within baramins implies

significant genetic diversity and the involvement of additional mechanisms designed to generate variety (Lightner, 2006; Lightner, 2007; see also Wood, 2003; Ashcraft, 2004). One of the most challenging and promising areas of future creationary biological research is in identifying genetic diversity within baramins and researching suitable mechanisms to explain this diversity. This research is crucial for a coherent creationary model that accounts for the

present diversity within baramins of land animals and birds after a severe genetic bottleneck less than 4500 years ago at the time of the Flood (Genesis 6–8; Ussher, 2003).

Biblical Starting Point

Since the Bible provides the only account of origins and early history from an eyewitness perspective, examining it first will eliminate many unnecessary rabbit trails. God created animals according to their kinds, with the ability to reproduce and with the intent that they fill the earth and seas (Gen. 1:21–25). Initially, all creation was declared “very good” (Gen. 1:31); but later humans rebelled,

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and the earth was cursed (Genesis 3; Rom. 8:18–22). Many centuries later human wickedness became so great that the earth was judged with a global flood. After the Flood, land animals and birds preserved on Noah's ark reproduced and filled the earth again (Gen. 8:16–17). God created the earth to be inhabited, and He cares for His creation (Isa. 45:18; Ps. 147:8–9; Matt. 6:25–34). Given this, it seems that animals would be designed with the genetic ability to adapt as they spread throughout the earth.

The fact that humans were created in the image of God (Gen. 1:26–27) has a variety of implications. In the present context, this implies that uniquely human traits, not including sinfulness, reflect the Creator. Some examples include abstract thought, advanced communication ability, creativity, appreciation for beauty, engineering abilities, and computer programming skills. God communicates to us (Heb. 1:1–2; 2 Tim. 3:16) and does so even using abstract concepts such as sin and redemption (Rom. 3:23–24). The beauty and creativity in creation is seen around us in the vast variety of living things in various sizes, shapes, and colors. The amazing adaptations in nature have inspired a whole field of science, biomimetics, in which engineers study and copy designs in God's creation. It follows that, as a programmer, God should be clearly evident somewhere in creation.

Genomes: Sophisticated Computational Information Storage Systems

Evolutionists have historically viewed the genome as the product of random mutations and other chance processes, including fortuitous events and culling by natural selection. The genome contains not only protein-coding genes, but also considerable noncoding regions, often referred to as “junk DNA.” Yet the scientific literature contains a tremendous amount of data indicating

that various types of repetitive DNA, including transposable (or mobile) genetic elements (TEs), are important for proper genomic function (reviewed in Sternberg and Shapiro, 2005). These TEs have traditionally been viewed as parasitic. So far over 50 human diseases are known to result from movement of TEs, which is estimated to represent approximately 0.3% of all human mutations. Many other TE insertions are considered neutral (Belancio et. al., 2008).

For all the scientific literature on the genome, we appear to have only a preliminary understanding of how it functions. The snapshots of data do not necessarily give us a clear picture of either what happens over time, or information about the causes and potential purpose related to these changes. For example, some mutations cause early death and may not be detected. This means that detrimental mutations may be more common than is now assumed. Many neutral mutations never reach sufficiently high levels in a population to be detected, thereby obscuring the rate and pattern of mutations. Additionally, there may be a significant reporting bias in cases where mutations cause disease because disease investigation is comparatively well funded; this may cause mutations to appear disproportionately deleterious. Furthermore, sequencing is generally done on only one or a few individuals; thus we often do not know how common allelic diversity exists at these loci. All these factors may serve to obscure a comprehensive understanding of genetics. Furthermore, the term “neutral mutation” generally refers to mutations whose effects are subtle or unknown. The large number of “neutral” mutations should make creationists very suspicious that something important may be occurring that has not yet been characterized.

Attempting to account for the molecular data generated since the modern synthesis theory of evolution was con-

ceived, some evolutionists see the need to view the genome differently. Some think of DNA as a data storage medium and have described genomes as “sophisticated computational information storage systems” (Sternberg and Shapiro, 2005, p. 108.) Using this metaphor, protein-coding genes are the data files and TEs serve to format the genome so that the “data files” are in the right place at the right time for organisms to function. Given the Biblical teaching of the Curse, one might expect that such a complex system would occasionally fail, resulting in disease or death, though this remains a small part of the whole picture. Sternberg and Shapiro (2005) conclude:

As we increasingly apply computational metaphors to cellular function, we expect that a deeper understanding of retroelements and other repeats, the integrative fraction of cellular DNA, will lead to increased understanding of the logical architecture inherent to genome organization. In the era of biocomputing and systems biology, the study of cellular information processing promises to revolutionize not only the life sciences but also the information sciences. We anticipate learning powerful new computational paradigms as we come to understand how cells use myriad molecular components to regulate millions of biochemical events that occur every minute of every cell cycle. Our expectation is that, one day, we will think of what used to be called “junk DNA” as a critical component of truly “expert” cellular control regimes (p. 114).

Some creationists also have argued that TEs play an important role in all living organisms. TEs mediate an increase in genetic diversity: they may activate or inactivate genes, increase the copy numbers of genes, and possibly allow for horizontal gene transfer between eukaryotes (Bergman, 2001; Wood, 2003).

Gene Duplications and Adaptive Mutations in Old World Monkeys (Cercopithecidae)

Shifting back to the general question of accounting for genetic diversity within baramins, a fascinating article by Jianshi Zhang (2006) may provide insight into mechanisms for generating diversity. Zhang studied the pancreatic ribonuclease (RNase) gene in a number of primate lineages (Zhang et al., 2002) and found the gene (RNASE1) ostensibly duplicated in the douc langer (*Pygathrix nemaeus*), a leaf-eating monkey.

Leaf-eating monkeys (colobines) are a subfamily (Colobinae) of Old World monkeys (Cercopithecidae) (Myers et al., 2008). A previous baraminology study suggested that Cercopithecidae represents a single baramin (cited in Wood, 2006). The colobines differ from others in this family in that their diet is primarily leaves rather than insects and fruit. They have a ruminant-like digestive system with bacteria in the foregut fermenting the leaves, which are high in cellulose. Subsequently, the bacteria are digested to recover the nutrients. These bacteria have a high ratio of RNA nitrogen to total nitrogen compared to other cells. Thus, foregut fermenters require higher levels of RNase to efficiently utilize bacteria as a nutrient source. Furthermore, the pH in the small intestine of colobines (pH 6 to 7) is significantly lower than that of humans (pH 7.4 to 8) (Zhang, 2006).

Molecular dating of the duplicated gene in douc langer (designated RNASE1B) suggests that it had arisen after the Asian colobines had diverged from the African clade. To test this, Zhang sequenced RNASE 1 and flanking regions in a guereza (*Colobus guereza*), an African colobine. In addition to RNASE1, the gene was apparently duplicated twice (RNASE1 β and RNASE1 γ) in the guereza. Phylogenetic analysis indicates that the RNASE1 duplications

were independent in the Asian and African colobine lineages.

Nonrandom Changes in the Duplicated Genes

The duplicated genes in both species have undergone considerably more changes at the protein sequence level than the RNASE1 genes. Specifically, DNA sequence comparisons suggest that in the douc langer there have been zero amino acid substitutions in RNASE1 and 10 in RNASE1B since the duplication. In the guereza there have been two substitutions in RNASE1, 10 in RNASE1 β , and 13 in RNASE1 γ since the first duplication. These rapid nonsynonymous substitutions are largely confined to the coding region. The synonymous and noncoding sites of the duplicated genes have significantly fewer changes.

Zhang (2006) cites evidence that not only are the timing and placement of the substitutions nonrandom, but the specific amino acids substituted are nonrandom as well. In douc langer, seven of the nine amino acid substitutions in the mature peptide involve a charge change, and all seven increase the negative charge of the protein (R1G, R4Q, K6E, R32L, R39W, R98Q, A122D). Similarly, in the guereza, ostensibly between the first and second duplications, seven of the nine amino acid changes affected the mature protein, 4 of these involved charge changes, and all four increase the negative charge of the protein (R4Q, K6E, R39W, N88D).

Functionally Relevant Results of the Nonrandom Changes

Zhang (2006) hypothesized that these proteins had independently undergone similar functional changes. Recombinant proteins were used to measure catalytic activity at various pHs. In the douc langer (Zhang et al., 2002) the optimal pH was 7.4 for RNASE1 and 6.3 for RNASE1B. In the guereza (Zhang 2006), the optimal pH was still 7.4 for

RNASE1 and 6.7 for both RNASE1 β and RNASE1 γ . Little difference was seen in catalytic activity among these enzymes at their optimal pH. Thus the enzymes encoded in these duplicated genes now perform more optimally at the pH present in the small intestine of colobines (i.e. pH 6 to 7).

Furthermore, there were three parallel amino acid substitutions between the douc langer and guereza, two of which are fairly uncommon replacements in most proteins. By reconstructing putative ancestral proteins, Zhang demonstrated that all three of these substitutions were important in changing the optimal pH of the enzyme by removing positive charges. It was also demonstrated that these derived proteins no longer degrade double-stranded (ds) RNA, a function present in RNASE1 of humans, rhesus monkey, and both colobines. While dsRNA is not typically present in the diet, it has been suggested that it may be important for antiviral defense, and it is known that human RNASE1 is expressed in tissues outside the pancreas. This suggests that retention of the RNASE1 gene in colobines may be necessary for the animal's survival.

Evolutionist versus Creationist Interpretations of the Data

Throughout the paper, Zhang (2006) uses statistical methods to demonstrate that these changes in amino acid sequence are nonrandom. Since the data are interpreted in an evolutionary paradigm in which mutations are *assumed* to be random, Zhang *assumes* that natural selection is able to account for these observations. In reality, even if random mechanisms could produce the mutations (which is questionable; see Bergman, 2005), there is no evidence that natural selection can produce the nonrandom pattern observed. Natural selection is a phantom rarely observed; it is primarily a rationalization to justify a purely materialistic origin of life (Bergman, 1992). Patterns existing in nature

invalidate natural selection as a major driving force. For example, individuals with higher fertility should reproduce and have more offspring with higher fertility; thus natural selection should tend to maximize reproduction rates. However, in nature lower reproductive rates are observed, keeping the population in balance rather than maximizing individual “reproductive success” (Ivanov, 2000).

Additionally, natural selection does not have the power to fix beneficial mutations unless there is an enormous disparity in reproduction rates between carriers and noncarriers of mutations (ReMine, 2005; 2006). Zhang (2006) cites fossil evidence that, when interpreted within the evolutionary paradigm, suggests colobine monkeys had shifted their diet and physiology several million years prior to the duplications in the RNASE genes. This is entirely inconsistent with the contention that natural selection can account for the fixation of a series of beneficial mutations in the population since the changes in the enzyme were not necessary to initially exploit the environment.

Evolutionists sometimes cite this type of evidence to demonstrate that gene duplication, random mutation, and natural selection can explain the acquisition of “new information.” In fact, my attention was first directed to Zhang’s article after an evolutionary scientist made this specific claim. In reality, these data do not help the evolutionary paradigm. The changes not only require the previous existence of a functional gene, but a gene that can be modified to produce functionally relevant results. It also requires gene duplication, which hardly appears to be simply a chance event, as indicated by an investigation of insecticide resistance in blowflies (Lightner, 2008).

For a creationist researcher who understands the critical importance of being able to explain intrabaraminic diversity, this article has significant implications. Zhang’s research provides

strong circumstantial evidence that the genomes of mammals were designed to be able to undergo adaptive genetic changes. Given that the rhesus monkey (family Cercopithecidae; subfamily Cercopithecinae), which does not carry a duplicated RNASE1 gene, and both colobines with their respective duplicated genes probably descended from two monkeys preserved on Noah’s ark less than 4500 years ago, designed mechanisms appear to be operating. This would include mechanisms to cause gene duplications and subsequent changes (in the duplicated gene only) that are incorporated into the germline.

Directed genetic mutations are consistent with the concept of a computational genome linked to environmental stimuli. This would allow migrating animals to exploit novel environments and niches fairly rapidly, perhaps within a few generations. It is unknown at what rate such genetic changes occur; it probably varies, depending on the type of change involved. In the example discussed here, gene duplication appears to have been necessary to allow another function of RNASE1 to remain intact. The gene duplication might initially allow for greater RNase activity while the subsequent changes allowed for improved performance in a small intestine with a lower pH. TEs may have played a role in gene duplication and possibly horizontal gene transfer. Homozygosity may have been increased in these animals through gene conversion. Animals not affected by these genetic changes would likely retain a more varied diet and would be free to migrate elsewhere. Thus, directed mutations combined with the founder effect appear to provide a more rational explanation for these observations than random mutations and intense natural selection.

Conclusion

The research reported by Zhang (2006) provides strong circumstantial evidence

that the genome of mammals was designed to allow for programmed adaptive genetic changes. A tremendous need exists for creationists to dig deeper into the available literature and assess the genetic variability within baramins. As we do, we will be better able to understand what types of changes occur and to consider what types of mechanisms may be involved. This is critical to further developing a more coherent creation model that accounts for rapid speciation and adaptation in a way that acknowledges the awesomeness of the Designer.

Acknowledgements

I am thankful that the Zhang (2006) article was brought to my attention on CRSnet (cf. Gen. 50:20; Rom. 8:28).

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Book Review

Eight-Legged Marvels

by Chad Arment

Coachwhip Publications,
Landisville, PA, 2008, 91 pages,
\$25.00.

Author Arment has written several books on herpetology and cryptozoology. He holds an undergraduate biology degree from Wright State University. This new book offers more than 200 beautiful color photos of spiders. The subtitle reads “Beauty and Design in the World of Spiders.” There are about 40,000 known spider species and perhaps five times as many yet unnamed (p. 7). The smallest known spider, *Patu digua* from Colombia, has an adult body size of only 0.37 mm. One of the largest spiders, *Theraphosa blondi*, is a bird-eating tarantula with a twelve-inch leg span. The

book offers “a basic biological overview of spiders and their world” (p. 5). There are delightful descriptions of the jumping spider’s binocular eyes, mimics, aquatic spiders, and net-casters.

A gracious creation worldview is promoted throughout the book. Well-chosen historical quotes appear by John Bunyan (1686, p. 85), James Brodie (1855, p. 6), A. N. Somers (1902, p. 52), and Robert Frost (1932, p. 85). A truly amazing story appears on page 52: In 1902, naturalist pastor A. N. Somers reported finding an artificial flower constructed by a funnel web spider. The creature

had woven together three concentric circles of butterfly wings to attract insects to its web. The outside flower circle was three inches in diameter with the wing petals arranged according to size and color. One can only wish that a current example of such an object could be found and photographed. If the story is credible, it shows impressive intelligence and artistry by the lowly funnel spider. If you do not like spiders, this book could change your mind.

Don B. DeYoung
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Book Review

Wonders of Creation: The Cave Book

by Emil Silvestru

Master Books, Green Forest, AR, 2008, 80 pages, \$16.00.

**AVAILABLE
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The Cave Book is the sixth in the popular *Wonders of Creation* series published by Master Books. The series come with workbooks so the books can be used in homeschool courses. The series is designed to provide a creationist alternative to the evolutionary dominated *Time-Life*, *Eyewitness*, and other children's books published by the secular media. The series is appropriate for grades six and above. We are privileged to have Emil Silvestru write this book; he received his Ph.D. in karst geology and has explored caves the world over. Cave pictures worldwide are displayed in the book.

Chapter 1 shows how humans have always used caves. There is much information on human activity in caves including bones, tools, musical instruments (bone flutes), footprints, and exquisite cave art found in over 300 caves from Spain to the Ural Mountains of Russia. Author Silvestru believes that cave art is related to religious beliefs. I found it interesting that no cave art has been drawn on speleothems. Could it be that the artists realized that speleothems

grow too fast, a subject taken up later in the book? A four-page spread on Neanderthals, who occupied caves in Europe during the Ice Age, shows that they are a unique type of human being.

Chapter 2 examines a range of cave subjects including echolocation in bats, the unique creatures that live in caves today, and cave climate. Chapter 3 delves into more technical details of caves and karst. The discovery that many caves are dissolved out by sulfuric acid and not carbonic acid is emphasized. This means that the initial cave openings can form rapidly late in the Flood and afterward. Chapter 4 describes the many fascinating, incredible features of caves that make them such popular tourist attractions. Such features can form after the Flood, especially in a wet Ice Age climate, as carbon dioxide rich water seeps down into the openings. Evolutionary scientists commonly date speleothems, but Dr. Silvestru shows how this dating cannot be accurate.

Chapter 5 describes Dr. Silvestru's

specialty of exploring caves. Cave exploration is a muddy business with many skills required such as vertical rope climbing, first aid, wearing the right clothes, and knowing how to take a good picture. One may also have to swim in the water which commonly occupies the lower parts of caves. Sometimes diving equipment is required. Some caves are open at the top and it is even possible to parachute into a few. The sixth and last chapter is another great interest of the author and that is studying caves and karst. In this chapter, he presents evidence that speleothems can form rapidly.

Technical terms in the book are defined in a glossary. There is a wonderful three-page spread summarizing the main points of the book. Like all the *Wonders of Creation* books, *The Cave Book* is in full color and will be enjoyed by adults.

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The Universal Deluge: Alternative Hypotheses for Hardground Origins

John Woodmorappe*

Abstract

Transport processes can potentially account for *in situ* hardgrounds in the sedimentary record. Steadily accumulating evidence undermines the certitude of life-position inferences of at least certain fossils. Some turbidity currents and debris flows allow for the contemplation of large-scale transport, imbrication, and coplanar deposition of large, flat slabs of antediluvian hardground origin. Modern volcanoes demonstrate that released gas can cause the flotation of large rock slabs. Finally, many *in situ* hardgrounds show evidences at least suggestive of a composite, allochthonous origin. A hardground-conduit hypothesis posits that hardgrounds formed in pseudokarstic-submarine (underwater cavelike) structures. This solves the apparent problems of time and stratigraphically superposed hardgrounds. The hardness of hardground organisms is just one factor consistent with this hypothesis.

Introduction

Ancient hardgrounds, usually inferred from the presence of borings and/or obligate hard-surface encrusting fossil organisms, are common in the Phanerozoic sedimentary record. The reader unfamiliar with hardgrounds can find basic information at an online tutorial (Anonymous, 2001).

Owing to the time ostensibly required for their construction, they are commonly presented as an insuperable problem for Flood geology. Woodmorappe and Whitmore (2004) examined their occurrence at the famous

Caesar Creek locality of southern Ohio, USA, and Woodmorappe (2006) showed that some types of hardgrounds could have formed within the Flood year.

An Allochthonous Origin of Some Individual Encrusters?

Encrusting hardground fossils have traditionally been thought to exist in their life orientation, but new research suggests this is worth revisiting. Meyer's (2006) work, though not directly related to hardgrounds, revised previously held opinions on the life-orientation position

of certain brachiopods. In addition, certain closed articulated bivalves cannot any longer be automatically assumed to be in life position (Cadee, 2002; it is unclear if closed bivalves of types other than those observed in this study can also float). Placed in a broader context, a variety of once-transported organisms can be mistaken for *in situ* fossils (Woodmorappe, 1999), and a statistical analysis indicates that at least some of them could have arisen by chance (Woodmorappe, 2008).

If the "life orientation" of fossils is largely the result of uniformitarian bias, an empirical mind-set would suggest that systematic flume experiments evaluate the "life orientation" deposition of fossils and should include ostensible encrusters. The experimental verification of the hydrodynamic stability of

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the convex-up orientation of concavo-convex and plano-convex brachiopods (Lescinsky, 1995) should lead to similar tests on the transport and “life orientation” deposition of seemingly encrusting mound-shaped (and, to a lesser extent, sheet-shaped) bryozoan colonies, especially if gases of decomposition—which are believed to assist the waterborne transport of dead, modern bryozoan remains (Thomas et al., 2003)—could have come into play. While such gases would not, according to conventional belief, be sufficient to float the heavily calcified Paleozoic bryozoans, they may have possessed enough buoyant action to orient the upper (convex-up) part of the bryozoan colony during transport, thus favoring its deposition in apparent life orientation.

Flood currents could have initially picked up organisms with their shell-mold base “plumbs” or “anchors” still attached. These bottom-heavy encruster-mold combinations would thereby tend to be stranded in life orientation (Waddington, 1980). Moreover, to the extent that the matrix and some of the inferred hidden molds are microscopically indistinguishable, the foregoing process can take place without leaving any independent evidence of its occurrence.

What about the “cemented in” look of hardground encrusters? In certain situations, precipitation of carbonate can be so rapid that plant leaves are coated with a thin veneer of lithified carbonate within hours, especially in mechanically agitated water (Zhang et al., 2001). Instead of being self-cemented to the hardground surface, bryozoans and other encrusters actually could have been washed into position and pressed into a surficial veneer of “instantly” lithifying carbonate. Such near-instantaneous precipitation is favored by mechanical agitation of water, with obvious relevance to Flood-related events. Furthermore, there is much that is unknown about rapid precipitation of carbonates (Silvestru, 2004).

Origins of Obviously Allochthonous Hardground Constituents

Most ancient hardgrounds are a blend of obviously allochthonous hardground clasts and inferred *in situ* hardground surfaces, with the former sometimes predominant (Wilson and Taylor, 2001). In situations where clast-only hardground remnants include a few clasts containing faunules in “life position” (Wilson, 1986), it is reasonable to suppose that this occasional “life position” is the outcome of fortuitous deposition. Owing to the fact that, under certain conditions, carbonates can indurate in a matter of hours (Zhang et al., 2001), and appreciable boring can occur in a matter of weeks (Woodmorappe, 2006), ample time was available for carbonate muds to lithify during the Flood (with embedded shells, etc.) to undergo subsequent Flood-related erosion and then to experience one or more generations of boring during the Flood year itself.

An Allochthonous Origin of Seemingly *In Situ* Hardgrounds?

The foregoing reasoning is now extended to situations where there is a hardground surface in outcrop, which is conventionally interpreted as a complete *in situ* surface.

Several mechanisms exist for the coplanar deposition of slabs up to at least a few meters length. One of these is submarine sliding, which is capable of moving blocks as much as tens of kilometers in size (Sigler, 1998) and with slopes as low as one degree (Wingerden, 2000). Possibly certain hardground slabs of antediluvian origin even could have been “wedged-in” into soft sediments.

Certain high-density turbidity currents or debris flows have the capability of entraining large slabs (Postma et al., 1988). These slabs “ride” the interfaces that exist in these turbidites in a manner reminiscent of a water skier pulled by a motorboat and maintain an imbricate orientation during this time (Postma

et al., 1988). Those especially flat slabs that happened to be deposited with sufficient regularity and spacing would be mistaken for continuous, even stratigraphically traceable *in situ* hardground surfaces. Isolated slabs deposited upside down would usually tend to be dismissed as locally eroded pieces of a hardground surface. When found occasionally imbricated against, and cemented to, respective *in situ* slabs, upside-down slabs would be misinterpreted as overhangs. A thorough understanding of massive movements of water, occurring on a currently unobserved scale is necessary to test the foregoing hypothesis.

Evidences for Transport of *In Situ* Hardground Surfaces

Many features of *in situ* hardgrounds are consonant with this type of composite origin. To begin with, laterally persistent hardgrounds commonly show considerable change over distance. Ostensibly diagnostic hardground characteristics appear inconsistently from locality to locality (Dogan et al., 2006). Frequently, hardground surfaces exhibit some areas that are strongly encrusted and large areas that are barren of encrusters and/or borings (Gruszczynski, 1979). This patchiness is usually blamed on the hypothetical presence of patches of sediment overlying the surface, denying access to borers and encrusters. The carbonate microfacies types of underlying and overlying strata, relative to hardgrounds, may or may not differ in texture and biotic content (Flügel, 2004). Hardgrounds can be intercalated with sediments exhibiting indicators of dynamic current action (Goldring, 1995), even acknowledged storm deposits (Woodmorappe and Whitmore, 2004).

Other common hardground features suggestive of a composite, allochthonous origin are more explicit. Numerous ostensibly *in situ* hardground surfaces exhibit cracks or fractures, and even

one hardground slab overriding another. Although these are blamed on stresses caused by submarine cementation, the latter may simply indicate imbricated transported hardground slabs. Hardgrounds containing synsedimentary faults, Neptunian dykes (see glossary; Eren and Tasli, 2002; Tucker, 1973), and/or possible dewatering structures (Misik and Aubrecht, 2004) may reflect the squeezing out of soft sediment around the margins of stranded antediluvian hardground slabs. The existence of numerous pelmatozoan (see glossary) holdfasts on the underside of certain hardground overhangs, described as a puzzling observation (Brett and Brookfield, 1984), find a straightforward explanation in terms of allochthonous deposition. These authors suggest that the pelmatozoans in question grew on the underside of overhangs, tolerating upside-down growth until their stalks could curve 180° to grow upward. It makes at least as much sense to instead question the conventional overhang interpretation. Perhaps these submeter-to-meter-sized, so-called overhangs are misidentifications of slabs that were deposited in an upside-down orientation, having experienced a prior history of successive encrustation on both sides, including the normal upward growth of pelmatozoans.

The relative thinness of most *in situ* hardground constituents and that of entire hardgrounds facilitate a prior history of transport. Overhangs in hardgrounds, which range from tongue-shaped to mushroom-shaped, are usually less than 20 cm tall (Brett and Brookfield, 1984; Koch and Strimple, 1968; Palmer and Fursich, 1974). Even very complex hardgrounds are usually less than 50 cm thick (Lindstrom, 1979), and this also holds for cavity-bearing hardgrounds (Brett and Brookfield, 1984). These figures are probably maxima, as most putative ancient hardgrounds, especially the complex ones, probably consist of multiple sheets deposited serially.

Flotation of Hardground Constituents Mediated by Gas

Attention is now focused on the potential for flotation of entire hardground faunal assemblies. This includes the surficial layer of the bored or unbored carbonate rock to which they are attached.

Kelp, with its air-filled vesicles, and operating under the constraints of normal marine processes, has been proven capable of rafting rocks at least 38 cm long and 6 kg mass, and then decaying away readily, leaving no trace of its former presence (Emery and Tschudy, 1941). The size limit of rocks rafted by kelp, of course, would have to be determined experimentally, especially when one considers the unprecedented large sizes and thicknesses of kelp rafts probably arising during the Flood.

Hardground faunas commonly consist of organisms that are intertwined with each other, and attention is now focused on the transport of hardground constituents that do not float but are attached to organisms that do. The prominence of hardground bioimmuration processes (Wilson et al., 1994; bioimmuration being the process by which soft organisms are molded by the hard, preservable organisms that overgrew them) point to the onetime existence of unpreserved soft-bodied animals on the hardgrounds. Soft organisms, candidates for bioimmuration processes, are prone to decompose (Voight, 1979), releasing gases that may have floated the entire assemblage, perhaps even with some of the subjacent, often-bored crust still attached. The latter would be most applicable to Mesozoic and Cenozoic hardgrounds, whose faunas tend to be thicker and more areally extensive than their Paleozoic counterparts, and which therefore would be expected to release and trap more gas as a result of decomposition.

An additional, or alternative, source of buoyancy is provided by air spaces that sometimes occur in the limestone itself. Surprising instances of floating

coral (Kornicker and Squires, 1962) illustrate this. Sketches in profile of *Trypanites* in densely bored cross sections of certain hardgrounds (Hecker, 1970, see his Figure 1b, p. 218) suggest that the minimum 60% of rock has been hollowed out. This alone would allow for the hardgrounds' potential flotation. At an assumed density of 2.5 g/cm³ for carbonate rock, just over 60% of it would have to be replaced with air to reduce the average density of the slab below 1.0 g/cm³ and allow it to float. Of course, borings containing trapped air or other gas would have to be sealed at this time, as would preferentially have occurred in complex hardgrounds slabs owing to their multiple layers of superposed and sealed, bored surfaces. The flotation of partially hollowed-out carbonate rocks should be tested experimentally.

Submarine gas releases occur today (Kuscu et al., 2005), and any Flood model must factor the vast amounts of gas that were probably released from subterranean sources during the Flood. Experimentation is needed to determine if large slabs of antediluvian hardground surfaces could have been made buoyant by trapped gas (Figure 1). Some evidence for the workability of this mechanism comes from observations of lava crusts floating atop molten lava, the result of gas trapped under the crusts (Perret, 1913).

The Proposed Conduit-Hardground Hypothesis: A Submarine Pseudokarstic Origin of Hardgrounds?

What if ancient hardgrounds did not form directly on ancient seafloors but on the seafloors of cavelike water-filled conduits that in turn occur within recently lithified, Flood-deposited sediments (Figure 2)? The actual water-sediment interfaces would usually be very subtle. If so, then unmistakably superimposed hardgrounds could be constructed concurrently and not just successively.

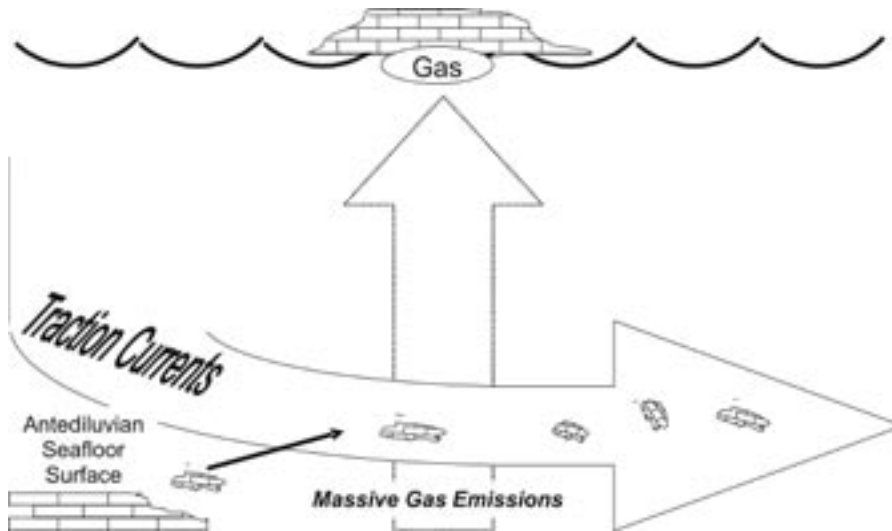


Figure 1. Massive gas emissions during the Flood potentially allow for the flotation of antediluvian hardground slabs, to be subsequently redeposited as both obviously allochthonous and seemingly autochthonous Phanerozoic hardgrounds.

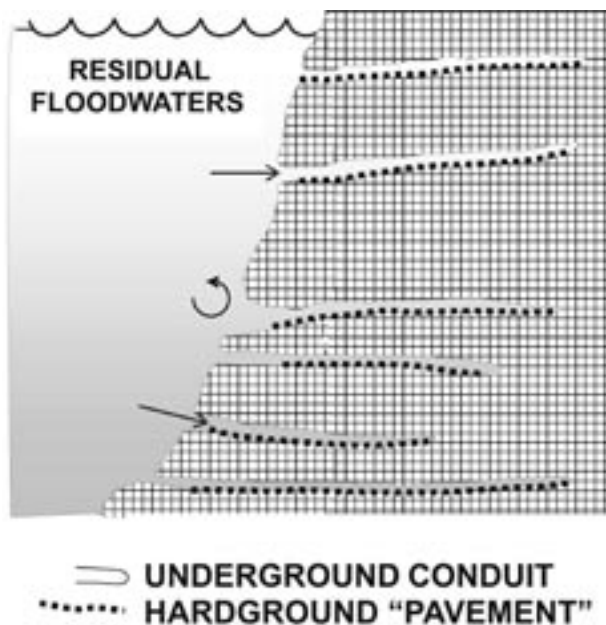


Figure 2. The conduit-hardground hypothesis. Horizontal conduits form in previously lithified Flood-deposited strata. Thanks to episodic forced movements of water, hardgrounds of varying complexity form on the floors of these flat submarine cavelike conduits. Note the potential ability of multiple horizons of hardgrounds to form long after the Flood itself and the extreme vertical exaggeration in this figure.

Note that this hypothesis proposes that hardgrounds formed during the late Flood and post-Flood period and within previously Flood-deposited sediment.

Of course, the existence and temporal persistence of the conduits implies that the strata are sufficiently lithified to open up as conduits, support the overburden, and maintain the conduits for significant periods of time. Research is needed on the dynamics of rapid lithification of considerable thicknesses of rapidly deposited sediment.

One might expect the postulated conduits (Figure 2) to have opened up along planes of weakness in strata. Interestingly, many hardgrounds are associated with obvious lithological changes (Eren and Tasli, 2002). Middle Paleozoic ones commonly occur below the shales of limestone-shale couplets (McLaughlin and Brett, 2004), and as illustrated elsewhere (Woodmorappe, 2006).

There is some overlap of hardground and karstic phenomena, as manifested by paleokarst/hardground associations that range from controverted (Keith and Wickstrom, 1993) to accepted (Desrochers and James, 1988; Vera et al., 1988). In the latter case, it was supposed that a karst was overlain by a hardground caused by a subsequent marine transgression. Otherwise, the postulated conduits should not be confused with caves as is usually understood by this term. Caves originate primarily from solutional activity, to which forced-water action is very much subordinate (Palmer, 1999). In contrast, the postulated conduits, generally devoid of karstic features and therefore termed pseudokarstic, must have formed almost entirely as the outcome of tectonic action and forced-water movements.

Field Testing of the Conduit-Hardground Hypothesis

One obvious way of testing for the onetime existence of horizontal subterranean conduits is to locate the cor-

responding vertical conduits. However, this may not be straightforward. To begin with, vertical conduits may be much less common than horizontal ones, as is the case with some modern karsts (Ford and Ewers, 1978), in which the horizontal flow of water (along bedding planes) is much more common than the flow of water in the vertical direction. To the extent that late-Flood and post-Flood conduits originated largely from tectonic action, this disparity may have been even more pronounced. The investigator must factor the post-Flood re-equilibration processes (e.g., regional downwarp) as ones that favored the slippage of rocks along bedding planes over the cracking of rocks perpendicular to the bedding planes. There is also the bias introduced by erosion: The same erosional processes that made the hardgrounds visible in outcrop also likely removed the overburden and the vertical conduits that it contained. Furthermore, the remaining vertical outcrop surfaces may not intersect the remaining vertical conduits.

Another way to test for the existence of onetime horizontal conduits is to check for evidences of collapse just above the hardgrounds. A thorough understanding of collapse processes is necessary because this, too, may not be as straightforward as it appears. Especially when the conduits were not large (perhaps a few cm tall for a simple hardground surface, and a series of closely-successive few-cm-tall conduits producing meter-thick complex hardground surfaces), their eventual crushing probably left little notable geologic evidence, being subsumed within the normal range of sediment-compaction processes, such as those that are already prevalent in chalks, including hardground-bearing ones (Garrison and Kennedy, 1977).

The Biology of Organisms in Conduit-Formed "Hardgrounds"

The testing of the conduit-hardground hypothesis must also extend to the biol-

ogy of hardground-dwelling organisms. Of course, most of the organisms that formed ancient hardgrounds are extinct, and we can only draw analogies with their extant counterparts.

Modern boring organisms are not as delicate as sometimes supposed. *Lithophaga* can continue boring for at least a year despite no feeding and no change in water (Kleeman, 1973). Polychaetes and bivalves include organisms tolerant of dysoxic conditions in sediment, a trait that varies greatly within species (Wignall, 1994), perhaps extending to some borers (Alexander, 1994). Other borers are only slightly affected by the dimming of light (Hill, 1996). The microboring fungi, whose traces have been found on some hardgrounds (Misik and Aubrecht, 2004), are aphotic (Perkins and Halsey, 1971), and the extent of their ability to modify carbonate fabrics is not fully understood (Jones and Pemberton, 1987). Extending this, one wonders if macroboring fungi existed during the Flood and if any of them were capable of making *Trypanites*-like borings.

Facultative borers (see glossary) can burrow through a soft surface before encountering a hard surface and boring into it (Macchioni, 2000; Stearley and Ekdale, 1989). This is true, for example, of sipunculan worms, responsible for *Trypanites*. The presence of these types of borers has been inferred in certain ancient hardgrounds (Goldring and Kazmierczak, 1974). Sharp-edge borings continue as fuzzy-edge burrows, proving that the same organism bored through a lithified layer before burrowing through a soft layer. Otherwise, when covered by a few to several centimeters of overlying sediment, organisms boring a modern limestone vary considerably by species in their tolerance of this sediment, with a few individuals being capable of boring under a much thicker sediment overburden than their conspecifics (Stearley and Ekdale, 1989).

Except for instances where organisms from the photic zone were washed

down into the subterranean conduits, their inhabitants must have been aphotic. These organisms were probably comparable to those modern bryozoans that prefer cryptic habitats (Kobluk et al., 1988). Interestingly, many encrusters and borings found in modern submarine caves can tolerate complete darkness as long as there is adequate circulation of water (Macintyre et al., 1982) for the delivery of nutrients and the removal of wastes, and such conditions must have been facilitated by the mechanical pumping of water taking place within the conduits during late Flood and post-Flood readjustments of the earth's crust.

Hardground Features in the Light of the Conduit-Hardground Hypothesis

The conduit-hardground hypothesis offers considerable potential explanatory power with regard to various hardground phenomena. Let us consider some of them.

Overhangs and cryptobiontic faunas may represent instances of preservation of the ceiling as well as floor surfaces of the conduits, surfaces that had undergone colonization by both borers and/or encrusters. It is unclear what factors would control the frequency of occurrence of colonized "overhangs."

Now consider rounded hardground clasts. These are commonly found alone or in association with *in situ* ancient hardground surfaces. Although the rounding of hardground clasts can readily be explained by the processes of syndepositional transport, in the present instance within the postulated conduits, unconventional processes that produce clast rounding (Clark, 1990) should also be tested, especially when there is a pronounced overlap of erosional and tectonic effects observed in hardgrounds. Rounding of clasts may result from transport in a gaseous stream, hydrothermal effects, subsurface chemical corrosion, abrupt decompression, etc.

Attention is now focused on the mineralization commonly encountered in ancient hardgrounds. Analogous to hypogenic karsts, mineralized zones can develop around solution conduits (Palmer, 1995). Processes of biokarst, a little-understood set of processes (Cunningham et al., 1995) includes bacteria, fungi, deposition of manganese and iron, and patches of fungal colonization. These likely played an appreciable role in the subterranean/substratal/submarine conduits. Experimentation is needed to determine to what extent bacteria and fungi can cause hardground mineralization outside of a conventional seafloor environment.

Complex hardgrounds may be the outcome of a complex, alternating series of water flushings, erosion, boring and encrustation, mineralization, etc. In the end, several mineralization events may have ended up alternated with several episodes of soft-sediment deposition followed by hardground “overprinting.”

Conclusions

Conventional hardground-related thinking is so profoundly steeped in uniformitarianism that it takes a great deal of mental effort to free oneself from actualistic mental boxes. Far from being an insuperable obstacle to Flood geology, ancient hardgrounds provide the investigator with a wide-open field of research initiatives that could reconcile Phanerozoic hardgrounds with the universal Deluge.

Much experimentation is needed to clearly understand the ability of waterborne transport processes to account for such things as individual “encrusting” organisms, turbidite-mediated transport of imbricated hardground slabs, gas-mediated flotation of both individual and collective hardground constituents, etc. Such experimentation appears to be very much underperformed by uniformitarians, especially with relevance to hardgrounds.

The understanding of Phanerozoic hardgrounds as the outcome of pseudokarstic/submarine instead of conventional-submarine processes suggests its own set of research projects. Analogies with the hardgrounds found in modern submarine caves are intriguing but, owing to the matter of scale, can only be of limited value in this regard.

Glossary

Facultative borers—organisms that can switch from boring in hard sediments to burrowing in soft sediments, and back again. (Most organisms can bore or burrow but not both.)

Neptunian dykes—intrusions of soft sediment upward into cracks that occur within lithified sediment.

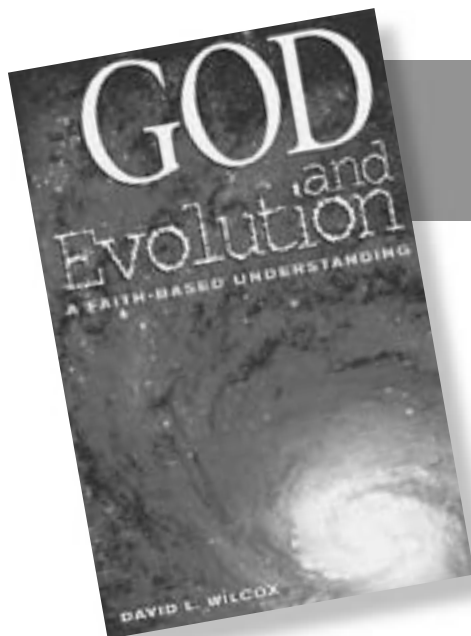
Pelmatozoan—refers to certain bottom-dwelling organisms, the best known of which are crinoids.

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Book Review

God and Evolution: A Faith-based Understanding

by David L. Wilcox

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David Wilcox is a biology professor at Eastern University, St. Davids, PA. He asks the reader to consider a “perspective of faith that does not ignore facts or compromise scientific integrity.” His opening sentence is a quote from a nine-year-old girl, “I can’t believe in both God and dinosaurs, so I picked God.” He then laments how Christians from all walks of life face the same disorienting choice—either choose facts, or choose

faith. Unfortunately this false caricature of creationists warring against facts is a common theme throughout the book.

Wilcox never revisits the opening sentence about dinosaurs, which reveals he is not current with the solid answers from creationists. Not only do we find good descriptions of dinosaurs in the Bible (Job 40:15–19, Isaiah 27:1, 30:6), but we also have powerful evidence that they were contemporary with man

in the not-so-distant past, such as the recent discovery by Mary Schweitzer of T-Rex blood vessels and soft tissue that prompted *Discover Magazine* to surprisingly print that her “dangerous discovery... erased a line between past and present” (Yeoman, 2006).

Chapter 1 begins with something we can all agree on: “No matter what the topic, the starting point for Christians is the Bible” (p. 1). Wilcox quotes Colos-

sians 1:15–17 and Psalm 148:5–6 and rightly states that God set the Creation in order and established its laws. He then lays some groundwork for theistic evolution by claiming God “continued to be in an active relationship with nature,” a theme he emphasizes in later chapters to promote his belief that God guided evolution.

In Chapters 2 and 3 Wilcox does a decent job covering the limitations of science and the historical battle between materialism and theism. He takes issue with the “church of naturalism” as promoted by atheists such as Richard Dawkins, pointing out that “the conflict is not between Christianity and Science, but between Christianity and the philosophical system of naturalism” (p. 18). He claims that certain things in science and theology should not always be taken literally, which is true, but what we really have is subterfuge for theistic evolution and a broad brush to dismiss verses that were clearly intended to be literal. He closes the chapter with the revisionist version of the “church” vs. Galileo, then lampoons that “young earth flood geology can be traced to the revelations of Mary Ellen White, founder of Seventh-Day Adventism” (p. 19). The last I checked, young earth flood geology can be traced to Genesis Chapter 7.

Things get interesting in Chapter 4, “The Age of the Earth.” Wilcox’s favorite example is the “140,000 year old coral” at Eniwetok, a coralline atoll where the first hydrogen bomb was tested. Like any earth “clock,” various assumptions have to be made, in this case a fairly constant growth rate over time. As it turns out, the assumptions don’t even matter. We now know the coral organism is really just a thin layer on top of a carbonate platform that could have been formed during the Flood (Oard, 1999). It is unfortunate that author Wilcox spends no time addressing the numerous clocks that argue against an old age, such as the earth’s magnetic field decay (Humphreys,

2002), helium in zircons (Humphreys, et al., 2004), and radiocarbon in coal, diamonds, and natural gas (Rotta, 2004; Doughty, 2007).

In Chapter 6 Wilcox challenges Michael Behe’s flagella motor as evidence of intelligent design, essentially taking the position that neither design nor undirected chance can be proven. He considers the evolutionist rebuttal that “spare parts” came together over time as a reasonable possibility, then says “we do not know for sure if bacterial motors ... could have originated without guidance” (p. 49). This statement is as nonsensical as saying “we do not know for sure if Mt. Rushmore was formed by wind and erosion.” God tells us His invisible attributes are “clearly seen, being understood by the things that are made” (Romans 1:20).

In Chapter 7 we find some common ground as Wilcox does a commendable job using genetics and information to show how unlikely the jump from non-life to life is, abiogenesis. But the miracle needed to first get a coding language in place isn’t the only problem. To naturalistically obtain new, useful information to produce organs, sonar, migration capability, and numerous other information-rich systems is also impossible (Gitt, 1997; Bergman 2005).

In Chapters 8–11 Wilcox begins his defense of biological evolution by appealing to an example of microevolution. He presents the polar bear as a relatively new species that is the result of a bottleneck on the Kodiak islands due to their genetic similarity to Kodiak bears. He asks why God would create a species of bear to look just like the isolated Kodiak species, and concludes “If God writes fictional narratives into the creation to throw us off, how can we trust either nature or the Word?” (p. 82). This is a straw man argument since creationists do not assume God created polar bears separate from brown bears, especially since these bears interbreed and produce fertile offspring. Creation-

ists recognize that God programmed a great deal of genetic diversity in the various kinds of animals, and thus we would have no problem with the proposed bottleneck scenario that could produce the polar bear variety from the original bear ‘kind’ some generations after the Flood.

Wilcox presents shared pseudogenes and endogenous retroviruses (ERVs) as evidence that all life evolved from a single source. Such evidence for common descent is built almost entirely on the assumption that these genetic elements are functionless junk. We have long been told of so-called junk DNA, but such is now going the way of the dodo bird. In 2007 the National Human Genome Research Institute issued the press release *New Findings Challenge Established Views on Human Genome*, reporting that “The new data indicate the genome contains very little unused sequences.” With junk DNA on its way to extinction, how far behind is the theory that has long depended on it?

In Chapter 13 Wilcox promotes human evolution by appealing to the standard-fare arguments such as 98 percent DNA similarity between chimps and humans, and Chromosome 2 fusion. Even if we accept his exaggerated DNA estimate (recent studies put the differences between 87 to 96%), this still represents a 60 million base pair difference, a mathematically insurmountable number given our low reproductive capacity and the cost of selection as described by *Haldane’s Dilemma* (Remine, 1991). David Wilcox is especially dogmatic on human Chromosome 2, saying it “clearly was created by fusing two ape-like chromosomes.” This ad hoc evidence does not take into account the unique information on this chromosome not found on apes. For Wilcox, believing human Chromosome 2 originated from an ape-ancestor has trumped believing the eyewitness account that man was created separate and distinct from animals.

Interestingly, Dr. Wilcox spends very little time dealing with the many theological problems with theistic evolution. I think it is fair at this point to ask just how serious he takes his credo that “No matter what the topic, the starting point for Christians is the Bible.” He offers no explanation for the overwhelming textual evidence that the six-day creation and global flood are written as literal history, and no explanation of how we could have millions of years of death before sin (Romans 5:22). His few theological ventures include (1) examples of passages outside Genesis that everyone agrees are not meant to be wooden-literal, (2) a tedious attempt to show that King David would have rejected the creation/evolution dispute, and (3) the oft-misused “one day is like a thousand years” of 2 Peter 3:8.

In the end Wilcox tries to skirt a fine line between God and evolution, falling much more into the materialistic evolution paradigm than I think he would care to admit. He claims God used “gradual governance in creation” by guiding change through a pre-engineered probability matrix, and concludes that it

“shows forth the glory of its Creator” (p. 153). This reminds me of something a theistic evolutionist once told me at a conference some years ago: “God is like a wondrous pool player who took lots of shots over eons of time to arrive at the variety of life we see today!” My response to him was “Such a pool game would have been chalked full of millions of years of violence, disease, and death. This sounds like a bad pool player to me!”

Our Creator is not the author of millions of years of death and suffering, but instead is the Living God who considers death an enemy (1 Cor 15:26) which was brought into this world because of our sin (Romans 5:12). We can take great comfort knowing that Jesus conquered death for us and that its temporary hold on history will soon pass.

“And God will wipe away every tear from their eyes; there shall be no more death, nor sorrow, nor crying. There shall be no more pain, for the former things have passed away” (Rev 21:4).

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Can Evolution Make New Biological Software?

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Abstract

The modern theory of biological evolution focuses almost entirely on how random mutation (including recombination) with natural selection could produce all of the physical features and functions that appear in plants and animals. Yet, how do new species of animals obtain the knowledge (the software) to operate the new limbs, organs, and other features (the hardware) that evolution produces? This article will look at reptile-bird evolution and the need for the simultaneous evolution of flying software to support the evolution of the flying hardware (the wings). Next, the article addresses whether random mutation and natural selection can modify software to achieve any new useful functions. Using the InforMutation simulation system, the analysis shows that random modifications to computer software yield broken programs, not improved software. By analogy, biological control systems cannot be modified randomly and then be able to operate new biological hardware.

Introduction

The chief historical evidence of evolution is allegedly the fossil record. The fossil record shows the vast array of plant and animal types that existed in the past, but fossils can provide direct evidence only about general body shapes, bone configurations, and external forms. The fossil record does not indicate how animals, for example, obtained the *information* (knowledge or skill) to operate their organs, limbs, and other features. Yet unquestionably all animals possess

enormous amounts of such operational information (Devlin, 2005; Behe, 1996). Richard Dawkins has claimed that undirected evolution can produce the information necessary to develop and operate living things (e.g. Dawkins, 1986, pp. 47–48). Many writers have argued convincingly that Dawkins is wrong (Behe, 1996; Bergman, 2001; Dembski, 2002; Poppe, 2005; and Spetner, 1999).

Evolution posits that all extant species descended from previous species that underwent a long series of beneficial

mutations that caused species A to give rise to species B, and species B to give rise to species C, and continuing. *For purposes of argument only*, this article assumes neo-Darwinian processes of common descent can create new species with new physical features. This article focuses on a distinctly different issue: Can evolutionary processes modify biological operating instructions to control and operate the new features?

Biological operating instructions are logically analogous to computer operating instructions. Evolutionists have expressly drawn this analogy (e.g. Levitin, 2006, pp. 118, 131, 169, 170; Lenski, 2003). For example, Daniel J. Levitin wrote, “as ... with memory, computer models can help us grasp the inner work-

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ings of the brain” (Levitin, 2006, p. 169) and “the brain represents all ... aspects of the world in terms of mental or neural codes” (Levitin, 2006, p. 177). Dawkins (1995) wrote that genes contain

within their minute internal structure, long strings of pure digital information [that] are truly digital, in the full and strong sense of computers and compact disks. The genetic code is not a binary code as in computers ... but a quaternary code, with four symbols. The machine code of the genes is uncannily computerlike. Apart from differences in jargon, the pages of a molecular-biology journal might be interchanged with those of a computer-engineering journal. (p.17)

Accordingly, to evaluate whether evolutionary processes can modify biological operating instructions, it is reasonable to test whether those same types of processes can modify computer program instructions. InforMutation (Stevens, 2007), an Internet-based simulation system described in the latter sections of this article, allows the user to evaluate whether evolutionary processes are capable of making successful changes to a computer program. The simulation tests whether it is possible to produce a series of favorable mutations in a computer program’s operating instructions, this process being analogous to mutating the operating instructions that a species requires to use a new limb, organ, or other feature. (Evolutionist researchers have expressly adopted the validity of analogies drawn from computer-simulated mutation and selection; e.g. Lenski, 2003.)

By direct analogy, if evolution-like processes cannot successfully modify computer programs, then it is unlikely that those same kinds of processes could successfully modify the operating instructions that control organs, limbs and other animal features (Appendix I summarizes the argument presented in this article).

How Birds Evolved from Reptiles

Neo-Darwinism asserts every species of plant and animal has emerged by the process of biological evolution (e.g. Van Biema, 2006, pp. 49–55; Kutschera and Niklas, 2004, pp. 256, 259). Evolution occurs without purpose by the dual materialistic mechanisms of *random mutation* and *natural selection* (Kutschera and Niklas, 2004).

Random mutation

Many evolutionary theorists claim birds evolved from reptiles (Southwood, 2003; Hecht, 2000). Their claim rests on these assumptions: (1) that random mutations in the genetic structures of reptiles caused the reptile-like creatures to develop wings, and (2) that the mutations were heritable. The mutations leading to the growing of wings did not occur all at once (Dial et al., 2006; Damuth, 2001). Rather, each mutation produced small changes in the reptiles’ genome that could be passed from the parents to their offspring, and each subsequent genetic change over time caused the reptilian species’ bodies to change. Over the generations the mutations continued to occur and accumulate, resulting in more changes in the reptiles’ bodies (Kutschera and Niklas, 2004; Pinker, 1997).

Evolutionists claim reptiles eventually developed wings from existing front feet (Clark, 2007). No recovered fossil record can show exactly how the early pre-bird reptiles manifested their new birdlike features.

Natural selection

Natural selection occurs as the environment acts on the living organisms, such that:

- organisms that are better fit to survive and reproduce in the local environment do in fact survive and reproduce in larger numbers
- organisms less suited tend to die out or reproduce in smaller num-

bers (Gould, 1996; Kutschera and Niklas, 2004).

A typical evolutionary scenario claims to explain the purely physical changes that might transform saltwater fish species into freshwater species. In a given body of water, the fish species carry genetic differences that make some individuals more tolerant of low salinity than other individuals. As environmental events decrease the salinity of a body of water, the fish able to tolerate the change will survive and reproduce in greater numbers than their less tolerant brethren. Natural selection occurs when the low-salt-tolerant fish survive and reproduce in greater numbers—their tolerance has conferred upon them a survival advantage. As the salinity of the water decreases further, the pressure of natural selection continues to favor the low-salt-tolerant varieties, while the other varieties die out. By these events saltwater fish evolve into freshwater fish (Pinker, 1997; Carroll, 2006). By favoring species with survival advantages (such as toleration of salinity changes), natural selection is considered the evolutionary force that creates new animal species from previous ones (Mlot, 1997).

Evolutionary theory postulates that the same kind of process on a greatly expanded scale applies to the reptile-to-bird scenario. As the pre-bird reptiles undergo mutations, they begin to form wings and structures to support and operate the wings. These mutations would somehow confer survival advantages to the mutants. Natural selection thus would favor the reptiles with stubby or incompletely formed wings (Dial, 2006), so that these pre-bird reptiles could survive and reproduce in greater numbers than the reptiles lacking pre-bird features (Pinker, 1997; Southwood, 2003). Over time, the pre-bird reptiles accumulate more mutations that confer to pre-bird reptiles some survival advantages over the non-bird reptiles. Evolution theory thus posits that, after millions of years and millions of generations of

pre-bird reptiles undergoing these physical changes, evolution produces a bird with wings.

A Missing Ingredient Is Evolved Knowledge

Assuming reptile species might have evolved as described, i.e., with physical structures becoming wings and reptile scales or hair becoming feathers (Padian, 2001; Clark, 2007; Hecht, 2000), there remains a crucial but unanswered question: Will this reptile-turned-bird *know how to fly*? This question cannot be dismissed by asserting “the ability to fly must also have evolved while the wing evolved.” Evolution needs to offer a reasonable explanation of the mutation-by-mutation steps (each one subject to natural selection) that account for the origin of the bird’s *knowledge and ability* to fly.

The saltwater-to-freshwater fish evolution scenario involved changes to physical equipment only. That scenario did not require changes in operation or behavior of the new fish species. In reptile-to-bird evolution, however, there must be changes to physical equipment (producing wings) along with changes enabling the reptile to operate the new equipment (fly) in a quite different, three-dimensional environment, i.e., the troposphere.

To prosper under natural selection, the wings must provide the bird with a survival advantage over the reptile. A (former reptile) bird might have all of the physical equipment to fly, but that physical equipment is useless for flying if the bird does not know how to fly. A nonflying bird in a reptile world is only a reptile with extra baggage. The wings cannot confer the survival advantage of flying if the bird cannot fly.

If flying confers no survival advantage, then natural selection will not favor the reptile-birds who can fly. Recalling the fish example, if low-salt-tolerant varieties of fish lack a survival advantage,

then they will not out-reproduce the other varieties. Natural selection will not favor varieties of more or less salt-tolerant fish unless such tolerance confers a survival advantage. Similarly, if flying is not a survival advantage, then natural selection cannot favor the flying reptiles over the ground-based reptiles. This case thus shows that a new physical feature cannot be favored by natural selection unless the feature is immediately functional, and for wings that requires concurrent knowledge of flying.

Natural selection can only select a trait that already exists in some measure in the population (Pinker, 1997). For natural selection to favor reptile-birds who have better flying knowledge and skills, the reptile-bird population must already possess some existing flying knowledge and skills (Ridley, 2002). Evolutionary theory must conclude that flying conferred a survival advantage to the reptiles-turned-birds. Yet the original question persists: how did the reptile-birds obtain the knowledge to fly? Three-dimensional movement in the troposphere would require an unprecedented and untested means of mobility and conscious perspective. There is no reason to assume that a reptile has any of the mental functions or aptitudes necessary for the challenges of flight.

Whether Walking Converts to Flying

Operating a wing is somewhat like operating a leg: moving the leg back and forth produces motion, and moving the wing back and forth produces vertical movement. There is nothing simple about walking (ex. Devlin, 2005, p. 43), but let us assume that a walking motion can convert directly to actuating wings. The pre-bird reptiles had stubby winglike legs, and when they ran, they lifted off the ground (Southwood, 2003, pp. 159–160, 163).

By what evolutionary mechanism could the accidental effect of lifting off the ground—caused by the presence of

winglike legs—become converted into brains *programmed from birth* to execute the intricate, specialized, and highly diverse flying skills of a hawk, sea gull, swallow, or hummingbird? Moving a leg or wing does not cause reprogramming of the brain or the changes in the DNA necessary for such a reprogramming. Somehow the evolving bird’s brain (to include its nervous system) must be programmed, like a computer, to recognize and use the advantages of wings.

Can Gliding Convert to Flying?

Consider the possibility that the pre-bird reptiles gained an advantage from having their stubby winglike structures by using them to glide down from trees (Hayden, 1999; Kutschera, and Niklas, 2004, p. 263). The possibility that the pre-wings might be used for gliding does not explain if, how, or when the pre-bird reptiles knew how to use this gliding feature.

Perhaps such a pre-bird reptile jumped from a tree to avoid a predator and glided to safety. What feature of the reptile’s brain and nervous system, however, would record that accident and be able to repeat that gliding maneuver? More to the point, by what mechanism would the experience of an accidental glide in one (or even several) stubby-winged reptiles become *converted* into built-in brain software by which a future pre-bird or bird would know how to fly (or even just purposefully glide)?

Modified Software Must Coincide with Physical Evolution

These questions highlight a key problem for evolution theory: it does not explain how the knowledge (e.g., brain, neural, or cellular software) to operate a new feature comes into existence. Yet the two developments—the feature and its operational system—must happen nearly simultaneously. Evolutionists assert learned knowledge is not inherited by the young animal from its parents (e.g., Gould, 1996, p. 222; Pinker, 1997,

pp. 158–159; Kutschera and Niklas, 2004, p. 260). It follows that knowledge or intelligence is either hardwired into the animal's body (brain or cells) or learned by the individual animal (Greenspan, 2002, pp. 595–596, 607; Pinker, 1994, p. 18). To operate a pair of wings requires the biological equivalent of a computer. Hardware is not enough; to fly with wings, the bird's brain needs the software, i.e., the set of instructions that operate the computer that controls the wings to accomplish flying (Pinker, 1997, pp. 10–12).

Feasibility of Mutating Software

The transformation of a grounded reptile into an accomplished flying bird requires numerous beneficial mutations to develop the wing bones, muscles, and feathers, as well as a set of control instructions. The control instructions are analogous to computer software (Pinker, 1994). Such an analogy requires us to consider whether it is even possible, subject to natural selection, to mutate software to make it “better” or at least different in a way that functionally deploys the new wing feature.

Software is required in the reptile's brain and body to enable it to walk; different software is required to enable flight. Every change in size or shape of a limb or wing would require changes in software. For evolutionary predictions to account for any new features in any new species, the theory must concretely explain how evolutionary processes can *modify* the necessary control software.

InforMutation Simulation Shows Effects of Mutation Upon Software

The InforMutation system (Stevens, 2007) is a simulation that enables the user to explore how mutations affect software. The user can test whether it is possible for a series of mutations to change software and thereby create new and interesting programs. The user can

see the actual instructions, instigate random changes to the instructions, and then witness how the computer executes the instructions and produces the results.

InforMutation runs a software program that calculates and prints out all of the prime numbers from 2 to 101. The late astronomer and ardent evolutionist, Professor Carl Sagan, considered the production of a long series of prime numbers (in ascending order) a task that requires advanced intelligence. The 1997 movie *Contact*, based on Sagan's book (Sagan, 1997, pp. 68–69), used this series of primes as strong evidence of intelligent life outside our solar system.

The InforMutation user can cause random mutations in the prime number generator program. The mutations include single-bit and single-character changes or exchanges, as well as multiple-bit and multiple-character changes or exchanges. These “mutations” resemble genetic mutations, e.g., nucleotide substitutions, insertions, deletions, or rearrangements (Sniegowski, 2002). The user can observe the mutations and watch the computer attempt to run the mutated software.

By changing the number and types of mutations, the InforMutation user can observe in real time whether mutations tend to improve, damage, or have little effect on software. Experience with InforMutation has shown most of the software mutations damage the software so that the mutated prime number program either does not deliver the correct (or “improved”) number series, or does not run at all.

“But Evolution Does Not Promise Any Improvements”

Gould emphasized that evolution has no purpose or direction: “The basic theory of natural selection offers no statement about general progress, and supplies no mechanism whereby overall advance might be expected” (Gould, 1996, p. 136). Pinker applied this to the evolu-

tion of intelligence: “Natural selection does nothing even close to striving for intelligence” (Pinker, 1997, p. 153). Yet without intelligence to guide modifications to software, evolution theory implicitly still assumes the software must somehow evolve.

What would constitute an evolutionary improvement in software? In particular here, what changes (mutations) in InforMutation's prime number program would be considered “improvements” or beneficial to the program?

The InforMutation system allows the user to evaluate whether changes to the prime number program could “mutate” it into a program that does something completely different—in Pinker's words, something “interesting”—and does it correctly (Pinker, 1997, p. 162). Interesting new programs that the mutation process might hypothetically create could include ones that produce:

- (1) the odd numbers from 1 to 101;
- (2) the even numbers from 2 to 100; or
- (3) the prime numbers from 2 to 1001.

To test the effects of much larger changes that are closer to the magnitude of changes needed to go from operating a leg to operating a wing, the “goals” of running InforMutation could include evolving a program that:

- (1) prints all 26 letters from A to Z in order;
- (2) receives a number from the user and prints out the same number times two;
- (3) plays blackjack with the user; or
- (4) draws a picture of an animal.

InforMutation can be used to estimate how many mutations would be needed to convert the prime number program to accomplish any one of these possible new functions. To date, InforMutation experiments have shown *no* likelihood that random mutation could do anything more than damage the program.

Software Failure = Disability or Death

Natural selection operates by favoring the increased reproduction rates of the more fit members of a given species. Analogously, in the InforMutation system the failure of the program to run is the equivalent of disability or early death in the natural environment—the program does not function and reproduce. Table I lists the most common program defects and output variations that random mutations cause within the InforMutation system.

Software program failure analogizes directly to the winged reptile's predicament when the reptile lacks properly functioning biological software. For the reptile to become a bird, an unbroken series of successful random (undirected) mutations must occur in both the hardware and the software. If the reptile's software has mutated to a nonfunctional state, or if the wings function poorly or not at all, then the whole process is terminated, since the nonfunctional software will have no second chance to get it right.

When the bird finally emerges, it has to operate its wings to gain the survival advantage that wings can provide. If the (former) reptile's software has been mutated and no longer functions effectively, then the wings will function poorly or not at all. If the reptile with this mutant software reproduces, then presumably the offspring reptiles will inherit the ineffective software. If the reptile's software is so faulty that the reptile dies or is killed prematurely, then the mutated software will never get another opportunity to further mutate.

InforMutation concretely illustrates the practical improbability that the simulation, even run thousands of times, would ever deliver an unbroken series of mutations, all of which functioned well enough not to crash the program and would convert the program from a prime number generator into some other functional program. The improb-

ability of making a mutant program via InforMutation exemplifies the improbability of evolution's modifying walking software to make it flying software.

InforMutation Versus Dawkins's WEASEL Program

Dawkins claimed that a computer program using a random mutation generator could in a feasible time convert a string of unordered letters into the phrase "METHINKS IT IS LIKE A WEASEL." Dawkins claimed this example showed amino acids could be ordered and reordered by random action in nature to produce complex proteins (Dawkins, 1986, pp.

47–48). (Readers may use a simulation of Dawkins's hypothetical program on the Internet; Maxwell, 2001).

Dawkins' program purports to show how random mutation and natural selection can produce a string of characters that carry meaning. His program operates by randomly selecting characters from an input string and arranging the output string in an attempt to match a predetermined pattern (e.g., the "WEASEL" sentence). Erroneous or non-matching sequences are immediately discarded.

Differing considerably from Dawkins's WEASEL program, InforMuta-

Table I. Most common error messages and output results that appear when mutations are applied to the InforMutation simulation program.

Error Message or Output Result	Meaning or Significance
"Syntax Error"	The mutated program language instruction cannot be decoded and executed; part of the program may still run
"Unknown command"	The mutated program language instruction cannot be decoded or executed; part of the program may still run
"Line number not found"	The program instructions can no longer be executed to complete the operational cycle
"Divide by zero"	The program instruction attempted an operation that was impossible to complete
"Incomplete statement"	The mutated program instruction is malformed and cannot be decoded or executed
(outputs a series of numbers that are not all prime)	The mutated program instruction(s) no longer produce the original series; the user can judge whether the new result is "interesting" or an "improvement"
(output of numbers or text that are not the prime series)	The mutated program instruction(s) no longer produce the original series; the user can judge whether the new result is "interesting" or an "improvement"
(program ends without output)	The mutated program executes to some degree but provides no resulting information
(program operates without change in expected output)	The mutation did not affect a portion of the program that changes the result

tion does not operate on an input string and deliver an output string to fit a given pattern. Rather, InforMutation operates by mutating the software program itself and then testing the mutant program's capability or fitness to do anything at all. Unlike the WEASEL program, InforMutation does not weed out nonfunctioning mutations before testing the mutant program. In other words, unlike the WEASEL program, there is the potential for failure.

Dawkins claimed success for his program when its output result matched the predetermined "WEASEL" sentence. Dawkins's program never changes during operation. In contrast, the prime number program in InforMutation starts out functioning properly and then undergoes mutations that might make it perform other, different tasks.

Can InforMutation successfully mutate the prime number program to produce something else? Random software program mutations, as occur during InforMutation's simulation, deliver the types of results listed in Table II below. A manual tally of such results

can provide an estimate of how often mutant programs appear that properly function and do something different from the original. To date, the results of InforMutation simulations show that only about 5% of mutant programs can even operate. Furthermore, no mutant program has done anything other than some variation, sometimes truncated, of counting from 1 to 101. Programs mutated more than once have nearly always been nonfunctional.

Summary and Conclusion

Even if new physical features, such as organs, limbs, and eyes, could arise via random mutation and natural selection, the knowledge and information necessary to use the new physical feature must arise simultaneously. For natural selection to favor a new or changed physical feature, the organism must be able to use the new feature in a beneficial manner. A new or transitional structure that is useless would likely interfere with survival, so natural selection would delete it (Bergman, 2005). A reptile with fully

formed wings (hardware), for example, lacks a survival advantage compared to its wingless brethren unless it has the knowledge (software) to operate its wings in a way that improves its survival and enhances its ability to reproduce and pass the wing-trait to its offspring.

Biological "how-to" knowledge is directly analogous to computer software. In both biological and computer environments, carrying out a function is a step-by-step process that is coded and then executed (Behe, 1996, p. 41; Berlinski, 2000, pp. xii, xvi, 313–315; Freeland and Hurst, 2004). When applied to computer software programs, random mutations nearly always hobble or destroy a program's original function. The InforMutation simulation system allows direct observation of the nonconstructive results of such mutations on even simple programs. Experience with InforMutation has shown most software mutations damage the software so that the mutated program either does not deliver the correct (or "improved") functional results, or does not run at all.

If random mutation can only harm the function of software, then random mutation lacks the creative power to install or modify the biological software to operate legs, wings, or any other newly evolved physical feature. If random mutation cannot create the software for a new physical feature, then natural selection cannot favor that feature in the evolutionary process. Finally, if evolution theory cannot explain the creation of control software needed to use new physical features, then the theory cannot sustain its claim that undirected mutation and selection processes gave rise to the diversity of all physical features in all life on earth.

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I deeply appreciate the careful review and feedback on later drafts from Jerry Bergman and several CRSQ reviewers,

Table II. The fate of computer programs.

Action Imposed on a Properly Working Program	What the Program Does as a Result
Nothing	Operates properly and gives correct results
Make a change	Does not operate; halts with an error code
Make a change	Operates but gives the wrong results
Make a change	Gives the correct results and uses fewer resources or runs faster
Make a change	Gives the correct results but uses more resources or runs slower
Make a change	Works properly with no observable change in operation or results
Make a change	Produces different, desirable results
Make a change	(The change having reversed out or corrected a previous change) the program returns to proper operation and correct results

and on earlier drafts from Joseph Kezele and Roger Heyen of the Arizona Origin Science Association and from Kenneth Poppe. For quickly, accurately, and efficiently programming and implementing the InforMutation simulation system on PC and Internet, many thanks to Stephen E. Stern of Titus Information Systems.

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APPENDIX I: SUMMARY OF ARGUMENT

The argument presented in this paper can be summarized as follows.

A. Causation Principle— Hardware—Software

1. Every operation of equipment (“hardware”), whether it be computer or biological, follows a series of cause-effect steps.
2. To direct the operation of any hardware, whether computer or biological, requires a stored set of instructions to direct the cause-effect steps. The instructions must be retrieved, decoded, and executed. The set of instructions is “software.”
3. Considering the example of reptile-bird evolution: to operate a wing requires a different set of cause-effect steps from those needed to operate a leg.
4. To operate a wing therefore requires software different from that required to operate a leg.

B. Evolution requires random mutation to software to operate mutated hardware

5. Evolution posits random mutation as the agent causing changes to biological hardware.
6. To operate changed hardware requires changed software.
7. To change software requires chang-

ing elements of the stored set of instructions.

8. Evolution states all changes to biological elements are random (undirected).
9. For evolution to change the software to support the changed hardware—in a manner necessary for the changed hardware to confer a survival advantage—there must be applied random (undirected) changes to the stored set of instructions.

C. Computer software is sufficiently analogous to biological software to show mutations to such software cannot produce needed changes to support new hardware

10. A computer program is a stored set of instructions.
11. Evolutionists affirm: (a) DNA is a software system containing stored instructions; (b) the operation of DNA is computer-like, albeit quaternary rather than binary; (c) the brain operates in a manner that bears comparison to a modern digital computer; and (d) computer models of evolutionary mutation and natural selection afford a valid comparison to biological evolution.
12. Applying random mutation to the stored instructions in a computer

program is therefore acceptably analogous to applying random mutation to the stored instructions in DNA and other biological structures that store instructions for later retrieval, e.g., the brain and nervous system.

13. The InforMutation system shows what happens when you apply random (undirected) mutations to a set of stored instructions.
14. Nearly always, random mutations applied to a stored set of instructions (analogous to biological stored instructions) damages the instructions, by causing the instructions to either: (a) not decode properly; (b) not execute fully or at all; or (c) not execute in a manner that produces a useful, beneficial, creative, or “interesting” change in the operation of the hardware.

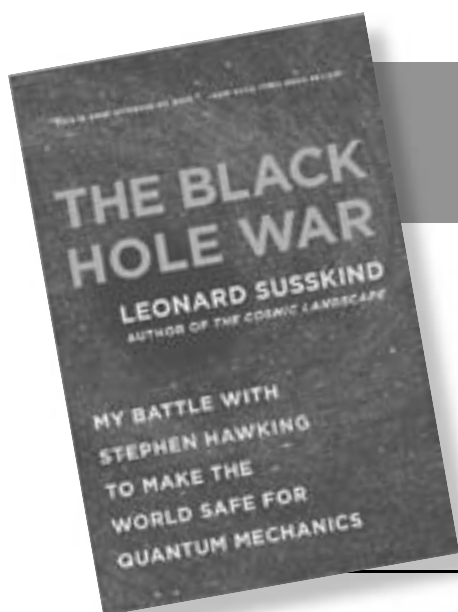
D. If software cannot be modified by random mutation to support new features and hardware under conditions of natural selection, then the change agent underlying evolution is too weak to support its claims

15. If computer software cannot be randomly mutated successfully to cause it to do anything qualitatively different from its current operation,

then it cannot be randomly mutated to operate different hardware or accomplish some other qualitatively different task.

16. By analogy, if computer software cannot be randomly mutated successfully, then there is no evident reason to believe biological software can be randomly mutated successfully to operate new or qualitatively different hardware.
17. Therefore, there is no reason to believe random mutation can modify the reptile’s leg software to operate wings at the very time that such software is needed to confer the wing’s survival advantage.
18. If a new hardware component, e.g., the wing, cannot be supported immediately by software and thus confers no survival advantage, then the hardware evolution of that new component will likely cease; and by necessity, so will any evolution of the software also cease.
19. Given the twin improbabilities of hardware evolution and coincident operating software evolution, the evolutionary method of producing new biological features (and thus new species) loses all plausibility as the creative change agent producing all species.

Book Review



The Black Hole War

by Leonard Susskind

Little, Brown & Co., New York, 2008, 470 pages, \$28.00.

The Black Hole War is written as a popular review of the controversy between the author, a theoretical physicist at Stanford University, and well-known British physicist Stephen Hawking. Author Susskind does this in a delightful and humorous way. The progress of the war, or debate, is well told. The physics concepts involved in quantum mechanics, relativity, string and membrane theories, while superficial of necessity, are done in an understandable manner. A few formulas are presented but most concepts are presented using multiple illustrations.

The discussion centers on the questions of the evident conflict between quantum physics and relativity, particularly as applied to black holes. The basic question is whether information is irretrievably lost when absorbed into a black hole. Stephen Hawking maintains that it is lost, whereas Susskind opposes this idea. Throughout the book, Susskind relates the pros and cons for each point of view.

The discussion raises a number of questions which Creation scientists need to consider. Susskind discusses entropy at some length. While he gives a mathematical definition of entropy and discusses the second law of thermo-

dynamics, he uses information entropy as a basis for his concepts, and states that "entropy is hidden information" (p. 133). This differs somewhat from the usual definition of information entropy: How much information is missing from a message. Information itself is usually considered to be a message which conveys meaning. In any event, the author states that "entropy *always* increases" (p. 141). Thus, the application of the macroscopic definition in the original concept of the second law of thermodynamics still holds.

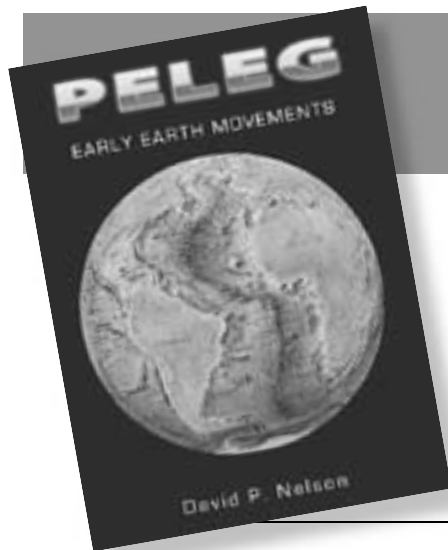
A question I have had for some time, and surfaces here, is why scientists insist on discussing religion in scientific books and discussions. The author, "a scientist with not a religious bone in my body," states on the next page "Darwin's idea of natural selection ... replaced the magic of creation with the law of probability and chemistry" (p. 275–276). He also indicates that debates on intelligent design are not scientific. The author insists on making such comments. Are these scientists trying to convince themselves that God doesn't matter? Or are they trying to convince their peers that they don't believe in a Creator? If they are not religious, why do they insist on including their religion of evolution

stating that only natural processes can be considered in describing origins and the natural world?

Another concept which the author discusses in some detail is the holographic principle. This conclusion states, "The three-dimensional world of ordinary experience ... is a hologram, an image of reality coded on a distant surface." However, if my holographic body is struck by a holographic car, I have difficulty in imagining holographic pain being projected into my consciousness. But does this principle create difficulties for the creationist? No, it doesn't. Reverting to the law of first principles, we can assert that, if this idea is true, God placed this information on the inner surface of the boundary of the universe, and supplies the light necessary for projecting the images encoded on the surface.

The author comments a number of times on scientists' need to revise their thinking. This includes relativity, quantum mechanics, and more recently string and membrane theories. I suggest that secular scientists also rewire their thinking to include *In the beginning God*.

Carl Stebner



Book Review

Peleg: Early Earth Movements

by David P. Nelson

Pelegpress, Clarksburg, WV,
2007, 118 pages, \$14.00.

This book is a salvo fired in the controversy over the meaning of the division of the world at the time of Peleg. While many young-earth creationists choose to equate the Babel dispersion with the Peleg event, there are dissenters, and Nelson is one of them.

His basic thesis is that it was the masses of ice that built up during the post-Flood Ice Age that eventually caused the breakup of an original Pangaea. In his view, this event, noted in the Bible as occurring at the time of the birth of Peleg, took place after the dispersion from Babel. He sees the break-up as dividing people groups so that similar cultures appear on opposite sides of the ocean. This also accounts for the isolation of animals in distant parts of the world such as Australia.

Nelson initially fits all the continents together in a somewhat crescent-shaped mass, his version of Pangaea, with great ice sheets at the north and south ends. Then he draws on the principles of his engineering training to show why the break-up of the earth was inevitable because of the stresses that this ice caused. For those who criticize this scenario on the grounds that the ice weight would not have been great enough to cause earth's break-up, he replies on his web

site www.pelegpress.com that it's the cumulative stresses that count, not the total load.

There is, however, a problem to solve. Nelson postulates that a certain amount of time is needed after the Flood for the earth to settle down and for the ice to build to its peak. However, the conventional Ussher timeline does not provide this time, because in Nelson's scenario Peleg is born at the height of the Ice Age. Nelson therefore suggests that the Biblical genealogies are not intended to give a specified length of time. When Genesis 11:16 says that Eber lived 34 years and then begat Peleg, Nelson suggests this really means is that Eber lived 34 years and then became the progenitor, or ancestor, of Peleg, allowing for time gaps in the genealogy. Readers might question this interpretation because simple logic dictates that Eber became the ancestor of Peleg the day Eber was born; he did not have to first live 34 years to then become Peleg's ancestor. Because the exact ages of all these men are given when they become fathers of the named sons, it does not seem reasonable that the Biblical writers meant these genealogies to be stretched to allow for indefinite periods of time.

Nelson apparently does not consider

the possibility that the longer genealogies of the Septuagint might give him the needed time. In any case, the requirement that Peleg be born when the ice masses were at their greatest extent is a sticking point in the main argument of the book, whether readers are for or against the breakup of the earth at the time of Peleg.

The appendix includes summaries of various aspects of young earth creation that are not directly related to the Peleg-earth division thesis of the book. Topics include the second law of thermodynamics, earth geology, starlight and time, and carbon dating. The appendix makes the book useful to any reader who is not familiar with these topics.

The large-format book has an attractive cover and professional drawings. Oddly, although it is well edited and reads well, "Arctic" is spelled wrong throughout the text. (For word-o-philes, an "artic" is what the British informally call an articulated lorry, which we in the U.S. call a semi-trailer truck. Nelson's spellcheck, like mine, must be British; it lets "artic" go without a quibble.)

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Can Recolonization Explain the Rock Record?

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Abstract

The recolonization model is a recently proposed diluvial solution to many enigmas of the rock record. Working within the framework of the global stratigraphic succession developed by uniformitarian geologists over the past two centuries, it seeks to reconcile it with Biblical history by moving the Flood event to the very base of the stratigraphic record. Thus the Flood is represented by that section that extends from the oldest crustal rocks (Hadean) up into the Carboniferous. The post-Carboniferous record reflects a sequential terrestrial recolonization by Flood survivors, preserved as a series of historical snapshots by post-Flood catastrophes. Although appealing in its attempt to merge the geologic column with Genesis, the model's positive arguments are unconvincing. An evaluation of Biblical, axiomatic, logical, and geological issues reveals significant weaknesses. Two of its greatest flaws lie in its two key assumptions: 1) the veracity of the geologic timescale's relative chronology, and 2) the validity of uniformitarian depositional models.

Introduction

During the eighteenth century, Enlightenment intellectuals used the stratigraphic record as an excuse to reject the Biblical Flood as the primary geological agent that shaped Earth's crust (Rudwick, 2005). Their goal was the larger rejection of Biblical authority, and the use of geology as a weapon against Chris-

tianity continues to this day. Christians have derived a number of novel ideas to address this problem—some ridiculous, some intriguing. Though the philosophical context is becoming clearer, the stratigraphic issues remain unresolved, as illustrated by the variety of opinions in the 2006 symposium, *The Geologic Column: Perspectives within Diluvial*

Geology, published by the Creation Research Society.

Since Steno (1638–1686), Christian naturalists have attempted to correlate the Flood event with a particular division of strata, while secular thinkers have sought to deny any link. Early in the Enlightenment, there was a tendency to minimize the Flood by moving it ever higher in the stratigraphic record. Although geologists gave lip service to the Flood up into the early 1800s, they diminished its relevance by relegating it to the uppermost sediments, which were called “diluvium.” When Louis Agassiz presented his theory of glaciation, uniformitarians welcomed the opportunity to exorcise the Flood from the rock record altogether instead

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of revisiting their earlier (incorrect) interpretations.

Whitcomb and Morris (1961) resisted the secular tide by attributing most of the sedimentary rock record to the Flood—a position still held by many creationists. In recent years, the Flood has been migrating stratigraphically once more; only this time it is moving *lower* in the section (Hunter, 2000; Tyler, 2006). Perhaps the most comprehensive example of this trend is the “recolonization model”—a theory that presents several novel ideas.

Proponents of these ideas are Christians and creationists, and we see the discussion as being “within the family,” rather than evidence of compromise or apostasy. Thus, their models deserve the same respect (and scrutiny) as other creation models and should be assessed in similar fashion for their (1) Biblical fidelity, (2) presuppositional and logical consistency, and (3) empirical correspondence to the phenomena to be explained—in that order of priority.

Although “recolonizers” reject the billions of years of deep time, they also reject the possibility that the bulk of the sedimentary rock record formed during the year of the Flood and so are forced to conclude that much of it is a product of post-Flood catastrophism. Dr. David Tyler’s (2006) synopsis describes extensive fossilization and sedimentation after the Flood, which he posits as ending with the Carboniferous strata.

In his model, the hyper-catastrophic onset of the Flood obliterated most antediluvian organisms, and so most fossils in the sedimentary record are descendents of marine survivors of the deluge and terrestrial animals aboard the ark. This logically demands the rapid and fecund repopulation of marine and terrestrial habitats during and soon after the Flood. For that reason it is called the “recolonization model.” Our critique will focus on Tyler’s (2006) presentation, though other articles (pro and con) are present in the literature and are included at the end of our reference section.

What Is the Recolonization Model?

We cannot understand the recolonization model unless we understand the driving force behind it. What assumptions and data drive the model? We see two significant factors. The first is the desire to accommodate the global geological chronostratigraphic time-scale (Gradstein et al., 2004), absent its geochronologic component of billions of years of prehistory. The key to understanding this conceptual construct—often called the geologic column—is the assumption that the rock record is best interpreted via globally correlative sequential time periods, whether their length is measured in days or millions of years (Reed, 2008b). In other words, strata can be best classified by their time of deposition or emplacement and then correlated globally on the basis of that time, since time’s progression is a global constant. For example, the recolonization model rejects the timing of the “Cretaceous Period” as being 145.5 million years ago (Ma) to 65.5 Ma, but it accepts the “Cretaceous” as a real interval of Earth’s history by which otherwise disparate rocks can be correlated worldwide. It also accepts the relative position of the “Cretaceous Period” to other time periods of the timescale (Figure 1).

A second factor driving the recolonization model is the perceived need to accommodate various uniformitarian depositional theories. These explanations tend to default to slow, low-energy environments, similar to those observed today. The recolonization model recognizes that many processes are quantitatively more rapid than the rates proposed by secular researchers but does not require qualitatively different processes, such as would be expected to accommodate the one-year time frame of the Flood. Dinosaur trackways and nests are commonly cited examples of features requiring time in excess of the Biblical chronology. According to Tyler (2006) and others, these features

Eon	Era	Period	Age (Ma)
Phanerozoic	Cenozoic	Neogene	23
		Paleogene	66.5
	Mesozoic	Cretaceous	66.5
		Jurassic	
		Triassic	251
	Paleozoic	Permian	251
		Carboniferous	
		Devonian	
		Silurian	
		Ordovician	
Precambrian	Proterozoic	Cambrian	542
			2,500
			4,000
			4,600

Figure 1. The geologic timescale showing both the relative chronostratigraphic arrangement that is assumed to be the same all over the globe (absent erosion and non-deposition), and the geochronologic ages currently accepted by uniformitarian geologists.

contradict continuous catastrophic deposition and thus cannot be integrated with the Flood.

Based on these premises, the model follows. In order to maintain a significant presence for the Flood in the rock record, and yet still attribute much of the sedimentary record to post-Flood time, Tyler moves the onset of that catastrophe to the oldest remnants of igneous and metamorphic crust on Earth. He notes that the beginning of the Flood was so intensely violent that it destroyed the original crust, stripping it down to the lower lithosphere (Figure 2). Tyler’s view is similar to, but less radical than, Hunter’s (1996; 2000) model, which places the pre-Flood boundary at the 660 km discontinuity in the mantle.

Thus the Flood began with the complete destruction of the crust on

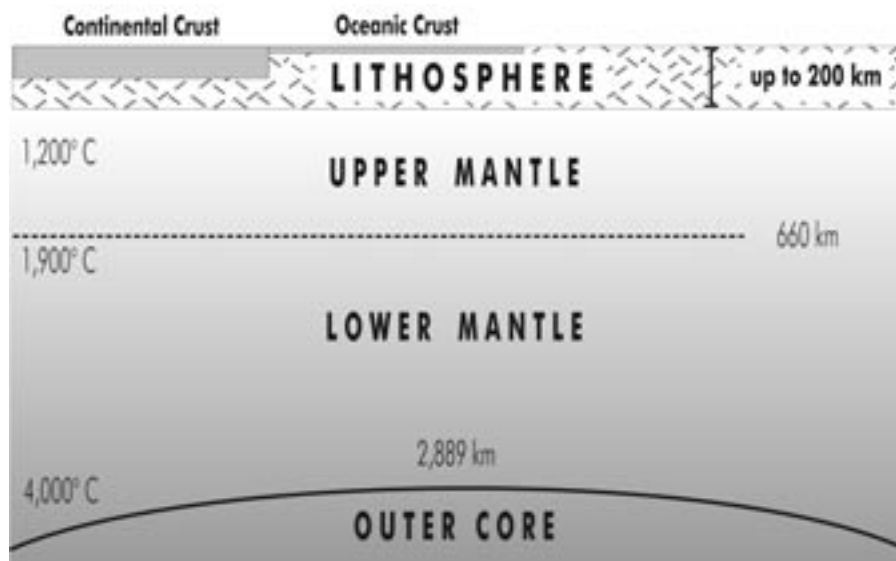


Figure 2. Earth's lithosphere, which includes the crust and part of the upper mantle, occupies the outermost skin of the planet, averaging 100 km and reaching thicknesses of 200 km. In contrast, the average thickness of the continental crust rarely exceeds 50 km and the average oceanic crust, 10 km.

the first day, and the reconstruction of its crystalline components by the end of the first forty days. To emphasize this special period of destruction, Tyler (2006) applies the Hebrew term *mābbūl* to the first forty days of the Flood as a distinct, especially destructive period that accomplished the majority of geologic work—not primarily sedimentary, as commonly thought by most diluvialists, but igneous and tectonic. He believes that this period of the Flood was so violent that practically all living land creatures died on the very first day or soon after.

Did any survive outside of the Ark after the first day? The bursting forth of all the springs is an indication that the entire earth was awash with surging water on the very first day. If anything did survive, it could not have been much longer than a day since the inundation was so overwhelming. The parallel Jesus drew with Sodom and with His own return indicates that the destruction of life was over quickly (2006, p. 74).

It follows that terrestrial life was annihilated on the first day, leaving little to no fossil traces. Even potential fossils were destroyed.

All the sediments coming from the antediluvian world would be mingled with the products of igneous activity, accompanied by extensive metamorphism, and this had the effect of obliterating anything that might potentially have become a fossil. In other words, the world that then was, was destroyed (II Peter 3:6) (Tyler, 2006, p. 76).

During this initial intense destruction, small populations of marine life were preserved in quiescent deepwater areas that Tyler calls “refugia.” As a consequence, the complete fossil record is not a record of the Flood’s destruction; every fossilized organism was either a survivor on the ark or of these marine sanctuaries.

The initial crustal destruction (Day 1) and the *mabbul* (through Day 40) are equated with the “Hadean” and/or the lowest part of the Archean, depending on which iteration of the geologic timescale

one accepts (“Hadean” is a new term used by the International Commission on Stratigraphy that denotes the time of earliest crustal formation). After Day 40, the springs of the great deep closed and the floodgates of heaven stopped, and the majority of the destruction ended.

What followed was the more conventional sedimentary work of the Flood, accompanied by a rapid recolonization of the globe by marine life that had survived in the “refugia” and which quickly began refilling empty habitats over the flooded shallow water continents. In this less catastrophic period of the Flood, life was fossilized in the order of its reappearance: simple forms initially, followed by more complex invertebrates (Figure 3). The blue-green algae and bacteria were the first “refugians” to be fossilized and appear in late Archean and Proterozoic sediments. Then, as more suitable habitats became available, the first multicellular life—the Ediacaran fauna—became established and preserved in late Proterozoic (Vendian in Figure 3) sediments as pioneers in environments too harsh for other organisms. As the Flood progressed, other environments became survivable and were filled, as documented by the “Cambrian explosion.” Late in the Flood, “Devonian” fish filled new habitats and began to be fossilized in great numbers.

As the Flood receded, exposing new terrestrial environments, plants took root, having survived the *mabbul* in the form of floating log and vegetation mats. Since all air-breathing, land-dwelling animals perished in the Flood, the only animals available to recolonize the terrestrial environments were those on the ark and their descendents. Tyler (2006) proposes that these animals began to fill the terrestrial environments and be preserved as fossils in the order found in the geologic timescale: on a gross scale of amphibians-reptiles-mammals; and on a finer scale with various small (attributed to evolutionary successions by secular naturalists), time-related

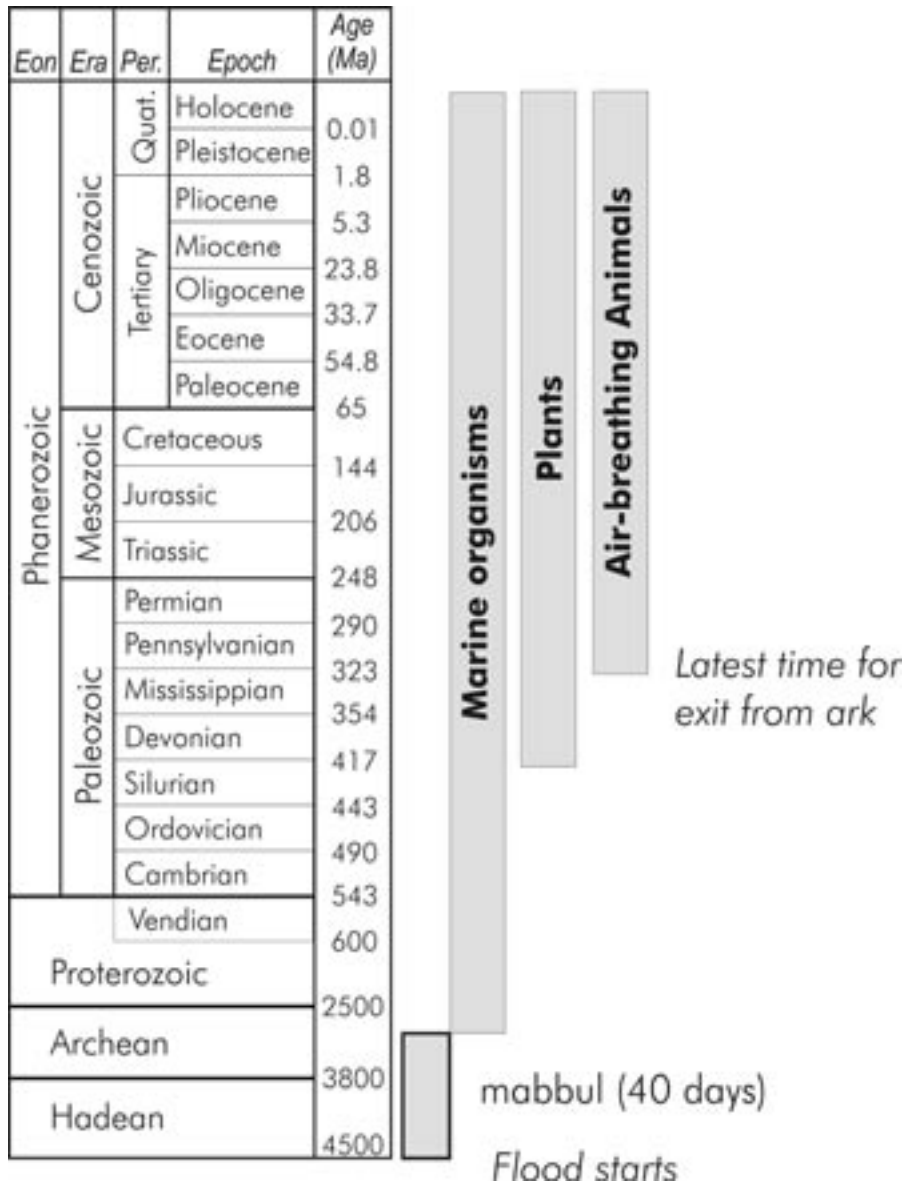


Figure 3. The stages of recolonization during and after the Flood are arranged relative to the geologic column, with the gray boxes representing the approximate extents of recolonization for marine creatures, plants, and air-breathing terrestrial creatures from the ark. The recolonization model does not accept the absolute timescale of the column. Modified from Tyler (2006).

changes (e.g., ammonite species, horses, microfossils). Thus, all air-breathing fossils, such as dinosaurs, were descendents of the ark's survivors, lived after the Flood, and were buried and fossilized by post-Flood catastrophes in a global sequential fashion congruent with a time-stratigraphic approach.

Stratigraphically, that leaves the post-Flood boundary—measured by the time the animals exited the ark—as sometime during the Carboniferous (Mississippian-Pennsylvanian on Figure 3), which corresponds to the first “appearance” of land animals in the uniformitarian column. Other European creationists had once

placed the boundary in the late Paleozoic (Garner, 1996a; 1996b; Garton, 1996; Robinson, 1996; Scheven, 1996; Tyler, 1996). There have been a few significant revisions in recent years. Robinson has moved the boundary from just below the Permian into the Precambrian (Garner and Peet, 1999), based on environmental indicators such as hardgrounds. On the other hand, Paul Garner (personal communication, Oard) has set it at the Cretaceous/Tertiary boundary.

So the recolonization model presents several distinctive propositions. These include:

- The Flood event is represented by the stratigraphic interval from the earliest crust up into the Carboniferous Period.
- The fossil record includes survivors of the Flood and their descendents, rather than antediluvian creatures.
- Large-scale, global post-Flood catastrophism occurred.
- The geological work of the Flood was primarily tectonic and igneous, not sedimentary.

Discussion

As with any other model of natural history, we can and should evaluate it by an evidential hierarchy congenial to Biblical Christianity. This would include: (1) Biblical and theological evidence, (2) presuppositional consistency, (3) logical consistency and coherence, and (4) empirical (mostly geological) evidence. This discussion will follow that hierarchy in its proper order from the most significant to the least weighty. Thus, though the geological issues may be the most intriguing, they carry the least evidential import in the Christian worldview.

Biblical Issues

As with any model of earth history, the primary evidence for or against the recolonization proposal is the infallible history contained in the Bible. Thus,

accuracy in interpretation and hermeneutical approach is the single greatest hurdle for the recolonization model. And the scriptural support elicited by the model (Tyler, 2006) is weak in at least four areas.

Interpretive Methodology

Tyler (2006) draws various conclusions in regard to the Genesis Flood narrative by appealing to New Testament references that cite the Flood as a means of judgment (Matt 24:37ff; Luke 17:26ff). Tyler justifies his approach by asserting that Scripture is best interpreted by other Scripture. Although this view is common among evangelicals in general, and young-earth creationists in particular, it is somewhat naïve and simplistic. In fact, the whole approach is either circular or intractable. If Scripture A and Scripture B refer to the same or similar thing, which one interprets which? Does A interpret B, or does B interpret A? Even if we assume the later Scripture (B) interprets the earlier one (A), then what interprets the later one? If it is another later Scripture (C), then what interprets this Scripture? We end up with an intractable Wittgensteinian problem of definition, where Scriptures are interpreted by other Scriptures, which are interpreted by other Scriptures, which are interpreted by yet other Scriptures, *ad nauseum*.

Evangelicals with a high view of Scripture are obliged to read Biblical passages from a grammatical-historical perspective: Biblical words and phrases must be interpreted in light of their grammatical, literary, and historical context. Although New Testament references and allusions may assist in determining and clarifying the literary and historical context, they do not override the intrinsic grammatical relationships and the original literary and historical context.

New Testament References

In the case of the Flood narrative, Tyler errs in allowing secondary allusions to

contradict the clear testimony of the primary historical narrative in Genesis 6–8. He cites Matthew 24:38–41 and Luke 17:26–35 as evidence that the Flood involved an overwhelming, immediate destruction. In Matthew 24:37–41, Jesus proclaimed:

As it was in the days of Noah, so it will be at the coming of the Son of Man. For in the days before the flood, people were eating and drinking, marrying and giving in marriage, up to the day Noah entered the ark; and they knew nothing about what would happen until the flood came and took them all away. That is how it will be at the coming of the Son of Man. Two men will be in the field; one will be taken and the other left. Two women will be grinding with a hand mill; one will be taken and the other left. (NIV)

According to Tyler, “Jesus refers to the Flood beginning suddenly. He drew this analogy between the judgments in the days of Noah, on Sodom, and His future return. Each judgment [Noahic flood, destruction of Sodom, and Christ’s second coming] is presented as sudden” (Tyler, 2006, p. 74). He adds:

Did any survive outside of the Ark after the first day? The bursting forth of all the springs is an indication that the entire Earth was awash with surging water on the very first day. If anything did survive, it could not have been much longer than a day since the inundation was so overwhelming. The parallel Jesus drew with Sodom and with His own return indicates that the destruction of life was over quickly (Tyler, 2006, p. 74).

Thus, Tyler concludes that these New Testament references imply a sudden, comprehensive, and rapid destruction.

In Noah’s day, the waters did not rise gradually. The mabbul came unexpectedly and overwhelmingly. Along with the destruction of Sodom, Christ used these historical parallels

because they were illustrations of how *unexpected*, how *rapid*, and how *comprehensive* will be the events in the hour when He returns” (Tyler, 2006, p. 85).

However, a careful reading of the cited texts shows us that Jesus’ purpose in referring to these events was to highlight their sudden and unexpected nature, not their duration. This is confirmed by Matthew 24:42: “Therefore keep watch, because you do not know on what day your Lord will come” (NIV).

Regarding the Flood, Jesus did indeed indicate that it was both completely unexpected and comprehensive in that it killed every living being except those in the ark. However, the text provides no warrant in itself to conclude that the total destruction took not much more than a single day. The duration of the destruction is simply not in focus here. This is confirmed by the use of Greek aorist tense for “came” (*ēlthen*) and “took away” (*ēren*). The aorist tense with the indicative mood is routinely employed to refer to a historical action as a whole without saying anything about the kind of action or its duration (Wallace, 1996, p. 554).

Again, it is possible to gain insight into the Flood account from other passages, but they cannot legitimately be used to twist the original narrative. To assert that brief and passing New Testament references provide a better source of information than the Genesis account itself demeans the integrity of Scripture. This is especially true when one considers that the original readers of the Flood narrative did not have access to either the New Testament or the teachings of Jesus. Does Tyler believe that these original readers were likely to have misunderstood the narrative because they did not have access to the New Testament?

A proper evangelical hermeneutic must take the Genesis Flood narrative as the primary source of information in regard to the Flood event. New Testament

references must be interpreted in light of their own specific literary and historical context and may or may not offer some insight into how the original readers understood the Flood narrative.

The Meaning of *mābbûl*

Tyler proposes a new interpretation of the Hebrew word *mābbûl*. He suggests that it refers only to the first forty days of the Flood, rather than the entire episode.

In Genesis, the word “mabbul” is used of the destruction. It applies to the first 40 days of the time when Noah was on the Ark. The mabbul is the “cataclysm.” It was overwhelming. After these 40 days, the springs of the great deep closed, the floodgates of heaven stopped, and the torrential rain ceased, signifying a cessation of destruction (Tyler, 2006, p. 75).

In other words, Tyler contends that *mābbûl* refers only to the period of destruction when the floodgates of the heavens were opened and the waters broke out from the springs of the deep. This period lasted for forty days (Gen. 7:17).

However, there are absolutely no etymological or philological grounds to ascribe such a meaning to *mābbûl*. It is not enough to simply assert such a unique interpretation. Tyler must demonstrate this meaning from its historical usage in general and its particular usage in the Flood narrative. The burden of proof lies with him alone, and he has not provided anything more than mere assertions.

The best way to resolve a word’s meaning is to examine it in context in order to determine how it is being used. The word *mābbûl* occurs 13 times in the Old Testament—12 times in Genesis and once in Psalm 29:10—and all refer to the Flood described in Genesis 6–8. Michael A. Grisanti (1997) notes that “the presence of the article on all but two instances (Gen. 9:11, 15) in the Flood account (Gen. 6–11) may indicate that

this ... was a well-known event.” In other words, *mābbûl* had become a special, technical term that was uniquely used to refer to the Noahic Flood. Moreover, all instances that refer to the Flood’s coming or describe its impact are juxtaposed with the Hebrew word *māyīm* (“waters”) resulting in the translation “floodwaters.” Furthermore, all the post-Flood instances refer to the Flood as a whole, not just to the first forty days (e.g., Gen. 9:28; 10:1; 11:10; Ps. 29:10). Therefore, the Old Testament usage of *mābbûl* suggests that it refers not to just the first forty days of flooding but to the presence of the floodwaters throughout the entire period the earth was flooded.

Textual Indicators of an Extended Destruction

Genesis 7:12 states that the rain fell *upon the earth* for forty days. Although *ērēs* can refer to the earth as a whole, it more commonly is used as a general reference to “land” or “ground.” This is confirmed by the instance in Genesis 7:17: “For forty days the flood kept coming on the *earth*, and as the waters increased they lifted the ark high above the *earth*” (NIV). The second, parallel, occurrence of “earth” in this verse is clearly a general reference to the ground.

In addition, Genesis 7:17–21 indicates that as the rain fell, the waters continued to rise. These verses provide markers of progress; the ark floated, the mountains were covered, and the depth was sufficient for the draft of the ark to never touch ground. In this passage, which covers weeks of time, the water “kept coming on the earth” (7:17, NIV) until all the mountains were covered “to a depth of more than twenty feet” (7:20 NIV).

In Genesis 6:13b, God proclaims that He will “destroy both [humanity] and the earth” (NIV). Thus, the object of God’s wrath is not just human (and animal) life but the earth itself. Given that it took at least 40 and as many as 150 days for the floodwaters to cover the

entire earth completely, it is not possible that the entire surface of the earth was destroyed on the first day of flooding.

Note also that the account does not indicate that every living thing on the earth was destroyed until *after* the entire earth was covered in water. In other words, it was not until the end of the period of rising waters, when the earth became completely covered in water, that all living creatures were finally destroyed. This should not be surprising given that a substantial number of creatures would have been occupying high ground at the time when the flooding began. Furthermore, birds would have been able to escape the floodwaters more easily than land dwelling creatures and could have flown to high ground.

It also must be asked how the rain could fall upon the “earth” if the crust was destroyed beforehand? How could there be mountains to be covered if the crust was destroyed? At a minimum, the water was rising for forty days before all land, including the mountains, was completely covered, and the waters prevailed for up to a total of 150 days before the ark came to rest on the mountains of Ararat (Gen. 8:4). In short, the text indicates the waters from the heavens and the springs of the deep steadily rose upon the earth for at least a forty-day period. There is no doubt that this inundation was catastrophic and—relatively speaking—extremely rapid. Nevertheless, the account does not support a complete inundation and crustal destruction resulting in the immediate death of all living creatures on the day the flooding began.

Axiomatic Issues

Uniformitarian Chronostratigraphy

It is clear that Tyler (in his 2006 article and many others) perceives the uniformitarian chronostratigraphic timescale or column to be an indisputable empirical description of the rock record. This starting point leads inevitably to conflict with the Biblical account of the Flood,

because the column is *not* empirical—it is a conceptual representation of the rock record resting on various presuppositions that are diametrically opposed to Biblical history (Reed, 2008a; 2008b; 2008c; 2008e; 2008f; Reed and Froede, 2003).

These presuppositions appeared during the Enlightenment, specifically among the mid-to-late-eighteenth-century continental intellectuals; they were not original to James Hutton (Reed, 2008d) or Charles Lyell (Rudwick, 2005; 2008). They included: (1) a lengthy prehistory—contrary to the Genesis phrase “in the beginning”—(2) the absence of God’s active participation (or even presence) on history’s stage, (3) the superiority of rocks to the Bible as reliable history, (4) uniformity of process through history, and (5) the material development of earth and life.

In other words, the uniformitarian timescale—even in its unquantified chronostratigraphy—springs from the worldview of Enlightenment secularism, or naturalism. Mortenson (2006) discussed the anti-Christian philosophy of the men who formed the timescale, and these commitments are confirmed by secular historians (Rudwick, 2005; 2008; Stark, 2003). Lyell’s anti-Christian bias was nothing new; it was the culmination of nearly a century of Enlightenment “geology” being used as a club against Biblical history—Buffon having published his *Histoire naturelle* in 1749.

There is more to the timescale than just anti-Biblical history. It rests on a questionable methodological cornerstone—the assumption that rocks can be globally correlated by their time of emplacement (Reed, 2008b). That assumption, quite unsurprisingly, rests on the philosophical axioms of extended prehistory and uniformity of rate, both contrary to the Bible. Long ages of geological stasis commend a time-stratigraphic approach (correlating by time periods); Biblical catastrophism does not. Early naturalists embraced the

time-stratigraphic method because it was evident that direct physical correlation was not possible on the ambitious global scale they desired. That method stands today; correlation is still done by *time*. “Cretaceous” is a time period; it refers only to an empirical rock body by the imputation of “Cretaceous” time to the rocks—an assignment that is not empirical.

Since there was no extended prehistory (Gen. 1:1) and since uniformity of rate cannot possibly apply to either the Flood or the Creation events, the derivative cornerstone of the time-stratigraphic approach—global correlation by time—cannot possibly be true. If the assumptions that prop up even the relative chronostratigraphy of the time-scale are untrue, then it follows that the chronostratigraphy is flawed. Furthermore, a global catastrophic flood would deposit rocks based on local conditions of energy, sediment source, topography, and chemistry. These conditions might vary from one region to another, even for rocks deposited at the same time. Therefore, it is unlikely that Flood deposits could be globally correlated by the methods and assumptions of the uniformitarian column.

Uniformitarian Speculation Uncritically Accepted

Like a number of other diluvialists, Tyler seems to uncritically accept uniformitarian interpretations of many aspects of the rock record. For instance, he says,

the abrupt appearance of so many phyla in low-energy environments (many Cambrian formations carry the marks of non-catastrophic deposition) makes little sense as an early (or the earliest) stage of the Flood (2006, p. 80).

Accepting rather than questioning this type of interpretation (i.e., “low-energy environment”) leads to difficulties. If so, then obviously the “environment” required much more time than the one-year Flood. Rather than contort

ourselves around the erroneous assumptions of secular prehistory, it might be more profitable to reexamine the possibility of deposition in a high-energy environment or the historical reality that a diversity of small “environments” would have been possible, given wildly varying local conditions even in a globally catastrophic flood. It is an error to assume that the Flood was wildly catastrophic everywhere on Earth at every moment over its duration. This parody is popular in anti-creationist literature (e.g., Young and Stearley, 2008) but needs to be avoided by creationists. Since uniformitarians are predisposed by their worldview to see slow processes of deposition over millions of years whenever they look at the rocks, we need to beware the pervasive power of their bias. Numerous instances could be cited of changes in interpretation from typical uniformitarian deposition to catastrophic deposition over recent decades (Ager, 1993; Oard and Reed, 2009). It is not unreasonable to believe that the continued advancement of diluvial geology will lead to more of these reinterpretations by both diluvialists and secular geologists.

As an example, shale and mudstone make up about 80% of all sedimentary rocks. Geologists have historically interpreted shale and mudstone as the products of low-energy environments, arguing from the physics of particle settling through a column of water that it would take vast periods of time for the fine particles to be deposited. They then have used those “necessary” millions of years to argue against the Flood. The problem is complicated by the fact that most fossils are found in shale or mudstone. Thus, they say, the Flood could not possibly have produced the fossil record.

But recent work by uniformitarian researchers has shown that mud can be deposited in significant quantities in fast-flowing water (Macquaker and Bohacs, 2007; Schieber et al., 2007).

This supports rapid deposition required by the Flood (Walker, 2008), and by a mechanism not recognized prior to these publications. How many other unknown mechanisms await discovery? Present ignorance of aspects of Flood processes is not a reason to default to uniformitarian interpretations of geological phenomena.

Furthermore, the relative scale of processes for the recolonization model is much closer to the Flood timing (weeks vs. centuries) than to the standard uniformitarian scenarios (millions of years). Given the necessary extent of relatively rapid deposition during posited post-Flood catastrophes, the recolonization model appears to demand an innovative examination of standard models of geology, just as other young-earth models do. The secular history encapsulated in the geological timescale cannot be made to fit with the recolonization model.

Finally, the problem is deeper than a simple disagreement over isolated geological phenomena. The real issue is whether or not uniformitarian speculation rests on philosophical assumptions antithetical to Scripture. It seems obvious, both from a historical perspective (Mortenson, 2006) and from a logical perspective (Reed, 2001), that they do. If worldviews are really at war, the scope of the fight must be acknowledged and integrated into historical models. Accepting uniformitarian interpretation with the full knowledge that the presuppositional foundations of that position are false is a dangerous way to approach truth. Areas of ignorance in diluvial geology do not justify defaulting to solutions derived from an erroneous framework. Having an “answer” is not worth sacrificing truth.

Logical Problems

Circularity of Historical Models and Historical Evidence

Because of the epistemological differences between science and history,

historical models face hurdles not commonly associated with scientific theories. The reservoir of evidence is usually much smaller, the models are attempting to explain unique events rather than general principles, and in these models, the necessity of speculation is much higher (because history deals with the unobservable and unrepeatable past). Given those constraints, it is not surprising that many historical models become somewhat circular—interpreting data within the framework of the model and then falling into the common trap of thinking that the ability to conceive of a *possible* interpretation within those boundaries somehow means that the interpretation must be true.

The recolonization model trips over this obstacle. There is no clear collection of data presented that *demand*s the recolonization approach. Instead, the framework is erected to resolve perceived problems with the rock record, and then the model goes in search of supporting evidence. It purports to find that evidence in the Bible and in the rock record, but none of that information is unique to the model. For example, as shown above, Genesis 6–8 allows a variety of historical solutions in terms of geologic detail and favors a more traditional Flood model. At best, the recolonization option is only one of many potential scenarios.

Likewise, the physical evidence cited in support of the model does not constrain us to the recolonization solution. Data that are presented as “evidence” of the model can easily be re-interpreted within a variety of other models in a consistent fashion. Tyler (2006) discusses various time-rock units such as the “Hadean” and “Archean,” but nowhere does he demonstrate the necessity of his interpretation vis-à-vis those units. He cites dinosaur eggs, tracks, and nests as indicators of post-Flood deposition, but viable Flood explanations exist (Oard, 2009).

Unfortunately, an extra layer of difficulty is added, because the “data” often

imported into the recolonization model are not data at all but mixtures of data and interpretation. Finally, the problem is made more acute by the blurring of boundaries between history and science. We are accustomed to secular models of earth history that are granted the certainty of experimental science simply because those proposing them are “scientists.” Conflating history as science is expected in the worldview of naturalism but should be avoided by Christians (Reed, 2001). The conquest of history by science is an Enlightenment error and clearly related to an anti-Biblical bias. It is thus an error that creationists must strive to correct.

History cannot meet the same standards of certainty and explanatory power as science because the epistemological differences between the two disciplines are significant, especially in a Christian worldview. Thus the recolonization model should be viewed as a potential historical interpretation—nothing more, nothing less.

Refugia Are Special Pleading

An illustration of this circularity is found in the proposed “refugia” of the recolonization model. First, the proposal itself is somewhat unexpected, given the implied repaving of Earth’s crust during the first day of the Flood. Instead of the expected total destruction of the surface, we learn that *not quite* everything was destroyed; bubbles of life survived in isolated marine settings. What happened to the crust beneath these settings? If it was destroyed, then how did the “refugia” survive; and if not, then does the model predict areas of distinctive oceanic crust that might identify these locations?

The model states that these areas functioned as nature’s arks, preserving marine life that would repopulate the oceans during the Flood. While we do not disagree that marine life survived the onset of the Flood, we believe that these pockets of life are inconsistent with the

extent of destruction proposed by the recolonization model.

The existence of these refugia is not demanded by evidence; it is demanded by the model. If the fossil record is primarily a record of recolonization rather than the destruction of the Flood, then the creatures that recolonized must have survived somewhere: ergo, “refugia.” Their existence is reminiscent of the cartoon of the lengthy chemical equation that contains the key term “then a miracle happens.”

Thus we must pose several questions about these biospheres. First, what positive data demand these oases? Second, how were these zones preserved in the face of the catastrophic and complete crustal overturn demanded by the recolonization model? How did a sufficient variety of life in sufficient numbers find their way into these deepwater environments, given the rapid and abrupt onset of the Flood? How did they survive without eating each other? How did they know when and where to migrate? How could they have traversed the distances to resettle globally and produce the abundant life found in the fossil record in the time allowed? In the case of those fossilized in the Flood, we are talking of a matter of weeks. Finally, if refugia were in deep water, how did shallow water bottom dwellers survive?

Timeline of Recolonization Does Not Fit the Bible

This leads to another issue—that of timing. Tyler’s model would be clarified by a time line that illustrates the sequence of the Flood as compared to the geological column as compared to the migration of life to the refugia, their dispersion across the flooded earth, and their subsequent fecund reproduction into the vast populations preserved in the fossil record—all within less than 331 days for the pre-Permian record and within a few centuries for the post-Permian record. This time line should incorporate the latest knowledge of both their relative

(to explain the fossil order) and absolute speed of travel for various fauna, as well as their reproductive cycles. We suspect that such an exercise would demonstrate the inability of the refugia solution to overcome the problems inherent in the recolonization model, because time constraints would not allow sufficient time of travel to and from refugia, nor would they allow sufficient time for reproduction, dispersal, and fossilization either during or after the Flood. For example, the “Cambrian Explosion” marks the preservation of vast numbers of creatures that would have had to migrate from their isolated refugia into shallow marine environments preserved in many places across the planet. Once there, they would have to reproduce in sufficient numbers within a matter of days to fill the fossil record for that time period—all in the midst of a tremendous catastrophe. And, of course, these same shallow marine environments would be expected to be subject to violent disruptions as rapidly rising Floodwater transgressed pre-Flood continents.

Geological Issues

Given the Biblical and logical weaknesses of the recolonization model, we now turn to the area of its greatest strength—its coherence with geological data. However, closer examination reveals problems similar to those found in other areas. Rather than strongly supporting the model, the geological data raise additional questions.

Antediluvian Origin of Much of the Crust

If the crust was destroyed and replaced during the earliest phase of the Flood, then the “Hadean,” Archean, and Proterozoic igneous and metamorphic rocks must have been emplaced during the first forty days of the Flood. That seems unlikely for several reasons. First, the lithosphere protects the hydrosphere and atmosphere from the mantle. The simultaneous global destruction of the crust

deep into the lithosphere would expose the surface to thermal and chemical hazards that would threaten the survival of marine life and life aboard the ark.

Second, large regions of the continental crust are granitic masses that appear by virtue of their extent, mineralogy, and position to be relicts of the Creation week, rather than the Flood. For example, the granitic crust in the midcontinent region of North America is cut by numerous late Precambrian to early Paleozoic rifts, which are readily seen as early Flood features. Reed (2000) interpreted the North American Midcontinent Rift System as marking the beginning of the Flood; and that feature crosscuts preexisting granitic crust, as well as other lithological terranes. Since the sediments infilling the rift basins appear to be nonmarine and covered by marine Paleozoic sediments, it appears that the rifting would have taken place between the onset of the Flood and the marine transgression of North America.

Models that propose the destruction of the crust must address the complications that arise from the global-scale volcanism that would surely follow. Furthermore, there is no Biblical or logical warrant for such a dramatic event. If nothing else, Occam’s razor should constrain such speculation. Why create the necessity to explain the catastrophic re-formation of all of Earth’s crust? The Biblical texts can all be satisfied without this extreme measure. It seems quite enough to have to explain the sedimentary record and the associated intrusive, extrusive, and erosional events.

Rapid Erosion of Continents?

The recolonization model proposes the removal of rock cover, sediment, and soil from continental interiors within a very short timeframe.

Following Robinson (1996), the recolonization model advocates subterranean water bursting from below the continents, immediately

scouring everything from the land into the sea (Tyler, 2006, p. 76).

The movement of water over land would follow well-known hydraulic principles. Topography would exert a profound effect on water flow: increasing or decreasing the hydraulic gradient would speed up or slow down flow, barriers would halt or divert flow, and the orientation of the landscape could create conflicting current paths. Rising base level also would affect the gradient, and even friction of the water moving over the land surface would change flow rates. Uncertainties abound, but it seems unlikely, from a hydraulic point of view, that water could overflow the full extent of the continents in one day. Think of the time required for modern flood peaks to travel downstream in a river. Also consider that in North America, floodwater would have to flow a thousand miles or more. Water moving 1,000 miles in one day would have to flow at an *average* current velocity of approximately 42 mph or 19 m/s for the entire distance. Water flowing greater distances would require proportionally greater average flow velocities.

Also, if the earliest crust is that which was emplaced during the Flood, then it stands to reason that all of the pre-Flood crust was destroyed. If so, how then could the water have run across the crust-that-was-no-longer-there? Water in contact with the lower lithosphere would not flow; it would flash into steam.

Heat Problem

Tyler (2006) notes that the first phase of the Flood was the destruction and re-creation of Earth's crust. "In summary, the Hadean/Archean was a time of 'meltdown' for the Earth" (Tyler, 2006, p. 77).

However, this extensive tectonic and igneous episode would, like catastrophic plate tectonics, create a hypercatastrophic thermal event that probably would have destroyed the ark. The heat flow from the upper mantle (ranging

in temperature from 1,200° to 3,600° C) would transfer vast quantities of thermal energy into the hydrosphere and atmosphere, perhaps enough to destroy them. Thus, the feasibility of the recolonization model depends on the demonstration that the release of thermal energy would not prove fatal to life in the refugia and aboard the ark.

Returning to the Biblical texts, there is no textual support requiring the equating of the "destruction" of the Flood to crustal melting. In fact, in 2 Peter 3, a contrast is drawn between the judgment of the Flood and that of the Second Coming; the first is a destruction by water, which is *contrasted* to the latter's destruction by heat.

Time Constraints on Recolonization

As noted above, Tyler's model requires the rapid migration, reproduction, and preservation of vast numbers of organisms during and immediately after the Flood. Even as a "thought experiment," it seems highly unlikely that "refugians" would cover the earth and reproduce in sufficient numbers to populate the fossil record in the time allowed by Biblical history.

After the destruction of the mabbul, the first continental environments to be recolonized were marine, as the surface of what was to become land was still covered with water. Only later, as the land emerged above the sea, could there be terrestrial recolonization (Tyler, 2006, p. 77).

Repopulating large continental areas with all manner of marine creatures within a matter of weeks requires giant refugia located immediately adjacent to the continents with favorable currents to carry the creatures to their ultimate resting places. Yet this seems contrary to his depiction of refugia as small, isolated, deepwater survival zones.

The order of the fossil record seems wrong, too. Why would the fossil record not show a systematic order based on the

speed of the organisms combined with their fecundity? And what creatures are fecund enough to provide that many fossils in a matter of days or weeks? Trilobites litter the lower Paleozoic. How fast could they move and reproduce? They would have to move from refugia to resting places all over the world in vast numbers within days. Other examples could be multiplied. We suggest that advocates of recolonization assemble these data on at least the major fossil groups buried by the Flood and demonstrate that their hypothesis is at least theoretically possible.

Origin of "Post-Flood" Rocks

The recolonization model terminates the Flood during the Carboniferous. Thus, the volumetric majority of the sedimentary rock record would then have been deposited *after* the Flood (e.g., Froede, 2007a; 2007b; vs. Tyler, 2007). This seems difficult to reconcile with the Biblical description of the Flood as a uniquely catastrophic global phenomenon. It also seems difficult to reconcile with God's promise in Genesis 9 to never again repeat the Flood, given the global presence of widespread marine strata younger than the Carboniferous. What specific non-Flood, but geographically extensive, catastrophes would have been required to deposit these sediments all over the world?

This problem is exacerbated by the Bible's restrictive timescale, even after the Flood. There is not much time between the Flood and the time when we would reasonably expect written historical records, and such records should then contain tales of monstrous catastrophes. That time frame also must accommodate the dispersal of terrestrial life from the ark and their repopulation in sufficient numbers to provide the quantity of terrestrial fossils observed in the rock record. Furthermore, geologists are confident that the existing rock and fossil records are only a fraction of the total *deposited* record, and so the num-

ber of fossilized creatures was probably much greater than that observed today. Once again, the premise of the timescale presents an additional roadblock for the recolonization model.

Rocks and fossils are not the only problem with the time line. What about landforms that overlie these supposedly post-Flood sediments? Many require large-scale erosion and orogeny, processes more consistent with late-Flood tectonism and receding floodwaters than modern low-energy events (Oard, 2008). If the most “recent” features of the geologic record were formed by the Flood, then it stands to reason that all underlying rocks were too.

How Did Post-Flood Civilization Survive the Mesozoic?

A spin-off of this problem comes from the establishment of human civilization and the rock record of the Middle East (Holt, 1996). Vast thicknesses of the rock record in Mesopotamia are Mesozoic and Cenozoic rocks deposited by marine processes in formations that cover large regions. According to the recolonization model, these sediments would be the result of post-Flood catastrophes and thus concurrent with early human civilization that spread rapidly throughout the Middle East (Genesis 10). How could the descendents of Noah have survived in a region undergoing these kinds of large-scale catastrophic events that were repeatedly occurring and burying the flora and fauna living with man? A simple comparison of the Table of Nations to the stratigraphy of the Middle East strongly suggests that the recolonization model cannot easily explain this discrepancy.

Furthermore, in the recolonization model, the Zagros Mountains in western Iran could not have risen until well after the Flood and probably after Genesis 10. This is true of many mountain chains, yet the Zagros Mountains (uplifted in the Pliocene) impinge upon the areas first settled by men after the Flood. In

that case, we would expect such an event to be recorded in ancient literature.

Conclusion

Having examined the recolonization model in the light of the Bible, the logic of its assumptions and conclusions, and the geologic data, it appears that the model raises more questions than it answers. We hope that Dr. Tyler and his fellow recolonizers will continue their efforts to understand the rock record in light of the Biblical record, but we suggest that they reexamine the recolonization concept as a means to harmonize special and general revelation.

If not, then it appears that they must rethink the model, especially in light of the worldview clash that sets the axioms of Enlightenment naturalism against Biblical Christianity in the arena of natural history. Given that conflict and given the clear and unambiguous linkage between the geologic timescale (even in its relative chronostratigraphy) and that secular worldview, the lines of investigation need to run much deeper than they do at present. We hope that this work and that of other diluvialists will begin to unlock the remaining secrets of the rock record and bring that facet of human knowledge into conformity with God’s kingdom.

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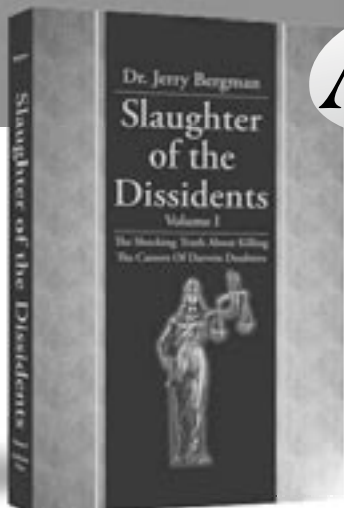
Appendix

Other Literature Sources for the Recolonization Model

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**Book
Review**

***Slaughter of the
Dissidents: The
Shocking Truth about
Killing the Careers of
Darwin Doubters***

by Jerry Bergman

Leafcutter Press, Southworth, WA, 2008, 493 pages, \$24.00.

Coupled with its provocative title, this book is sufficient to shake a reader from head to foot. As the first of five proposed volumes, this issue truly is an experience. My attention was riveted and my emotions ranged from delight to disgust, mostly the latter. We are served by Bergman (and lesser authors including Kevin H. Wirth, D. James Kennedy, and John Eidsmoe) a smorgasbord of true stories. Most of the victims unjustifiably suffered seriously, being denied educational advancement, status, positions, compensation, etc. However, there is near the end of the book a redeeming

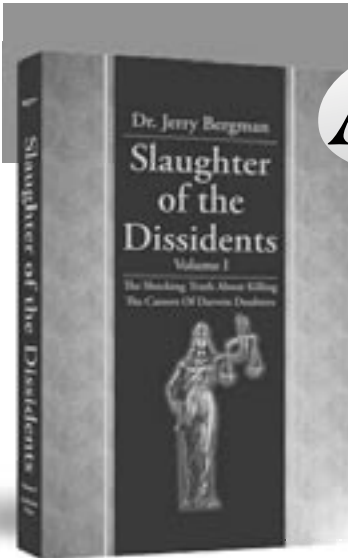
“survivors” chapter presenting accounts of those including Wernher Von Braun who came through persecution with relative success.

This significant compilation authenticates the harassment of various Darwin doubters, creationists, and intelligent-design advocates. In carefully compiling these case studies, Bergman says his “plea is that readers and supporters will work to move the pendulum toward more tolerance and accommodation of Darwin skeptics in line with the principles of a free and just society” (p. 15). Bergman affirms that during his

data compilation he “made every effort to contact both the victims and their critics” (p.12).

The book has convenient footnotes containing authors, dates, and pages for cited material. For complete references, readers can go to the 68-page bibliography. Also, there is a helpful 22-page index. I anticipate that the volume will have a serious impact; it deserves wide distribution.

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**AVAILABLE
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Book Review

Slaughter of the Dissidents: The Shocking Truth about Killing the Careers of Darwin Doubters

by Jerry Bergman

Leafcutter Press, Southworth, WA, 2008, 493 pages, \$24.00.

In *Slaughter of the Dissidents*, Jerry Bergman documents numerous incidents of punishment, discrimination, and injustice for those who question Darwinian principles. These “Darwin Doubters” consist of high school teachers, scientists, and college professors who verbalized their doubts about various neo-Darwinian mechanisms. The result was vicious persecution by the Darwinian orthodox. The “high priests” threatened and intimidated anyone who would challenge their materialistic dogma, justifying their actions in the name of science and the protection of students from religion. The hypocrisy is blatant, but unfortunately religious humanism is often backed by the courts, government, and mass media. Because of this obvious bigotry, present in most of the power centers in this country, many Darwin Doubters lose their jobs, are blackballed, and experience emotional stress.

For Bergman, this book represents his personal rallying cry against religious intolerance and suppression because he himself experienced this bigotry and intolerance. Bergman is not trying

to prove or disprove origins theory, but makes the case that academics have the right to question Darwinism without being hurt personally and professionally. He feels that this rallying cry must be heard and heeded or we will lose all of our academic freedoms. In the preface, Bergman makes the case that discrimination against Darwin Doubters is a hate crime because it manifests itself in derogatory comments, denial of entry into graduate programs, denial of degrees, firings, censorship and personal threats.

Chapter 1 is written by Kevin Wirth who sets the stage for the context of this discrimination. Chapters 2 and 3 briefly discuss several specific cases of Darwin Doubters and how they experience various forms of intolerance by the Darwinian establishment. Chapters 4–13 detail the stories of people like Dean Kenyon, Ray Webster, Caroline Crocker, Raymond Damadian, and Guillermo Gonzales who would dare to question evolutionary dogma. Often, many of these researchers and educators want to help their students critically examine the

weaknesses of the Darwinian paradigm, using Darwinist literature, and find themselves branded “creationists” and accused of bringing “religion” into the classroom. In chapter 14 Bergman highlights those Darwin Doubters who successfully survived academia and how they were able to do it. They include Stephen Austin, Kurt Wise, Paul Nelson, and Wernher Von Braun. Chapter 15 closes with what can be done to stop this intolerance. There is an extensive index and 68 pages of citations.

The book is well written and I had a hard time putting it down. It is a must read for educators, scientists, and graduate students desiring an awareness of the Darwinian establishment’s strangle hold on academic freedoms. There are many things that can be done, both individually and collectively, but we must do them before it is too late. I highly recommend *Slaughter of the Dissidents*, an important addition to any library.

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Notes from the Panorama of Science

Biological Hovercraft: Where the Rubber Meets the Glass

Diatoms have unparalleled geometric beauty fashioned into siliceous, Petri dish-like houses (or frustules—see Figure 1) (Armitage, 1994; 2007; Armitage and Lumsden 1995). They are bewilderingly complex, unlike any other plant or animal cell on Earth in their abil-

ity to construct the three-dimensional glass structures in which they live. A recent study by University of Edinburgh researchers has yielded a “simple” materials-science model to construct diatom-like microstructures using a “quasi-two-dimensional, two-compo-

nent incompressible fluid mixture with fixed overall composition” (Lenoci and Camp, 2007). The higher order math used to explain the formation of only *two* dimensions of the diatom frustule (each dish-like half of the diatom shell is known as a frustule) clearly illustrated the complexity of these so-called primitive life-forms. However, the method by which these single-cell plants assemble such an elaborate greenhouse begins just after cell division, when

silica deposition occurs near the freshly exposed surfaces of the daughter cells in membrane-bound compartments called silica deposition vesicles (SDV's). [They maintain that the process seems to occur in two distinct stages.] In the first stage, a thin (~30 nm) base-layer of silica is deposited possessing an irregular system of ribs (or *costae*) of silica emanating from near the center of the new valve. Between newly formed costae are found rafts of organic droplets and/or vesicles, which may have had a role in directing the initial formation of the costae. In the second stage, silica growth proceeds [in a] normal [conformation] to the base layer (leading to vertical differentiation) until the valve has acquired the necessary thickness (~10–100 nm), and the fine details of the porous structures are complete. Interestingly, the structure of the base layer does not necessarily correspond to the pore structure on the external face of the new valve; in some species, small pores in the base layer can be observed directly through the large pores in the ex-

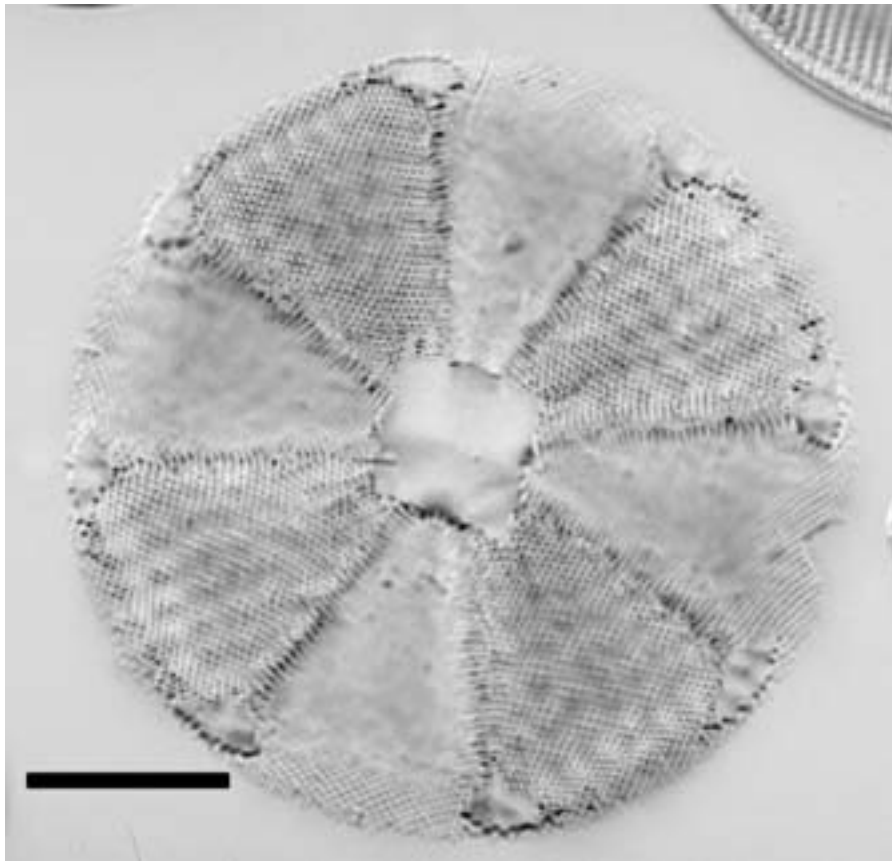


Figure 1. *Actinopterychus* sp. diatom frustule (one half of the paired Petri-dish-like glass enclosures that single-celled algae live in.) Photographed in brightfield under a 500X microscope magnification. The single-celled plant manufactures frustules out of silica (SiO_2 , or glass), which naturally exists dissolved in seawater. It is then glued together by a girdle or several girdle bands) that circumscribes the Petri dish. Evolutionists contend that such elegant structures are merely “apparent design” and formed by chance shuffling of genes in plant DNA. Scale bar = 10 micrometers (microns).

ternal surface. In general, the first stage of silica deposition to form the base layer is completed within 10–20 min, while the second stage of vertical differentiation can take up to several hours (Lenoci and Camp, 2007, p. 223).

The authors did not summarize all of the experimentally observed variations, but they noted, “depending on the diatom species, vertical differentiation has been observed to proceed in both directions normal to the base layer” (Lenoci and Camp, 2007, p. 217).

Diatoms extract silica (actually silicic acid $\text{Si}(\text{OH})_4$) from water by employing a complex silica-membrane transport system (see Sullivan, 1976, and Drum and Gordon, 2003) to make these houses. They also render the silica inert (thus incapable of dissolution back into the water) once they have manufactured their frustules, probably by employing an organic coating of some type, such as pectin (Beakes, et al., 1992, p. 1). We creationists would say that such a complex membrane transport system, in concert with a technique of rendering the silica inert, resulted from the sophisticated planning of an intelligent Designer, not the trial-and-error method proposed by evolutionists. Diatoms also construct these structures in *three dimensions* with no apparent scaffolding method (Drum and Gordon, 2003). Therefore the silica membrane transport system, as complex as it may be, is eclipsed by the construction procedure that renders the silica inert and then fashions it into three-dimensional geometric shapes. Furthermore, even the synthesis of diatom DNA appears silica dependent (Darley and Volcani, 1969), making these organisms inconceivably unique. One can easily make the case that such intricate manipulation of molecular glass, and the resulting geometric shapes, cannot be the result of chance-based neo-Darwinian mechanisms, even if life on earth had billions of years in which to experiment by trial and error.

Geometry is a product of design—it is information pressed into matter, and not a property of the matter itself. Crystal growth and other similar abiotic physical processes have an orderly arrangement due to the basic atomic assembly of atoms. Our evolutionist colleagues refuse to acknowledge that an intelligent Designer obviously was involved in the devising and construction of these stunning biogeometric shapes. One of the most vociferous anticreationists (and an admitted atheist) writing about design and evolution states that

the world is divided into things that *look as though somebody designed them* (wings and wagon-wheels, hearts and televisions), and things that just happened through the unintended workings of physics (mountains and rivers, sand dunes, and solar systems)...the unaided laws of physics—the laws according to which things “just happen”—could, in the fullness of geologic time, *come to mimic deliberate design*. The illusion of design is so successful that to this day most Americans...stubbornly *refuse to believe* it is an illusion (Dawkins, 2005, p. 1. Emphases added).

Many billions of years of trial and error are required for the improbable to become reality, neo-Darwinists confess. Furthermore, Dawkins is fully capable of recognizing design when he sees it (Dawkins, 2005; Armitage, 2007), and according to him, apparently “most Americans” are as well. Recent work shows that “just-happen” advocates like Dawkins do not enjoy the luxury of “the fullness of geologic time.” The earth is, according to radiometric data, far too young (Humphreys et al., 2004). In spite of the mounting evidence supporting a young earth, Dawkins maintains his counterintuitive belief that physics can “mimic deliberate design.” We argue that the design that we observe in biology (particularly diatom design) is deliberate design and does not owe its existence to

unguided physics. (Recent work actually has distilled the governance of these complex geometric shapes into one “superformula” described by a Belgian mathematician; Gieles, 2003.)

As an aside, Dawkins betrays his schizophrenia on this subject when he ascribes mimicry (a *thinking* entity’s game) to an inanimate object, unaware of a set of rules such as “the unaided laws of physics.” He compounds his problem repeatedly when he claims:

The *achievement* of nonrandom natural selection is to *tame* chance. By *smearing out* the luck, *breaking down* the improbability into a large number of *small steps*—each one somewhat improbable but not ridiculously so—natural selection *ratchets up* the improbability. As the generations unfold, ratcheting takes the cumulative improbability up to levels that—in the absence of the ratcheting—would exceed all sensible credence (Dawkins, 2005, p. 2. Emphasis added).

One wonders how “the unaided laws of physics” and “natural selection” became so—well—humanlike, as to seek out “achievement,” to learn to “tame,” “smear out,” “break down,” and “ratchet up” such things as “small steps”? Is there any non-ridiculous evidence that the laws of physics achieve this?

The presence of complex, three-dimensional symmetrical geometric shapes fashioned from glass by single-celled plants is strong evidence that a superdesigner exists. Furthermore, the microscope documents that some of these little marvels of engineering actually jet around like hovercraft under their own directed power. They accomplish this movement by using a multifaceted (and still very poorly understood) pressurized cytoplasmic flow system, which exudes, apparently “at will,” from elegantly designed vents and pores built into the glass walls.

Motility in single-celled creatures has become a hot topic for evolutionists,

and this continues to be the case because molecular motors, such as the bacterial flagellum, are so small (approaching the angstrom range in size) and yet remarkably efficient (even 100% efficient) (Kinosita et al., 2000; Schwartz, 2003). They resemble the best motors ever designed by humans. Such complexity in motor design seems to defy a plausible “origins-by-trial-and-error” story. Yet Dawkins tries to make such a case:

If the bacterial flagellum is too complex to have evolved, it might also be too complex to have been created. And indeed, a moment's thought shows that any God capable of creating a bacterial flagellum (to say nothing of a universe) would have to be a far more complex, and therefore [as] statistically improbable [an] entity than the bacterial flagellum (or universe) itself—even more in need of an explanation than the object he is alleged to have created (Dawkins and Coyne 2005, p. 4. Emphases added).

Seeking refuge in the argument of “how do we explain God?” does nothing to promote a plausible explanation for nearly perfected efficiency of a nanoscopic motor, embedded in a single-celled organism. The fact is that diatoms and bacteria perform feats of locomotion that our oil-starved world can only dream of (our very best electrical motors can approach 95% efficiency but not for extended periods; Kinosita et al., 2000). Depending on the organism, such biological motors have varying degrees of complexity. Differences in motor design are frequently misinterpreted as representing the vestiges of a “trial-and-error” history throughout deep time, and Dawkins falls into this trap.

Biologists have located a plausible series of intermediates, using ingredients to be found elsewhere in living systems. But even if some particular case were found for which biologists could offer no ready explanation, the important point is that the “default”

logic of the creationists remains thoroughly rotten (Dawkins and Coyne, 2005, p. 4).

Scientists are at present dumbfounded by the staggering number of *families* of nanoscopic motors that recently have been discovered.

Fifteen years ago, only a few molecular motors were known. In contrast, complete inventories of molecular motors are now available in a number of diverse organisms. While these remarkable accomplishments

have answered many questions, the genomic inventories also have exposed many areas of ignorance (Vale, 2003, p. 2).

The evidence from “rotten” creationist logic just keeps piling up and is admittedly ignored by those who refuse to consider it *a priori*.

At the Creation Research Society's Van Andel Creation Research Center (Chino Valley, AZ), Armitage (2007) introduced an ongoing microscopical study of the fossil diatoms from the



Figure 2. Fossil diatom frustule of a large centric diatom from the Lompoc, CA fossil deposits. Scanning Electron Microscope (SEM image). Centric diatoms are circular and have radial symmetry. Here the diatom is almost completely covered over by many glass shards and the remains of other shattered diatoms. Dotted scale bar = 17.6 microns.

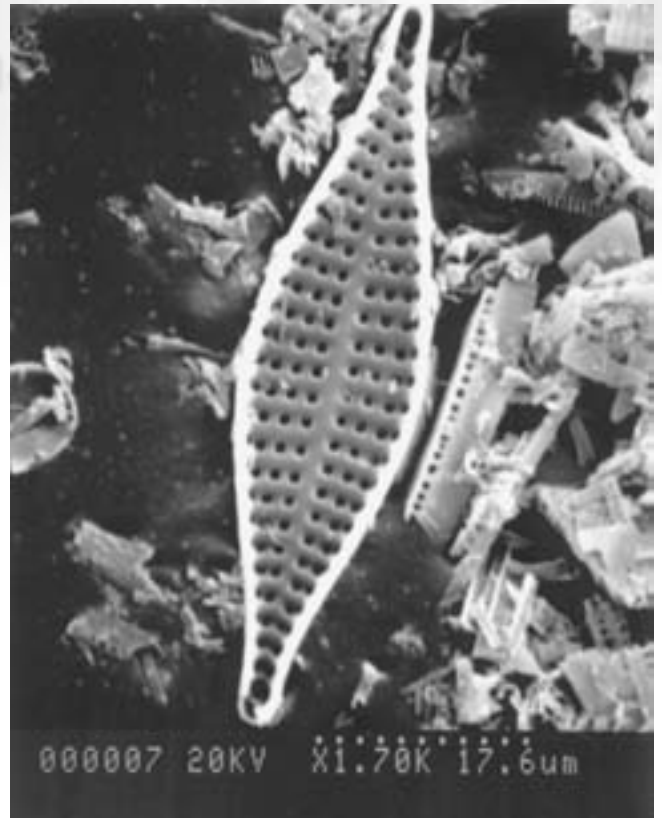
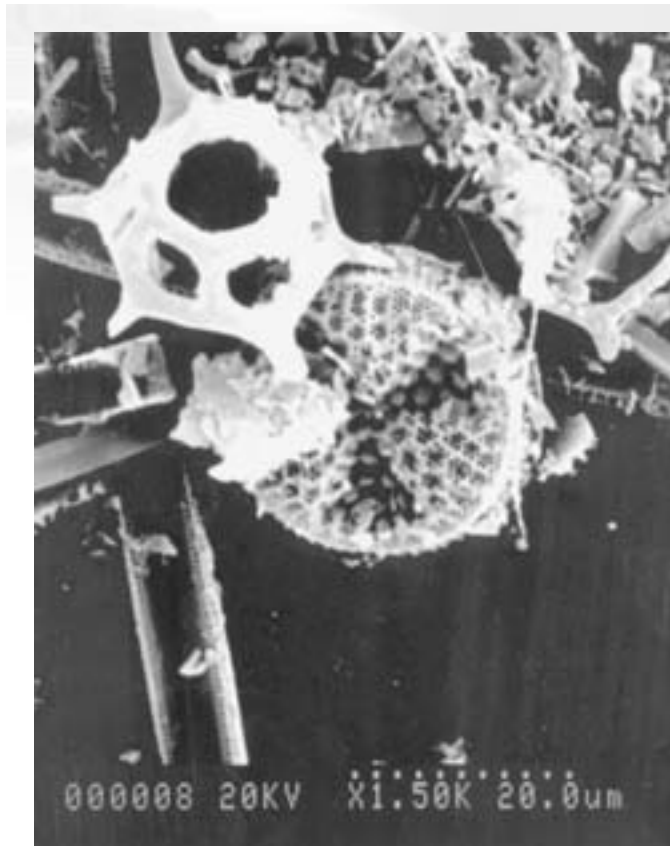


Figure 3 (*above left*). Lompoc fossil diatom frustule of a small centric diatom. SEM image. This diatom is also covered by other siliceous pieces. The highly ornamented glass “greenhouses” that these microscopic algae live in are prized by microscopists for their compelling beauty. Dotted scale bar = 20 microns.

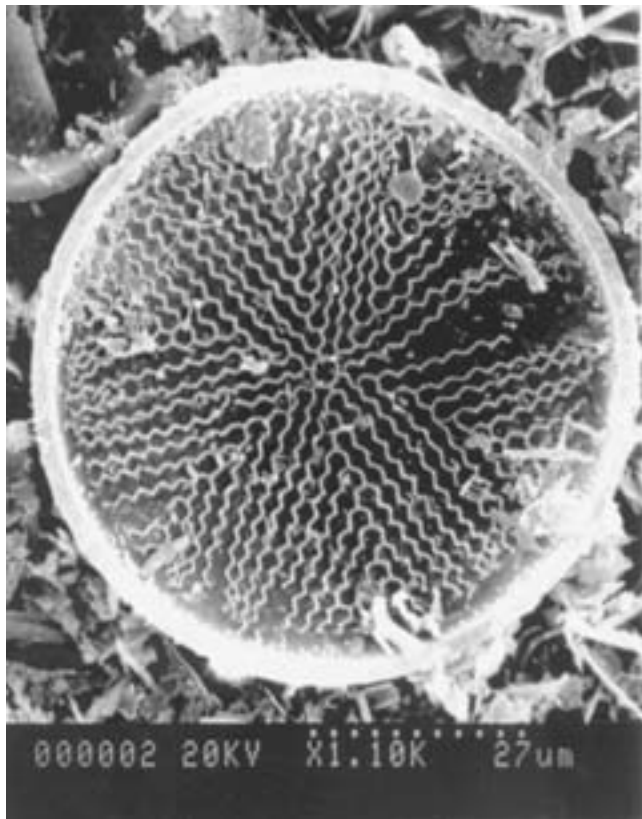


Figure 4 (*below left*). Lompoc fossil diatom frustule of a large centric diatom. SEM image. Note the pattern of (under 1 micron thick) fine ridges present on the diatom’s surface. These glass ridges evidently serve no functional purpose and are purely ornamental. Dotted scale bar = 27 microns.

Figure 5 (*above right*). Lompoc fossil diatom frustule of a small pennate diatom. SEM image. Pennate diatoms are usually elongated and have bilateral symmetry. This is one of the few pennate diatoms found at the Lompoc deposits. Dotted scale bar = 17.6 microns.

Lompoc, CA deposits, and exhibited several examples of individual specimens. To date, this study has revealed that when intact specimens are found (many Lompoc diatoms are shattered into small shards—see Armitage, 2007), they seem to be comprised mostly of centric diatoms (or diatoms that are radially symmetrical, see Figures 2–4). Some pennate diatoms (diatoms that are bilaterally symmetrical—see Figure 5) are found at Lompoc; however, they do not appear to have the required “raphe” structure on which this form of diatom motility is based. Further work searching through the shattered remains of the Lompoc deposits for pennate diatoms with the raphe structure should be done. Presently there is something on the order of 100,000 extant (or living) species of diatoms on earth (Round et al., 2007). Only about a third of these are now known as the Bacillariophyceae, the pennate form (containing a raphe).

The raphe is constructed out of a very fine slit (approximately 200nm in width—see Figures 6a–10), which traverses most of the axis length of the pennate diatom form. The raphe is usually truncated at the center of the diatom by a structure called a nodule (Solliday, 1991—see arrows, Figure 7a). Often both top and bottom frustules feature this structural slit, which is open to the inside layer of the frustule (and thus the algal cell wall). It is through this narrow slit in the diatom frustule that a thick mucilage, or gummy liquid, is exuded under considerable pressure and at a swift rate. This allows the diatom to propel itself along a solid or semisolid substrate. For this reason, some workers have dubbed the diatom “the world’s fastest microorganism” (Drum and Gordon, 2003, p. 326).

The sudden appearance in the fossil record of this jet-like motor has been touted so as “to equate this in importance with the evolution of flight in birds” (Sims et al., 2006, p. 391).

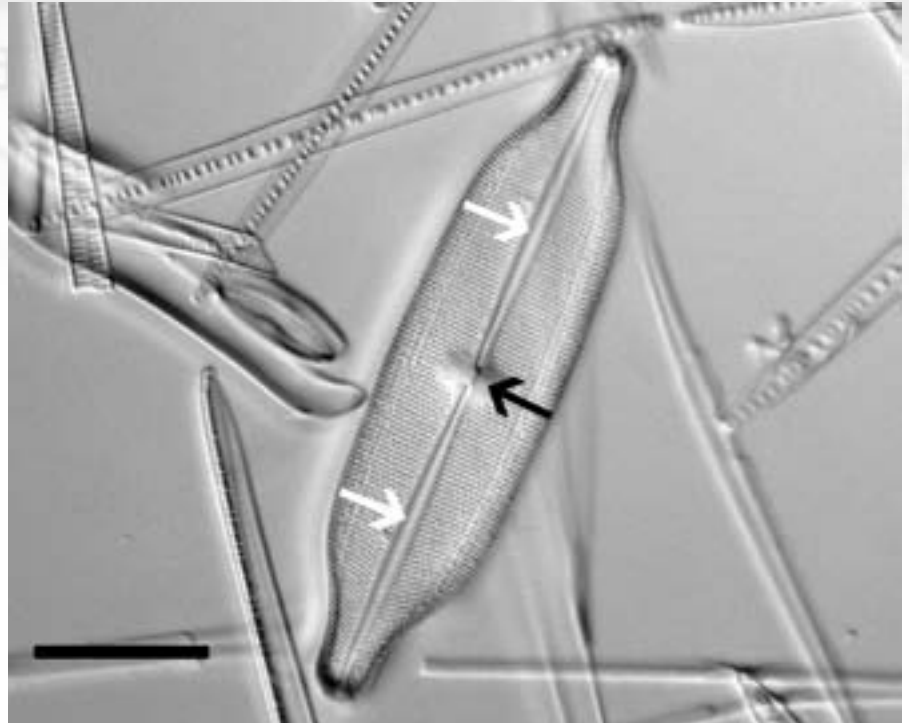


Figure 6a (top). *Neidium* sp.-type (most likely *Neidium affine* var.) freshwater recent pennate diatom from Owens River, Inyo County, CA. Nomarski light microscope image (500X). Note the elongated raphe, or slit (white arrows), through which this diatom forces a sticky mucilage (or thick liquid) for locomotion. The raphe is interrupted at the center by a nodule (black arrow). Scale bar = 20 micrometers. Photo—Jim Solliday.

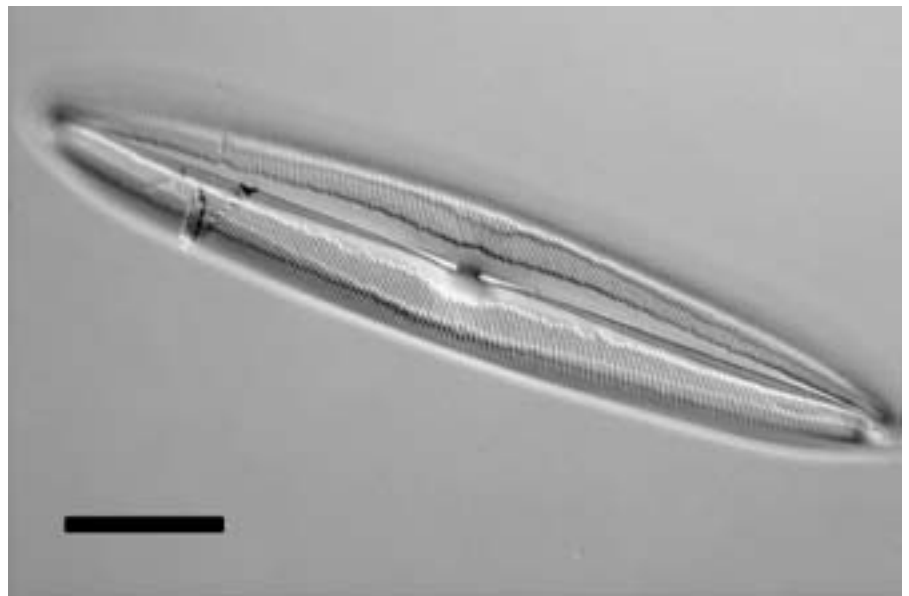


Figure 6b (bottom). *Calonies* sp.-type (most likely *Calonies westii*) freshwater recent pennate diatom from Arizona Arizite minerals area. Nomarski light microscope image (500X). The distinct central raphe is evident. Scale bar = 19 micrometers. Photo—Jim Solliday.

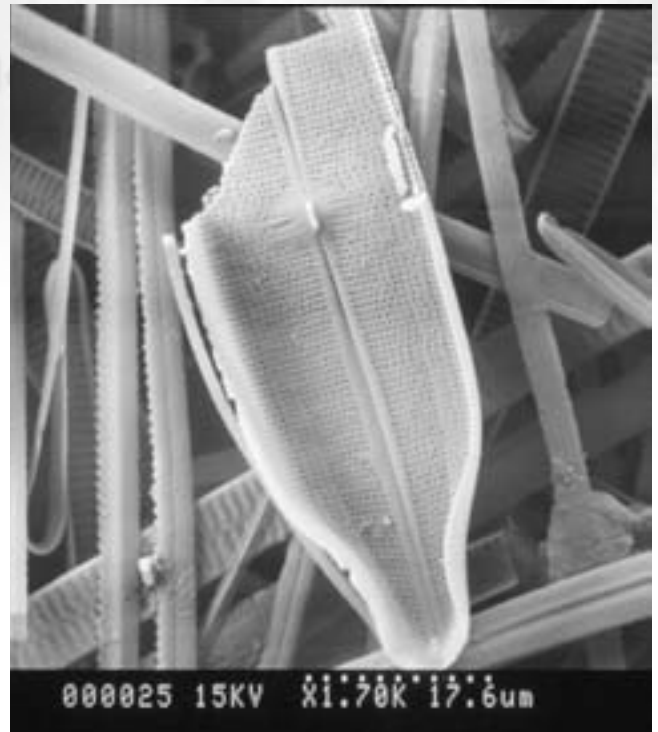
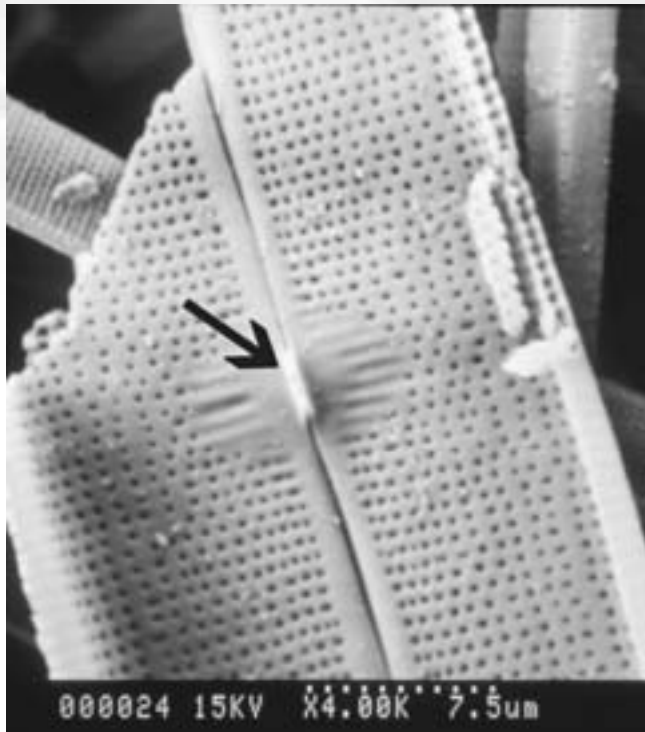


Figure 7a (above left). *Neidium* sp.-type (most likely *Neidium affine* var.) freshwater recent pennate diatom from Owens River, Inyo County, CA—internal view. SEM image. Note central nodule (black arrow) that interrupts the raphe at the center of the diatom. The raphe is about 0.3 microns in width. Dotted scale bar = 7.5 microns.

Figure 7b (above right). SEM image. A lower magnification view from Figure 7a. Dotted scale bar = 17.6 microns.



Figure 8 (below left). *Diploneis* sp.-type (most likely *Diploneis ovalis*) recent diatom frustule from Leucadia, CA—external view showing large raphe. SEM image. Dotted scale bar = 10 microns.

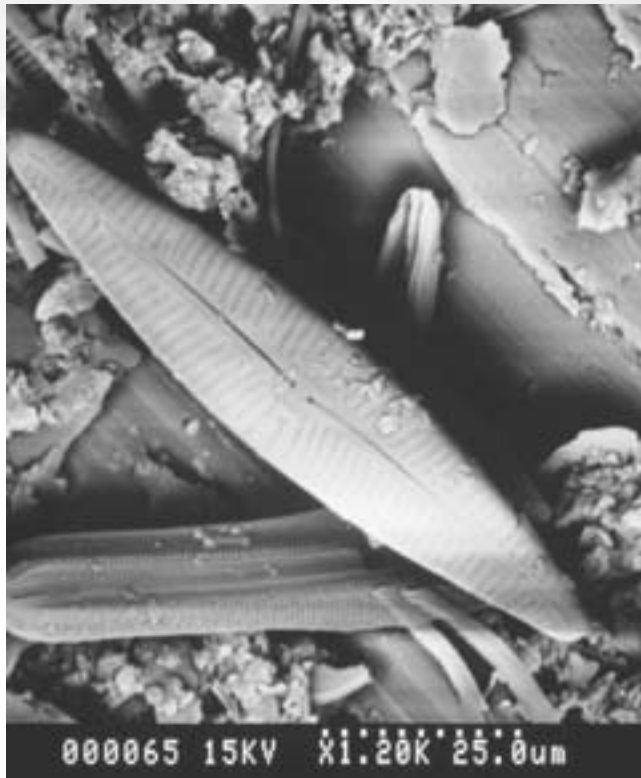


Figure 9. *Navicula* sp.-type (most likely *Navicula peregrina*) recent diatom frustule from Leucadia, CA—external view showing fine raphe structure. SEM image. Dotted scale bar = 25 microns.

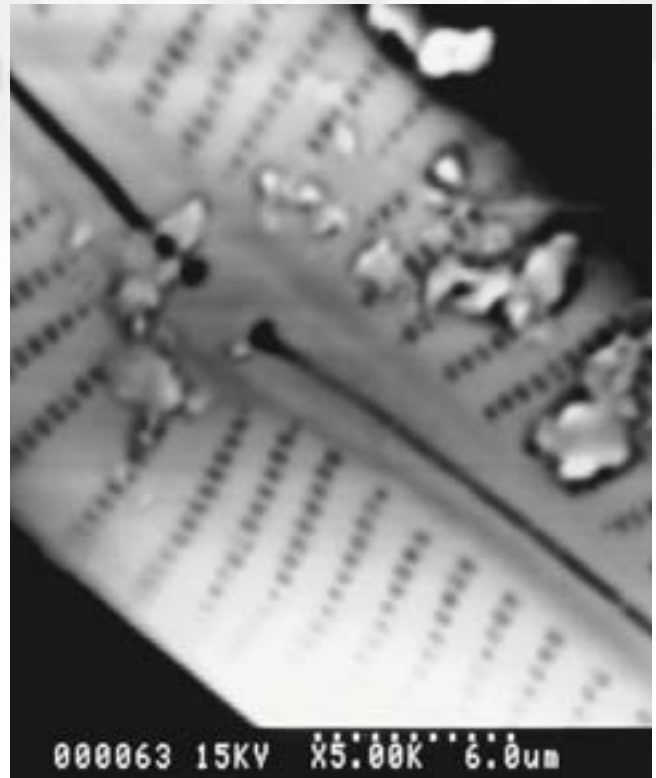


Figure 10. SEM image. Higher magnification view from Figure 9. Dotted scale bar = 6 microns.

Many pennate diatoms live on sandy or muddy bottoms where sediment is frequently added; thus they would become buried without some form of locomotion. They migrate upwards as sediment accumulates over them. Furthermore, some require motility for the completion of the sexual reproduction cycle. Diatoms also respond to gravity, light, and O_2 content and will move accordingly. They even retreat into the mud or sand during non-daylight hours (Solliday, 1991; Jonsson et al., 1994). The unique construction and lack of understanding of the raphe has led to much work in the diatom literature.

A comprehensive review of the long speculation history among diatomists regarding possible mechanisms for diatom locomotion was provided

by Solliday (1991). Drum (1963) was one of the first to obtain thin sections of diatoms for examination under transmission electron microscopy. He noted that over a century of work had “not solved the problem of diatom movement” (Drum, 1963, p. 436). Yet Solliday (1991) has shown that the first observations of the unique method of diatom movement were actually recorded by Baker (1753), over 100 years earlier than Drum’s work. Thus, microscopists have been speculating for over 200 years about the curious reversible gliding locomotion exhibited by pennate diatoms. Drum’s work has made clear that diatom locomotion does not involve any type of cilia or flagella. Solliday notes, “the raphe is too narrow and eccentric in shape to

support any known system that utilises [sic] cilia” (Solliday, 1991, p. 535).

Drum and Hopkins (1966) proposed that mucilage secretions by diatom cells were responsible for making contact with the substrate and that the secretion force propels diatoms forward. Much work that followed (Gordon and Drum, 1970; Edgar and Pickett-Heaps, 1983; Medlin et al., 1986; Lind et al., 1997; Dugdale et al., 2006; Gupta and Agrawal, 2007) slowly revealed the mechanism of diatom raphe motility. However, many mysteries of the microscopic “jet valves under glass” persist.

As in other areas of biology, the purported evolutionary explanation for the development of the raphe/secretion system in pennate diatoms is far from clear (Sims et al., 2006). These workers

lament that either “much of the early history of the raphid group has been lost or we have not yet searched in the right places...the fossil record may often be deceptive for raphid diatoms” (Sims et al., 2006, p. 392). They appear suddenly in the fossil record as fully developed, modern diatoms and persist unchanged for their entire existence on earth. To better understand the emergence of diatom motility in the fossil record, these workers should consider diatomaceous earth deposits as Flood-related, and not as gradually developed “clues” to billions of years of slow sedimentation. Their current state of understanding is represented by statements such as, “unfortunately this takes us no closer to understanding how raphid diatoms evolved” (Sims et al., 2006, p. 392).

In summary, diatoms can no longer be dismissed lightly by evolutionists as having evolved from an unknown life-form by a trial-and-error method. The unparalleled functional design shown here in “the world’s fastest microorganism,” coupled with the stunning geometrical design we observe in diatom frustules, loudly proclaims that there is an intelligent Designer who made them.

Acknowledgments

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Book Review

Noah, the Musical

2008. Sight and Sound
Theatres, Branson, MO.

Sight and Sound Theatres are located in Strasburg, PA and Branson, MO. This ministry is the nation's largest Christian theatrical company. The quality programs include a cast of dozens, hundreds of live and animatronics animals, times of humor, and high-tech special effects. The *Genesis* program was reviewed earlier (DeYoung, 2008).

During its season, the classic *Noah* production is shown daily to thousands of visitors. The parking area is a sea of tour buses. Inside the theatre one finds a 300-foot stage that wraps around the audience. Viewers find themselves inside the 40-foot, three-story Ark filled with animals and activity. The 2½-

hour story adds some creative ideas without detracting from the Biblical flood account. For example, enemies of Noah's family attempt to burn the Ark during its century-long construction. The builders include a sizeable hired crew. A plausible friendship is pictured between Noah and Methuselah in the pre-flood years.

The animals enter the Ark, walking down the theatre aisles from all directions. As the Flood waters gather, one hears the pleas of skeptics outside the Ark, now desperate and beyond help. In contrast, all is tranquil within the Ark. During the year of the Flood, however, there are times of tension within the Ark. Especially toward the end of the Flood,

Noah's family is troubled by dwindling food reserves.

As the Flood story concludes, Noah's family and the audience enjoy a large rainbow in the sky. Narration includes a clear gospel presentation. There is a warning that the coming judgment will not be by water, but by fire according to 2 Peter 3:10. Sight and Sound productions are highly recommended for viewers of all ages, from 5 to 105.

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Petroleum Hydrocarbons Derived from Leaf Litter in Turbidite Sands (Kutei Basin, Borneo, Indonesia):

How Do We Apply the Biblical Framework?

Introduction

Oil is the lifeblood of the global economy. Often oil and gas are found offshore, and demand for these vital resources has driven drilling into ever-deeper water. Geologic exploration models have followed technology; many naturalistic depositional models used to explain the origin of petroleum source sediments in offshore areas have changed dramatically. New ideas are being developed and refined with each new seismic line or well core (e.g., Saller et al., 2004).

Exploration and development in the Kutei Basin of East Kalimantan province, Borneo, Indonesia (Figure 1) has led to a surprising new proposal. Examination of the source rock reveals that leaf litter was the probable organic

source for the petroleum currently being extracted from the Mahakam Delta (Saller et al., 2006). To explain these data, naturalists invoke turbidity currents along the prograding delta front, beginning in the early Miocene (Huc et al., 2001). These submarine landslides carried leaf litter out across the continental shelf, where it was buried over millions of years by sediments also transported by turbidity currents. Burial, heat, and pressure transformed the organic matter to petroleum, which migrated into overlying stratigraphic traps (sandstone

layers) presently targeted by the petroleum companies.

Can this mechanism be incorporated into the Creation/Flood framework? If so, would this setting be relegated to the Flood or post-Flood? We need to return to the physical information and decide how it can be interpreted within Biblical Earth history (see Froede, 2007). The evaluation of geologic data within the context of Scripture should allow us to draw reasonable conclusions regarding the source of the leaf litter (and other organic materials), its time of deposition,



Figure 1. A portion of the Indonesian Archipelago with sites discussed in this article: the Mahakam Delta (M); ODP-Site 767, Celebes Sea (C); and ODP-Site 768, Sulu Sea (S). Modified from Silver et al. (1989).

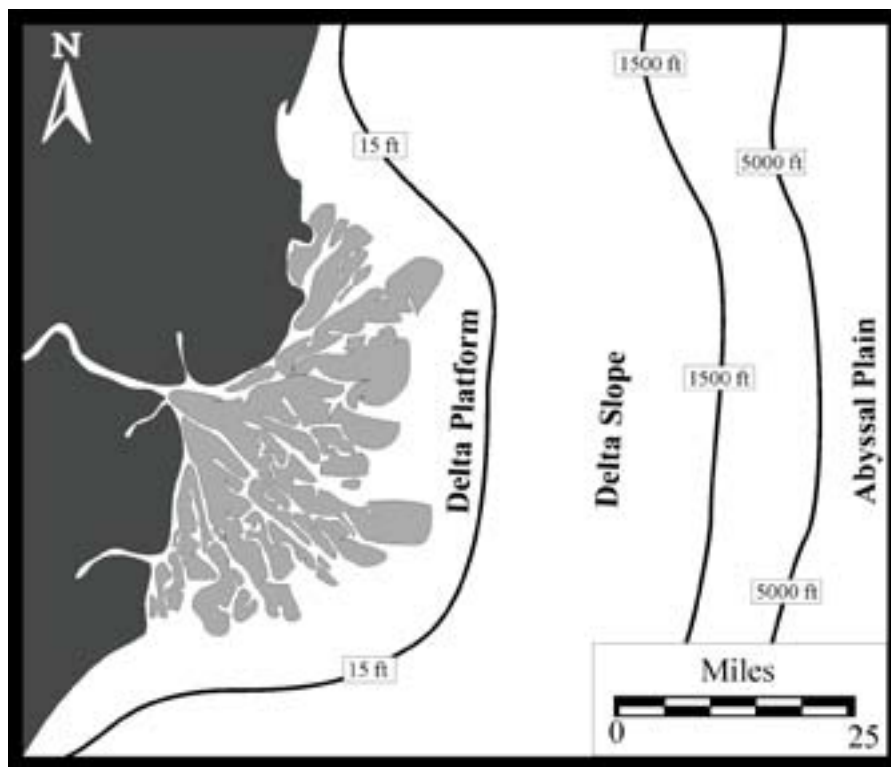


Figure 2. The Mahakam Delta in the Kutei Basin off the coast of East Kalimantan province, Borneo. Also shown is the edge of the continental shelf, slope, and abyssal plain. The delta has prograded across the shelf and created turbidites that extend over a hundred miles into the abyssal depths. Modified from Storms et al. (2005).

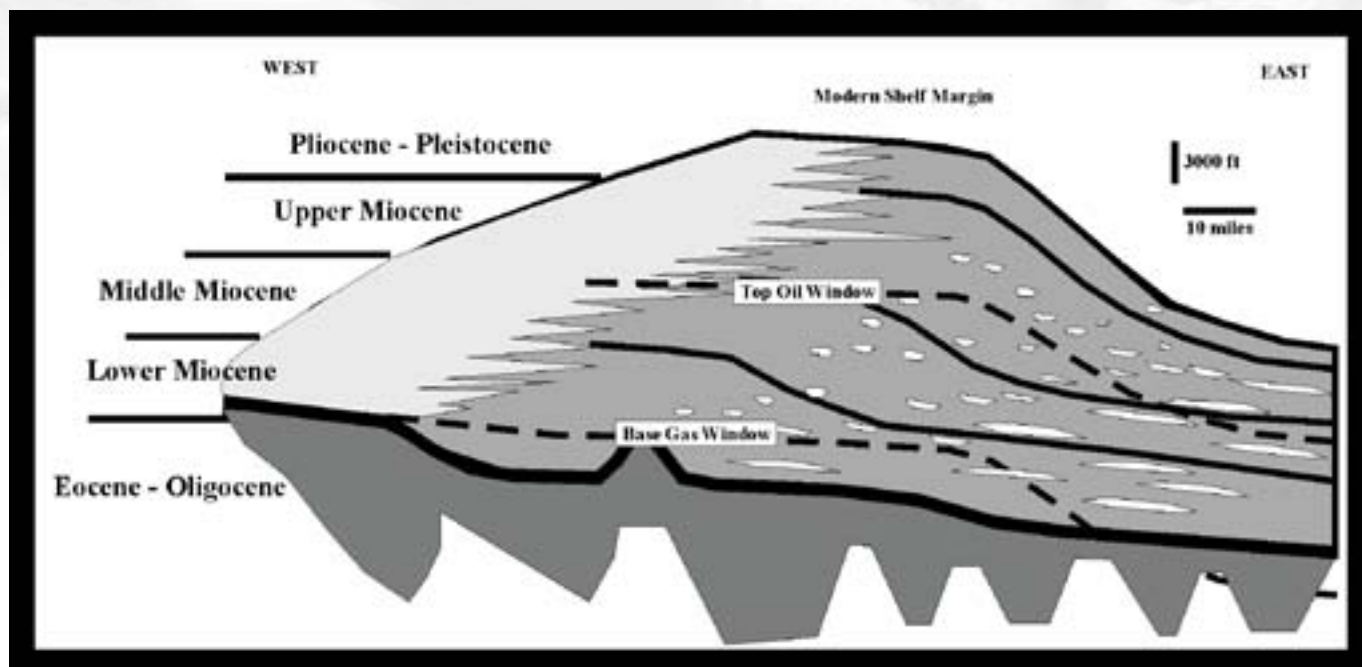


Figure 3. Generalized cross-section of the Mahakam Delta showing the prograding nature of the deltaic (from left to right) and turbidite deposits across the continental shelf. The thickness of the delta (over six miles; Saller et al. [2006]) suggests a massive volume of sediments were eroded from eastern Borneo during the Miocene. The light-colored area on the left represents fluvial sands. The dark materials on the right are silts and clays that transformed to shales with depth. The Miocene shales are organic-rich and are considered the source rock for the petroleum deposits. The small white spots are sandstone reservoirs. Modified from Saller et al. (2006).

and its transformation into a petroleum source. This should then allow us to define this setting within the Creation/Flood framework and possibly define other areas that might be promising areas for petroleum exploration.

Uniformitarian Depositional Setting

The Mahakam Delta extends off the coastline of East Kalimantan province, Borneo, Indonesia (Figure 2). This massive delta began prograding outward from the coastline in the lower Miocene (23 million years [ma] ago), eventually extending approximately 93 miles across the continental shelf (Saller et al., 2004) (Figure 3). According to naturalists, organic materials derived from tropical rain forests on Borneo mixed with the fluvial sediments as the delta grew (Saller et al., 2006). Turbidity

currents then transported the organic-rich mixture from the front of the delta out across the continental shelf. Burial, heat, and pressure changed the organic-rich sediments into hydrocarbons. The hydrocarbon-generating zone occurs between 10,000 and 19,600 feet in the lower/middle Miocene sediments, while the stratigraphic traps containing the hydrocarbons occur in overlying upper Miocene sandstones (Saller et al., 2006).

Local or Widespread Subsurface Organics?

Saller et al. (2006) claim that the modern depositional setting of the Mahakam Delta can be correlated to the Miocene. Over a period of time spanning millions of years, leaf-litter and turbidite sands were deposited across the East Kalimantan continental shelf, slope, and basin.

This perspective leaves the reader with the idea that this organic-rich depositional setting was localized and unique. However, this is not true.

In November 1988, leg 124 of the Ocean Drilling Project (ODP) was launched to understand the age and stratigraphy of the Celebes and Sulu basins in Southeast Asia (Silver et al., 1989). The goal was to drill and collect sediment cores in the deepest part of these basins to avoid influences from the basin margins or ridges (Bertrand et al., 1991) (Figure 1).

Celebes Basin

In the Celebes Basin (ODP-Site 767), Bertrand et al. (1991) identified multiple zones of organic-rich sediment extending from 0 to 2,460 feet below the seafloor (fbsf) (Figure 4). The organic material was derived from terrestrial plant life,

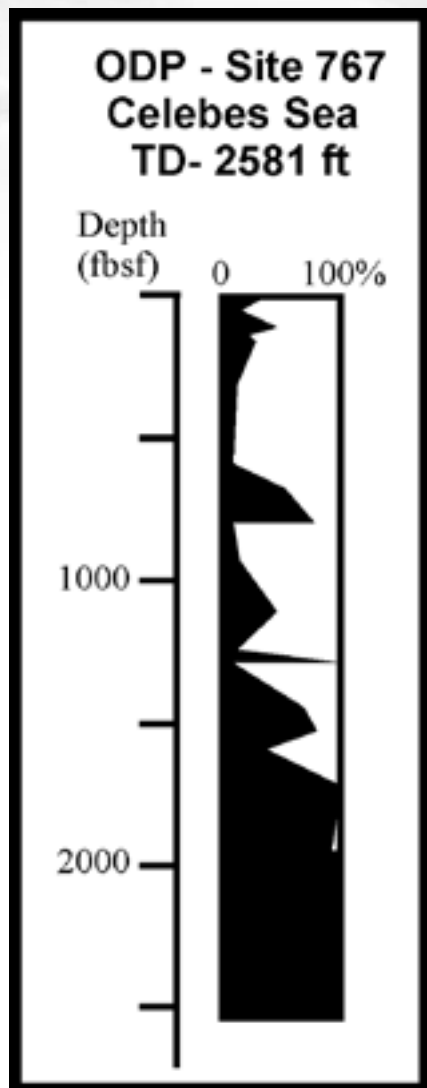


Figure 4. A depth profile for the Celebes Sea core (ODP-Site 767) showing the percentage of terrestrial (lignaceous) organic content relative to other organic sources. These terrestrial-derived organics are a considerable distance from any island land mass. The deltaic source for the organic-rich turbidites found at this locale remains unidentified. Modified from Bertrand et al. (1991).

including lignaceous fragments, spores, pollen grains, and fungus filaments (Bertrand et al., 1991). Organic content as high as 4.99 percent total mass was measured from a 1.2-inch interval at

1,847 fbsf (Bertrand et al., 1991).

Bertrand et al. (1991) divided the deposition of the organic facies into three episodes:

1. Eocene to middle Miocene (42 ma to 11 ma)—low total organic carbon (TOC) and low sediment accumulation rates. Major lithology is pelagic to hemipelagic. Organics derived from distant sources in an open ocean environment.
2. Middle to late Miocene (11 ma to 9.0 ma)—high TOC accumulation rates associated with major turbidite deposits and high sedimentation rates. Turbidites contain terrestrial organic materials. Possibly associated with a major tectonic compressive event across the area during the middle Miocene.
3. Late Miocene (9.0 ma to present)—lower TOC levels but high levels of sedimentation. Organic materials appear to be derived from terrestrial and marine sources. Terrestrial turbidites appear less frequently.

Silver et al. (1989) noted volcanoclastic sediments from the early to late Miocene to the present, probably derived from the erosion of preexisting basalt and andesite. The naturalistic history of the Celebes Sea begins in the middle Eocene.

The basement is basalt and is overlain by middle Eocene red clays. The basal red clays show low rates of sedimentation and the presence of manganese micronodules, fish teeth, and radiolarians, indicative of open ocean environments (Silver et al., 1989, p. 9).

From early Miocene onward the sea has been the site of high rates of volcanogenic turbidite deposition, but from early to late middle Miocene continental sources played a major role in providing sediments to the basin. By late Miocene time the continental

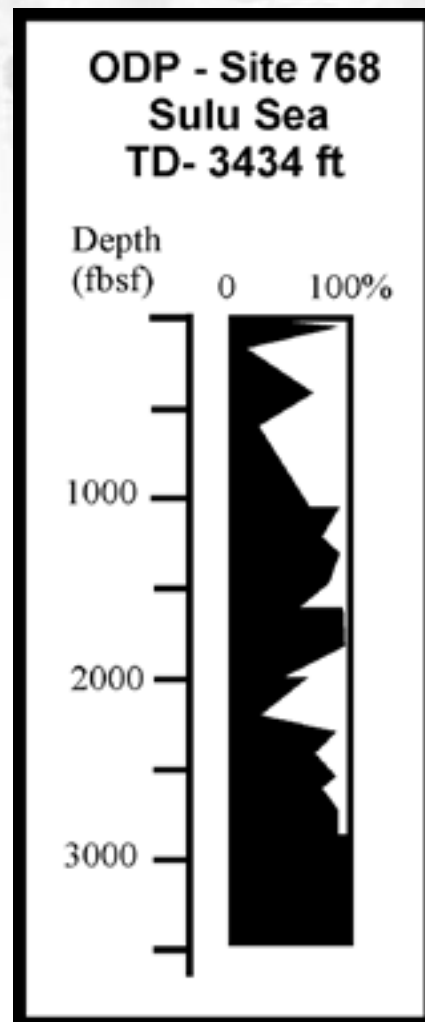


Figure 5. A depth profile for the Sulu Sea core (ODP-Site 768) showing the percentage of terrestrial (lignaceous) organic content relative to other organic sources. These terrestrial-derived organics are a considerable distance from any island land mass. The deltaic source for the organic-rich turbidites found at this site remains unidentified. Modified from Bertrand et al. (1991).

sources were cut off, perhaps due to the initiation of the Cotabato and north Sulawesi trenches, which now act to trap sediments along the margins of the basin. In the late Pleistocene abundant volcanic ash, much of it air-fall in origin, dominated sedimentation of the Celebes Sea (Silver et al., 1989, p. 10).

Sulu Basin

The sediment core from the Sulu basin (ODP-Site 768) also contains multiple zones with organic-rich sediment extending to the bottom of the core at 3,434 fbsf (Figure 5). The highest value of total organic content was measured at 3.85 percent from a 1.2-inch interval at 943 fbsf (Bertrand et al., 1991). The numerous organic concentrations can be broadly grouped into three episodes of organic sedimentation (Bertrand et al., 1991):

1. Early to middle Miocene (18.7 ma to 9.8 ma)—low TOC accumulation rates with the organic materials derived from a terrestrial setting. Organic materials settled in an open ocean environment formed as a result of the rapid opening of the Sulu Basin.
2. Middle Miocene to late Pliocene (9.8 ma to 2.1 ma)—high levels of TOC derived from terrestrial environments, along with high levels of turbidite sedimentation. Possibly associated with a major tectonic compressive event across the area during the middle Miocene.
3. Late Pliocene (2.1 ma to present)—lower TOC accumulation rates with organics being a mixture of terrestrial and marine sources. There were fewer turbidite deposits and generally reduced conditions within these subsurface sediments.

Volcaniclastic sediments, beginning in the early to late Miocene sediments and extending into the late Pliocene, are predominately ash tuffs mixed with terrigenous clastics. The tuffs are believed to have been derived from nearby active volcanic centers (Silver et al., 1989). Following the drilling of Site 768, naturalists proposed that the Sulu Sea possibly

originated as a backarc basin in the early part of the middle Miocene,

though its exact time must await basement dating... The major part of the volcanics deposited on that basement is represented by the 250-m-thick pyroclastic flows, which probably accumulated during a short period of time after the oceanic crust of Site 768 was formed. Brown clay deposition continued above the tuffs, for about 30 m, after which the dominant lithology was greenish claystone. Sands and silts are abundant in the claystone, indicating abundant turbidity current deposition. The sudden development of continentally derived turbidites in the middle Miocene...could be the response to the collision of the Cagayan Ridge with north Palawan. Increasing terrigenous influx from middle Miocene through the late Miocene may coincide with the development of this collision, magnified by the effects of the more recent collision of the Philippine mobile belt with the Cagayan, Palawan, and Sulu ridges. Renewal of volcanism began during the late Miocene, but with a noticeable increase in the Pleistocene, associated with higher oceanic productivity. The onset of volcanism and decrease in terrigenous turbidites may have coincided with the development of the Sulu Trench (Silver et al., 1989, pp. 12–13).

Miocene Organic Turbidites

Three distinct and completely separate areas across the Indonesian archipelago contain Miocene turbidites with significant levels of TOC content. Why did the high organic concentrations occur at this particular point in time, and what was happening to create so many turbidites that extend even onto the deep-basin abyssal plains? Naturalists suggest that tectonism played a role in the uplift of the adjacent islands and this could explain the terrigenous sedimentary sources. But even on this point there

are problems with turbidite transport distance.

In all three instances, the Miocene organic-rich turbidites would have traveled up to a hundred miles from island shorelines. This is a considerable distance for turbidity currents (although not outside the purported range of hyperpycnal plumes; see Froede, 2007). Also, the volume of organics necessary to mix with these sediments over the alleged millions of years of deposition exceeds present-day depositional conditions. There is no modern analogue for these organic-rich turbidites.

A Creation/Flood Interpretation

Both naturalists and young-earth creationists begin with the same geologic data. The difference is interpretive, based on distinct worldviews. A Biblical interpretation is possible. Like any other model it is subject to change based on new information; however, any changes must remain within the constraints of the Biblical framework.

The composition of the organic materials (terrestrial and marine) found in the Miocene turbidites is not a problem for either naturalists or creationists. The source of these organics will differ significantly. Naturalists envision millions of years of tropical forest litter washing down a river system onto a delta that is subject to massive submarine landslides, resulting in the formation of organic-rich turbidites across the continental shelf. Occasionally, these landslides were large enough to transport the organic-rich sedimentary deposits beyond the continental shelf, out across the continental slope, and even down to the abyssal plain (see Huc et al., 2001; Saller et al., 2004). The source area for the terrestrial litter found in the Celebes and Sulu basins is enigmatic. The landmasses from which the organics were derived are a significant distance from likely source areas.

Young-earth creationists do not need millions of years to explain the formation of these organic-rich sediments. Most of the geology we observe can be attributed to the Creation Week or the global Flood. The abundance of subsurface sedimentary terrestrial organic material across this area of Indonesia suggests antediluvian sources. Flood-derived sediments would need to mix with Flood-derived organic material. The organic material would have floated on the Floodwater and coalesced into large areas of floating forest debris due to surface winds. A similar concept was proposed by Austin (1979) for his catastrophic coal-formation model invoking floating log mats. The windblown concentration and movement of trees and forest litter also was demonstrated on Spirit Lake following the eruption of Mount St. Helens (Austin, 1986).

If floating forest debris and leaf litter were concentrated by surface winds, waterlogged organic materials would have settled out of the water column onto areas undergoing uplift and erosion. The presence of volcanoclastic sediments mixed with terrestrial sediments suggests that concomitant island uplift was occurring across the Indonesian Archipelago. Erosion of the exposed island sediments mixed with grounded and still floating organic mass materials. These mixed sediments were then deposited across a deltaic feature. With continued uplift, even the continental shelves proved unstable, generating organic-rich turbidites that moved out onto the continental slopes and abyssal plains. This explains the high concentration of organic-rich sediments within specific subsurface stratigraphic zones and explains why this process is not occurring today.

Conclusions

Naturalists claim that Earth is billions of years old and its geologic processes remain constant across time. Thus, the organic-rich Miocene turbidites found across Indonesia are interpreted within

the context of present-day natural processes, but there is no modern analogue. Naturalists strain in their explanation regarding the large volumes of organic material mixed within the Miocene turbidite sediments and its transport across tens of miles from potential source areas.

Two questions were raised at the beginning of this article: (1) Can the naturalist interpretation play a part in defining these leaf-bearing turbidites in the Creation/Flood Framework? (2) Where would creationists assign these deposits—to the Flood or post-Flood? Both creationists and naturalists would agree that the leaf-bearing sedimentary deposits represent turbidites (and potentially hyperpycnal flows). However, the differences between time (deep or recent), rate of sedimentation (very slow or very fast), tectonism (slow or fast), and petroleum production (slow or fast) are so significant that the worldviews cannot be combined. We cannot join the Biblical record of Earth history to the naturalistic interpretation by simply compressing the assumed span of time. Flood deposits formed under unique conditions that do not occur today. We must review the geological data and interpret them within the constraints of the Biblical framework of Earth history. The explanation presented here is not the only possible interpretation of the data, but it is consistent with the expectations of the Flood model.

A possible petroleum exploration strategy for these Flood-deposited organic-rich sediments would be to evaluate areas adjacent to the uplifted islands in the Indonesian Archipelago. Geologic materials derived from volcanism and subaerial erosion would need to bury the organic-rich sediments to sufficient depth and pressure to transform the organics into liquid or gas petroleum products. Porous and permeable reservoir strata (typically in the form of sandstone layers) would be necessary to capture and trap the petroleum products.

Acknowledgments

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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.

Investigating the Mystery Mountains

I read with great interest “Two Mystery Mountains” by Harold Coffin (2009) in the spring issue of the *Quarterly*. Several weeks before, I performed a geotechnical investigation for a proposed building in the Big Sky, Montana, area. Unusual materials were encountered. A large slope is covered with diamict—gravel in a well-graded, fine-grained matrix—which would automatically be interpreted by many geologists as glacial till. The diamict contains angular rock fragments of various lithologies, and the terrain is hummocky, but the several other features typical of glaciation (e.g., cirques, moraines, striations) are lacking. The slope is moderately steep, and the

diamict mantles sedimentary strata at a considerably steeper attitude (possibly contributing to the hummocky surface form). We also encountered what appeared to be pockets, lenses, or layers of dense silt, but Atterberg Limits analysis indicated this was actually fat clay. I work almost daily with fat clay, and whenever I have encountered fat clay that fooled me like this, it has been associated with volcanism. I inferred that the diamict was a result of mass wasting, not glaciation, though the scale of the slope and lower-angle, hummocky surface of the deposit contrast markedly with the much smaller postdiluvial, subaerial slides and debris flow lobes across the

Gallatin River to the east. I interpreted the diamict as likely a submarine debris flow deposit and the fat clay as altered volcanic ash. Our investigative report was published only a few weeks before I read Dr. Coffin’s article, and fits neatly with his observations.

Reference

Coffin, H.G. 2009. “Two mystery mountains.” *Creation Research Society Quarterly* 45:293–297.

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Editor's Forum

Editor's Note:

As a continually developing scientific model, some areas of creation science are not yet fully understood or established. The purpose of the Editor's Forum is to provide a structured means of presenting differing positions on various subjects of interest to creationists. Since geology is a study of catastrophe and chaos in earth's history, creationist geologists differ on several areas of interpretation. This forum offers differing opinions in one of these areas of interpretation: where is the pre-Flood/Flood boundary? Readers are invited to evaluate the arguments of both positions and form their own opinions.

The Pre-Flood/Flood Boundary and the Precambrian



Position of Max Hunter— The Pre-Flood/Flood Boundary: Early Precambrian Sedimentary Strata Below the “Greatest Unconformity”

Introduction

After using the five “discontinuity criteria” of Austin and Wise (1994) to propose a pre-Flood/Flood boundary at the “Greatest Unconformity” at the top of the “igneous/metamorphic basement” in the Grand Canyon (Froede and Oard, 2007, pp. 3–4), Froede and Oard then question the validity of those criteria, suggesting that “none of these criteria are absolute” (Oard and Froede, 2008, p. 30). Yet, they continue to maintain that the pre-Flood/Flood boundary is at the “Greatest Unconformity.” They concede, however, that there may be “other criteria [which] might move the boundary lower than the exposed geological section in the Grand Canyon” (Froede and Oard, 2008, p. 9, emphasis added).

Having discussed pre-Flood geological activity and attempting to relate the nature and distribution of Precambrian microfossils and stromatolites to the Biblical accounts of Creation week (Gen.

1:1–2:7), the antediluvian period, and the Flood (Gen. 6:7–8:19), Oard and Froede (2008) now suggest: “It is possible that most, if not all, Precambrian sedimentary rocks were deposited in the Flood” (p. 31).

Froede and Oard (2008), Reed and Oard (2008), and Froede (2008) all claim that subdivision of Precambrian strata is based solely on radiometric dating, with Reed and Oard (2008) claiming that “the Precambrian time scale has *no real connection to empirical stratigraphy*” and that subdivision of the Precambrian is “*nothing more than the arbitrary decree of the International Commission on Stratigraphy (ICS)*” (p. 42, emphasis added).

Froede and Oard (2008) state, regarding global correlation of early Precambrian strata, that “unlike *sedimentary strata*, there are no lithological or biostratigraphic criteria that can be applied either locally or globally” (p. 8, emphasis added).

Thus, due to their reliance on the ICS as a credible source of information regarding methods of correlation of Precambrian strata and their “empirical approach” to the Precambrian of the Grand Canyon (Froede and Oard, 2008, p. 9), they foster three misconceptions regarding the Precambrian:

1. Precambrian “*igneous/metamorphic basement rocks*” in the Grand Canyon are actual basement.
2. The global early Precambrian geological record is ordered solely by radiometric dating.
3. Global early Precambrian strata cannot be correlated because they contain no sedimentary strata.

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Editor's Forum

The Pre-Flood/Flood Boundary and the Precambrian



Position of Michael Oard and Carl Froede— Further Thoughts on the Pre-Flood/Flood Boundary in the Grand Canyon

Introduction

Our recent articles discussing the location of the pre-Flood/Flood (p-F/F) boundary in the Grand Canyon (Froede and Oard, 2007; Oard and Froede, 2008) have generated controversy (Dickens and Snelling, 2008; Hunter, 2008a). Some of the disagreement seems to be the result of misunderstanding, while others disagree with us based on their model-driven assumptions. We will first clarify several misunderstandings and then comment on Max Hunter's proposal for the global location of the p-F/F boundary.

Misunderstandings

First, we did not take a dogmatic position on the location of the p-F/F boundary at the contact with the igneous/metamorphic rocks and the overlying Precambrian sedimentary rocks in the Grand Canyon. We have stated that the boundary at the Grand Canyon may have to be shifted up or down depending upon further fieldwork.

However, this boundary could be shifted either downward where it is determined that some of the basement was melted during the Flood (e.g., Zoroaster Granite), or upward where pre-Flood sediments might have been buried and preserved (Froede and Oard, 2007, p. 4).

Barnhart (2008) supports our tentative location of the p-F/F boundary in Grand Canyon, while pointing out that we may need to deal with the intrusion of the Zoroaster Granite into the Vishnu schist. We agree (as stated above), recognizing that the problem is in defining the rock record at the p-F/F boundary.

Second, our focus was limited to the Grand Canyon (Froede and Oard, 2007) and secondarily to the eastern Mojave Desert (Oard and Froede, 2008), where an assessment of the p-F/F boundary had previously been performed, since the Grand Canyon is easily accessible (Austin and Wise, 1994; Wise and Snelling, 2005). Expanding discussions regarding

the p-F/F boundary to other areas across the globe is inappropriate, as we stated.

Therefore, any attempt to identify a pre-Flood/Flood boundary for another location would require an examination of the strata and rocks with that particular area. Basically, no single stratigraphic contact on Earth can be used to globally define a pre-Flood/Flood boundary (Froede and Oard, 2007, p. 4).

Our specific focus on the rock record in the Grand Canyon negates the criticism that we did not consider the sedimentary rocks within the greenstone belts of the North Pilbara Terrane and the 22 miles (35 km) of sedimentary and volcanic rocks in the Hamersley and Bangemall basins of Western Australia (Dickens and Snelling, 2008). Greenstone belts are variably metamorphosed

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Precambrian Subdivision and Correlation: A Different View

Regarding subdivision and correlation of Precambrian strata and the occurrence of sediments/metasediments and unconformities in the Precambrian below the "Greatest Unconformity," it is instructive to note the work of others, including Lazarus Salop (1982), a Russian geologist who has compiled and interpreted the work of many geologists and correlated Precambrian strata on all continents. Salop ruled out radiometric dating as a valid means of correlation of the earliest Precambrian and describes, among others, the "geohistorical" method of correlation of Precambrian strata, noting, in marked contrast to the more recent ICS position, that

it is believed that *certain irreversible changes in the tectonic evolution of the Earth exist*, and that they are also known in the chemical composition and thermodynamic conditions of its outer shells which, when combined, govern the evolution of sedimentation and rock formation. The origin of *specific, unique types of rocks and their associations*... is a result of this evolution and they build up definite levels in the normal Precambrian sequence and thus *can be used for the global correlation* (Salop, 1982, p. 7, emphases added).

Whereas it is encouraging that Oard and Froede (2008) now acknowledge that there are valid alternate explanations for lack of fossils in the earliest Precambrian strata (Hedtke, 1971; Hunter, 1992; 2000b; 2008a) and that the Austin and Wise "discontinuity criteria" are not absolute, it remains of concern that they, with many others, base their conclusions regarding the distribution of sediments/

metasediments and unconformities in the early Precambrian geologic record, and the location of a pre-Flood/Flood boundary, on what is observed in the very limited Precambrian exposures in the Grand Canyon and eastern Mojave Desert.

Earlier, Froede and Oard (2008) counselled creationists to "adopt a more *empirical approach* to stratigraphy (even "Precambrian" stratigraphy) and *ignore the dictates of geologists who advocate a system built on uniformitarianism*" (p. 9, emphasis added).

By ignoring "the dictates of geologists who advocate a system built on uniformitarianism," Froede and Oard, and any who accept this counsel, deprive themselves of any means, other than their "empirical approach," of assessing where the Precambrian so-called "igneous/metamorphic basement" rocks exposed at the bottom of the Grand Canyon lie in a global stratigraphic context, or of verifying the occurrence or nature of sedimentary/metasedimentary strata and unconformities stratigraphically below the "Greatest Unconformity," within their "igneous/metamorphic basement" rocks.

Precambrian Sedimentary Strata below the "Greatest Unconformity"

Down-sequence in the geologic record from the "Greatest Unconformity" in the Neoprotozoic of the Grand Canyon (Figure 1), the next earliest erathem is the Mesoprotozoic, in which Salop (1982) describes

characteristic Mesoprotozoic *geosynclinal strata* developed away from the [Canadian] Shield in the Eastern Rocky Mountains...(Wyoming,

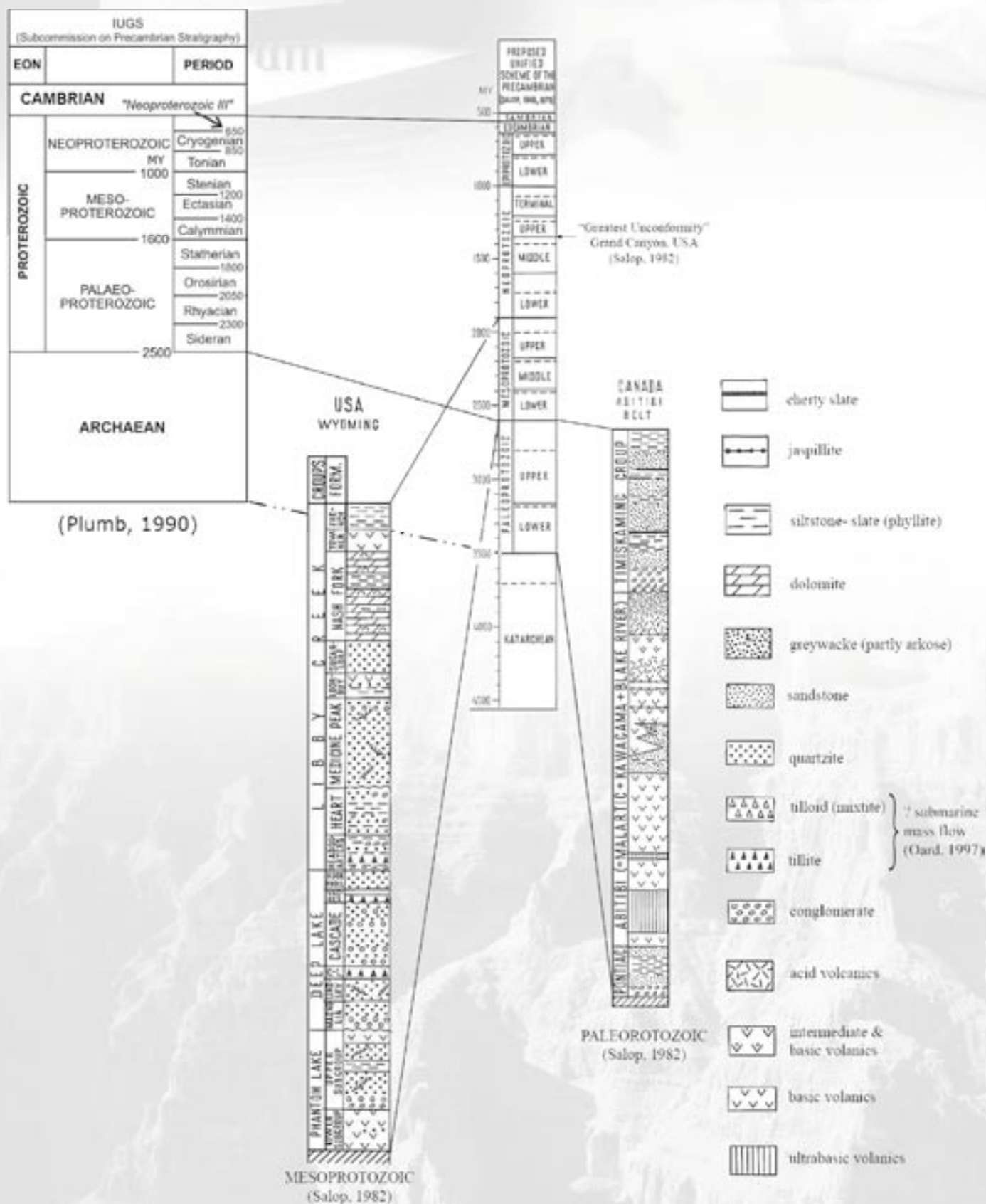
U.S.A.);...represented by the *Phantom Lake, Deep Lake* and *Libby Creek* Groups...separated by breaks (p. 163, emphasis added).

The principal rocks of the youngest Libby Creek Group (Figure 1), which attains a thickness of 7,660 m (25,131 ft), comprise "phyllite or micaceous schist...metaconglomerate...quartzite...[commonly cross-bedded and sometimes ripple marked]...dolomite...carbonaceous slate" (Salop, 1982, p. 163), which Salop notes formed in shallow-water marine conditions with some quartzites formed subaerially.

Salop (1982) also notes that the Deep Lake Group (Figure 1), which attains a total thickness of up to 3,000 m (9,842 ft), "mainly accumulated in river valleys and deltas and partially under shallow-water environment...mainly consists of quartzite, quartz-pebbled, and polymictic conglomerate [and] is composed of three cyclic strata (subgroups), each starting with conglomerate, and up-section...quartzite, commonly cross-bedded" (p. 163).

The oldest Phantom Lake Group "lies with a sharp angular unconformity on the Katarchean gneiss and granite-gneiss [and comprises] thick strata (up to 2,000 m) of mainly quartzites...commonly cross-bedded and containing bands and horizons of quartz and arkosic conglomerate, phyllite and sheets of amygdaloidal metabasalt" (Salop, 1982, p. 163). He adds (p. 163), "The sedimentary rocks and volcanics of the group accumulated principally under the con-

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Hunter Figure 1. Subdivision of the Precambrian (modified after Plumb, 1990 published by permission) and lithostratigraphic columns of the Mesoproterozoic and Paleoproterozoic (modified after Salop, 1982).



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tinental environment, and quartzite and conglomerate are of fluvial origin. Some rare varieties of quartzite and phyllite represent shallow-water formations.”

Elsewhere, in the Canadian Shield, Salop (1982) describes Mesoprotozoic Huronian Supergroup strata, which he says,

rest *unconformably* on the Paleoprotozoic greenstone rocks and...granitoids [and] were accumulated under littoral-marine and continental environment and...commonly display different aspects of shallow-water conditions (ripple marks, cross bedding, sun cracks, etc.) (p. 159).

Significantly, he correlates some of these Huronian strata in the Canadian Shield with the Ventersdorp Supergroup of Southern Africa, in which Davison (1995) noted raindrop imprints.

Continuing down the geologic record, the next earliest erathem, below the Mesoprotozoic is the Paleoprotozoic, of which Salop notes the sedimentary-volcanogenic strata of the Superior tectonic province of the Canadian Shield are typical. He describes the Timiskaming upper terrigenous Group (Figure 1), noting that it attains a thickness of 3,000–4,000 m (9,842–13,123 ft) and “unconformably overlies different rocks of the Blake River and Pontiac Groups...greywacke sandstones, siltstones, and polymictic conglomerates...[in which] cross bedding of stream or deltaic type is common” (p. 94, brackets added).

The oldest Paleoprotozoic, the Pontiac Group (Figure 1), comprises “greywackes, and argillites...conglomerates with pebbles of granitoids of the basement” (p. 94).

Salop (1982) describes his earliest Precambrian erathem, the Katarchean

(Figure 1), as comprising “the oldest...supracrustals and plutonic rocks building up the basement of all the remaining geologic formations” (p. 22) and further notes that “marbles and graphite gneisses or crystalloschists are...undoubtedly of sedimentary origin” (p. 31). He also notes an “abundance of high-aluminous sedimentary rocks in the Katarchean strata” (p. 60). Significantly, Salop (1982) notes regarding the environment of sedimentation in the Katarchean, “The lack of any...traces of existence of older land (areas of erosion) is suggestive of the fact that sedimentation and lava outflow occurred in a huge ocean...that at times covered the major part of the Earth’s surface or the whole planet” (p. 58).

Admittedly, as demonstrated by Woodmorappe (1981), these Precambrian strata sequences cannot anywhere be seen stacked in a continuous sequence in the relative order illustrated in Figure 1 or as described by Salop (1982). This does not mean, however, that they were not deposited in that relative order. The relative order has been established by field mapping and correlation of strata sequences, and by interpretation of “certain *irreversible changes in the tectonic evolution of the Earth* [which] build up *definite levels in the normal Precambrian sequence and thus can be used for the global correlation*” (Salop, 1982, p. 7, emphases added).

If the relative order of these Precambrian strata described by Salop is accepted, we see that extensive sedimentary/metasedimentary strata and major unconformities occur in, and are used to correlate, the early Precambrian geologic record, stratigraphically below the

“Greatest Unconformity” in the Grand Canyon.

Oard and Froede’s (2008) conclusion, then, that “*most, if not all, Precambrian sedimentary rocks were laid down in the Flood,*” (p. 31, emphasis added), if taken at face value and to its logical conclusion, would imply that all of the Precambrian geologic record, including all of their “*igneous/metamorphic basement*” rocks below the Greatest Unconformity down to the base of the Precambrian geologic record is Flood deposited, and that the pre-Flood/Flood boundary therefore occurs at or below the base of the Precambrian geologic record (Hunter, 1996; 2000a).

These, I suggest, are some of the “other criteria” which “might move the boundary lower than the exposed geological section in the Grand Canyon” (Froede and Oard, 2008, p. 9).

Pre-Flood Water Volume

The early Precambrian also contains large volumes of volcanic strata (Figure 1), much of which are submarine volcanics, including Archean volcanic sequences up to 20 km (12.4 miles) thick (Hunter, 1992; 1996), and thus a big problem with a pre-Flood origin for these Precambrian strata is the availability of sufficient water to accomplish the massive sedimentation and submarine volcanism evident in the early Precambrian geologic record.

Most creationists agree that during the Flood the “fountains of the great deep” and the “windows of heaven” (Gen 7:11) added a significant volume of

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water to the earth's surface, meaning that the waters available prior to the Flood for geological activity such as sediment distribution and submarine volcanism may have been considerably less than was subsequently available for geological activity during the Flood.

This poses a problem for both Oard and Froede (2008), who want to place the pre-Flood/Flood boundary at the "Greatest Unconformity," and for Wise and Snelling (2005), who want to place it higher in the geologic record, at the base of the Ediacaran, both thereby relegating significantly more than 50% of the geologic record to the pre-Flood period. There may not have been enough water!

Created Precambrian Strata?

Difficulties in harmonizing geological and biostratigraphic features of the early Precambrian geologic record with the Creation week and antediluvian Biblical record have led some creationists to

speculate regarding creative processes in the early Precambrian. Woodmorappe (1997) suggested creationists should not reject the possibility that "at least some of these rocks were *created ex nihilo*, or...were subject to *divine sculpting* that is completely different from currently-known geologic processes" (p. 51, emphases added). More recently, Wise and Snelling (2005) wrote regarding creation of fossils: "Young-age creationists *must* seriously consider this type of question" (p. 20, emphasis in original), and Dickens and Snelling (2008) now postulate creation of "huge stacked thicknesses of [Precambrian]...sedimentary and volcanic rock units [and] continental crust" (p. 49).

Whitmore and Garner (2008) state that "we can see no Scriptural reason to exclude the possibility that unfossiliferous sediments were directly created early in Creation week" (p. 427).

That creationists must resort to such speculation to explain the early Pre-

cambrian in my opinion suggests that Snelling (1991) was much closer to the truth when he wrote that

it is far easier to conceive of most, if not all, of these Precambrian strata sequences, particularly from the Late Archaean and Early Proterozoic onwards, as being deposited during the Flood (p. 172).

Conclusion

A catastrophic Flood origin for all of the Precambrian would render irrelevant the convoluted and seemingly endless speculation regarding the nature, distribution, and origin of Precambrian microfossils and all attempts to harmonise these features with the Biblical Creation week—antediluvian—Flood accounts, including discussion of the biotic vs. abiotic origin of stromatolites (Oard and Froede, 2008; Wise and Snelling, 2005; Dickens and Snelling, 2008) and the organic vs. inorganic nature of carbon (Dickens and Snelling, 2008).



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basalt and mantle rocks with associated sedimentary rocks that commonly occur between granite and gneiss in shield areas of continents. These specific Australian locations were not compared or contrasted by Dickens and Snelling (2008) to the p-F/F boundary that we defined within the Grand Canyon. So we have no means of understanding why our proposed boundary is inconsistent with these rocks in Australia. We are also perplexed regarding the assertion that we used "flawed criteria" in our analysis, since we simply reanalyzed previously used criteria (see Austin and Wise, 1994; Wise and Snelling, 2005).

Third, our use of uniformitarian/evolutionary rock labels (e.g., Precambrian) has been criticized, suggesting that we are being favorable to naturalism (Dickens and Snelling, 2008). We use these labels for communication purposes only. As creationists, our preference is to view the rock record through the lens of Biblical earth history, especially by the mechanism that laid down most of the sedimentary rocks, namely the Flood (Froede, 1995; 2007; Oard, 2008a; Walker, 1994).

Is the Pre-Flood/Flood Boundary at the 660 km Discontinuity?

While some creationists believe the p-F/F boundary should be located at the Precambrian/Cambrian contact or slightly lower, Hunter (2000a) places it much lower at the 660 km discontinuity—the transition between the upper and lower mantle. This discontinuity is based on seismic data and probably represents either a compositional or phase change to a denser polymorph of upper mantle rocks. This boundary is generally similar to his earlier suggestion that the boundary is

in the upper mantle (Hunter, 1996), and that the Archean sedimentary rocks and equivalent mafic and ultramafic volcanic sequences (greenstone belts) were produced at the very beginning of the Flood (Hunter, 1992). This latter belief means these rocks have to be derived from melting of the upper mantle. So, Hunter places the p-F/F boundary in the upper mantle below the melted rocks.

In Hunter's model, the 660 km boundary was caused by a miraculous gravitational decompression of the earth due to a sudden, temporary reduction in gravity. This is based on the fact that decompressed hot rock can turn liquid. Such decompression is normally caused by upward moving mantle rocks to regions of lower lithostatic pressure. If we understand Hunter (2000a) correctly, this decompression initiated melting of the pre-Flood "upper mantle" that subsequently differentiated into the upper mantle we see today. The differentiation resulted in the Archean and Proterozoic igneous and metamorphic rocks observed on the surface. We believe that such a radically unique model requires more evidential support.

During the time the mantle was differentiating, water purportedly exsolved out of the minerals and became the "fountains of the great deep," adding 89% of the ocean water we observe today. At the same time, a vapor canopy condensed, adding 1% of our current ocean water. This would mean that the pre-Flood ocean volume was only 10% of the current ocean volume.

The mantle differentiation must have affected only the upper mantle, since Hunter states that the rocks below the 660 km discontinuity retained their pre-Flood characteristics but may have changed slightly. But, he later claims:

"This de-compression caused much of the mantle to melt, possibly to a depth of 1,000 km, resulting in the sub-crustal mantle 'magmasphere' (or 'magma ocean')" (Hunter, 2004a, p. 221). If this much melting occurred below 660 km, then his p-F/F boundary could be defined even lower, depending on how he defines the boundary. In fact, the boundary could be located at or near the center of the earth, depending upon how much the earth was melted or altered as a result of the Flood event.

We have already commented on Hunter's theoretical model as raising more difficulties than it sets out to solve (Froede and Oard, 2008). It had many assumptions and details that have not been resolved. It is hard to understand why such an extreme model is needed. One of the first issues to be addressed would be the tremendous heat generated in the upper mantle and crust—heat sufficient to boil the oceans off the earth. Obviously, Hunter assumes Precambrian igneous and metamorphic rocks formed in the early Flood, but this assumption needs to be documented with site-specific examples. Besides, if these Precambrian igneous and metamorphic rocks really did form in the early Flood, there could be another Flood mechanism to account for their origin without resorting to Hunter's melting of the upper mantle.

Another assumption Hunter appears to take for granted is the vertical rock zonation of the Precambrian assumed by evolutionary/uniformitarian scientists. We find this assumption unjustified. These scientists have a model of Earth

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evolution starting with the nebular hypothesis for the formation of the solar system. The dust cloud condenses to planetesimals that bond together, building to planet size. During this process a magma ocean is produced and the earth differentiates into the core, mantle, and crust. This is an evolutionary scenario that obviously contradicts God's record of creation presented in the first chapter of Genesis. Evolutionary assumptions regarding the Precambrian depend upon radiometric dates, not necessarily on lithology (Reed, 2008). Why should any creationist believe this evolutionary/uniformitarian scenario?

And even if radiometric dates support a certain evolutionary sequence of rock

formation, why should these radiometric dates add any credibility to this sequence. Different radiometric dates for Precambrian rocks are simply differences in chemistry of radioactive rocks and may have no relative value for creationists. If there is relative value in radiometric dates, this must be established as probable before developing an extreme hypothesis such as the melting of the upper mantle.

Summary

Hunter's upper mantle p-F/F boundary is directly related to his model—a model that attempts to account for the Archean and Proterozoic igneous and metamorphic rocks by mantle melting and differentiation. The Archean and Proterozoic

rocks must be demonstrated to be Flood rocks and that the upper mantle melted during the Flood. Hunter's proposal raises more difficulties than it solves. The heat problem alone is tremendous. We are not convinced that we should reconsider or abandon our previous proposal regarding the p-F/F boundary in the Grand Canyon. Therefore, we will continue to claim the tentative p-F/F boundary being at the contact between igneous/metamorphic rocks and overlying sedimentary rocks in the Grand Canyon. Other purported "Precambrian" locations need to be analyzed within the context of their stratigraphic setting without resorting to radiometric dates and assumed lithological changes with time in the Precambrian.



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Response by Hunter

Introduction

I appreciate Froede and Oard's discussion of the gravitational decompression Genesis Flood interpretation of the earth's geological history (Froede and Oard, 2007), their encouragement to further develop the model (Froede and Oard, 2008), and their presentation of an accurate overview of the model in this forum. I reject any inference that my proposal is "*model-driven*" and respectfully submit that, contrary to their assertion otherwise (Froede and Oard, 2007, p. 4), Froede and Oard's placement of the pre-Flood/Flood boundary is "*model-driven*" inasmuch as the "*discontinuity criteria*," both as originally conceived and applied by Austin and Wise (1994) and as now applied by Froede and Oard (2007, 2008) and by Wise and Snelling (2005), were established *before* being applied to the Precambrian strata of the Grand Canyon.

In contrast, and in the light of 2 Peter 3:6, which shows that the Flood affected the whole Universe (*kosmos*), I looked first at the geologic record throughout the solar system, including the composition and density distribution of the earth's subcrustal mantle (Figure 1) and its overlying unidirectionally ordered geologic record, specifically the nature and distribution of "Precambrian" strata, all as imperfectly represented in the uniformitarian geologic column (Oard, 2006; Snelling et al., 1996; Tyler and Coffin, 2006), and concluded that all of the geologic evidence was consistent with the conclusion that gravitational decompression was the only mechanism capable of providing the energy

required for the reduced mantle viscosity, which Baumgardner (1986) correctly recognized as necessary to enable the enormous tectonic changes and geological work of the Genesis Flood (Hunter, 1992, 1996, 2000a, 2000b, 2004a, 2004b). In this scenario, reduced *g* (acceleration due to gravity) would facilitate the distribution of sediments and volcanics during the Flood.

The gravitational decompression, in my opinion, is confirmed by geological and astrophysical evidence elsewhere in the solar system, including catastrophic melting and overturn of the mantle of Mercury (Snelling, 1995), impact orbits such as that of comet Shoemaker-Levy 9 with Jupiter (DeYoung, 2000; Levy et al. 1995), volcanic cratering and water flow on Mars (Spencer, 2008), the excess recession rate of the moon's orbit (Nicolson, 1981), and perhaps the excess precession of the perihelion of Mercury (Ramirez-Avila, 1986) and the possible explosive origin of the asteroids (Froede and DeYoung, 1996; Parks, 1990).

Precambrian Stratigraphy

A correct understanding by creationists of the origin and stratigraphic position of the "Precambrian" in the global geologic record is essential to development of a viable young-earth Genesis Flood geologic model, which, when finally deciphered, I suggest, will not comprise one of Froede and Oard's suggested "simpler models" (Froede and Oard, 2008, p. 8), which are simpler only because they address very few critical issues.

David Tyler (2005) discussed creationist treatment of Precambrian "basement rocks," noting:

Within creationist circles, the Precambrian has suffered from neglect and this situation deserves to be changed. *The diversity of views among Flood geologists is enor-*

mous...The time is right...for the emergence of new explanatory models of the basement rocks (p. 128, emphasis added).

Theologian and young-earth creationist Alfred M. Rehwinkel, in his book *The Flood in the Light of the Bible, Geology, and Archaeology* (Rehwinkel, 1951), cited what he called "*a very recent textbook on geology*" in which "*pre-Cambrian*" rocks were discussed as follows:

The pre-Cambrian rocks essentially lacking the record of life (fossils) cannot even be correlated very accurately. ... In fact, the pre-Cambrian rocks are so badly altered and show such wide variations in composition and structure... Little wonder that *the early geologist* called these beds of rock Primary, or Primitive, and dismissed them as *too complicated to be deciphered* (p. 285, emphases added).

The lack of an up-to-date, comprehensive global treatment of the Precambrian by creationist theorists, the variety of inconclusive creationist opinion regarding the biostratigraphy of the Precambrian, and the readiness to use biostratigraphic criteria to locate a pre-Flood/Flood boundary at or just below the base of the Cambrian (Austin et al., 1994; Baumgardner, 1986; Wise and Snelling, 2005) confirms Tyler's view regarding neglect of the Precambrian and suggests that many creationists, like Rehwinkel's "early geologist," may still consider the Precambrian "too complicated to be deciphered."

Fortunately, not all geologists gave up on the Precambrian, and, largely due to the importance of Precambrian strata as hosts for major commercial deposits of

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Response by Oard and Froede

A Reliance on Too Much Uniformitarianism

In Hunter's defense of his model and in support for the location of the pre-Flood/Flood boundary at 660 km, he uses the classification and correlation scheme of Russian geologist Lazarus Salop, who believes that the Precambrian can be divided up without the use of radiometric dating. Salop (1977) points out that there are three ways to subdivide the Precambrian: (1) radiometric dating, (2) fossil dating, and (3) geological methods. We applaud Salop for distrusting and not using radiometric dating and pointing out its many discrepancies. Salop believes fossil dating of the Precambrian is also problematic. So, he uses geological methods.

Cannot Use Lithology to Age-Date Rocks

It is well accepted by geologists that you cannot age-date the Phanerozoic, the time younger than about 550 Ma, by geological events or the composition of the rocks. But Salop (1977) believes that this approach can be justified for the Precambrian. He assumes that the Precambrian can be subdivided because he believes in *irreversible changes in the evolution of the earth*.

The most important techniques for subdivision and correlation of Precambrian strata are the classical stratigraphic analysis and the lithoparagenetical ("formational") analysis. The basis for these techniques is the belief in the existence of irreversible changes in the tectonic evolution of the earth (Salop, 1977, p. 11).

He states elsewhere:

The rocks of these [Precambrian] eons were formed under quite different physical and chemical environments representing different stages in the geological evolution of the planet (Salop, 1977, pp. 22–23).

So, he is essentially correlating the seemingly unique events of the Precambrian, using lithology by assuming a distinctive geological evolution of the planet (Salop, 1977, p. 12).

In accepting many of Salop's ideas, Hunter appears to accept a more naturalistic approach to defining the evolution of the earth. Again, we question this position within creation science. Why should any creationists accept such earth evolutionary stories?

It should be noted that Salop's ideas for dating and correlating the Precambrian have not gone unnoticed within the geologic community. A book review of Salop's 1982 book on the Precambrian of the whole earth (he published the *Northern Hemisphere* in 1977) rejected Salop's thesis (Goodwin, 1983). Goodwin sums up his review: "In sum, the basis of Salop's classification and terminology appears to be dubious." He provides the example of Salop's belief that all of the earth's high-grade metamorphic terrains are older than 3.5 billion years as contrary to the beliefs of the geological establishment. He states that

the more conventional viewpoint is that high-grade metamorphic rocks have been developed periodically throughout geologic history and thereby lack any first-order temporal significance (Goodwin, 1983, p. 923).

So, the idea of using Salop's approach to define the geological evolution of the earth through the correlation and dating of rocks based upon lithology is rejected by mainstream geologists. That

position is also rejected by the International Commission on Stratigraphy (ICS), which organizes the Precambrian strictly on chronology based on radiometric age dates (Reed, 2008). Not only is lithology based on geological evolution unreliable, but many of the older radiometric dating methods also are not to be trusted. Please note that we mention the ICS position to show current, mainstream geological thinking on the subject. So, we see no basis for assuming Salop's or the ICS's scheme in a Flood model.

Hunter also says that the igneous and metamorphic rocks below our tentative boundary in the Grand Canyon must be from the Flood only because they are dated as "upper Precambrian." We stick with our position that every location needs to be considered on its own merits, which also means there is a lot of work in order to pinpoint the pre-Flood/Flood boundary anywhere. This is also why we limited our analysis to the Grand Canyon and eastern Mojave Desert; other areas have not yet been analyzed.

Cannot Use Uniformitarian Paleoenvironmental Deductions

Hunter appears to accept the uniformitarian paleoenvironmental interpretations used by Salop (1982), such as a "shallow-marine condition" for the Libby Group, "river valleys and deltas" for the Deep Lake Group, "continental fluvial environment" for the Phantom Lake Group, the Katarchean sediments as deposited in a "huge ocean," etc. As creationists, we cannot simply accept such paleoenvironmental deductions, since we are dealing with a hydrodynamic explanation of Earth history, while the above interpretations

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gold, silver, lead, zinc, nickel, and iron ore, and especially since the discovery in 1969 of characteristic Archaean high-temperature, high-magnesium komatiite lavas (Arndt and Nisbet, 1982; Tyler, 2005; Viljoen and Viljoen, 1969), the Precambrian has been well explored and deciphered in much detail on all continents. The Precambrian has been shown to comprise characteristic interstratified sequences of intrusives, volcanics, and sediments (Mueller et al., 2002) in distinctive associations, which are globally correlative on structural and lithostratigraphic grounds and are not seen anywhere else in the geologic record (Anhaeusser, 1971; Dickens and Snelling, 2008; Goodwin, 1996; Salop, 1982). The Precambrian, though complex, can no longer be dismissed as "too complicated to be deciphered."

Oard and Froede accept the pronouncements of the International Commission on Stratigraphy (ICS) that Precambrian strata are ordered solely by radiometric dating and reject the "vertical rock zonation of the Precambrian" as being "assumed by evolutionary/uniformitarian scientists." They therefore do not accept that the early Precambrian volcano-sedimentary strata sequences described by Salop and others occur globally in the order described, stratigraphically underlie, and were deposited earlier than, the earliest Precambrian strata visible in the Grand Canyon.

Oard (2006), however, has argued that the uniformitarian geological column is "A General Flood Order with Many Exceptions" and uses the uniformitarian system to globally correlate Precambrian Neoprotozoic strata, noting regarding the

Chuos "tillite" in Namibia, "It *correlates* with many other Neoprotozoic supposed glacial deposits *in West Africa*, as well as *many other locations across the earth*" (Oard, 2008b, p. 36, emphases added).

Like Oard (2006) and Dickens and Snelling (2008), and in spite of the pronouncements of the ICS, I recognize that "the vertical rock zonation of the Precambrian" is not "assumed" but that each of the Precambrian subdivisions comprises a distinctive litho-structural assemblage. These assemblages, with obvious significant local and regional variations, occur globally in the same unidirectional order, recording, I believe, Flood deposition resulting from gravitational decompression-induced differentiation and progressive depletion of the earth's mantle.

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are based on strict uniformitarianism (Froede, 2007; Oard, 1998; 1999). We need to analyze such assertions in depth. Sometimes the uniformitarian interpretation is likely correct; for instance, a "marine" fossil was at least buried in a subaqueous environment. We cannot say the same for a terrestrial fossil, since in the Flood these organisms could have been swept off the continent and buried in Floodwater.

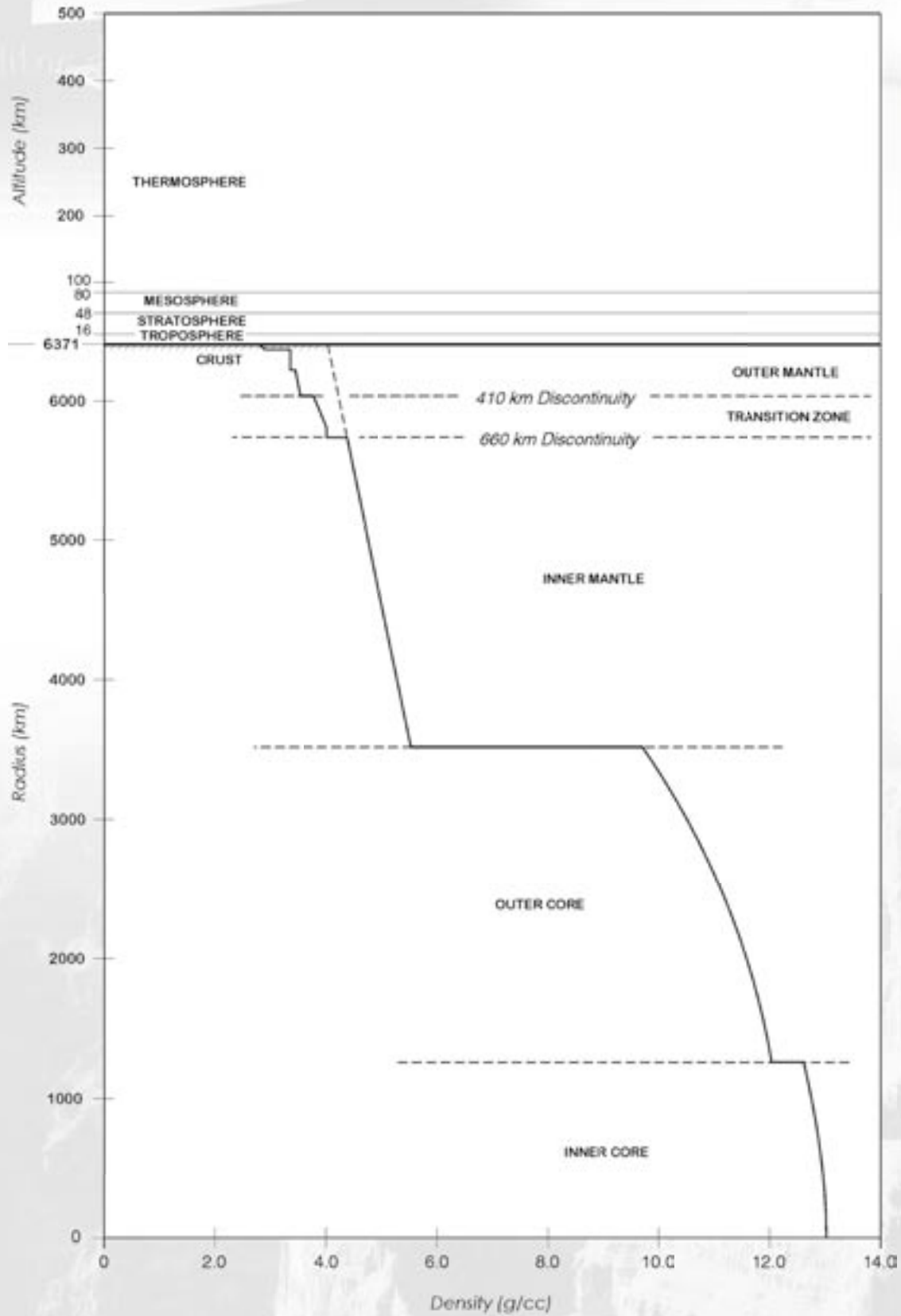
What Do We Do with the Precambrian?

We still need to analyze the Precambrian and determine where the rocks fit within a Flood model, if at all. We cannot simply accept uniformitarian deductions, even from a maverick geologist such as Salop. We maintain that every location needs to be considered on its own merits, which also means there is a lot of work remaining in defining the pre-Flood/Flood

(p-F/F) boundary. This is why we limited our analysis to the Grand Canyon and eastern Mojave Desert.

In developing any Flood model, we need to analyze the rocks and weight carefully any uniformitarian interpretation within the framework of Biblical history. We contend that Hunter accepts too much uniformitarianism in the development of his model.

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Hunter Response Figure 1. The density distribution within the earth according to the Preliminary Reference Earth Model (PREM) of Dziewonski and Anderson. Note that a different distance scale applies to the atmosphere than applies for the solid earth (after Hunter, 2000a).



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Summary of Hunter Position

Having previously acknowledged that there are environmental factors that may have precluded preservation of fossils in early Precambrian strata (Hunter, 2000a; Oard and Froede, 2008, p. 28), Oard and Froede now tacitly acknowledge that early Precambrian strata, stratigraphically far below the "Greatest Unconformity" in the Grand Canyon, do contain significant sedimentary strata. They seem unwilling, however, to acknowledge that this invalidates their inference that early Precambrian strata below the "Greatest Unconformity" cannot be correlated because they contain no sediments (Froede and Oard, 2008, p. 8). They also remain unconvinced that these early Precambrian sedimentary strata should be considered Flood deposited, as a logical extension of their conclusion that "most, if not all, *Precambrian sedimentary rocks were deposited in the Flood*" (Oard and Froede, 2008, p. 31, emphasis added), not, as they now claim, "*because they are dated as 'upper Precambrian.'*"

A Failure to Differentiate

Oard and Froede link the "magma ocean" (or "magma sphere") concept and "the vertical rock zonation of the Precambrian assumed by evolutionary/uniformitarian scientists" with the "model of Earth evolution" held by these scientists, which model they correctly describe as "an evolutionary scenario that directly rejects God's record of creation presented in the first chapter of Genesis."

In linking these three issues, however, Oard and Froede fail to differentiate between models of the earth's origin (nebular hypothesis or instantaneous *ex-nihilo* creation) and models of its geological history (uniformitarian or diluvialist). They suggest that "Hunter appears to accept a more naturalistic approach to defining the evolution of the earth" and ask "why should any creationists accept such earth evolutionary stories?"

Origin of the Earth and the "magma sphere"

I have consistently and clearly advocated that the earth was created instantaneously *ex nihilo* and that the "*magma ocean*" (or "*magma sphere*") and the subsequent geological record resulted from gravitational decompression-induced melting of the created Earth's outer mantle during the earliest stage of the Genesis Flood (Hunter, 2000b, 2004a, 2004b). I thus find it difficult to understand how Oard and Froede can claim that I appear to accept "naturalistic...earth evolutionary stories."

Oard and Froede seemingly infer that the use of the "magma sphere" concept in the gravitational decompression model invalidates the model because that concept is part of the "evolutionary/uniformitarian scenario" of the earth's origin. I have always treated the nature and origin of the "magma sphere" and the nature and origin of the Precambrian geologic record as separate issues from the earth's origin.

Origin of the Precambrian Geological Record

Using Mr. Froede's oft-repeated "too much uniformitarianism/naturalism" mantra (Froede, 1997, 2008; Froede and Oard, 2008), Oard and Froede quibble over Salop's paleoenvironmental descriptions of early Precambrian sedimentary strata, claiming, "As creationists we cannot simply accept such paleoenvironmental deductions" because they are "based on strict uniformitarianism." Perhaps so, but can they not also be interpreted in a diluvial context?

Unlike the nebular hypothesis for the earth's origin, the "vertical rock zonation of the Precambrian" is, as noted by Dickens and Snelling (2008), an observable, mappable, physical reality, which has been well explored and documented by secular workers. The subdivision and geological history of the Precambrian is currently debated by diluvialists as a separate issue from the earth's origin.

Whilst I reject Dickens and Snelling's attempted harmonization of the Precambrian geological record with the Biblical record, and especially their contention that Precambrian strata were created, I fully concur with their assertion that "the acceptance of the valid *empirical stratigraphy* of the *Precambrian sequences of mappable rock units* is in [no] way bound in chains to *naturalism*" (Dickens and Snelling, 2008, p. 49, emphases added).



Oard and Froede, continued from p. 66

Summary of Oard and Froede Position

We agree with Hunter and with Tyler, whom he quoted, that the Precambrian needs a lot more study. We also thank him for emphasizing this fact. We are aware that there is a lot more data to work with than ever before.

However, we believe Hunter is going beyond the state of the science when he claims that the Precambrian can be globally correlated by structure and lithology. It is an interesting idea but requires much additional research by Hunter and other creationists. Dozens of papers likely are needed. A thorough evaluation of the data should be done prior to the formation of speculative models, such as Hunter's decompression theory.

We cite the position of the ICS to show that the current opinion of uniformitarians—who have every reason to expect and believe in Precambrian stratigraphy via lithology and structure—have been forced to abandon that hope and admit that there is *no* Precambrian stratigraphy other than a purely chronological model built around radiometric dating. We in no way accept the ICS position, but we take it to mean that most Precambrian experts do not agree with Salop's proposals. Salop's work is interesting and original in

many ways, but if it were compelling, we would expect widespread uniformitarian agreement.

Hunter misunderstands Oard (2008) as using "the uniformitarian system to globally correlate Precambrian Neoproterozoic [sic] strata" in regard to presumed tillites. Oard referenced the uniformitarian system for discussion purposes only, a position often stated in his articles.

The following ideas expressed by Hunter are speculative and in need of much more verification: (1) that 2 Peter 3:6 refers to the whole cosmos, (2) that mantle decompression and melting is congruent with the CPT model, (3) that all geological evidence is consistent with decompression, and (4) that Venus (not Mercury) experienced a catastrophic melting and overturning of the mantle.

We finish with a brief mention of a "simpler model," as a positive contribution to this forum. Using the Moon as a comparative template, we can estimate past impacts on Earth. Oard (2009) shows that Earth should have been the target of more than 36,000 craters greater than 30 km in diameter, about 100 craters greater than 1,000 km in diameter, and a few up to 4,000 to 5,000 km in diameter. We sug-

gest that meteorite impacts very early in the Flood and tailing off throughout the Flood may be able to explain features that Hunter believes support his model. Flood tectonics, erosion, and deposition would erase most of this evidence, but there should be indirect evidence. Perhaps this concept holds more fruitful potential for research.

Despite Hunter's challenge, we see no reason to change our tentative location of the pre-Flood/Flood boundary in the Grand Canyon at the contact between igneous/metamorphic rocks and the overlying sedimentary rocks. Hunter's assumption that the Precambrian shows a systematic change in structure and lithology with time, according to the work of Salop, is the main reason behind his claim that the boundary should be much lower. But these assumptions are without foundation, and so is his claim for a lower boundary in the Grand Canyon.

Acknowledgment (Oard and Froede)

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Book Review

Science Discovers God

by Ariel Roth

Autumn House, a division of Review & Herald Publishing, Hagerstown, MD, 251 pages, \$20.00 hardcover.

Author Ariel Roth has enjoyed a long career of study and writing about flood geology, zoology, and creation in general. He is a well-known creationist, especially in Adventist circles. This new book, based on four score years of experience, is a fine example of Dr. Roth's ambition and clarity in explaining important issues.

The book centers on seven convincing lines of evidence for the Creator's existence. These include (1) organization and precise properties of matter, (2) four basic forces of nature, (3) origin and complexity of life, (4) interdependent components of life, (5) the lack of time, even deep time, to accommodate the evolution model, (6) the fossil record, and (7) the human mind.

There are many delightful items in the book, and a sampling follows:

The battle between Isaac Newton and Gottfried Wilhelm Leibniz over priority of their math discoveries (p. 16); the motion of the sun around the Milky Way which carries the earth along at 504,000 miles per hour (p. 37); a naïve Middle Ages recipe for the spontaneous formation of live mice from trash (p. 74); the catastrophic explanation of Washington State's Channeled Scablands by J Harlen Bretz (p. 134; Bretz insisted on no period after the J in his name); a wonderful description of eye design (p. 114); a review of Thomas Kuhn's paradigm model of science progress (p.160).

In his discussion of carbon, Dr. Roth appears to accept the nucleosynthesis of elements. I would agree that the element carbon has remarkable properties that might lend themselves to this type

of origin. However, in reviewing the geologic eras, Dr. Roth inserts a note that he does endorse deep time (p. 143). He also avoids any acceptance of the big bang.

This book makes clear that separating science from God or religion is not valid. Scientific data clearly requires the hand of a very perceptive Creator. If science seeks truth, it must follow the data wherever it leads, and this path points to God. This attractive book is a fine overview of evidences for the Creator. As Romans 1:20 puts it, there is no excuse for turning away from the truth. The book deserves a wide reading.

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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

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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.

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

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Special Sections

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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* has been gradually enlarged and improved and now is recognized as the outstanding publication 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.