

# CRSQ



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# CREATION RESEARCH SOCIETY QUARTERLY

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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

## Editor's Comments

With the December 2000 *Quarterly* comes Season's greetings from the volunteer editorial staff to you. This issue covers biological, geological, astronomical and philosophical issues. Your comments on the various subjects presented are of interest to us.

You probably have noticed over the years that creationists disagree with each other over various issues. Remember, we deal with scientific models of the created world and certain individuals may prefer one model over another. This is as expected. I have attended scientific conferences and gatherings and listened, as well as participated, in arguments over models, methods and personal opinions. Scientists are an opinionated bunch ready to duel intellectually at the drop of an idea.

The ultimate "put-down" is that the other fellow is unscholarly. This *ad hominem* expression generally hides the accuser's lack of ability to scientifically counter the other person's argument. Another meaningless remark is that the

opponent uses out-of-date information without bothering to answer the man's point of discussion. Newton's laws of motion devised centuries ago are still employed in classical mechanics without being out-of-date. Using bad data is another accusation, yet the person fails to explain why the data are bad. Creationists often use these ploys on each other.

It is always best to evaluate the pros and cons of a discussion remembering that scientific models are tentative, not absolute truth. A model is sometimes the only way of viewing a process or natural situation, for the creation is so complex that it defies human perception. This is one reason you will read different scientific views expressed in creationist journals and hear opposing ideas at creationist conferences. Such discussions are an indication that creation science is in a healthy state.

Emmett L. Williams  
Editor

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## Book Review

*Rare Earth* by Peter D. Ward and Donald Brownlee  
Springer-Verlag, New York. 2000, 333 pages, \$27.50

This book has become a bestseller. The authors, professors at the University of Washington, Seattle, have dared to suggest that complex life is rare and possibly unique on earth. Instead of Carl Sagan's estimate of  $10^{17}$  civilizations in the universe, there instead may be just one (p. xiv)!

The book describes a long list of special, if not unique, earth features. The sun we orbit is a stable star. Earth is located in the habitable zone of the solar system, where liquid water can exist. Our large moon stabilizes the tilt of the earth's axis, ensuring seasonal changes. Plate tectonics recycles earth elements and thereby keeps the volume of atmospheric carbon dioxide relatively uniform. The large outer planets, mainly Jupiter, protect us from comet collisions. Earth's magnetism deflects the solar wind radiation. Terms such as "remarkable conditions", "shear luck", and "charmed planet" are used to describe these special earth features (p. 37).

The previous list goes further, but the book totally fails to treat perhaps the most important factor regarding life: its zero probability of origin. Instead, the book writers assume that microbial life has evolved practically everywhere in space, in spite of a complete lack of evidence or detection. It is only "higher" animal and plant life forms, which are said to be rare in the cosmos. Of course, "higher" is a relative term. One wonders whether the authors really comprehend the complex structure and functions of a single cell.

There are other problems with *Rare Earth*. The authors describe the famous Mars meteorite of 1996 without mentioning that microbial evidence within the rock is now doubted (p. 11). DNA is taken as the greatest evolutionary evidence of a common ancestor for all life (p. 57). The authors end their book with several politically correct but inaccurate statements. Thus the world's problems are said to be due to overpopulation and also the loss of the world's topsoil (p. 284). However, recent studies have challenged both of these misguided ideas (Pearce, 1999; Monastersky, 1999).

As the book shows, the earth is indeed a unique planet. There is no place like home! And creationists agree that all earth's life is precious. Not because it arose by sheer luck, but because the Creator placed life here to show his glory.

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Pearce, Fred, 1999. Counting down. *New Scientist* 164(2206):20-21.

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# Lack of Evidence for Subduction Renders Plate Tectonics Unlikely

## Part I—Trench Sediments and Accretionary Prisms

Michael J. Oard\*

### Abstract

Scientists accepted plate tectonics too quickly. Despite many anomalies, all observations are automatically fit into the plate tectonics paradigm. Geological and geophysical data at subduction zones

are critically examined. Trench sediments and accretionary prisms are not in character with early conceptions of subduction zones, resulting in many ad hoc hypotheses.

### Introduction

The paradigm of plate tectonics is widely believed by scientists and laymen alike. Plate tectonics is indeed an impressive theory. It has supposedly solved a number of tough problems in geology, such as the origin of magmatism, the cause of orogeny, and sedimentation within “geosynclines” (Hamilton, 1979, p. 14).

Plate tectonics was little accepted by scientists until the magnetic anomalies in the ocean crust were discovered in the 1960s (Glen, 1994, p. 75). Then, there was a wholesale and rapid conversion—a bandwagon effect—to widespread belief in plate tectonics. Edward Bullard quipped in 1967 that as a result of plate tectonics his field, geophysics, has been “...transformed from a backwater into a bandwagon” (LeGrand, 1988, p. 256). This is a classic example of paradigm change by scientific revolution, as described by Thomas Kuhn (1970). But was the rapid belief in the plate tectonics paradigm premature? How well did the scientific community understand the paradigm before wholesale acceptance? Have new scientific data treated the paradigm well?

In a poll of 128 Fellows of the Geological Society of America and 87 active members of the American Association of Petroleum Geologists on the acceptance of the plate tectonic paradigm, Nitecki et al. (1977) discovered that a majority of these scientists believed in plate tectonics *despite a lack of familiarity* with the relevant research. The researchers state elsewhere:

We were led to the hypothesis that at some time in the mid- or late 1960s, there may have been a sort of ‘chain reaction’ or general shift in opinion, which more or less uniformly altered the attitude of the majority of the profession as a group, and which was not,

at least in most cases, the result of individual judgments of the accumulating evidence and arguments for and against the theory (Lemke, Nitecki, and Pullman, 1980, p. 617).

In other words, most geologists accepted the plate tectonics paradigm by faith. Lemke, Nitecki, and Pullman (1980) add that rapid acceptance stifled critical debate and analysis. This basic critical approach was needed to understand and sort through the many difficulties that would confront the paradigm as more information became available.

The plate tectonics paradigm motivated the geological profession to interpret new results and to *reinterpret* old research *exclusively* within this paradigm (Ollier and Pain, 1988, p. 1; Ollier, 1991). The bandwagon effect blinded the eyes of scientists because they became less critical of the new paradigm as additional data came forth, many of which were not favorable to plate tectonics. It is interesting that Lemke, Nitecki, and Pullman (1980, p. 615) believed that if scientists would have possessed the results of deep-sea drilling prior to the paradigm shift, they probably would *not* have accepted the plate tectonics paradigm. But since the paradigm was firmly entrenched, contradictory data were simply forced to fit the paradigm. Wolfgang Krebs (1975, p. 1639) states:

At first sight the undoubtedly fascinating hypothesis of new global tectonics seems to have worldwide acceptance; but in many regional, tectonic, petrologic, and geophysical details there are contradictions and peculiarities which are explained by the aid of auxiliary assumptions such as obduction, reversal of arc polarity, flipping subduction zones, mid-plate tectonics, and others.

Obduction is the supposed plastering of igneous rocks, such as seamounts, onto the landward side of the trench. A reversal of arc polarity is the complicated situation in

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which a subduction zone changes dip, for instance from a southwest dip to a northeast dip. This supposedly occurred between the Australian and Pacific plates in the vicinity of the New Hebrides island arc. Flipping subduction occurs when a subduction zone shifts many tens to hundreds of kilometers, as in the case of the eastward jump postulated for the Mariana Trench. Since plate margins are deemed responsible for vertical tectonics, mid-plate tectonics actually does not fit this paradigm. Examples of intraplate tectonics include the high Transantarctic Mountains within the Antarctic plate and the South African superswell within the African plate. The many auxiliary assumptions and explanations are likely the main reason why researchers, who once envisioned the plate tectonics process as simple, now view it as *much more complicated* than originally envisioned (Lemke, Nitecki, and Pullman, 1980, p. 616).

In analyzing plate tectonics, one must go beyond the plethora of secondary hypotheses that plate tectonics proponents have proposed to explain anomalous new data. One must examine the raw data itself. In view of the premature acceptance of plate tectonics, the faith of many in the paradigm, and the willingness to interpret data only within the paradigm, the new data need to be examined to see how well they fit into the plate tectonics paradigm. I will limit this paper to certain geological aspects of subduction zones.

## The Classic Subduction Zone

According to plate tectonics, the earth is divided into about a dozen major plates and a number of minor plates. These plates diverge at mid-ocean ridges, converge at deep ocean trenches, and slide past one another along transform faults. As new ocean crust is formed at mid-ocean ridges, the old crust spreads away from the ridges in a process called seafloor spreading. Since there must be a balance between

crustal origin and destruction, the old ocean crust must converge with another plate and descend back down into the mantle. These zones of convergence are called subduction zones. The existence of these subduction zones was at first an inference:

The concept of subduction in the framework of plate tectonics was introduced more or less as a logical consequence of sea-floor spreading to keep the surface area of the earth constant (Uyeda, 1982, pp. 133,134).

Figure 1 shows schematically what scientists had envisioned in the 1970s as a classic subduction zone—a trench-accretionary prism-island arc-backarc system. There are also subduction zones where an ocean plate is converging with a continent, and these convergent zones are somewhat different from an ocean-ocean plate collision. The difference depends upon such variables as tectonic environment, sediment supply, duration of subduction, and convergence rate (Mrozowski and Hayes, 1980, p. 223; Cloos and Shreve, 1988a). In Figure 1, an ocean plate subducts under an island arc, starting at an ocean trench. A trench is a deep ocean trough that may stretch thousands of kilometers along the ocean floor. The Mariana Trench is the deepest trench in the world at 11,003 m, deep enough to drown Mount Everest beneath 2,155 m of water. Although there are individual differences, trenches have similar topographic profiles (Fisher, 1974). Figure 2 shows three profiles along the lower Japan Trench that are generally similar but show significant lateral variations. Trenches notably outline the Pacific Ocean (Figure 3), while only two comparatively short trenches occur in the Atlantic Ocean.

Uniformitarian geologists assert that sediment which had been accumulating on the ocean plate for millions of years is scraped from the upper plate margin, forming a thick, deformed wedge. This is called either an accretionary wedge or accretionary prism. The offscraped sediments form a series of imbricate underthrust sheets, and

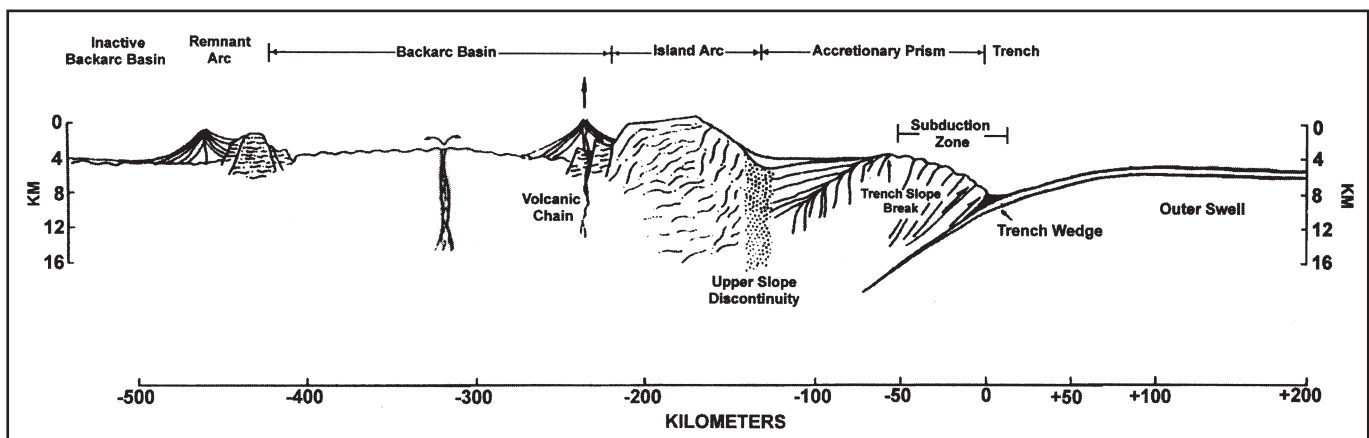


Figure 1. A classic subduction zone-island arc system as envisioned in the 1970s (from Karig and Sharman, 1975; redrawn by Nathan Oard). Vertical exaggeration is 5:1.

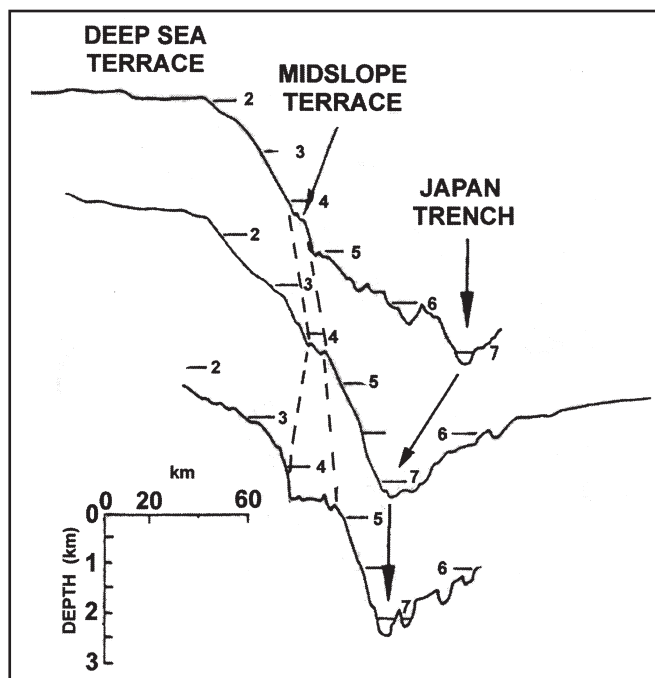


Figure 2. Three profiles along the lower Japan Trench (from Nasu et al., 1980; redrawn by Nathan Oard). Vertical exaggeration is 20:1.

the accretion wedge grows and uplifts with time. The island arc is a mass of volcanic debris or reworked volcanic debris that is believed to be caused by subduction. In plan view the island arc is usually a curved line of volcanoes parallel to the trench. The trench-island arc system is also called a convergent margin. Farther from the trench, there may be an active backarc basin, also called a marginal sea. Sometimes a remnant or fossil island arc, which lies beyond the backarc basin, is postulated (see Figure 1). Fossil island arcs are supposedly formed by a flipping subduction zone. All of these features can be lumped together and generally referred to as a *subduction zone*.

## Trench Sediments

A trench is a zone where two plates supposedly have been converging for millions of years. According to the theory of plate tectonics, thousands of kilometers of lithosphere (ocean sediment, ocean crust, and upper mantle) have been converging. The soft oceanic sediment is supposed to have been plastered against the upper plate while the lithified ocean crust and upper mantle lithosphere descend into either the upper mantle or into the lower mantle. For instance, the Kermadec Trench, north of New Zealand, would have been required to swallow 13,000 km of oceanic lithosphere, or one-third the circumference of the earth, during the past 150 million years of geological time (Carey, 1988, p. 178). Based on the classic early vision of a subduction zone, one would expect that over

many millions of years of such convergence, the deep ocean trenches and the upper plate would be loaded with huge piles of contorted pelagic and hemipelagic sediments. Except for areas of clay, ocean sediments are usually pelagic, which are sediments composed predominantly of the shells of marine organisms, or hemipelagic, which are pelagic sediments that contain a significant proportion of terrigenous or volcanic sediments and usually accumulate near continental margins. Do we see thousands of kilometers worth of pelagic and hemipelagic sediments in the trench and plastered against the landward side of the trench?

### Many trenches contain little or no sediment

The character of trench fills has been known for some time. As is the case, some trenches have virtually *no* sediment in them at all! For example, the Chile Trench between 16°S and 28°S has almost no sediment (Thornburg and Kulm, 1987). Some locations within the Middle America Trench are also barren of sediments (Moore, Shipley, and Lonsdale, 1986, p. 517). There is little or no sediment in the Tonga Trench; the sediment that is observed appears to have been deposited by mass movement from the arcward slope (Lonsdale, 1986, p. 295). Most of the floor of the Kermadec Trench is bare rock (Carey, 1988, p. 178). Some locations in the Japan Trench contain no sediment; those areas that do have minor sediment are normally at the mouths of submarine canyons (Ludwig et al., 1966; von Huene, Arthur, and Carson, 1981, p. 394). Empty trenches or trenches with a thin trench fill are indeed anomalous, since the ocean crust seaward of these starved trenches generally possess 200 to 600 meters of soft pelagic and hemipelagic sediments (von Huene and Scholl, 1991, pp. 291,292). These observations seem most anomalous.

### Thick trench sediment horizontal and generally undeformed

Most other trenches have a moderate to thick trench fill, up to 2 km thick or more in several Pacific trenches (von Huene and Scholl, 1991, p. 289). The interesting fact about these trench fills is that the sediments are *horizontal or nearly horizontally layered*, showing little or no evidence of compression within the trench (Shor, 1974). For instance, the Chili Trench has undeformed sediment south of 28°S, with the trench completely filled south of 37°S (Scholl et al., 1970; Thornburg and Kulm, 1987). The central and eastern Aleutian Trench is floored by horizontal beds (von Huene, 1972; McCarthy and Scholl, 1985). When von Huene and Scholl were more open minded about plate tectonics, they considered the undeformed trench fill of the eastern Aleutian Trench as evidence *against* subduction: "The undeformed fill provides no evi-

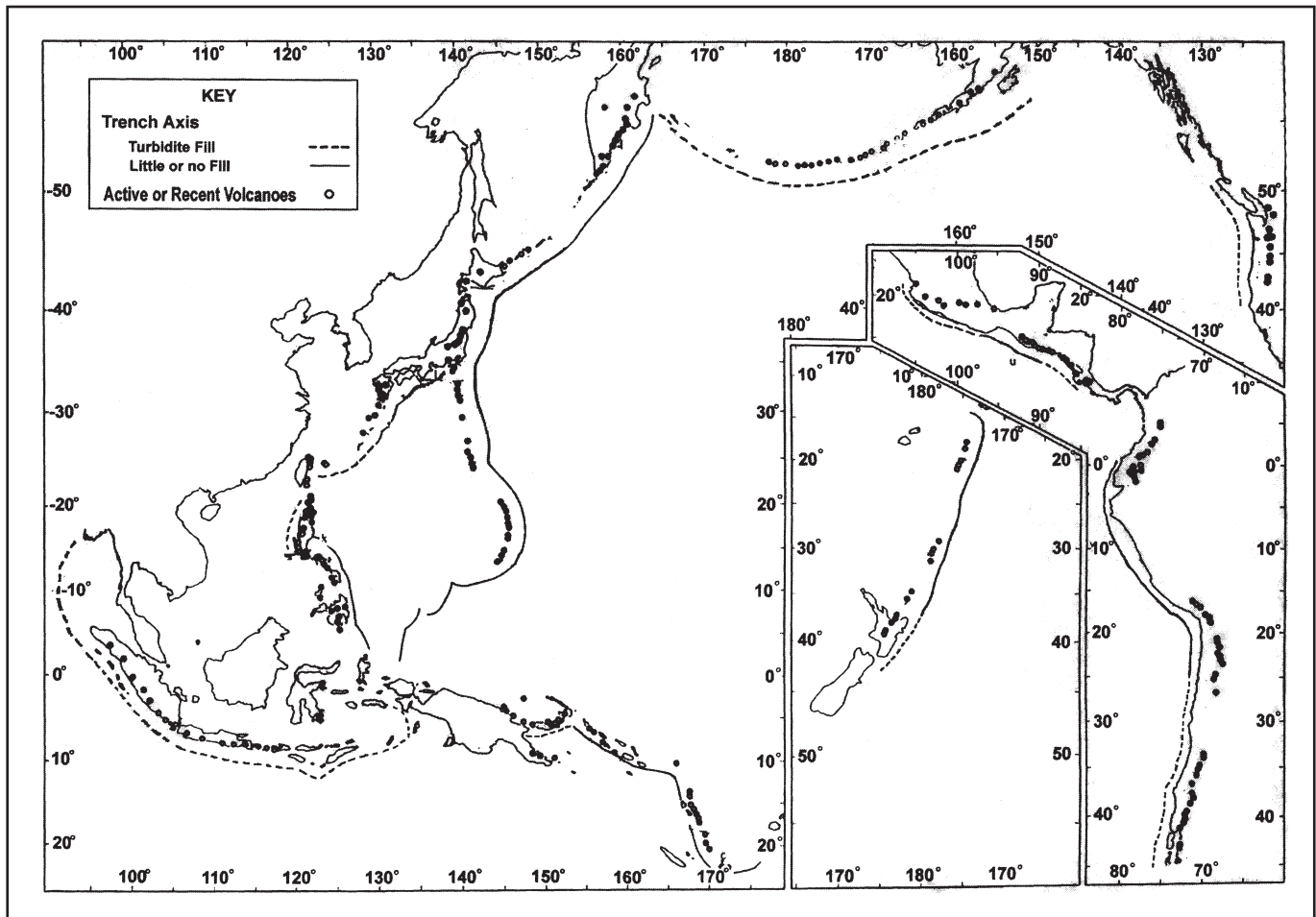


Figure 3. Active trenches in the Pacific Ocean. Trenches with little or no sediment shown by a solid line, while those with relatively thick, undeformed sediment indicated by a dashed line (from Karig and Sharman, 1975, and von Huene and Scholl, 1991; redrawn by Nathan Oard).

dence for a large thrust fault zone at the base of the continental slope" (von Huene and Shor, 1969).

Hatherton (1974, p. 95) considered the flat, undeformed trench sediments remarkable and anomalous for a subduction zone:

The sediments in the bottoms of most trenches appear to be remarkably undeformed, and provide no evidence for a large thrust fault at the base of the continental slope...

The state of the trench sediment is indeed an anomalous feature for a location that is supposed to have been converging for many millions of years:

...sediments in the Chile Trench were found undisturbed...this evidence has been considered anomalous and incompatible with an active spreading of the ocean floor (Katz, 1971, p. 1753).

Francis (1971, p. 98) exclaims:

One baffling problem is the almost complete lack of deformation in the sediments found in oceanic trenches...there is no evidence for the accumulations of contorted sediments that were originally expected.

Figure 3 shows the trenches that contain little or no sediment and those with relatively thick, but undeformed sediments.

#### Trench sediments predominantly turbidites

Since converging oceanic plates have soft bottom sediments above the ocean crust (Cloos and Shreve, 1988a), one would expect that the trench fills would contain a large proportion of pelagic and hemipelagic sediments within the trench. Most of the trench fill sediments, however, are *unconsolidated turbidites* that have collected in the trenches from the continents or island arcs. S. Warren Carey (1988, p. 177), once a believer in plate tectonics, summarizes the evidence:

Dr. David W. Scholl and Dr. Tracy L. Vallier of the United States Geological Survey pioneered the work that established the absence of accumulations of oceanic sediments anywhere around the allegedly subducting Pacific rim.

### Plate tectonics explanations

The trench turbidites are believed to be quite young, mostly Pleistocene within the geological time scale (Scholl, 1974; von Huene and Scholl, 1991, p. 287). Hence, the sediments are assumed to have collected rapidly and have not had time to deform. This explanation is bolstered by the uniformitarian ice age idea that sea level was as low as -120 m with much erosion during multiple glaciations. Neither sea level this low nor multiple ice ages enjoys much support (Oard, 1990). It is likely that the young age of trench turbidites is simply assumed because the turbidites generally are undeformed, which would be an example of circular reasoning. This excuse seems hollow when one considers that *all* thick trench sediments are generally undeformed. Besides, there still would have been 100 km of plate convergence at the trench in the presumed two million years of the Pleistocene period at a modest convergence rate of 5 cm/yr. It seems that even a fraction of this movement should have deformed thick trench sediments, but extensional features are more common in the trench fill (as will be shown in Part II).

Because plate tectonics is considered a fact—Hatherton (1971, p. 294) even calls it a *dogma*—there have been several hypotheses to explain these enigmatic observations in trenches. One idea to account for the relatively thick, flat turbidites in trenches is that earthquakes shook and liquefied the sediments that subsequently settled as horizontal layers, a process called thixotropy (Francis, 1971). The same hypothesis is used to explain similarly undeformed, horizontally stratified sediments in fracture zones that cut perpendicular to the mid-ocean ridges (Francis, 1971, p. 100). However, this idea apparently never took hold, probably because of the large scale of the liquefaction that would be required.

Another ad hoc hypothesis to account for the lack of sediments in some trenches or trench segments is that the ocean plate and trench sediments were simply subducted. This hypothesis is widely believed but seems virtually incredible, since trench sediments are quite soft. Porosities of trench fills are quite high, 70% as a rule in the upper portion and probably about 50% one km deep (Francis, 1971, p. 99).

An ancillary hypothesis to account for the subduction of soft sediments is that the sediments pooled in grabens, which are common on the oceanward trench wall. As the grabens are subducted, so are the soft sediments (Hilde, 1983). This process can be envisioned as the teeth of a gear in which the sediment caught in the trough is subducted while the friction is born at the gear ridges. One problem with this explanation is that in many trenches the sediment is usually too deep, deeper than the horsts and grabens, but is still horizontally layered.

A popular explanation for the horizontally layered sediment is that the trench sediments deform only against the edge of the continent or island arc at a “backstop.” Trenchward of the backstop, the trench fill has not yet converged and hence remains undeformed. It is questionable whether such a backstop, envisioned as a snowplow deforming the sediments close to the blade but not out away from it, would result in undeformed trench sediments. I have observed that pushing a snow shovel through powder snow on the sidewalk causes underthrusting and deformation well out ahead of the snow shovel. A similar process should occur well out into the trench from the toe of the continental or arcward slope, especially since sediment is more cohesive than snow.

### Accretion Wedges

As an ocean plate converges, the soft pelagic and hemipelagic sediments are believed to become plastered onto the inner trench wall. Terrigenous sediment from the island arc or continent deposited into the trench would also be plastered against the slope. Several examples of large accretionary wedges have been claimed, such as in the Lesser Antilles, Cascadia, and Makran forearcs (Cloos and Shreve, 1988a, p. 473). These accretionary wedges are mostly under the ocean surface in forearcs adjacent to “active” subduction zones.

Geologists also point to what they believe are ancient accretionary wedges on land, which supposedly act as a guide to their understanding of the accretionary process. The Franciscan Formation in central and northern California has been the most intensively studied of these supposedly ancient accretionary prisms.

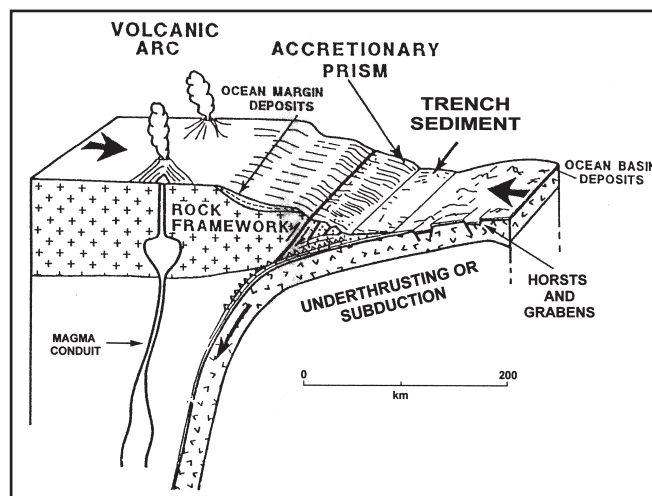


Figure 4. Schematic of a typical accretionary prism in subduction zone (from von Huene and Scholl, 1991; redrawn by Nathan Oard).

Figure 4 is a drawing of a typical accretion wedge as envisioned today. A comparison with Figure 1 will demonstrate that the accretion wedge is now viewed as small and mainly found on the lower trench slope. It is presumed that convergence has caused underthrusting of trench sediments against an increasing accumulation of accreted sediment. Seismic reflection profiles sometimes show landward dipping reflectors below the boundary or toe of the accretionary wedge that are assumed to be the top of the downgoing ocean plate. However, there are quite a number of significant problems with the hypothesis that accretionary wedges are evidence of plate tectonics, if indeed they really are wedges of sediment caused by a converging plate boundary.

### No accretion prism along many subduction zones

In the beginning, plate tectonic advocates fully expected to find all ocean and trench sediment plastered against the landward side of the trench:

Not long ago, it was generally believed that oceanic and trench deposits are accreted to the leading edge of the overriding plate as an oceanic plate enters the subduction zone at a deep-sea trench... (Hilde, 1983, pp. 381,382)

It has come as a shock that many subduction zones do not have an accretionary wedge at all!

In 1973, the Middle America Trench off Guatemala was considered a *type site* for an accretionary margin based on landward-dipping seismic reflections (Aubouin and von Huene, 1985; Moore, Shipley, and Lonsdale, 1986, p. 513). However, further information from drilling and seismic profiles demonstrated that there is no classic accretionary prism in the Middle America Trench off Guatemala (see Figure 5) (Shipley and Moore, 1986). Little or no accretion has taken place in the southeastern Middle America Trench (de Lépinay et al., 1997), and much previous interpretation was simply wrong (Aubouin and von Huene, 1985). Moore et al. (1979) lament that an extensive accretionary prism and fore-arc basin should have developed landward of the Middle America Trench in view of 100 million years of convergence with an average of 170 m of soft sediment seaward of the trench, but the accretionary wedge is largely missing. There is a small accretionary prism in the northwest section of the trench off Mexico, at least locally (Karig et al., 1978; de Lépinay et al., 1997).

Karig and Sharman (1975) had predicted a classic accretionary prism along the arcward wall of the Mariana Trench (Hussong and Fryer, 1981, p. 33). However, there is little if any accretionary prism along the Mariana Trench (Hussong, Uyeda et al., 1981). Bloomer (1983) stated that although 600–800 m of sediments on the ocean plate between 17°N and 19°N are being carried into the Mariana Trench, there is no accretionary prism

on the arcward slope, which is composed largely of igneous rocks.

Karig (1974) once claimed that the Tonga Trench possessed a large accretionary prism. However, the Tonga Trench is now known to lack such a prism (Clift et al., 1998). Bloomer and Fisher (1987) stated that the ocean sediment is thin on the oceanward side of the Tonga Trench, but this should not matter in view of the belief that over 10,000 km of ocean crust and thin sediment have supposedly converged at this trench. The geophysical data that led to the original interpretation of a large accretionary wedge were misinterpreted (Bloomer and Fisher, 1987, p. 469). Misinterpretation at subduction zones has been common without borehole data (Karig et al., 1980; von Huene, Arthur, and Carson, 1981; Cloos and Shreve, 1988a, p. 462; von Huene and Scholl, 1991, pp. 283, 284).

To further develop the point, little if any accretion has occurred at the Japan and Philippine Trenches (Ludwig et al., 1966, p. 2124; Cardwell, Isacks, and Karig, 1980, p. 18; Hilde, 1983, p. 388; von Huene, Arthur, and Carson, 1981, p. 399; Bloomer and Fisher, 1987). This is in spite of 1 km of soft ocean plate sediment, along at least one transect, converging with the Japan Trench (von Huene, 1986, p. 9). There is no accretionary prism at the “inactive” Yap Trench (Hawkins and Batiza, 1977), nor at the Kuril Trench (Cadet et al., 1987, p. 323).

### All accretionary prisms too small

Even in trenches that do possess an accretionary wedge, the amount of sediment estimated in the wedge is far short of the amount that should have accumulated over many millions of years of plate convergence. For instance, Karig et al. (1978, p. 265) lament:

Plate convergence between the Mexican section of the North American plate and either the Cocos or other lithospheric plates within the Pacific Ocean has been occurring at least intermittently for more than 100 m.y. and probably for several times that long...It is quite anomalous, then, that much of the Mexican continental margin so poorly reflects the maturity normally associated with persistently convergent plate boundaries.

Maturity in this case is associated with a thick accretionary prism.

Von Huene (1972, p. 3624) stated that there is not enough sediment in the eastern Aleutian accretion zone for the subduction of 7,000 km of soft ocean sediment. Ryan and Scholl (1989, p. 499) reinforced this conclusion for the central Aleutian forearc when they claimed that accretion had occurred only since the Pliocene while subduction has supposedly been continuous since the Eocene. Von Huene and Scholl (1991, p. 287) have stated that in small-to-medium-sized accretionary prisms, only

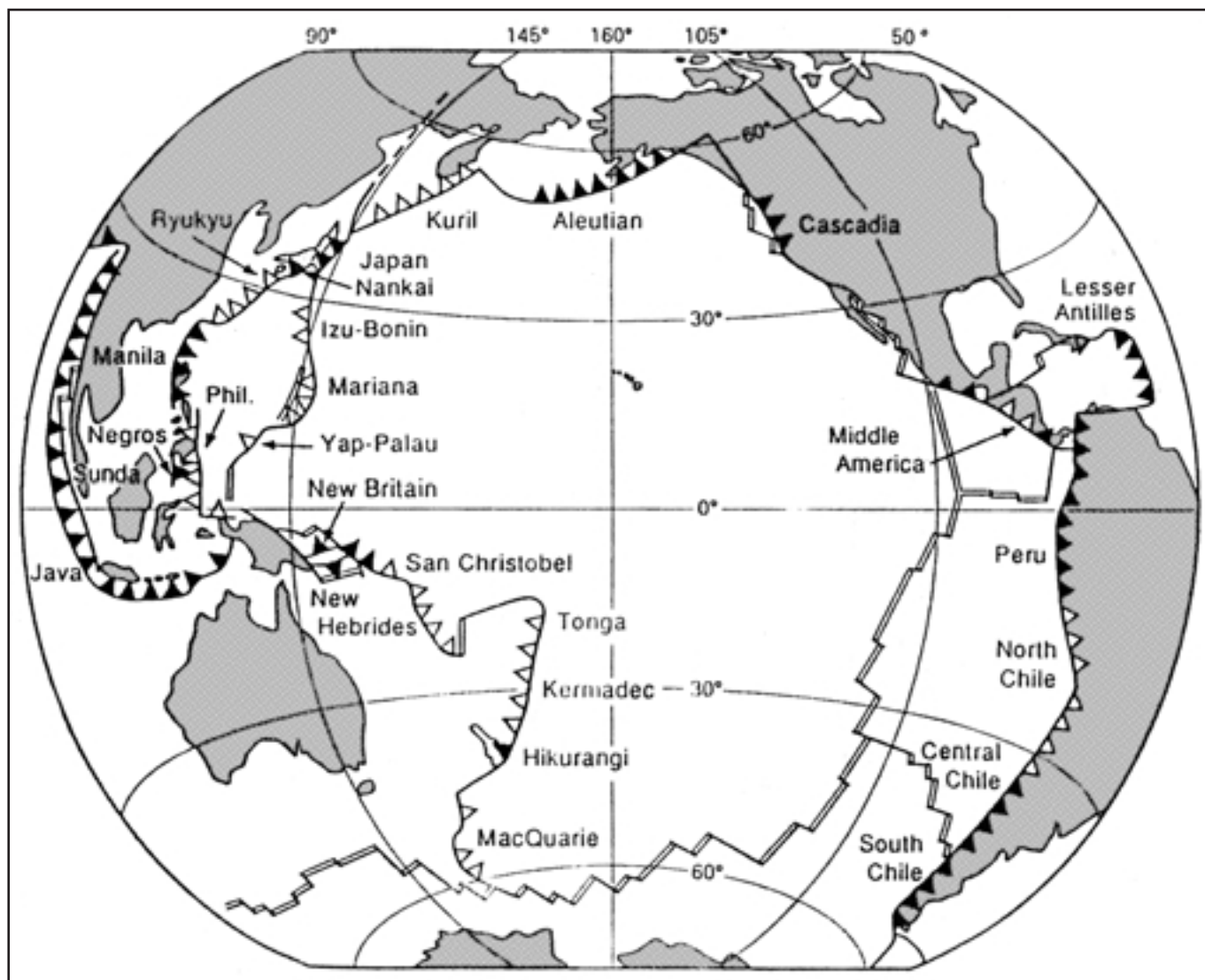


Figure 5. Trenches with accretion wedges (solid triangles) and those without accretion wedges (open triangle) (from von Huene and Scholl, 1991; redrawn by Nathan Oard).

about 20% of the sediment deposited during the Cenozoic is found in the accretionary prism.

Some marine geologists claim that western Pacific trenches mostly lack accretionary masses because of a dearth of terrigenous sediments reaching the trench (von Huene and Scholl, 1991, p. 288). However, these island arcs are areas of extensive volcanism. One would expect that copious volcanic debris would have been deposited on the forearc and into the trenches over many millions of years, similar to terrigenous sediments along continental margins bordering trenches. However, the problem is not necessarily the lack of continental or island arc sediments reaching the trenches, but a *lack of oceanic* sediments. Oceanic sediments should not only have entered the trench, but also thickly piled against the landward trench wall.

Figure 5 shows the locations of both the accreting and non-accreting subduction zones within and around the Pa-

cific Ocean. The total length of all of these trenches is about 43,500 km. Of this amount, 19,000 km, or 44%, have no accretion wedge (von Huene and Scholl, 1991)! Of the remaining 24,500 km, about 16,300 km, or 37% of the total trench length, have small to medium wedges, and about 8,200 km, or 19% of the total, have thick wedges. Where did all the sediment that should have been accreted to the landward or arcward trench wall during millions of years go?

#### Sediment within "accretionary prisms" predominantly terrigenous

Another major problem with the hypothesis that accretionary wedges are evidence for plate tectonics is that practically all presumed accretionary wedges consist of terrigenous sediment and *not* offscraped oceanic sediment. When scientists have been able to drill into what

was believed to be an accretionary wedge, they have commonly found that the sediments were derived from the land and not from the ocean (Cloos and Shreve, 1988b, p. 510). For instance, marine geologists drilling landward of the Japan Trench discovered mostly terrigenous sedimentary rocks, even close to the trench (von Huene, Arthur, and Carson, 1981). Moreover, the “imbricate accretionary model,” based mainly on the interpretation of seismic reflection profiles, did not apply:

The study of some recently obtained drillcore samples at convergent margins casts doubt on the validity of interpreting seismic records only in terms of the ‘imbricate accretionary model.’ (von Huene, Arthur, and Carson, 1981, p. 393).

This is another example of misinterpretation based on blindly following the plate tectonics paradigm.

Von Huene and Scholl (1991, p. 279) admitted that a large majority of accreted sediments are terrigenous: “The bulk of the subducted material is derived directly or indirectly from continental denudation.” For instance, the fairly thick accretionary prism in the eastern Aleutian Trench is constructed of mud and sand turbidites (von Huene et al., 1998, p. 468). The thick accretionary wedge of the Lesser Antilles Arc in the Caribbean is mostly terrigenous, derived from northern South America (Speed and Larue, 1982).

For many years, most of the information for accretionary wedges came from presumed ancient accretionary wedges on land, such as the Franciscan Complex of coastal California (Dickinson and Seely, 1979, p. 18; von Huene and Scholl, 1991, p. 281). However, practically all the Franciscan Formation, as well as other presumed accretionary wedges on land, are *turbidites* with a minimal amount of ocean sediment (Scholl, 1974; Scholl and Marlow, 1974; Kimura et al., 1996, p. 76). After many years of study, these supposedly ancient accretionary wedges on land have offered only limited information on the subduction process:

But the study of these accretionary complexes provided little insight into inferred and suspected processes that might effect the bypassing of ocean sediment (subcrustal sediment subduction) and wastage of upper plate material (subduction erosion)...(von Huene and Scholl, 1991, p. 281)

### Subsiding accretionary complexes

Accretionary prisms are supposed to *grow and uplift* with time. There are several classic examples of this presumed development. For instance, in the forearc of the Sunda Trench, the growing accretionary prism has supposedly uplifted and formed several islands, such as Nias Island (Moore et al., 1980). However, it has come as a mild shock to discover that some forearcs are believed to have *subsided*

several kilometers. For instance, in the eastern Aleutian accretionary prism, von Huene et al. (1998) suggested that the prism had subsided. This conclusion is based on the imaging of a regional erosion surface, presumably formed at sea level. The scientists drilling DSDP legs 56 and 57 concluded that the Japan trench inner slope subsided, which was puzzling and not envisioned by most popular models of convergent margins (Arthur and Adelseck, 1980, p. 5). von Huene (1986, p. 9) suggested that the Japan forearc has subsided 5 km.

Based on shallow water benthonic foraminifera and a broad erosion surface, the shipboard scientific party of ODP leg 112 concluded that the continental margin off Peru has subsided several kilometers (Suess, von Huene et al., 1988). The Middle America forearc probably has subsided at least 3 km, based on the submersible discovery of a 10 m thick layer of well-rounded conglomerate covering an erosion surface on plutonic rocks (de Lépinay et al., 1997).

### Tectonic or subduction erosion

Researchers have also discovered that many convergent margins, instead of being areas where sediment is plastered onto a backstop, are probably areas where *rock has been removed* by a process called *tectonic or subduction erosion*. Based on the short distance between the Middle America Trench off Mexico and Cretaceous plutons in the forearc, Karig et al. (1978) conclude that the former continental margin has somehow been removed. This conclusion was bolstered by the recovery of “old” Cretaceous and Eocene sedimentary rock at the toe of the inner trench slope (Aubouin, Bourgois, and Azéma, 1984). Tectonic erosion along the Japan Trench is also suggested by the discovery of Mesozoic and Paleozoic consolidated or metamorphosed rocks along the inner trench slope (von Huene and Lallemant, 1990). Supposedly, the lack of younger sediments requires tectonic erosion of the missing rocks. Tectonic erosion has been virtually forced onto researchers because of these “old” sedimentary rocks:

The recovery of Mesozoic and Paleogene sediment at the front of the Japan, Mariana, and Middle America convergent margins *required* not only subduction of sediment but in some cases, massive tectonic erosion [emphasis mine] (von Huene, 1986, p. 2).

The suggestion of tectonic erosion of forearcs is rather unusual for a margin that supposedly should have been converging and collecting sediments for millions of years. Tectonic erosion is mostly based on “old” dates of some of the continental or arcward plutons or sediments. The process of tectonic erosion is supposedly bolstered by the horst and graben topography on the ocean plate entering the trench. Researchers suggest that this bathymetry acts like a

chain saw cutting away at the upper plate. Such a process is nearly impossible in those trenches with thick sediment or when the horst and graben structure is buried by ocean sediments. Von Huene (1986, p. 12) stated that, "Such a process is difficult to envision when the cutting surface is blanketed by sediment such as along the Japan Trench." Regardless, tectonic erosion is another one of those many auxiliary hypotheses necessitated by the conflict between data and theory.

### The explanation of sediment subduction

As with the trenches that contain little or no sediment, researchers claim sediment that should have been accreted was instead *subducted*. Furthermore, the subduction process was even able to erode the continental or arcward edge of the trench and subduct the rock down into the mantle. Plate tectonic advocates have drifted afar from their original theoretical vision of a subduction zone. In subduction zones with no accretionary wedge, 100% of the soft ocean and trench fill sediment must be subducted. Sediment subduction is also how they explain the paucity of pelagic sediments in presumed accretionary wedges (Cloos and Shreve, 1988b), although this does not seem reasonable for thick accretionary prisms. In small to medium accretionary wedges, 80% of the ocean sediment is believed subducted, while in trenches with thick wedges, 70% is thought subducted (von Huene and Scholl, 1991).

The subduction of soft oceanic and trench sediment brings up an interesting mechanical problem. How are these unlithified to semi-lithified ocean sediments supposed to be passively transported down into the mantle on top of subducting hard ocean crust shearing under the mostly consolidated inner trench slope? von Huene (1972, p. 2624) once thought subducting soft sediment a difficult mechanical problem:

The first alternative [subduction] results in injecting large amounts of soft sediment down a thrust fault, a difficult mechanical concept.

However, since he is a staunch believer in plate tectonics, he now has no choice but to believe such a notion anyway:

In our view the widespread occurrence of both nonaccreting margins and accreting margins that retain in frontal accretionary bodies only a fraction of the oceanic sediment provided documents the workings of efficient sediment subduction processes... (von Huene and Scholl, 1991, p. 290)

In other words, the missing sediment *justifies* the difficult mechanical concept of sediment subduction, as well as tectonic erosion.

Instead of a difficult mechanical problem subducting soft sediment into the mantle, some have come to believe the soft sediment acts as a *grease* to aid the sliding

(Thornburg and Kulm, 1987, p. 50). What pressure keeps the "grease" from squirting back out, the way real grease does in machinery? "Elevated pore pressure" in the sediment is supposed to aid the shearing of one plate past another (Aubouin, Bourgois and Azéma, 1984, p. 216). Of course, reduced friction due to soft sediment will not work for the many sediment starved trenches, which are believed to be high stress environments (von Huene, 1986, p. 1). Now that sediment subduction has been accepted, further support supposedly comes from trace elements and isotope ratios, as well as young ages, for volcanic arc magmas assumed to have been produced by melting in the subduction zone (Cloos and Shreve, 1988b, p. 536; von Huene and Scholl, 1991, pp. 306,307).

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# Laws of Fertility, Role of Natural Selection, and Destructiveness of Mutations

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## Abstract

Research into fertility has revealed facts that are incompatible with selectionism, the modern concept of evolution. In whatever species, fertility is never so close to the most productive (optimal) level that it would guarantee survival of most of the offspring. This is a radical contradiction of the selectogenesis theory, which postulates that 1) the level of species fertility has been attained because of selection, and 2) any individual modification of fertility is a matter of adaptation. Neither fertility itself nor its modifications have anything to do with Darwinian adaptation or with increased population growth; actually, they hold the population stabilized within certain limits. It is not the maximization of individual fitness (also known as the reproductive success) that makes up the basic principles of life organization, but allocentrism (the availability of self-limiting properties of species that are advantageous to the

ecosystem as a whole, i.e. are good for the mutual benefit of all the species). Despite permanent natural selection for elevated fertility, the distribution of fertility in any species remains invariable. This phenomenon proves the perfect destructiveness of the mutation process. Undoubtedly, mutations that increase fertility have occurred and continue to occur, but do not become fixed because they diminish fitness on the whole. Therefore, selectogenesis cannot be a factor of fertility or of any other character less associated with fitness than fertility, and the creationist concept of the species invariability is thus confirmed. A short classification of cosmogonies is given. Denying the miracle of creation, evolutionism is forced to admit another miracle—the inactivity of the second principle of thermodynamics. Likewise, atheistic science turns out to be inimical to reason and morals.

## Laws of Fertility: The Role of Selection and the Meaning of Fertility Modifications

Fertility means here the number of young in a litter of viviparous animals, the number of eggs in a clutch of birds and other egg-laying species, or the number of seeds in a plant formed within one year or growing season. The number of an individual's offspring that survive and live to reach puberty is the reproduction success (RS). In brief, fertility is the potential and RS is the actual productivity of one reproductive cycle of an individual.

The distribution of fertility and RS values at its various levels has been studied in many animal and plant species. Based on these data, the mean fertility  $\bar{x}$  in the population and the optimal fertility  $x_0$  (at which RS is maximized) are presented in Table I for various species. In all cases, the mean fertility  $\bar{x}$  is much lower than the optimal fertility  $x_0$  ( $\bar{x} < x_0$ ), so that optimal fertility is often beyond the limits of fertility variation in the population, exceeding many of its values, not only the mean.<sup>1</sup> The relation  $\bar{x} < x_0$  is well

known for many species in other taxa and has no exceptions. Most often it has been observed that as RS increases, so does fertility all over the range of its variation; hence it follows that  $\bar{x} < x_0$  (Blagosklonov, 1991; Lack, 1954).

This phenomenon contradicts selectionism—the doctrine according to which the fertility level is determined by selection. If selectionism were true, the mean fertility would coincide with the optimal one, i.e. the equality  $\bar{x} = x_0$  would be fulfilled. Lack (1954) explains this contradiction by adaptive modification of fertility (AMF) corresponding to the given place and time. For example, small clutches are found where there are poor feeding conditions and large ones in good feeding conditions. As a result, the RS increases from small fertility values to large ones, and the fer-

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<sup>1</sup>Generally speaking, extrapolation of the empirical relations beyond the argument's variation limits is not substantiated (Pollard, 1977); therefore the optimal fertility  $x_0$ , if it is beyond the fertility variation limits, is an artificial quantity, useful only for a demonstrative representation of the difference between the limit to which the selection tends and the actual level of fertility.

Table I. The mean fertility  $\bar{x}$  and the optimal fertility  $x_0$  in plant, animal and human population

| No. <sup>1</sup> | Species and source of data                |                                 | n <sup>2</sup>     | $\bar{x}$          | $x_0$             |
|------------------|-------------------------------------------|---------------------------------|--------------------|--------------------|-------------------|
| 1                | Oat ( <i>Avena sativa</i> )               | Sample 1                        | 99                 | 36.2               | 646               |
| 2                |                                           | Sample 2                        | 112                | 38.0               | $\infty^3$        |
| 3                |                                           | Sample 3                        | 119                | 45.9               | $\infty$          |
| 4                | Wheat ( <i>Triticum aestivum</i> )        | Sample 1                        | 116                | 6.8                | $\infty$          |
| 5                |                                           | Sample 2                        | 120                | 20.2               | 74.4              |
| 6                | Grouse ( <i>Lagopus scoticus</i> )        |                                 | 153                | 7.52               | $\infty$          |
| 7                | Partridge ( <i>Perdix perdix</i> )        |                                 | 3916               | 14.6               | $\infty$          |
| 8                | Wood duck ( <i>Aix sponsa</i> )           |                                 | 63                 | 13.8               | $\infty$          |
| 9                | White-bellied swift ( <i>Apus melba</i> ) |                                 | 885                | 2.56               | 5.87              |
| 10               | Black swift ( <i>Apus apus</i> )          |                                 | 171                | 1.99               | 3.09              |
| 11               |                                           |                                 | 125                | 2.0                | 5.3               |
| 12               |                                           |                                 | 83                 | 2.16               | 14.1              |
| 13               | Starling ( <i>Sturnus vulgaris</i> )      | Early broods                    | 3516               | 4.48               | 7.84              |
| 14               |                                           | Late broods                     | 1150               | 3.89               | 5.06              |
| 15               | Great tit ( <i>Parus major</i> )          | Early broods                    | 431                | 7.21               | 14.2              |
| 16               |                                           | Late broods                     | 196                | 5.69               | 8.43              |
| 17               |                                           | Early broods                    | 235                | 9.06               | $\infty$          |
| 18               | Blue tit ( <i>P. caeruleus</i> )          |                                 | 181                | 10.4               | 20.1              |
| 19               | Guinea pig ( <i>Cavia porcellus</i> )     |                                 | 1104               | 2.73               | 5.20              |
| 20               | Sheep ( <i>Ovis sp.</i> )                 | 1-year-old ewes                 | 51583 <sup>4</sup> | 1.32               | 5.04 <sup>4</sup> |
| 21               |                                           | Older ewes                      |                    | 2.93               |                   |
| 22               | Human ( <i>Homo sapiens</i> )             | Caucasians of the USA 1929–1931 | >1000 <sup>5</sup> | 1.012 <sup>5</sup> | 3.27              |
| 23               |                                           | England and Wales 1956–1960     |                    |                    |                   |

<sup>1</sup>References for items: 1–5: Data obtained by the author in 1993; 6: Jenkins et al. 1963, quoted from Wynne-Edwards 1964; 7: Lack 1947<sup>6</sup>; 8: Leopold 1951<sup>6</sup>; 9: Lack & Arn 1947<sup>6</sup>; 10: Lack & Lack 1951<sup>6</sup>; 11: Perrins & Lack 1964; 12: Data obtained by the author in 1999; 13–14: Lack 1948<sup>6</sup>; 15–17: Lack 1950<sup>6</sup>; Lack et al. 1957; 18: Lack et al. 1957; 19: Wright & Eaton 1929<sup>6</sup>; 20–21: Bradford 1987; Stein 1987; 22–23: Stern 1965; Kanaev 1968; Strandkov & Ondina 1947<sup>6</sup>; Allee et al. 1949<sup>6</sup>; Lègarè 1972.

<sup>2</sup>n is sample size.

<sup>3</sup> $\infty$  signifies that as the fertility increases, reproductive success (RS) as a function of  $u(x)$  is not maximized at its definite value but increases infinitely, so that it is impossible to calculate the fertility optimum  $x_0$ .

<sup>4</sup>Values for both classes of ewes together.

<sup>5</sup>Values for both classes of humans together.

<sup>6</sup>Quoted from Lack 1954.

tility distribution reflects that of trophic conditions in the population. Then the mean fertility is equal to the mean value of fertility optimum under heterogeneous feeding conditions of the population. As support for the existence of AMF, Lack points to fertility variations caused by oscillations of feeding conditions (fertility optimum), and gives an example in owls and other predatory vole-eating birds. In years when voles are abundant, the clutches of these birds are larger, whereas in vole-poor years clutch sizes are smaller. Thereby, according to Lack, the mean clutch size is kept at the optimal level, so that under any feeding conditions the fertility level ensures the maximal RS.

However plausible this idea may seem, it has not found adequate factual substantiation. 1) It relies on the hypothesis that the feeding conditions in the population are very heterogeneous. But the fertility of birds, for example, does not change regularly according to the gradient of feeding conditions, but accidentally, so that its extreme values can be found in places close to each other where there are no reasons to expect contrasting feeding conditions. The mobility of birds and the procuring of food for nestlings by members of different couples in the same feeding places (it is known that the nesting and the feeding territories usually do not coincide) rule out a considerable difference in feed-

ing conditions for broods of the same population. 2) The error consists here in the fact that unless it has been demonstrated that  $\bar{x} = x_0$ , one may not interpret parallel changes of these two quantities as AMF. From the relation  $\bar{x} < x_0$  which is never violated, it follows that when  $\bar{x}$  and  $x_0$  decrease simultaneously, the mean fertility  $\bar{x}$  undergoes a non-adaptive change, because it does not approach the optimum, but, on the contrary, moves farther from it. Therefore, the parallel changes of  $\bar{x}$  and  $x_0$  are not AMF. 3) The existence of AMF is disproved by the fact that its consequence is the constancy of the fertility variation coefficient  $V = s/\bar{x}$  at all  $\bar{x}$  values within the species. But this is not confirmed for either of the species studied:  $V$  values always increases as  $\bar{x}$  decreases (because the standard deviation  $s$  decreases more slowly than  $\bar{x}$  does), which means a decrease of the population's average fitness. Therefore, fertility modifications are not adaptive in the Darwinian sense, but have a regulatory significance in the population and in the ecosystem. This follows from the fact that at a high population density the fertility decreases, i.e. fertility modifications serve as one of the factors regulating the number of individuals of any species.

It has been established that in birds a clutch contains far fewer eggs than a female can lay without any harm to her offspring (Romanov and Romanov, 1959; Lack, 1954), or than a couple can brood without chilling [Lack 1947–1951; Leopold, 1951 (quoted from Lack, 1954)]. The clutch size is as a rule much smaller than the number of nestlings that can be fed to live to adulthood (Blagosklonov, 1991; Lack, 1954). Therefore, birds do not reach their physiological, energetic and trophical potential in reproduction. Wynne-Edwards (1964) tried to explain the limitation of fertility at a non-adaptive level by the fact that group selection for a decreased fertility goes on when highly fertile populations die, because the habitat is destroyed as a result of overpopulation. It is supposed that the action of group selection overpowers that of individual selection, and therefore the problem of selection strength requires special consideration.

In all species, the productivity of large fertility values (in the sense of number of surviving offspring) is usually higher than that of small ones; nevertheless, the mean value of fertility and its limits are maintained at a low level. That is why a constant selection for increased fertility goes on, the strength of which can be measured in two ways: 1) by means of the average coefficient of selection in favor of the most productive (usually the largest) values of fertility in the population, and 2) by means of the selection differential with respect to fertility which, for the sake of comparability in various species, can be expressed in standard deviations  $s$  of fertility. These indices of selection for increased fertility in populations are presented in Table II. The average coefficient of selection in favor of

the most productive fertility  $x_m$  in the population is equal to

$$\bar{s}[x_m] = 1 - \bar{u} / u_m,$$

where  $\bar{u}$  is the mean RS and  $u_m = u(x_m)$  is the most RS in the population. It points to a relative reduction of reproduction in a real population as compared to the maximally possible one, such that the individuals in the population as a whole will have the most productive fertility. So, in man, the reproduction in real populations is by 50–62% lower than as if all the births consisted of triplets and there were neither singles nor twins. The selection differential (SD) is the difference between the mean values of the character in a group of producers of the next generation and in the population that is sampled. Because of the fact that more fertile individuals produce more offspring and vice versa, the mean value of fertility in the producers is calculated with “weights” (formula) – products of RS  $u_i$  at fertility  $x_i$  by its frequency  $f_i$ , which determine the contribution of the given value of fertility to the next generation. The sum of “weights” is equal to the mean RS  $\bar{u}$  in the population, so that the absolute SD is

$$SD = \frac{\sum x_i u_i f_i}{\sum u_i f_i} - \bar{x} = \frac{\sum x_i u_i f_i}{\bar{u}} - \bar{x}.$$

From Table II one can see that the normalized SD, otherwise called the intensity of selection (Kirpichnikov, 1979), has a rather large value in all the species ( $0.08 < SD/s < 0.62$ ), so that the absolute SD values often exceed  $0.5s$ . According to common sense, it is never negative or even zero, but, what is more important, such a strong selection

**Table II. The mean coefficient of selection  $\bar{s}[x_m]$  in favor of the most productive fertility value  $x_m$  and the normalized selection differential  $SD/s$  for fertility, where  $s$  is its standard deviation, in populations of various species.**

| Species             | $\bar{s}[x_m]$ , % | $SD/s$    |
|---------------------|--------------------|-----------|
| Oat                 | 59–61              | 0.44–0.53 |
| Wheat               | 52–68              | 0.33–0.62 |
| Grouse              | 32                 | 0.19      |
| Partridge           | 50                 | 0.16      |
| Wood duck           | 45                 | 0.28      |
| White-bellied swift | 13                 | 0.20      |
| Black swift         | 24–40              | 0.20–0.43 |
| Starling            | 12–22              | 0.18      |
| Great tit           | 21–53              | 0.21–0.32 |
| Blue tit            | 23                 | 0.10      |
| Guinea pig          | 32                 | 0.29      |
| Karakul sheep       | 46                 | 0.33      |
| Human               | 50–62              | 0.08–0.10 |
| Total limits        | 12–68              | 0.08–0.62 |

for increased fertility is also perfectly constant. That is why there are no reasons to believe that a group, interpopulation, selection for decreased fertility which overrules the effect of the individual, intrapopulation, selection is at work. The number of acts of individual selection per unit time would have incommensurably exceeded the same index for group selection. We would have been able to admit the existence of group selection only if frequent extinction of populations or even of ecosystems had happened. It is actually not the case, although in an ecosystem there are a lot of species and the fertility of each of them must be continuously decreasing due to the group selection. Extinction of populations would have been continuously interrupting the biological circulation and would have been catastrophic. So, the main argument against the hypothesis of group selection, and therefore against selectogenesis, is that had there been selectogenesis, no populations with low fertility would have remained, and since group selection eliminates highly fertile populations, everything would have died out and nothing would have remained to conserve.

In this way, group selection is unnatural, in the full sense of the word. And yet Wynne-Edwards (1964) is correct in stating that fertility has a level that maximizes not individual adaptation, but the stability of the species population and of the ecosystem. Therefore, the clutch size in birds, like fertility in general, has a level that is the most expedient for maintenance of biological circulation in the ecosystem, which is useful for all the species contained in that ecosystem. This confirms the basic principle of organization of life—the principle of collective interest that follows from creationism, i.e. the concept of a reasonable design of the world (Ivanov and Ivannikov, 1997). To summarize, one can formulate the following laws of fertility and selection.

- The fertility of animals and plants varies at a much lower level than that required for maximization of the number of surviving offspring.
- Fertility modifications are not adaptive in the Darwinian sense, but serve for regulation of the species population, i.e. for conservation of the ecosystem and maintenance of biological circulation.
- Neither ordinary natural selection, nor group selection can account for (or develop) the observed laws of fertility. This obliges us to conclude that selectogenesis is impossible in any of these forms.
- Selection works, but it does not create anything. It only conserves the equilibrium of parts, not letting any character or property, even such an adaptive one as fertility, become excessively enhanced; it is a guardian of the species' constancy. The causes of the constancy are quite clear. The final cause, or goal, is conservation of the ecosystem, and the motive, or the direct cause is selection

against deviations that violate the concordance of parts in the organism.

- These facts demonstrate a collective interest of all the species in the global ecosystem as the basic principles of life organization. They also confirm the conception of constancy of species and they correlate with creationism—a theory involving the intelligent construction of the universe by the Creator.

## The Destructiveness of Mutations as a Result of the Absence of Selectogenesis

An extremely important generalization in studies of natural mutagenesis is the idea of its destructiveness. There is always concern about risk of losing the mutant allele due to contamination of the strain by tolerable alleles. The mutation, because of its destructiveness, can never stand competition with the wild type and is usually eliminated. On the other hand, there need be no fear that the mutant allele will be converted to a tolerable one by means of a new mutation, i.e. will be improved, and the former mutation will be eliminated due to fixation of this new allele in the strain. It is usually assumed that constructive mutations do arise, but in an extremely infrequent fashion, and therefore much more time is required to obtain them than the time during which we usually keep our mutant strains. We are sure to conserve our destructive mutations in the culture thanks to the fact that their conversion to constructive tolerable alleles by means of mutation is, because of the shortage of time, a practically impossible event. The laws of fertility disprove the assumption that eventually a constructive mutation excelling the tolerable allele will be able to arise.

Why is selectogenesis of fertility absent so that a selection-induced shift between any consecutive generations is zero? This is because fertility variations are non-heritable, modification-dependent, but are not mutation-induced variations. Much time has passed, however, since the very beginning of any species, enough time for constructive, adaptive mutations to arise. If these had taken place, they would have served, on the strength of their heritability, as material for selectogenesis of fertility. But since this is absent in all species, one has to conclude that all of them, without exception, were destructive, i.e. harmful for survival and therefore they could not serve as material for selectogenesis. Therefore, 1) natural mutagenesis, because of its destructiveness, is not a factor of biogenesis, and 2) all the normal, tolerable alleles of any gene have not arisen by means of mutations, but were the products of creation and were inherent in the species since the moment of its emergence, or more exactly, since the creation of the ecosystem whose part the species is. Any changes in an optimally bal-

anced system can only worsen it, which is the case in the influence of mutation process on tolerable alleles.

Experiments by W. Johannsen (1903) have demonstrated non-heritability of quantitative characters in pure strains. In populations consisting of pure strains that differ in any quantitative character the efficiency of selection is limited by the fact that a pure strain arises with a maximal expression of the character under selection which cannot be further changed by selection. It was supposed that it was possible to promote selection of the character as a result of mutations (Filipchenko, 1923). From the laws of fertility, however, it is quite clear that, because of the absence of constructive mutations, the effect of selection on the character comes across an insurmountable obstacle, from which the absolute impossibility of selectogenesis in general follows.

## Cosmogonies and Their Classification

A cosmogony is an idea of origin of the universe (cosmos) and life. Cosmogonies can be divided into two major groups:

- theistic, or creationistic cosmogonies, and
- atheistic, or evolutionistic cosmogonies.

For an unequivocal understanding of cosmogonies, it is necessary to explain the terms *evolution* and *evolutionism*. *Evolution*, as Clausius defined it, is any process that goes in accordance with the second principle of thermodynamics, i.e. with an increase in entropy, chaos and dispersion of energy (Berg, 1922). It is in this primary sense that evolution must be understood as *nomen preoccupatum* whose meaning may not be changed to an opposite one, because this will lead to confusion. Therefore, evolution is always a degradation, decay, and is opposite to progress, i.e. increase of order and complexity of organization. As to *evolutionism*, or the “theory of evolution,” it is the erroneous idea that evolution is the source of progress and the cause of the cosmos structure—life and any other systems in the universe. Evolutionism denies the transcendental and the supernatural. It assumes that the universe arose without any interference of the Supreme Will, and that it does not contain any intention or purpose (design) as it is transformed only according to immanent laws. Evolutionism is thereby the opposite of creationism—the theory of a rational creation of the universe by God in a transcendental act or series of acts.

Theistic cosmogonies can be subdivided as follows:

- The Creator has created time, space, matter, and life at once in all their complexity, whereupon the universe degrades gradually and continuously according to the second principle of thermodynamics. This is Biblical creationism.
- The Creator created first one system and then created other systems later. He continues to create new ones,

while the old ones are degrading. For example, at first He created the whole celestial mechanism containing the solar system, the earth, and the moon. Then He created the biosphere in which, according to the geological chronicles, extinction of fossil faunas and floras happened repeatedly. New fauna and flora formations arose in new acts of creation, on whose basis geochronological units are distinguished in stratigraphy. In this way, the universe did not appear suddenly, but it has had a history in which transcendental acts of creation have alternated with periods of immanent development and gradual decay. This is the creationism of naturalists of G. Cuvier’s school, or factological creationism.

The Creator created the universe once, in a germ containing the potentials of complication, whereupon the universe developed by itself, without any interference of His will, according to immanent laws without any supernatural phenomena. This is a transitive, evolutionistic, hybrid creationism that differs from pure evolutionism by recognition of the primary intention and impulse, after which the Creator desisted and did not interfere with universal processes. Subdivisions of transitive creationism are based on the diversity of evolution theories.

Atheistic cosmogonies are all simply different forms of evolutionism in which God is denied as the Creator at all; matter and the universe are eternal and have neither origin nor end. In them the world develops from the primary chaos into cosmos without participation of the Supreme Will and Design. It happens by immanent laws, but it runs contrary to the second principle of thermodynamics, which is believed not to hinder the world’s progress. Denying supernatural acts of creation, evolutionism is forced to admit a miracle of the second principle of thermodynamics being invalid despite its universal character.

Despite the facts that disprove it, evolutionism is being imposed on science because of its atheism and moral degradation—not for scientific but for ideological and political reasons. A product of atheism, evolutionism claims that mankind is the only intelligence in the universe, thereby justifying the re-making of nature and society in accordance with the false ideals of scientific and technological progress. Wealth is considered to be the main criterion of “progress,” about which Christ says: “You cannot serve both God and Money... What is highly valued among men is detestable in God’s sight” (Luke 16:13–15). However, atheistic science embodied in evolutionism has conquered the mind.

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## Book Review

***What's Darwin Got to Do with It?: a Friendly Conversation About Evolution***  
 by Robert C. Newman, John L. Wiester, Janet Moneymaker and Jonathan Moneymaker  
 InterVarsity Press, Downers Grove, Illinois. 2000, 146 pages, \$10 paperback

A person easily could be fooled by a quick look at this “cartoon” book which is advertised on its back cover as a friendly conversation between two professors on evolution and what science can explain about life. Find out what logic’s got to do with it. See if the changing beak sizes of Galapagos Islands finches prove Darwinism. And enjoy the exciting adventures of those Darwinian superstars Mutaman and Selecta...

In his back-cover endorsement of the publication Phillip Johnson calls the work a “brilliant critique...and more fun than a barrel of Australopithecines.” The publication is all this and more, and it has depth that is not superficially apparent. The authors Newman and Wiester have backgrounds in science and various creation/evolution discussions; and the Moneymakers are specialists in design and illustration.

After a brief Introduction on competing ideas, the illustrated adventure leads to the meeting of Professor Teller and Professor Questor, two biologists who challenge each other’s views regarding the origin of life. From page to page the banter flies rapidly like a tennis ball going back and forth, thus forcing the observer-readers of the book to see both sides.

Evolution and creation-science (creationism) both are described as wagon words meaning that they can be used in lots of different ways. For example, evolution usually indicates unguided innovations (minor and major changes) and spontaneous generation of life, all over long periods of time. Whereas creation-science usually refers to “The belief that the earth is no more than 10,000 years old, and that all biological life forms were created in six calendar days and have remained relatively stable throughout their existence” (p. 10). After referring to differences of opin-

ions, authors Newman, et al. have activated their cartoon antagonists mainly to express concern over comparing the idea of a purposeless progression of life with that of intelligent design.

Professor Questor indicates that no theory about origins is “directly observable or provable by experiment” and she enunciates the ground rules for her subsequent debate with Professor Teller. Rule #1 is “Stick to the evidence” and Rule #2 says “that hypotheses must be consistent with the evidence, and that we should prefer the best explanation of the evidence” (p. 16).

There follows a discussion of microevolution caused by artificial (intelligent) selection with dogs. For examples of natural selection Professor Teller uses peppered moths in England and also Galapagos bird beaks. Incidentally, in a non-illustrated chapter at the end of the book, Newman, et al. indicate that the data used to support the moth evolutionary studies have been exposed as fraudulent. However, both of the debating professors recognize that there have been minor variations in pre-existing populations. Questor emphasizes that it is “unwarranted extrapolation” to extend the microevolutionary studies to explain the origin of major innovations.

There follows discussions of mutation, and natural selection, gaps between groups, “information” coded in DNA, and homology (the clue of the similar shanks). Questor asks Teller to “imagine that the human race has been wiped out, and a group of archaeologists from another planet is looking through the ruins of one of our cities about a thousand years from now” (p. 64). These extra-terrestrial scientists agree to believe in autophylogeny which involves the evolution of automobiles by some natural processes. Then they discover a machine with wings and a propeller (airplane). They agree that it had evolved from some car, but the paleocarriologists strongly disagree on “whether the wings developed as gradual mutations of the doors or as extensions of the floorboards” (p. 67).

Questor, who has identified herself as a “design theorist” suggests that a logical alternative to Darwinism is “off the shelf technology” in which engineers (intelligent de-

signers) utilize existing structures in constructing new products (for example radio parts in building a TV or tape recorder).

The two professors then discuss the idea of imperfect design (Gould’s panda’s thumb), and missing transitional fossils. Then the Cambrian explosion (“biological big bang”) is considered.

Professor Teller argues against the idea of a designer and is accused of wanting to be in charge so that he can make his own rules. There follows “Inference to the Best Explanation” wherein a compelling case is made for the reasonableness of intelligent design and a challenge for scientists to be willing to reconsider the evidence from a design perspective.

Following the cartoons, the book has an eleven-page “Background Information” (text only) section. This chapter contains additional discussion with references on the competing viewpoints. Then there is a two-page chapter of additional resources on both sides of the debate.

Author Newman has explained that the “the major purpose of the book is to help high school and college biology students (plus others who are inclined to feel the force of Darwinian apologetics) to see what the arguments really amount to. We were not writing for Christians and so do not expect our readers to have an inclination to take the biblical data on creation seriously. We would hope that the book would function as a sort of pre-evangelism to get the reader to look more carefully at the evidence for God in nature, and as a result, be drawn to Christ” (personal communication). I feel that the publication can accomplish this stated purpose. The authors of *What’s Darwin* are old-age creationists, and the book clearly was conceived to stress the logic of *intelligent design* and *limited changes of organisms*. However, most of the text has been crafted so that it also can serve accurately to expand the understanding of a broad spectrum of creationists’ comprehension of evolution as well as the logic of creation positions.

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## New Age Philosophy and Darwinism

With the spiritual totalitarianism of the New Religion, there will be political totalitarianism. The New Age avatars proclaim their tolerance and their love of democracy. However, they would solve mankind’s problems by utopian social and political revolution—a process that has led to tyranny and mass murder wherever it has occurred. The New Age movement uses the theory of evolution—a theory of inevitable and desirable Progress—as a justification for the policies they deem necessary to drive humanity and the planet to the next great leap forward. Can anything good *ever* come from applying Darwinism to society?

Lee Penn in “URI Part III: New age and globalist strategies—unity, collectivism, and control.”  
*Spiritual Conterfeits Project Journal* 23(4):57 (2000).

## Historiography and Natural History

John K. Reed\*

### Abstract

Natural history is commonly considered a science by virtue of the application of the scientific method. Although distinctions exist between human history and natural history, natural history is not a science because the study of unique past events is history. Since natural history is a class of history, it presupposes and requires a “natural historiography”, just as history presupposes and requires historiography. This natural historiography cannot simply appeal to the scientific method; indeed, a focus on method alone is inadequate. A complete and explicit historiography of natural history remains to be developed and applied. Historiography

provides a template for a natural historiography, despite differences between human history and natural history. Deriving a natural historiography is best done within an integrated worldview which can define its scope, value, and methods. The worldview of Naturalism cannot do this because of irreconcilable differences between its axioms, methods, and conclusions that pertain to natural history. These problems are not present within Biblical Christianity which can alone define and justify a natural historiography. Christianity validates natural history but modifies its scope, value, and method from that currently accepted and applied.

### Introduction

#### Natural History in the Origins Debate

Although the false dichotomy of religion vs. science is apparently still useful as a propaganda ploy, thinkers on both sides of the origins debate have begun to recognize the role that extrascientific considerations play in the debate. Some even correctly understand that the heart of the debate is between competing worldviews of Biblical Christianity and Naturalism (Johnson and Provine, 1994; Noebel, 1991). Unfortunately this line of thought is not carried to its logical extent, and natural history has been seemingly exempted from critical analysis. For example, Johnson (1997) ably attacks the process of organic evolution from a philosophical point of view, but his “baloney detector” never points at natural history, implying that natural history and Naturalism are disconnected. Scientific attacks on the possibility of evolution (e.g., Behe, 1996; Denton, 1986) have created an upsurge of intellectual support for a role for God in the origin of the universe. Lagging behind is an appreciation for the connected and parallel role of God in history and the subsequent hesitation of many to question natural history. Many scientists are willing to accept God as creator while rejecting God as sustainer and Lord of His creation. Indeed, the acceptance of a natural

history embodied in the geologic column and modern cosmology appears to be a litmus test for separating “respectable” opponents of Darwinism from the “lunatic fringe” of creationism even within Christianity. Underlying this hesitation to critically evaluate natural history is the faulty premise of assigning the status of science to natural history, and consequent misplaced sense of objectivity for the interpretations of modern natural historians.

#### Importance of History

Some may wonder why the issue of the age of the earth and the facts of its history merit any concern. First, the recognition of such a thing as a unified and coherent worldview presupposes that history be included. Second, history has strong religious connotations.

That the question of history has any importance at all is in itself a religious conclusion. The classical view was that reason transcends the facts of history, just as universals transcend particulars. Therefore, historical events – as, indeed, all change – were relatively unimportant. The cycles of history were not drawn to a goal but would keep on recurring endlessly. This notion devalued events and robbed them of significance. Eastern mystics also devalue history, regarding events as particularities in which they have no interest and preferring instead to contemplate the unity from which they believe the particularities de-

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rive their meaning. That is why, as G. K. Chesterton said, it is fitting that the Buddha be pictured with his eyes closed; there is nothing important to see. (Schlossberg, 1983, pp. 12–13)

As will be shown, many of the crucial assumptions that both religious and secular thinkers in the western tradition make regarding history are derived from biblical theology. Third, many modern thinkers, whether of Hegelian, Marxist, or other secular persuasion place great value upon history *per se* and find ultimate meaning in some immanent historical process. This requires a strong response from those who insist on history's significance being derived from the transcendent God of the Bible.

In the Christian conception, the unconditioned acts on the conditioned, the absolute on the contingent, the outside on the inside, creator on the created, God on history. The action beyond history makes history what it is but is absent from the accounts of history. That is why Niebuhr concluded that "history does not solve the enigma of history." (Schlossberg, 1983, p. 37)

Thus, downplaying the importance of natural history as some side issue is inimical to a real resolution of crucial differences between Christians and secular thinkers even apart from disagreements over origins. The studied and shallow agnosticism of those Christians who cede earth history by default to the modern geologic establishment is at odds with both sound theology and sound thinking.

### Empirical vs. Presuppositional Approach

A perusal of sources arguing either side of the origins debate reveals that most present inductive, evidential arguments to support one view against the other. A similar strategy is applied to arguments regarding both Darwinian evolution and natural history. These attempts to evidentially modify particulars of the narrative of natural history, while commendable, cannot replace a more foundational evaluation of the type applied here, and probably will not result in the worldview shift currently required away from the naturalist status quo.

The analysis of historical geology by means of a formal analysis of worldviews has been performed by Reed (1998, 1996a, 1996b) and Reed and Froede (1997). In each of these articles, a formal critique of Naturalism was employed demonstrating a failure of coherence and consistency between axioms, methods, and conclusions. This approach provided an abbreviated truth test relative to seemingly endless inductive arguments regarding the meaning of particular phenomena. Although abbreviated, this method is a more effective attack on evolution because it renders its foundations in Naturalism untenable in a rational sense, and thus requires either the abandonment of rational methods (i.e., science) or the worldview itself.

What then is the benefit of inductive science? Great in every respect—but impossible without the superstructure of theology and philosophy explicit in its formative stages.

In a similar fashion, this paper seeks to focus on facets of Naturalism found in natural history. It will demonstrate the superiority of the Christian worldview to Naturalism in this area. The remainder of the paper will proceed to do so by the following steps:

- present a general overview of history;
- uncover distinctions between natural history, history, and science; and show the necessity of a natural historiography distinct from the scientific method;
- define links between natural history and Naturalism;
- show that natural history fails logical tests because of its connection to Naturalism; while
- showing that the Biblical Christian worldview supplies the philosophical and theological foundations for history, both traditional (human) and natural, lacking in Naturalism;
- outline parameters of a natural historiography; and
- explore the relevance of these conclusions to the origins debate.

## An Overview of History

### Definitions of History

History is commonly given two meanings. The first is all of the events of the past, and the second is the fraction of the first that is preserved in recorded accounts. The difference between the two definitions is the concern of historiography. Historiography is defined "as the principles or methodology of historical study" (Websters II New Riverside University Dictionary, 1988). Although most people have an intuitive understanding of what history is, historians have a difficult time agreeing on a singular definition of history. A cross-section of historians and historiographers reveals a surprising variety in definition. Four of these include:

...to find out what happened in the past and to render it intelligible. (Hexter, 1962, cited in Clark, 1994, p. 19)

...history may be regarded as a record of all that has occurred within the realm of human consciousness. (Barnes, 1937, cited in Clark, 1994, p. 19)

...the record of facts which one age finds remarkable in another. (Burckhardt, 1943, cited in Clark, 1994, p. 20)

It is essentially the study of transition, and to the historian the only absolute is change. (Butterfield, 1959, cited in Clark, 1994, pp. 20–21)

Clark (1994) concludes the attempts at definition with an extended definition by R. G. Collingwood (1956), one

of the most prominent historiographers of the twentieth century. In place of a single definition, he offers four points integral to a definition of history. He states that

- history is an inquiry; it involves asking questions about what we do not know as opposed to the recording of events that we already know,
- It is a record of human actions as opposed to those of the gods,
- It is based on the interpretation of evidence, and
- Its purpose is to teach us about man.

History is then similar to many other subjects. Its nature appears obvious on the surface, but study and reflection reveal significant hidden complexity. Is it just the complexity of the subject that leads to such significant disagreement of even a definition by historians? Clark does not think so, and offers a more insightful reason for the differences:

*History requires philosophy.* Not only is the need for philosophy seen in the earlier difficulties and puzzles, but it is also seen, where some people do not expect it, in the very definition of history... The definitions of history, listed above, all reflect the philosophy of their authors. Those authors who have reflected but little on philosophical problems give looser definitions. Those who have puzzled through many difficulties become more pedantic, more careful, more accurate. Implicit in their formulations are their views of man, of society, of God, and therefore of knowledge... whatever his definition and extended views of history are, there must always be an underlying and controlling philosophy. It can be ignored, but it cannot be avoided. (Clark, 1994, pp. 21–22, *Italics added*)

I have previously shown a strong dependence of origins studies on philosophy and theology based upon their role undergirding science (Reed, 1996a; 1996b; Reed, 1998). Although natural history is not science, demonstrating a similar dependence of history on philosophy and theology offers a similar basis for a formal critique of natural history in its present close relationship to Naturalism and in its potential relationship to biblical Christianity. If the axioms, methods, and conclusions of history must be reconciled with Christianity rather than Naturalism, then natural history must also be reconciled with biblical Christianity or abandoned. Marxism shares the same weaknesses as Naturalism in this regard (see Table I), and eastern worldviews do not provide the basis for science or history as they are understood by western culture.

### Origins of Modern History

The historical development of history has been the topic of numerous books, and has been perhaps best summarized in R. G. Collingwood's, *The Idea of History*. For the purposes of this paper, suffice it to say that a sense and view of

history that are dissimilar to those of almost all other cultures is a feature of our modern culture. Glover (1984), among many others, argues convincingly that the sense of existing in history or "historical self-awareness" is directly related to a biblical understanding of man. The role of biblical theology on the modern understanding of history can be appreciated by summarizing the presuppositions of modern history dependent on and related to biblical theology (Table I). Some of these have been downplayed by post-Christian practitioners, but many remain, even though the biblical connection has been ignored or obscured.

Glover summarizes the crucial role these philosophical assumptions have played in the development of a modern concept of history:

An analysis of the Western sense of history reveals three aspects of it that are especially pertinent to this study: a linear, unidirectional sense of time; voluntarism, an emphasis on will and purpose as creative of novelty; and a faith in God's sovereign control over both nature and history. The last, of course, does not carry over into secular or atheistic experience of historical existence; but the first two are shared by Christian and secular humanist. (Glover, 1984, p. 192).

Schlossberg notes the same dependence:

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

### Theories of History

The modern rejection of the Christian worldview has been manifested in various theories of history popular since the Enlightenment. Three theories relevant to modern natural history include Physical Determinism, Marxism, and Scientific Naturalism. *Modern practitioners of natural history explicitly or unknowingly borrow to some extent from each of these theories.* Clark (1994) evaluates each of them by critiquing their philosophical roots, demonstrating the dependence of history on philosophy. Although other theories of history exist, these three have dominated the twentieth century. Their importance to natural history is seen in the often-implicit acceptance of their underlying philosophical positions in aspects of natural history. The weakness in all post-Christian theories of history is their need for assumptions based on biblical theology. These assump-

Table I. The theological bases for presuppositions of modern history and natural history are shown to be derivative of biblical Christianity. Although some differences are readily apparent, the most important presuppositions of both history and natural history depend on doctrines of Christianity. These assumptions cannot be logically derived or defended within the naturalist worldview. Examples from Glover (1984), Schlossberg (1983), and Clark (1994).

| Assumption About History                                                        | Biblical/Christian Basis                           | Shared by Secularists                                 | Applied to Natural History         |
|---------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------------------------|------------------------------------|
| Nature distinct from history; escape from determinism                           | God transcends nature and acts in time             | Yes = generally<br>No = Hegel, Marx                   | No; inconsistent                   |
| Ultimate meaning of history is outside history                                  | Kingdom of God vs. earthly kingdoms                | No                                                    | No                                 |
| Change explained by ultimate unchanging reference point                         | God is immutable                                   | No, inconsistent                                      | Yes (evolution as a principle)     |
| All events of history have meaning                                              | God is omniscient, omnipresent, omnipotent         | Yes, but subjectively assigned by historian           | Subjectively assigned by historian |
| World had a beginning                                                           | Genesis 1:1                                        | Yes, "big bang"                                       | Yes, defer to cosmology            |
| Time is linear                                                                  | Time has beginning and end with purpose in between | Yes                                                   | Yes, evolution                     |
| Time is irreversible, and events are non-recurring                              | God's purpose drives history to goal               | Yes                                                   | Yes, Dollo's law                   |
| Man transcends nature, expresses freedom and creativity in historical existence | Man created in God's image; Dominion given to man  | Yes, inconsistent                                     | Yes, inconsistent                  |
| Mission oriented aspect of man; individual and cultural                         | God showed purpose for his people in OT and NT     | Yes, e.g. environmental movement; inconsistent        | Yes, but imposed by nature         |
| Flow of history has meaning                                                     | Purpose worked out in history; i.e., Old Testament | Y = Hegel, Marx<br>N = existentialists, nihilists     | Yes, meaning found in evolution    |
| History moving to culminating point                                             | Final judgment in Revelation                       | Yes, secular visions; both optimistic and pessimistic | Yes, nature "dies"                 |
| Idea of progress; progressive history = progressive understanding               | Progressive revelation; God's plan and purpose     | Yes, Hegel, Marx and dialectic                        | Yes, Evolution                     |
| Values defined outside of history                                               | God exists outside of history; imposes value       | No                                                    | No                                 |

tions and their application by modern historians are seen in Table I. The extent to which any of them borrows Christian notions of reality for support is an indication of the degree of inconsistency inherent in each one. Table I presents a historical case for the dependence of non-Christian

worldviews on Christian axioms in the sense of what actually has transpired in the development of these worldviews. A critical evaluation of Naturalism (e.g., Noebel, 1991; Glover, 1984; Schlossberg, 1983) demonstrates that the historical inconsistencies are mirrored by logical inconsis-

tencies. These can be seen by performing a thought experiment to derive and justify the Christian axioms within the metaphysical framework of competing worldviews. It is not possible.

Natural history has borrowed elements of Physical Determinism. Clark (1994) traces Physical Determinism to various thinkers, but considers its explication by Immanuel Kant as the most basic to date. Physical Determinism is a non-historical explanation of history (Clark, 1994) that asserts an explanation of reality (including history) is possible by reference to matter and its properties, particularly position and motion. Since everything is a function of physical position and composition, then mathematical descriptions and predictions of reality are theoretically possible. But history is largely an account of moral actions and implies purpose; therefore a moral and teleological framework for explanation must be derived. Since it is difficult to describe morality or purpose mechanistically in material reality (Kant's phenomenal world), Kant placed purpose in another sphere of reality, which he called the noumenal world. However, there was no connection between the noumenal and the phenomenal worlds. In essence, Kant asserted that although we could not discover purpose or ethics in nature, we should live and investigate as though they existed. Clark (1994) asserts that Kant could not consistently explain purpose or morality, and thus could not explain history.

This then may be taken as the climax of the mechanistic theory of history. Mechanism and teleology can be harmonized only by declaring the latter to be imaginary. Morality and freedom are banished to an unknowable intelligible world which has no control over visible human action. And whatever could possibly be said about the purpose or inclination of a single person, the course of history like the course of nature can have no goal. (Clark, 1994, p. 49).

Natural history has also incorporated elements of Marxism into punctuationist concepts of evolution. Clark (1994) points out that Marxism is much more than a theory of history – it is a comprehensive worldview that embraces economic determinism. Noebel (1991) presents an exhaustive comparison of Marxism to Biblical Christianity. Marx took the structure of Hegelian idealism, exchanged the spiritual for the material, and derived dialectical materialism. The struggle between inherent contradictions in nature (and man) leads to the revolutionary resolution in the dialectical process, which in turn leads to a new synthesis. As materialists, Marxists are explicit about the link between science, history and all other knowledge. Like Physical Determinism, Marxism falters in the definition of ethical and moral criteria for judging actions (and history). The contradictions between assertions of value-free knowledge and absolute statements of approval (of communism) and condemnation (of capitalism) are

difficult to reconcile. Not only do they fail in their epistemology, but also in their ability to explain history – supposedly a strength.

Marxists prefer to dilate on social phenomena as large as the replacement of one civilization by another. In this they obtain a measure of abstract security. But when it comes to the details of history, their vaunted scientific methods leave them silent... Let us then ask the Marxists, since they claim that history is a science, to explain why Napoleon chose to invade Russia rather than to consolidate his hold on Western Europe. Or, let them explain why imperial capitalism in the United States undermined Chiang Kai-shek and invited communists to take over China. (Clark, 1994, p. 95).

Scientific Naturalism is defined by Clark (1994) in terms of its positivistic method. It asserts an unrealistic ideal of explanation by the empirical discovery of laws of history similar to those of physical science. Although pure forms of philosophical positivism have been largely abandoned, this view of history demonstrates that mutated forms still thrive outside philosophical environments. Clark (1994) traces the roots of this theory of history to Henry Thomas Buckle (1821–1862) who thought that laws of history could be defined statistically. Scientific naturalism stresses the key elements of necessary causation and prediction, carryovers of a scientific method. The positivistic method has been forcefully advocated this century by such eminent historians as Oswald Spengler (1880–1936) and Arnold Toynbee (1889–1975) who both proposed laws of history based on cycles of civilization. Clark (1994) critiques this view by pointing out that the conceptual framework of both historians (cyclical civilization) cannot be discerned empirically in history. Disagreements between the two historians suggest that the “universal law” of cyclical civilization cannot be universally applied. Finally, positivistic interpretations cannot provide prediction on any significant level of detail.

Scientific naturalism has been congenial to natural history. A supposed ability to derive laws of history helps suppress questions about the derivation of such laws in natural history. The emphasis (even in our existential 20<sup>th</sup> century) on “laws of evolution”, “laws of facies”, and of course the ‘first commandment’ of natural history—“the present is the key to the past”—underscores the relationships between the two. Scientific naturalism as a theory of history is important for natural history because the most prevalent law of history in modern times has been the idea of progress, intimately connected to assertions of biologic evolution. The unmasking of evolution as a part of a worldview is apparent in this context— the idea of progress as a universal and inevitable law of history is grounded in a belief in biological evolution, supposedly derived empirically. Clark's (1994) critique of a positivistic method in history not being able to generate uni-

versal laws carries significant import for natural history, which also asserts universal laws of history within a positivist scheme. If natural history is history, then Clark's (1994) critique applies to it, too. Pertaining to the idea of progress (or evolution in any sense), Clark (1994) points out that progress implies a goal that cannot be known or even demonstrated within naturalism, rendering progress a semantic trick rather than a true explanation.

## Natural History, History, and Science

What is natural history? How did the discipline develop? Does it differ from history? If so, how? Does it differ from science? If so, how? These are the basic questions that must be answered if a satisfactory natural historiography is to be constructed.

### What is Natural History?

Natural history is defined as, "The study of the nature and history of all animal, vegetable, and rock and mineral forms". (Bates and Jackson, 1987). As currently practiced, natural history displays its dependence on assumptions of naturalism. Since it is an account of the history of nature, and since nature is thought to be very old, it focuses on the development of the geological and biological aspects of the earth prior to the advent of man. Because there could be no written record of history prior to man (since revelation is excluded a priori), then the historical record consists of the physical features themselves, interpreted by principles of historical geology and evolutionary biology. Because the evidence is physical rather than written, science must provide the method of investigation.

All of these assumptions lie outside of history, and the assumption of a scientific method is a particular problem for natural history. This assumption is fallacious because the scope and goal of the project, instead of just the nature of the evidence should also dictate the method. The peculiar combination of a historical project and physical evidence is an argument for a mixed question approach, and defaulting to science is improper. As with science, the denial of a metaphysical base inherent in modern Naturalism has led to an epistemological error of significant proportions.

Prior to the nineteenth century, the Bible was the defining account of the history of the earth, and history was interpreted in the context of God's relationship with man. Although the medieval hermeneutic gave proper emphasis to the underlying purpose of history (bolstered by Augustine's *City of God*), the Reformation hermeneutic of literal interpretation restored a proper emphasis to the importance of and reliability of the factuality of history. This theological impetus combined with the Renaissance understanding of man in his relationship to God. Glover (1984) argues con-

vincingly that a renewed appreciation at this time of man existing in God's image and in a special relationship with God provided the foundation for the western sense of historical self-awareness taken for granted today. In these complementary developments of the Renaissance and Reformation, Biblical Christianity provided (1) the meaning of history, (2) a methodological emphasis on the factuality of history, and (3) a record of many of the facts of history.

During the Enlightenment, the overtly Christian approach was distorted. Although empirical humanists maintained a methodological emphasis on the factuality of history, they rejected the Christian meaning of history, and rejected the veracity of the Bible as a factual record of history. Lyellian uniformitarianism was thought to provide the context for an empirical natural history apart from the records in the Bible, and Darwinian evolution provided the unifying principle in historical interpretation previously ceded to man's relationship with God. Man's importance was seen in his new relationship to nature as the pinnacle of evolution, rather than a transcendent image-bearer in fellowship with God. History was divorced from natural history, which assumed importance apart from God and man.

Natural history as it is studied and taught today is the story of the natural origin and evolution of the earth and all of its lifeforms. It pretends no relationship to man or God. Nature apart from God must have evolved (in a rational manner if rational approaches to reality were to be applied) and so history became the study of evolution which occurred in the past. Since no historian was present to record the past, only physical clues are available. Since the goal of the historical project became the discovery of the "story" of evolution, the "text" became the historical record of rocks and their constituent fossils. The rock record was assumed to require scientific knowledge to decipher, and interpretation was assumed to be within the scientific method. The positivistic euphoria of the nineteenth century precluded serious questioning of this error.

This attempt to make history scientific originated in the positivism of Auguste Comte. The term positivism was used to contrast the reliable methods of natural science with the ethereal speculations of metaphysics; and while later postivistic historians may not accept other parts of Comte's philosophy, the term itself is not too inaccurate. The aim is to discover laws by empirical observation. (Clark, 1994, pp. 99–100).

### Similarities between Natural History and History

Mortimer Adler (1965) derived four basic types of natural knowledge by two dichotomies. The first was a dichotomy of method with investigative and non-investigative branches of natural knowledge. Both history and science

were classified as investigative branches using special experience, as opposed to philosophy, which employs the common experience of all mankind regardless of time or place. The second dichotomy was between analytic and synthetic knowledge (borrowing the terms from Hume and Kant). History and science were again classified together as synthetic (i.e., empirical) forms of knowledge. However, history and science were distinguished by two important criteria. The first is that history is the empirical investigation of singular events in time while science is the empirical investigation of universal principles not bound by time. The second is that history investigates features of the past, but science utilizes special experience to derive universal conclusions. Adler agreed with Collingwood (1956) that history is an investigation and that it is understood empirically with an emphasis on the facts of history rather than some type of Platonic, Hegelian, or Marxist speculation. However, Adler (1965) clearly distinguished the scope and method of history from those of science. Recently, he expanded on this concept with an apt illustration of natural history:

Similarly, when scientists (such as geologists, paleontologists, and evolutionists) sometimes attempt to establish the spatial and temporal determinants of particular past events or to describe a particular sequence of such events, they cease to be engaged in scientific inquiry and become engaged in historical research, sometimes called natural history. Though both history and science are investigative modes of inquiry that submit their conclusions to the test of experience (i.e., the data obtained by investigation), history by its method can answer questions that science cannot answer; and science by its method can answer questions that history cannot answer. (Adler, 1993, p. 15).

Adler's (1965) insight that history and science are both synthetic investigations of special experience perhaps explains the ease with which natural history is classified as a branch of science and assumed to possess a scientific method. However, history and natural history share more important connections that render natural history a subset of history and not a subset of physical science or its own unique subject. The first is investigation of particular events and the second is the investigation of the past.

An argument might be made that natural history has uncovered various "laws" of history through a process of scientific discovery, and has thus validated the assertion that it is a scientific enterprise. However, closer examination of these so-called laws shows that they are speculative interpretations of limited data sets and not testable in the same sense as empirically derived concepts of science. Dollo's law of the irreversibility of evolution is a good example of this type of claim. However, Dollo's law cannot be a "scientific" law of history for several reasons. First, it cannot be the result of empirical discovery since insuffi-

cient time has elapsed during the scientific enterprise to observe sufficient evolution to draw a conclusion of irreversibility. Second, it is suspicious that a non-empirical philosophical assumption of irreversible, linear time existed prior to the "scientific" formulation of Dollo's law. Third, Clark (1994) argued against any derivation of laws of history by an empirical process. Finally he observed that knowledge of direction implies knowledge of a goal that cannot possibly be discerned or even demonstrated to exist at all. These objections conclusively show that the so-called laws of natural history are unproven speculative constructs unsupported in the same manner as those of physical science. Why then do natural historians persist in attempting to extract these "laws"? It is possible that the philosophical necessity for continuity *within* nature forces naturalists to extract predictable "processes" from history, rather than dealing with unique events.

What about the "first commandment" of natural history—uniformitarianism? It certainly attempts to blur the unique, non-repeatable nature of past events into regular processes conducive to scientific description. But is it an empirically derived law of history, or a presupposition employed by desperate necessity? Arguments for the latter are found in Reed (1998). Several lines of evidence strongly suggest that uniformitarianism is an interpretive scheme not derived from data, but from philosophical necessity. The assertion that the past can be characterized by universal generalizations independent of time is merely an assertion, it has not been and can never be demonstrated. Thus, it is a philosophical or theological presupposition. Although it might be justified by tests for coherence and consistency, it fails those tests within the context of Naturalism (Reed, 1998). Finally, uniformity is more consistent with the Christian worldview than with Naturalism.

Natural history and history are also linked in their methods by the sharing of methodological limitations. Clark (1994) notes that many of the key concerns of historiography were mentioned by Descartes (1637) in his *Discourse on the method of rightly conducting one's reason and seeking the truth in the sciences*.

But I believed that I had already given sufficient time to Languages, and likewise to the readings of the writings of the ancients, to their Histories and Fables. For to hold converse with those of other ages and in travel, are almost the same thing. It is useful to know something of the manners of different nations, that we may be enabled to form a more correct judgment regarding our own, and be prevented from thinking that everything contrary to our customs is ridiculous and irrational – a conclusion usually come to by those whose experience has been limited to their own country. On the other hand, when too much time is occupied in traveling, we become strangers to our native country; and the *over-curious*

*in the customs of the past are generally ignorant of those of the present. Besides, fictitious narratives lead us to imagine the possibility of many events that are impossible; and even the most faithful histories, if they do not wholly misrepresent matters, or exaggerate their importance to render the account of them more worthy of perusal, omit, at least, almost always the meanest and least striking of the attendant circumstances; hence it happens that the remainder does not represent the truth, and that such as regulate their conduct by examples drawn from this source, are apt to fall into the extravagances of the knights-errant of Romance, and to entertain projects that exceed their powers.* (Descartes, 1637, cited in Clark, 1994 pp. 3–4, emphasis added).

Descartes, in this short paragraph, summarized the most basic uncertainties of the discipline of history. Resolution of these uncertainties is the task of historiography. How do these relate to the practice of natural history?

The first challenge shared by historian and natural historian is maintaining a balanced assessment of the past through his knowledge of the present. This tension in historical interpretation of geological phenomena has not been resolved by the axiomatic application of uniformitarianism. For example, disagreements over the degree to which modern environments can act as interpretive templates of the past have resulted in the gradual modification of the uniformitarian axiom from the rigid formulation of Lyell to the almost completely elastic one of the present. The puzzling existence of rock types and inferred existence of environments not described in the present has been a thorn in interpretive schemes for almost two centuries. The real problem is in defining an appropriate standard against which interpretation can occur. Natural history clearly shares this tension between past and present by striving for a timeless interpretation of time-bound phenomena.

The second challenge to history is that of dealing with sources of information that become known to be false. The problem is twofold. First, the factual inaccuracies must be corrected wherever applied, and second, any aspect of interpretation based on the factual inaccuracy must be expunged or corrected. Because there are levels of interpretation within natural history, false interpretations of accurate data that become the basis for further false interpretations must also be addressed. The problem lies not only in the generation of blatantly incorrect data, but in the increasing resolution provided by advances in technology that invalidates old interpretations by providing new data. Woodmorappe (1999) illustrates the difficulties both of these challenges pose in the area of radiometric dating. He shows an inverse relationship between the sophistication of and experience with a given radiometric method and its reliability. Increasing experience with all methods has revealed inaccuracies in the initial claims made for each one.

The third problem is the role of interpretation in any historical narrative, assuming that all of the facts are accurate and presented in context. Collingwood (1956) insists that a criterion for doing history is the interpretation of data. What is the basis of that interpretation? Does it hopelessly distort the most accurate presentation of fact? Once again, natural history shares this challenge with history. Multiple interpretations of datasets are frequently presented in geological literature. Many times the disagreeing parties agree on the data presented but differ severely on their meaning. An aspect of this problem not mentioned by Descartes is the bias introduced by competing world-views. Differences of interpretation between Neo-Darwinians and punctuationists are a good illustration of this aspect of the interpretive problem.

The fourth problem is one of the most persistent of historiographic challenges. How does the faithful historian select the often-miniscule subset of information to be presented in the limited number of pages he can write? What is the basis for inclusion and omission of that information? What appears as a casual detail today may become a crucial keystone of information tomorrow? Natural history shares this methodological challenge. Arguments in controversial topics such as human evolution often hinge on the assignment of relative importance or unimportance to key data by advocates of one side or the other. This issue is more severe for natural history than for human history for two reasons. First, the record being physical and not written is more ambiguous than a human account. Second, natural historians readily admit that the geologic record is composed mainly of gaps. Thus, the decision of the natural historian regarding the data that he will include in his account is even less a matter of his own informed (but still subjective) choice than might be true of a historian.

In summary, natural history is best classified as a subset of history because it shares a crucial distinctive with history: the investigation of singular past events. It is thus distinct from science, which investigates general, repeatable principles, usually through controlled experiment or observation—the “special experience” of Adler (1965). The speculative extrapolation of “laws of natural history” does not require the repositioning of natural history into the area of natural science. The close relationship of natural history to history is also demonstrated by their sharing the historiographic challenges summarized by Descartes. However, natural history is not identical to history. What are the aspects of natural history that distinguish it from human history?

### Differences between Natural History and History

Collingwood (1956, pp. 210–217) tries to make a case that history and natural history are distinct by virtue of history’s purpose including an “inner” study of the thoughts of the

past behind the events as opposed to an “outer” study of the facts of the events themselves. He starts with the right idea:

We must ask what is the general nature of the problems which this method is designed to solve. When we have done so, it will appear that the special problem of the historian is one which does not arise in the case of natural science. (Collingwood, 1956, p. 213).

However, Collingwood fails to carry this project through to its logical conclusion because he accepts the false premise that natural history as performed by geologists and biologists is science. He forces himself into the corner of having to define history after already having conceded its most basic properties to science. Missing this crucial point, he is left with history being distinct only by virtue of the historian being able to rethink the thoughts of historical figures—a questionable enterprise with numerous epistemological problems as outlined by Clark (1994). Had he arrived at a similar classification scheme to that of Adler (1965), he could have saved more of history. And if he had understood the role played by integrated worldviews, he would better have understood the nature of evolution and the danger it presented in nature swallowing history.

If Collingwood erred in lumping natural history and science, how can we avoid a similar mistake of a false dilemma between science and history? The answer is to recognize with Adler (1965) the possibility of mixed questions; indeed to recognize that such projects are common (Klevberg, 1999). We can concede that although natural history is, in its essence, history, it differs from human history in several important ways, and thus can be addressed as a distinct subset of history proper, apart from human history. What then are the differences between history and natural history?

The most obvious one is the subject of study. As Collingwood (1956) states, history is the study of human events in the past. Natural history examines the events of the past as they are resolved in nature. Instead of manuscripts, the natural historian relies on forensic evidence of rocks and fossils. The rejection of the possibility of textural evidence (i.e., the Bible) by natural historians is merely a result of assumptions within their worldview, and cannot be justified scientifically. Some Christians have been intimidated into a similar, but less complete, form of this error when they modify the biblical evidence to fit a naturalist interpretation of the physical evidence. Thus the Flood is local, because there is no evidence of it in the geologic column, etc. Of course, even the distinction between the relative temporal applicability of textural and physical evidence relies on a philosophical assumption that man is distinct from nature. Whether this separation between man and nature is because of man’s absence during most of history, or results from a metaphysical conclusion de-

pends on the acceptance or rejection of the Christian or naturalist worldviews. Needless to say, Christians have no excuse for accepting the priority of naturalist interpretations of limited physical evidence over a record that presents itself as God’s account.

The second obvious difference is derivative and touches the method of natural history. Because the subject is nature, there is considered to be no exhaustive written record of events in the same manner as are available for historians. Whether this deficiency is total or partial depends on the acceptance or rejection of the biblical Christian or naturalist worldviews.

Thus, it is clear that while natural history as it is currently understood displays features distinct from human history in the object of the study (and somewhat in the resulting method), it is more properly a subset of history than of science, since its defining features are those of history and not natural science. The false dilemma of Collingwood (1956) is resolved by the classification of Adler (1965) and by his advocacy of the possibility of mixed questions. The inability to properly classify natural history during its infancy probably resulted from a distorted view of science during a time when positivism overtly attempted to remove the boundaries between natural science and other disciplines. It is understandable that natural history was distorted by science, but that distortion now needs to be corrected to allow future progress in the discipline.

## Natural History within Worldviews

Natural history plays an important role within the dominant worldviews of the twentieth century for two reasons; the importance each worldview itself places on history, and the internal intellectual momentum of natural history over the past two centuries. As previously discussed, history assumes a religious significance in its meaning in any worldview. The influence of Christianity in developing the historical consciousness of western man is evident even in those worldviews antithetical to Christianity for reasons summarized in Table I. Additionally, natural history itself generates a certain amount of inherent intellectual interest as evidenced by man’s fascination with dinosaurs, fossils, and strata. Added to the intellectual interest is the commercial interest related to fossil fuel and economic mineral exploration and development.

Natural history as understood at present includes much more than a view of history. Much of Naturalism is inextricably intertwined with natural history as it is currently understood. Therefore, the worldview selected prior to any consideration of natural history *per se* will impact the scope and method of natural history. This section will describe how natural history fits both the Christian and naturalist worldviews and evaluate which is able to consistently

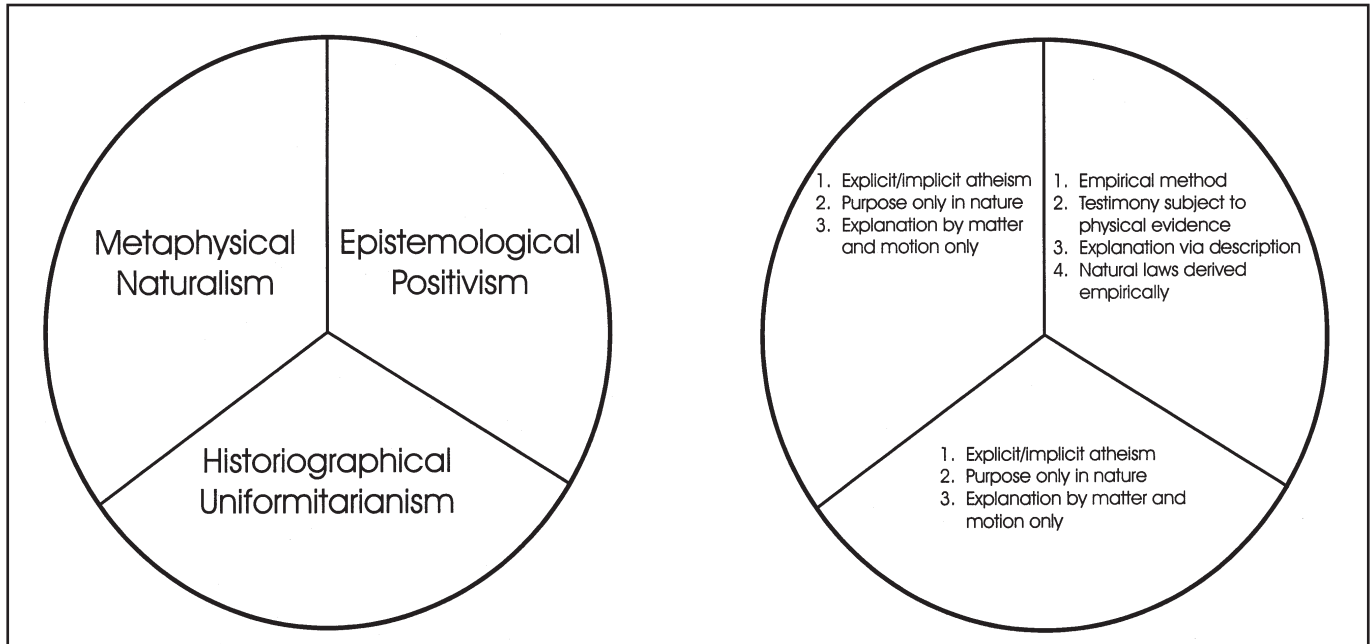


Figure 1. The triad of naturalism shows the metaphysical, epistemological, and historiographic aspects of the worldview. Although other facets could be explored, these are the crucial three that relate to the development of natural history and natural historiography.

support the presuppositions required to perform natural history. A natural historiography can then be approached that will be consistent with other elements of the selected worldview.

#### Natural History within the Naturalist Worldview

Knowledge is systematized into worldviews. Thus, no branch of knowing including natural history is independent from a worldview. Unfortunately, not everyone recognizes his own structure of thought in these terms, and many assert discrete realms of knowledge independent from each other. The rise of philosophical relativism and the popularity of all forms of twentieth-century existentialism aid this illusion. The resulting dichotomy within Christian thinking that combines the condemnation of evolution with the acceptance of natural history demands a minimal demonstration of the connections between natural history and Naturalism. This demonstration can be accomplished by describing three important aspects of Naturalism and then by showing the inseparable links between natural history and each of these aspects.

Having started prior to the twentieth century, modern naturalism presents itself, at least on the surface, as an integrated worldview with logical links between its different facets. To be understood, Naturalism must be examined from this perspective, rather than the piecemeal approach favored this century. Logical links can therefore be uncovered between metaphysical, epistemological, and historiographic assertions of the naturalist worldview. Figure 1

shows this triad. There is little doubt that metaphysical naturalism, or materialism, the denial of the non-physical, is the heart of Naturalism. Most people understand the entire worldview of Naturalism in this context. The part often ignored is the logical linkage between metaphysical aspects of Naturalism and other facets of the integrated worldview.

The theory of knowledge applied in naturalism is a logical outgrowth of that metaphysical position. If there is no reality beyond matter/energy existing in space/time, then knowledge about God, the soul, purpose, ethics, etc. is nonsense. Positivism developed from a skeptical materialism, and flourished during the nineteenth and early twentieth centuries. Although positivism has altered its appearance many times since Auguste Comte, the essential assertion that truth is found only in empirical observation of phenomena, remains.

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

Thus, since all of reality is sensible, then knowledge must be restricted to the investigation of the sensible phenomena.

The historiographic connection made in Reed (1998) is discovered by the logical conclusion that positivism is not congenial to historical research, despite the many attempts

to develop a positivist historical method. If knowledge is restricted to empirical science, then knowledge of history must be very limited because the investigation of one-time, non-repeatable events frustrates the scientific method. In brief, the problem is that of philosophic continuity. A level of certainty of empirical knowledge in the present does not guarantee the same certainty in the past without the non-empirical assumption of uniformity. The examination of the past relies on the reasonableness of extrapolation of present empirical knowledge into the past. But metaphysical naturalism removes the possibility of an infinite, eternal, and unchanging God as a basis for physical predictability through space and time. That being so, a rigid uniformitarianism is the only possible way that "scientific" knowledge (i.e., positivism) can be extrapolated into the past. This logical connection is reinforced by an examination of the philosophical purity of Hutton's and Lyell's concepts of uniformitarianism (Figure 2) and its later degradation. Only a decline of philosophical thinking by scientists this century can explain the blind accommodation of a radically different concept of uniformitarianism that offers no stability in the past without the consequent failure of the whole enterprise of the positivist natural history.

How does natural history fit into this framework? In the area of metaphysical reality it is obvious that natural history affirms and accepts Naturalism. There is no reference to God, the history of nature supercedes the history of man, and natural history is self-consciously the search for relicts of evolution. A commitment to evolution and the need to understand origins and development drives natural history. In the area of epistemology, natural history affirms its method as being "scientific". There is no place for revelation, speculative theology, rationalistic philosophy, or even historiography in natural history. Few are even willing to concede that natural history may be a mixed question, and even then the mix is between positiv-

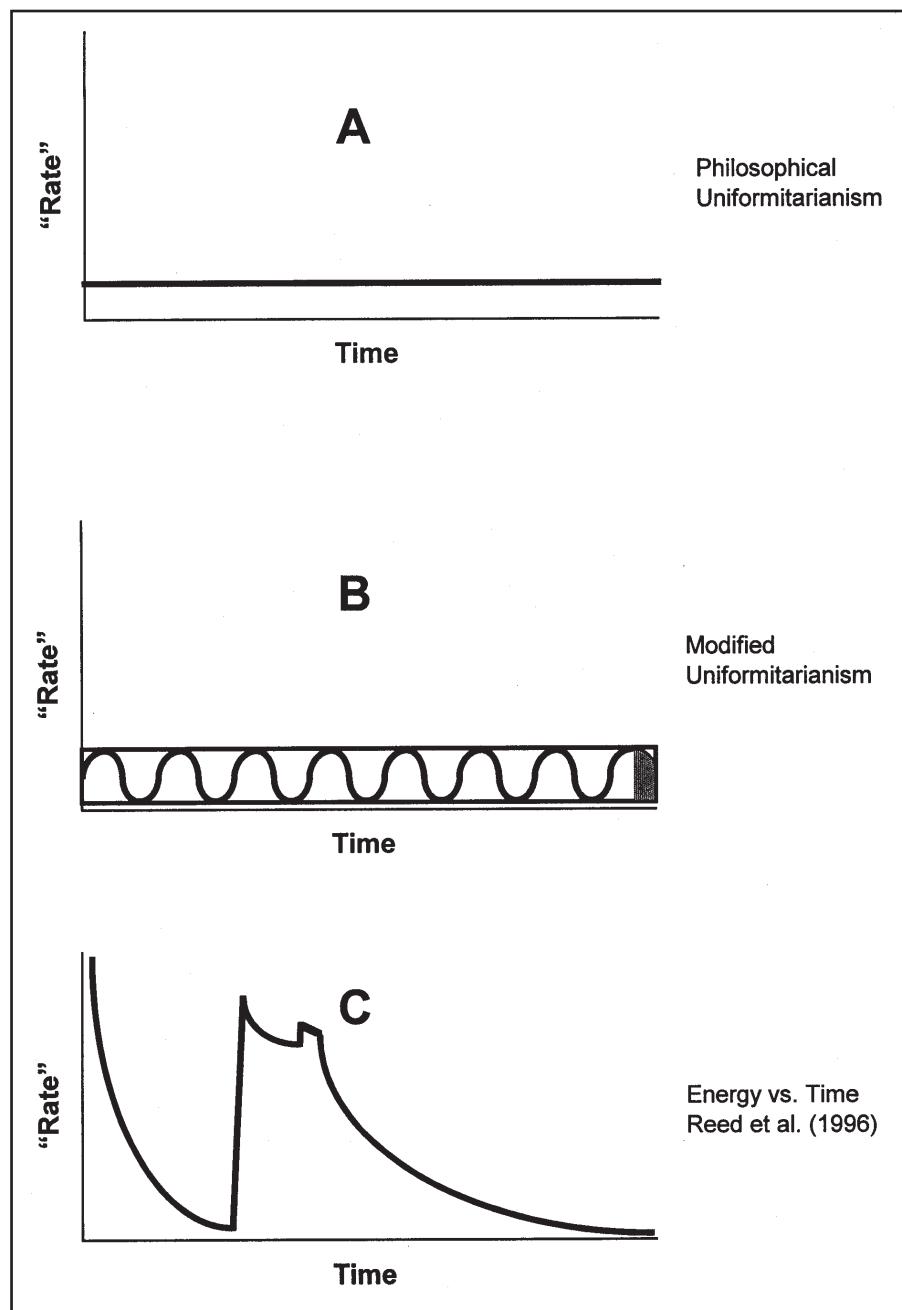


Figure 2. Comparative illustrations showing strategies for interpreting the past. Methods are referenced to rates of geologic processes. Figure 1A, labeled "philosophical uniformitarianism" shows an invariant rate of process required for confident extrapolation of interpretation into the past. This graph illustrates the Principle of Temporal Invariance. Figure 1B, labeled "modified uniformitarianism", shows how the term is defined and applied at present. The shaded area represents historical observation of processes, although it cannot be shown to scale on the time axis (it would not be visible if it was). Figure 1C is the time vs. energy plot from Reed et al. (1996). An entirely different method is employed; geologic processes are not extrapolated from present observations, but are deduced from revealed accounts found in the Bible.

ist science and positivist history. Finally, in the area of history, the link between uniformitarianism and natural

history is self-evident. In the modern understanding, uniformitarianism is the first commandment of natural history.

### Inconsistencies between Natural History and Naturalism

Since modern natural history is inextricably linked to Naturalism in its definition, its scope, and its method, the failure of natural history to conform in *all* of its aspects to Naturalism must have one of two consequences. The first, and least severe, would be the requirement that natural history be adjusted to a different set of metaphysical and epistemological presuppositions to provide consistency and coherence within another worldview. The second possible consequence would be the complete failure of natural history as an enterprise. I propose that the first consequence is possible, but only by realigning natural history to fit a Christian worldview. The refusal to make that readjustment can only lead to the logical incoherence and ultimate end of natural history as presently understood. Before the task of outlining such a readjustment is undertaken, I will demonstrate its necessity by reference to natural history's failure to pass formal tests.

Natural history fails formal tests of consistency by incorporating presuppositions of biblical Christianity. Having developed inside a culturally dominant framework of Christianity, it was unlikely that nineteenth century geologists could entirely divorce themselves from its presuppositions. Their inability to apply critical scrutiny to their own assumptions probably resulted in part from their denial of the importance of philosophy and theology. Although their venture may have appeared at that time strikingly antithetical to Christianity in its denial of the historical validity of the Genesis records, the passing of western culture into a post-Christian and post-modern phase this century has unmasked how unconsciously biblical they really were. An examination of Table I is all that is required to establish this point. The status quo can only be maintained if natural historians can demonstrate how Naturalism consistently provides justifications for the same presuppositions shown in Table I in a manner superior to that of Christianity. As concluded in Reed (1996a), it cannot because the presuppositions of Naturalism are justified ultimately by biblical theology, and ironically, many of them by reference to the biblical doctrine of creation (Glover, 1984).

Natural history also fails formal tests of consistency because its modern foundational assumption of uniformitarianism fails similar tests (Reed, 1998). Uniformitarianism cannot be maintained consistently as logically required by epistemological positivism. When pressed, advocates of natural history default to the uniformity of natural laws over time and space (Reed, 1998; Gould, 1997). However, the assertion of even uniformity cannot be defended empirically; it is the historical and logical out-

growth of the biblical doctrine of the nature of God. Naturalism cannot consistently support either uniformity or uniformitarianism apart from wishful thinking (Reed, 1998).

Finally, natural history fails tests of consistency because metaphysical naturalism requires the hidden use of biblical presuppositions as described in Reed (1996a). Since modern natural history is interwoven with metaphysical naturalism (there is no God, and no revelation), then the unentangling of natural history will require that many parts of it be cut out in order to save any of it at all.

### Natural History within the Biblical Christian Worldview

History is an essential part of the biblical worldview. It provides the arena for an eternal God to develop relationships with finite men. Instead of universal laws of nature, Christians concern themselves more with the nature of God, and understand Him better through the inspired record of His dealings with many individuals over many generations. The concept of learning the lessons of history takes on a special meaning in biblical categories. Biblical theology is littered with ethical demands illustrated by history lessons. The apostles' admonitions to imitate the life of Jesus carry across the centuries with perfect application. God is the point of reference for all temporal events, and the multiplicity of these events can be rationally integrated in a comprehensible fashion by men in this way.

History is freed from all of the philosophical errors of autonomous knowledge by reference to the unchanging nature of God and the infallible revelation of Himself and past events as recorded and transmitted in the Christian Bible. History in the Christian worldview does not require an extensive self-justification, and its value is clear in the context of our relationship to God and our knowing Him. Collingwood's (1956) need for history to be the rethinking of thoughts of the past is spurious. Concerns about the preservation of knowledge adequate for the historical enterprise and all of the rest of Descartes' objections are resolved in revelation (assuming the omniscience of God). History is good. History is possible. History is a means to know God.

Natural history in Christianity would then have no temporal break from history *per se* as it does in Naturalism. Since reality in both space and time is resolved by reference to the mind of God, then history as knowledge of the past becomes dependent on God's testimony, rather than the endless speculations of trained historians. Like nature, there is a sense in which history reveals God to man. Collingwood (1956) was only half right in his assessment of the purpose of history. John Calvin (1559) corrects the oversight by noting that true knowledge consists of knowledge of God as well as ourselves. Lessons from history are drawn in the Bible, implying that we can

validly draw similar lessons from history that we learn apart from the Bible.

How then would the subset of natural history differ in the Christian worldview from history in general? One way is to emphasize the object and purpose of the study, rather than its method. The object of natural history would still be nature, but the metaphysical background relating nature to God and man would play a more prominent role. The purpose of natural history would be defined in gaining knowledge of God and in exercising the dominion commanded in Genesis. The meaning of natural history is ultimately theological, and we should expect that the basic meaning would be supplied in the Bible. For example, explanations about the meaning of the Genesis Flood are found in several places in both the Old and New Testaments. Natural history can provide many details and insight into the meaning of history in general.

### Natural Historiography

All disciplines require a foundation to justify the truth claims that are made inside the discipline. The foundation should, at a minimum, speak to the definition, value, scope, and method of the discipline. Traditionally, historiography has spoken more to the method, but the failure to evaluate aspects of the philosophy of history has been shown by Clark (1994) to be a significant weakness of modern historiography. This weakness can be resolved by providing an explicit context for a field of knowledge within a comprehensive worldview. In fact, the definition, value, scope, and method of history and natural history can all be addressed by providing such a context.

The Biblical Christian worldview can help provide a definition for natural history. Collingwood (1956) defined history by four criteria that display a philosophical commitment away from Christianity. Each of his criteria requires modification within a biblical worldview to correct what turns out to be a truncated vision for history. He states (p. 9) that history is an inquiry; it involves asking questions about what we do not know as opposed to the recording of events that we already know. However, Clark (1994) demonstrates that a philosophical base is required to direct the asking of the questions and the methods by which they are asked and answered.

But though a historian can get along fairly well without philosophy, history cannot. All statements, historical as well as physical, that claim to be true must be based on some theory of truth. All statements presuppose some sort of general epistemology. And therefore, the practice of history depends on a philosophy of historical truth. (Clark, 1994, p. 50).

Collingwood (1956, p. 9) also states that history is a record of human actions as opposed to those of the gods. This definition presupposes that human actions are the

only meaningful and knowable ones in the universe. Natural history cannot survive inside this definition, since most human actions are not a significant part of natural history. In the biblical Christian worldview human actions impact natural history because of the temporal proximity of men and nature since the beginning, and because of the role given to man at the creation. The causal relationship between man's sin, for instance, and the Genesis Flood is acknowledged. Collingwood's (1956) definition also assumes that either God does not exist, has not acted in history, or cannot be known. Any of these assumptions are axiomatically rejected by Christianity, which overtly teaches that God does act within history in an obviously intelligible fashion.

Collingwood (1956, pp. 9–10) also states that history is based on the interpretation of evidence. He again displays a tendency to truncate the historical enterprise. History can also include the gathering and sifting of evidence prior to its interpretation. Interpretation itself is also a large problem, as Clark (1994) demonstrates. Collingwood presents no basis for interpretation by which the problems formulated by Descartes are answered. Christianity does answer those problems by referencing the knowledge of history and its proper interpretation to God. Although historians may be challenged to interpret the past correctly, God is not.

Finally he avers that the purpose of history is to teach us about man (Collingwood, 1956, p. 10). John Calvin (1559) displays a fuller appreciation of knowledge states at the beginning of his *Institutes of the Christian Religion*, "Nearly all the wisdom we possess, that is to say, true and sound wisdom, consists of two parts: the knowledge of God and of ourselves". (McNeill, 1960, p. 35). Collingwood's (1956) tendency to truncate history is again evident. The purpose of history is to enhance our understanding of our own relationship with God, with each other, and with nature by discovering how God has directed each of these relationships in the past. Life is short. If we are unable to learn from others, then our experience through life is truncated.

A Christian definition of history should be broader than Collingwood's (1956). It would consist of man's incomplete knowledge of the past, both the myriad of events and their various levels and shades of meaning. History must be seen as revelation: a general revelation for those aspects outside of the biblical record, parallel to the general revelation provided in nature; and a specific revelation of those events and meanings recorded in Scripture.

Under this worldview, natural history operates as a subset of history. History in general would include the investigation of events of the past and their interpretation in the context of the worldview itself. This definition overcomes the problems developed by Clark (1994) that try to make history a virtually autonomous branch of knowledge. No branch of knowledge can exist independent of axiomatic

metaphysical and epistemological assertions. Recognizing this dependence eliminates the inherent uncertainty imported by other definitions of history that do not explicitly recognize the connections. For example, Collingwood (1956) discusses the task of the historian to interpret the events of history, but provides no basis by which to perform the interpretation. Agreement by all historians over the meaning of historical events is unlikely. Having consistency within a single worldview at least provides coherence between philosophical positions and historical interpretation – a coherence not presently enjoyed in the present relativistic milieu.

The Biblical Christian worldview can help provide a scope for the history enterprise. By recognizing the relationships that exist between God, man, and nature, the historian can interpret events of the past by reference to all three, instead of just man. The preference of Collingwood (1956) to restrict history to man is stultifying to historical investigation because it ignores critical aspects of the task. As Descartes (1637) noted, the selection of historical material is performed outside of history. The choice of events to discuss can at least be driven by consistency with a given worldview. For example, the historical events surrounding the life of Abraham take on a different significance if the actions of God and the meaning provided by Abraham's relationship with God are allowed to be a part of the historical enterprise. Likewise, the scope of natural history should be defined by reference to a worldview. For all practical purposes, it already is, but the connections are hidden and secret, and not out in the open. Studying the historical events in terms of their biological and geological significance cannot be divorced from their connections with God and man.

The Christian worldview can help clarify the value of history. Value must presuppose purpose of some type and purpose must presuppose mind. History as a channel of revelation gives an ultimate meaning to historical events. All events are significant since all are ordained by God and work to His purposes and ends. The possibility of deeper insight into the mind of God should motivate a historian much more than Collingwood's (1956) dubious goal of rethinking the thoughts of historical figures. Random natural history is thus impossible, and natural history must derive its value from exploring the mind of God, rather than the mind of man or the mindlessness of nature.

Understanding the definition, scope, and value of history within the Christian worldview helps develop a unique method. There is a dual method to the study of history that cannot be accepted by positivists or rationalists. Since history exists as revelation, it parallels the recognition of the dual source of revelation, which is contained in both nature and Scripture; the latter being recognized as superior to the former. If history is to function as a form of

revelation, then the primary facet is special revelation in the Bible. As God's special revelation, the historical events, the historiography, and the theology/philosophy of history are all presented. Recognizing each of these aspects in the Bible frames historiography in the biblical Christian worldview. The second pathway of knowledge lies in the empirical investigation of events outside of the Bible, along with the indirect interpretation of their meaning. The significance of events is confirmed by the Bible, and the methods of interpretation are also provided by example. Natural history functions in exactly the same way. The outline of historical events and their meaning is explicitly supplied. Details outside the biblical accounts are investigated empirically and interpreted within the theology of the Bible. Since the Bible is superior in its certainty to empirical investigation, one of the rules of natural history is then to interpret phenomena in light of Scripture and not the Bible by phenomena. Another rule would be to search the Bible for the meaning of natural historical events first, and then use biblical principles to complete the task. The existence of the Bible allows for as great a certainty to be attached to historical endeavor as to the scientific (Reed and Froede, 1997).

## Conclusions

The distorting effects of the naturalist worldview in its materialistic metaphysic, its positivist epistemology and its uniformitarian historiography have created a false understanding of both history and natural history. The comparative analysis of presuppositions, methods, and conclusions performed in this paper suffices to demonstrate irreconcilable tensions between Naturalism and a philosophy of both history and natural history. In contrast, the biblical Christian worldview defines the meaning, method, and factual framework of both history and natural history. But consistency must also be achieved within the Christian worldview. Doing so has demanded that both history and natural history be redefined in their scope, value, and method.

What does this mean for Christians interested in natural history? Three conclusions are obvious. First, the advantages of history and natural history having a place within an integrated worldview cannot be realized unless the integration is consistent.

In any case, the conclusion is that history must, with all other subjects, be fitted into a comprehensive system of philosophy... Most historians are oblivious to the philosophical difficulties that beset their subject. But unconsciously they must adopt one position or another. Sometimes they utilize several different positions without being aware of their inconsistency. (Clark, 1994, p. 18).

Greater attention must be paid to those links. For example, Christians who desire a biblical worldview, but wish to accommodate the fads of modern natural history must recognize their own inconsistencies. The age of the earth does matter, because link by link it reaches into every corner of the origins debate. Ultimately, it impacts such fundamental issues as the existence of God and the possibility and veracity of revelation.

Second, the current “scientific” approach to history is invalid. History within a biblical worldview has a dual method. The first and most basic is the knowledge of the facts and meanings directly revealed in Scripture. The second is the empirical investigation of additional facts and meanings not provided in Scripture. The two facets of history stand in a curious juxtaposition; the first is epistemologically foundational but the second is the facet of the most intense human activity. This level of activity pushes it into the center of attention, but a balance must be maintained to prevent future errors similar to those of the Enlightenment.

Finally, the naturalist presuppositions of modern natural history are refuted by this vision of history. There is no time when nature operated autonomously out of the control of God or, for the most part, the dominion of man. The meaning of history is not found in a natural process of evolution (or any other natural process; e.g., Hegelian or Marxist dialectic). In fact, there is no place for history within the naturalist worldview that leaves room for consistency and coherence. The historical enterprise, including natural history, is only rescued by the assumptions granted and justified within Christian theology.

What is the future of natural history? In the Christian worldview, natural history can function in symmetry with history; both firmly based on a set of axioms that solve metaphysical and epistemological issues of historiography. It can include the investigation of the physical, chemical, biological, or geological aspects of events of the past. However, the ultimate meaning, methods, and factual framework must be based in special revelation – the Bible. The second aspect of natural history’s method, empirical investigation, is open-ended and the proper domain of intense study. Science plays a part, in a forensic sense that affirms natural history as a mixed question. But boundaries exist, and the historian who strays will find, like many this century, only a morass of uncertainty and frustration outside of the borders of revelation.

## Glossary

Dollo’s Law: The axiom that evolution is irreversible.

Epistemology: The category of philosophy that addresses the problem of knowing.

Existentialism: A modern school of philosophical thought that holds to the impossibility of systematic knowledge. Man authenticates his own existence by making choices in spite of the meaninglessness of his existence.

History: Used in three senses. The first is the events of the past. The second is the record(s) of those events. The third is the discipline that studies history in the first sense by use of histories in the second sense.

Historiography: The principles and methods of historical study. In this paper, it would also include aspects of the philosophy of history.

Marxism: The modern worldview named for its founder, Karl Marx, that embraces a theory of dialectical materialism to explain reality. It is best known for its emphasis on economic determinism.

Natural History: The discipline concerned with the history of nature. In the present-day context of the naturalist worldview, it is considered a facet of science and used almost synonymously with historical geology. In the biblical Christian worldview, it would be a facet of history, though distinguished from human history by method.

Naturalism: The dominant secular worldview of the last two centuries; it integrates metaphysical materialism, epistemological positivism, and uniformitarianism into an atheistic explanation of reality.

Physical Determinism: A nineteenth century theory of history that explains all events by reference to the properties of matter, particularly motion and position.

Positivism: A theory of knowledge with many variations of the central theme of the empirical or scientific derivation of truth to the exclusion of philosophic or theological paths.

Scientific Naturalism: A theory of history that predicts the discovery of absolute laws of history in the same sense of laws of science and, also similar to science, by empirical investigation.

Worldview: A comprehensive and integrated understanding of reality in all of its aspects.

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## Book Review

### *The Design Inference: Eliminating Chance Through Small Probabilities* by William A. Dembski Cambridge University Press, Cambridge, UK. 1998, 243 pages, \$59.95

This title has appeared on at least one list of the twentieth century's "Top 100 Books." The author refers to it as a monograph, a revised version of his philosophy dissertation from the University of Illinois at Chicago (1996.) With additional studies in mathematics, probability theory, and complexity theory Dembski comes to his subject well qualified. The problem: How to distinguish events which are the result of design from those due to regularity (natural law) or to chance.

The design inference does not indicate what the design agency was, nor how it operated. These are separate problems. But by demonstrating "patterned improbability" the indication of design in an event precludes chance as an agent.

Dembski's text is dense with symbols and equations, although he employs some intriguing practical examples illustrating improbabilities. The reader will do well to focus on a flow chart entitled "The Explanatory Filter" (p. 37), which illustrates a clear and simple method for distinguishing chance from design.

Of special interest to creationists is a case study, "The Creation-Evolution Controversy", pp. 55-62. Further con-

siderations regarding the same argument are discussed in the chapter on Small Probability, in which the claims of Richard Dawkins as to spontaneous origin of life are answered.

The chapters on probability and complexity theory condense a great amount of material into some 30 pages each. Other researchers have written large books on each of these subjects, and Dembski's abbreviated treatment will be difficult to follow for all but the mathematically trained.

In an epilog, Dembski states that he believes the main significance of the design inference for science is that it detects and measures information. Where systematic information is found, design and not chance must be inferred. Other researchers also have concluded that information is the central problem of biology, and is essential to a theory of human consciousness.

The book has an index and an extensive list of references.

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# The Life Clock and Paley's Watch: The Telomeres

Jerry Bergman\*

## Abstract

The complex telomere structure eloquently demonstrates an example of a precise mechanism which in numerous ways parallels a mechanical watch time piece. The structure also provides a possible mechanism to explain the wide variations in

longevity of humans found in history, specifically those described in the Biblical record. This mechanism may also give us insight into the Biblical fall and the change in longevity that has occurred since.

## Introduction

One of the most convincing proofs for the existence of a creator has been the existence of a creation. Eloquently propounded by Saint Thomas Aquinas and other prominent church fathers, this line of evidence was more recently elaborated by William Paley and many others since. Paley compared the intricacy and design of living organisms to mechanical watches. He concluded that it is immediately apparent when one holds a watch that it was designed by an intelligent engineer and built by a skilled craftsman. Likewise, the understanding of biology which was just beginning to develop in Paley's time has helped to convince many persons of the validity of the logic that design proves a designer.

Scientists now recognize that the complexity of a single eukaryotic cell is much greater than was known about most entire organisms in Paley's day. We can now say from our vantage point that the understanding of living organisms in Paley's day, and even in the early 1900s, was primitive compared to today's knowledge. Paley's watch thesis has now been eloquently confirmed, especially in the fields of molecular biology, cell structure and function (Behe, 1996; Senapathy, 1994). Numerous examples of this complexity exist including the cell cycle and telomere system which illustrate both intelligence and design which we only now are beginning to understand.

## Telomeres and Telomerase

One of the most promising new research fields is the telomere DNA maintenance system used in all mammals. This system uses telomerase enzymes and accessory structures that catalyze the manufacture of telomeres and also maintain their length and even repair them as needed (Lang, 1998). Telomeres are part of the protective end caps located on both sides of all normal chromosomes. Telomerase is an enzyme that maintains telomere length

by adding DNA bases to the chromosome ends and by producing certain telomere structural proteins (Blackburn, 1991). It will be discussed in detail later.

The most critical role of telomeres is to maintain an intact chromosome by preventing degradation of its ends. They also prevent translocation of DNA from one chromosome to another and the formation of ring chromosomes (Haber, 1995; Kipling and Cooke, 1992). If these caps break off or are gradually lost as a result of normal cell division, the chromosome ends can fuse, producing ring chromosomes. Translocations result if a telomere-absent chromosome end attaches to another chromosome and one of the connected chromosomes breaks, leaving part of the telomere-absent chromosome bonded to the other chromosome.

Telomeres also function as a biological clock which helps to regulate the length of the cell's life span by triggering the nondividing state termed senescence after a certain number of cell divisions occur (Bodnar et al., 1998). When senescence occurs depends on telomere length which is usually directly related to the number of cell divisions and not chronological or metabolic time as once thought. Human somatic cells have only 92 telomeres, and other living cells have more or less, depending on the species. One animal, the supposedly primitive *Tetrahymena thermophila*, has 20,000 telomeres (Lewis, 1998, p. 982).

The term telomere was first coined by geneticist Hermann J. Muller (1890 to 1967) and comes from *telos*, Greek for "end," and *meros*, Greek for "part." The modern research on the function of telomeres began with the work of James Watson in the 1970's and Howard Cooke in the middle 1980's (Lange, 1998). Telomerase was first discovered in human cells in 1989 by University of California,

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Davis biologist Gregg Morin (Seachrist, 1995). Since then, a meteoric rise in our understanding of the complexities of this cellular life span control system has occurred.

## The Structure of Telomeres

Telomeres in humans and most higher eukaryotes consist of numerous associated proteins and a six-nucleotide sequence (TTAGGG or T<sub>2</sub>AG<sub>3</sub>) that is repeated from a few hundred up to a thousand times (Shore, 1998). This sequence, with few exceptions, is highly homologous in all eukaryotes examined to date (Clark and Wall, 1996, p. 35). Telomeres also are involved in a wide range of diverse biological phenomena which include influencing both gene expression and DNA replication.

Human germ-line cells contain telomeric TTAGGG/CCCTAA repeats at each chromosome end averaging 10,000 DNA bases (10kb), and telomeres can make up as much as 10 percent of the total genome (Bodnar et al., 1998; Blackburn, 1991). Telomeres also differ "in major ways from other DNA sequences in both structure and function" (Blackburn, 1991, p. 569). For example, the DNA at the extreme ends of some telomeres is not arranged in a double helix but is single stranded. Furthermore, telomeres are guanosine-base rich nucleotides that can bend back to form a hair-pin structure with the complementary cytosine base rich strand and this is evidently necessary for the functioning of telomere DNA.

Another structure located at the end of the telomere is a protein/guanine "cap" which protects the telomeric ends *in vitro* and may also help to regulate the action of telomerase by preventing both further chromosomal elongation and degradation. The cap is a heterodimer (a unit consisting of two sections), and its units have a molecular mass of 55,000 Daltons (55kD)<sup>1</sup> and 41 kD.

## How the Telomere Functions as a Clock

Telomeres are often likened to the plastic tags called aglets located at the end of shoe strings which prevent the shoe-strings from fraying in order to extend their useful life. Once all or most of this protective end is lost, the chromosome deterioration process can begin. Each time the chromosome divides, a short section of the telomere end is left uncopied—and the copy is thus shorter than the original—because DNA strands cannot be replicated to the very end by DNA polymerase (Lange, 1998). The reason is that the DNA polymerase must bind to a primer at the 3'

end, and new bases cannot be added at the point where DNA polymerase primer attaches to the DNA.

The area where the DNA polymerase attaches to the DNA is called the *primer space* and is necessary to start the DNA duplication process. Consequently, the chromosome end copy shortens with each cell division, and its length serves as a timer which determines the cell's lifespan. The end result is the chromosome shortens with each round of cell division producing a "mitotic clock" that determines how much time will elapse before a cell enters senescence (Lange, 1998).

In the average human somatic cell, the telomeric end loss rate is estimated to be between 15 to 40 nucleotides per year. Consequently, telomeric length can be used to estimate both the past number of cell divisions and the cell's age. When the functional telomere is totally lost, the affected chromosome breaks down and as a result the cell is damaged to the degree that it normally undergoes apoptosis (a process of internally controlled cell destruction). Telomeres that are shortened to a certain point also may cause the activation of a checkpoint pathway system that inhibits cell proliferation (Hartwell and Kastan, 1994).

## The Telomerase Structure

Cell death in many animals can be delayed or even prevented by a complex telomere elongation system which replaces the lost DNA and stops the process triggered by telomere loss, allowing the cell to continue to survive (Barinaga, 1996). This elongation system involves the enzyme telomerase. Telomerase is a complex 123 kD ribonucleoprotein that consists of RNA and a protein framework shaped to support a short RNA strand that contains the set of nucleotides complimentary to telomere DNA (Blasco et al., 1995). Telomerase has three main components: a catalytic protein portion that possesses reverse transcriptase activity, an RNA template, and an associated protein called *telomeric repeat binding factor* (Lewis, 1998, p. 981). Comparisons of telomerase with other proteins have shown that the telomerase gene does not resemble any known gene in the existing database. Consequently, identifying it was enormously difficult. This problem has been partly solved by the use of new methods to determine the protein composition and sequence of telomerase (Lingner et al., 1997).

The human telomerase gene was the first mammalian telomerase gene ever cloned (Seachrist, 1995, p. 30). The first two identified telomerase proteins have molecular weights of 80 kD and 95 kD. Analysis of the telomerase enzyme shows that although it does resemble some viral RNA synthesizing enzymes, it is considerably different than *all* other enzymes that synthesize DNA.

<sup>1</sup>A mass of 55 kD is equal to the mass of 55,000 hydrogen atoms.

Two types of telomerase systems exist, one for somatic cells and another for germ line cells. Both are imperative for species survival. If the germline chromosomes were shortened with each cell division, extinction of that animal would soon occur. Actually, while telomeres normally become shortened with age in somatic cells, they often become *longer* with age in some germ cells, specifically sperm cells (Clark and Wall, 1996, p. 36).

Telomerase also completes the assembly of the lagging strand in DNA replication and can in some cases repair broken chromosome ends. As far as is known, all members of the monera kingdom and both germ and cancer cells as well as tumor-derived cell lines that grow indefinitely *in vitro* all continually synthesize telomerase. In higher organisms telomerase activity is shut off in all but germ cells and some blood-forming cells (Haber, 1995). In humans, telomerase production is maintained in only a few cell types, including the *stem cells* located in bone marrow and the testes which use telomerase to produce a life-long production of healthy blood and sperm cells, respectively (Crawford, 1995). Telomerase must also interact with the protein cap located at the DNA ends which may help serve as a regulation system to allow the cell control over its life span in specific situations (Bodnar et al., 1998).

An enzyme which translates RNA back into DNA is called a *reverse transcription enzyme* or a *reverse transcriptase*. Telomerase functions by using reverse transcription to produce a DNA copy of its RNA sequence and its major protein component called *human telomerase reverse transcriptase*, resembles known reverse transcriptase enzymes (Lange and DePinho, 1999). The telomerase catalyst uses a template to lengthen the telomere. It does this by fusing the DNA made by telomerase onto the 3' terminus of the chromosome and as a result extends the cells lifetime. The strand is then copied to produce a double stranded DNA. This ends the normal cell life span and if the extending mechanism is not damaged or turned off, it potentially confers immortality to the cell (Lingner et al., 1997).

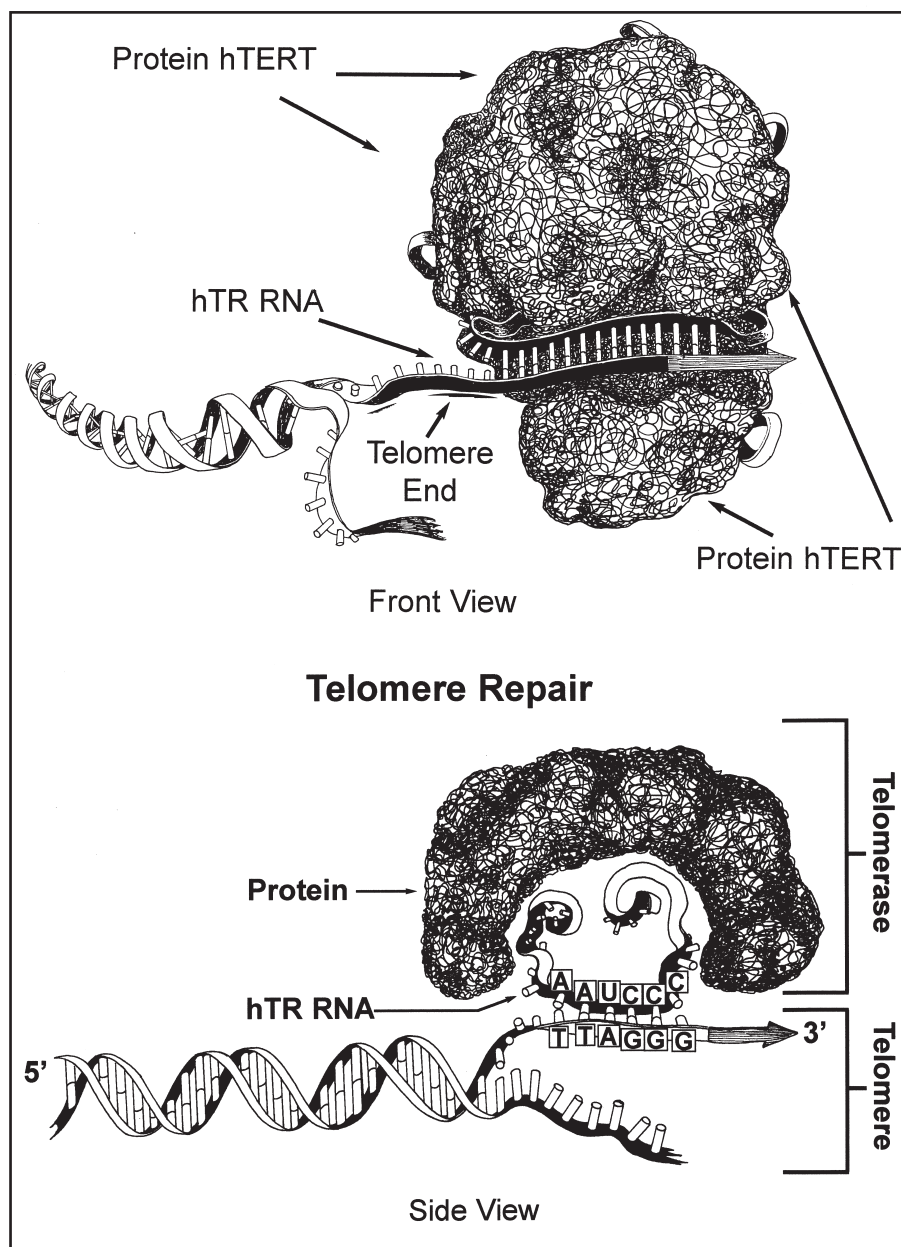


Figure 1. Two views (front and side) of the telomere and telomerase assembly unit. The telomerase enzyme adds new bases onto the end of the chromatin to extend its life. The telomerase is composed of hTERT protein and nucleotides shown in the front view. (Adapted from several sources including Haber, 1995).

Another protein called the *telomeric repeat binding factor* physically connects to both the RNA template and the reverse transcriptase chromosome end in order that six-nucleotide DNA repeats can be added to the chromosome end. This cellular machinery is essentially a built-in telomere factory that is permanently turned on in certain cells such as gametes and in other cells only at certain times (Lewis, 1998, p. 981).

## Telomerase and Cancer

Telomerase is active in all known vertebrates, mostly in germ cells and the early stages of the embryo, and is normally inactivated or repressed in somatic tissue (Sharma et al., 1996). The function of telomeres was first indicated from the finding that a major difference between senescent cells (normal somatic cells) and the so called immortal cells including normal germ or cancer cells was the telomeres (Travis, 1995). The relationship between telomeres and aging was also supported by the discovery that patients with *progeria*, an inherited disease which causes lethal rapid aging at a rate about nine times normal, is caused by defective telomerase. Damage from cell death due to lack of functional telomerase causes a 10 year old progeria patient to physically resemble a 90 year old. Progeria is caused by a deficiency which results in pronounced shortening of the patients telomeres.

Understanding the factors that trigger the production of telomerase is now recognized as critical in a number of fields including cancer (Lange and DePinho, 1999). By assaying telomerase enzyme levels, Kim et al. (1994) found evidence of telomerase activity in 90 out of the 101 primary tumors they sampled, which included 12 different cancer types. This is in contrast to a total lack of telomerase activity in the 50 normal tissues that were examined.

In another study, 98 out of 100 cancer-derived cell lines were found to express telomerase activity, in contrast to none of 22 cell lines that were derived from non-cancerous tissues (Kim et al., 1994). Lange concluded that telomerase-positivity is not a mere side-effect of dedifferentiation or rapid proliferation related to cancer development, but is evidently a *prerequisite* for continued tumor growth (Lange, 1998). Lange and others have also presented evidence that telomere shortening is a major tumor-suppressing mechanism.

Telomerase expression has now been found in approximately 90% of all metastatic cancers including those of the lung, breast, stomach, uterine, and liver and is hypothesized to be a universal factor produced at some time in all cancer cells. Importantly for tumor marker research, it seems likely that *all* tumors contain measurable telomerase activity at some stage in their development, but the telomerase activity in some non-cancerous cells may be too low to measure by current techniques. Background noise must be effectively filtered out before telomerase can be a useful tumor marker. Furthermore, cancer cells do not usually contain *longer* telomeres, but rather do not experience telomere *loss* (Kim et al., 1994).

An example of the use of research on the telomerase as a tumor marker to aid in diagnosing cancer at the early stages, Kinoshita (1997) found of the 45 bladder cancer patients they examined, 36 exhibited telomerase in a bladder

washing and the enzyme was found in the urine of patients in over half of the cases they examined.

In contrast to most malignant tumors, some *benign tumors* such as *colonic adenomas* evidently do not express telomerase in levels measurable by current assays, while only 10% of all tissues effected by *benign prostatic hyperplasia* express telomerase. For this reason this enzyme may provide information on the type of, and location of, a tumor (Haber, 1995). This discovery may be critical both for cancer diagnosis and treatment if enzymatic assays can be developed to directly or indirectly detect the presence of cancer cells, and select methods of blocking telomerase activity may be an effective method of adversely affecting cancer cells while having no effect on healthy normal cells.

Compounds have been synthesized which block the action of telomerase, and testing these compounds on humans has now begun. The blocker would disproportionately affect cancer cells, since most normal human cells would be largely immune to a telomerase blocker because they totally lack or contain extremely low amounts of telomerase. One blocker type is an antisense RNA strand that binds to, and thereby inactivates, the telomerase enzyme's RNA. The success of this approach in mice suggests that antisense telomerase RNA can be useful to treat human cancer. A major concern is that the drug may also block telomerase produced by stem cells which are necessary to produce red blood cells. Another promising approach to treating cancer is to produce a means of upregulating telomerase in cancer cells.

Cells can become cancerous without telomerase activity, but sustained growth of the cancer evidently *requires* the constant production of telomerase. Malignant cancer cells normally do not undergo apoptosis, and many even fail to undergo senescence. Telomerase genes can become active by a mutation that damages their control system. An example is damage to the system which inhibits telomerase production also causes loss of regulation, allowing uncontrolled production of the telomerase enzyme.

Telomerase research also has helped investigators to understand why non-cancer cells normally replicate only about 50 times *in vitro* before they die, and why previous efforts to extend cell life have achieved limited results. The number of cell divisions that cultured normal human cells such as fibroblast cells can undergo is highly correlated with the *initial* telomere length. Telomere length is therefore hypothesized to be a major factor that determines cell longevity and may partially account for the normal wide variation in the life span of most of cell types (Haber, 1995). Telomere length also controls when cells enter the senescent or terminal growth arrest state.

Drugs that increase telomerase production may also retard the aging process, particularly in vulnerable cells

such as brain cells. Researchers at the University of Texas Southwestern Medical Center have successfully stimulated the production of telomerase in normal skin and retinal cells. Their goal was to reduce disease and cell damage due to the effects of aging (Bodnar et al., 1998). This mechanism already has to some extent been exploited by the utilization of hybridomas, tumor-derived cell lines which can grow indefinitely *in vitro* because they express telomerase, preventing the normal progressive shortening of their telomeres (Kipling and Cooke, 1992).

## The Process of Telomere Repair

DNA repair enzymes constantly monitor the integrity of DNA, and rapidly repair any breaks that are discovered. If the telomeres are not properly maintained, DNA repair enzymes can occasionally mistake the ends of chromosomes for broken DNA. As a result, telomeres may be inappropriately joined together or even become fused to genuine chromosomal breaks by recombinational or end-joining mechanisms (Shore, 1998, p. 1818). The result is usually an unstable, dicentric chromosome that can result in transpositions or other abnormalities which can contribute to cancer progression. This is one reason why cancer cells frequently show chromosomal instability resulting in ring chromosomes, telomeric associations, and dicentric chromosomes (Sharma et al., 1996). The complex set of end cap proteins normally protect the chromosomal ends from inappropriately joining, and defects in these proteins can lead to the cascade that results in damaged chromosomes.

Part of the large enzyme required for normal DNA repair is a DNA binding subunit called *KU complex*. A KU protein is a DNA-dependent protein kinase which is a member of the ATM gene family (Shore, 1998, p. 1819). The exact role of this system in various types of cells and organisms has yet to be determined, but KU proteins evidently are key players in the replication and protection of telomeres. The KU protein family and its homologues may also play a role in telomere metabolism, meaning that it may be involved in telomere replication as well as in gene silencing, and evidence now exists that the KU complex is physically bound to telomeres. The KU70 protein and its homologues including YKU70, HDF1, YKU80, and HDF2 are one of several protein families that can bind with high affinity to DNA ends including those that are blunt, overhanging, or hair-pin in structure (Shore, 1998).

As a consequence of telomeric erosion, the telomeric length can be stabilized by activating telomerase to add a hexameric repeat of the sequence 5' TTAGGG 3' to the chromosome ends. Since telomerase production and activity is normally inhibited in healthy cells, researchers are now trying to understand how the cell's telomerase inhibi-

tor system works. This understanding may aid in finding a way to turn off the telomerase enzyme *only* in cancer cells in order to stop cancer cell growth.

Researchers are also experimenting with turning telomerase on or even adding telomerase to normal cells to enable them to live beyond their normal life span. Early experiments indicate that normal cells can continue to divide long past their normal lifespan evidently without any ill effects. The immediate goal is to use the telomerase enzyme to treat certain health problems associated with aging such as macular degeneration or skin ulcers. Recently Bodnar et al. (1998) were able to activate telomerase, resulting in the addition of TTAGGG repeats which artificially elongate telomeres. As a result the growth potential of the cell increased so that it could divide beyond its normal senescence length.

These studies usually add the telomerase gene to the cells which were grown *in vitro*, which produce ectopic expression of telomerase. Lange and DePinho (1999, p. 148) in a summary of the literature concluded that ectopic expression of human telomerase reverse transcriptase could confer immortality on the cells as now occurs with our germ cell line. This approach may also be used to replace cells lost due to injury, degenerative diseases, diabetes, and rheumatoid arthritis. Work is also underway to use this approach to extend the human lifespan to 140, 180, or more years. The results of the preliminary research in this field is now regarded by many specialists as very promising (Feber, 1999, p. 154–155; Lewis, 1998).

## Telomere Length Mutations

As noted, the major reason for telomere shortening is because DNA ends cannot be replicated to their terminus by normal DNA polymerases (McEachern and Blackburn, 1995, p. 403). Almost all eukaryote cells can manufacture telomerase which catalyzes the addition of nucleotide repeats on telomeric DNA termini. This process has so far been most extensively studied in yeast. Regulation prevents the telomeric DNA lengths from deviating in *either direction* from the ideal length. A control system consisting of protein and structural support molecules is required both to ensure that the necessary length is achieved and that elongation *beyond* this point does not occur. This is another example of the extreme complexity required to produce the watch-like precision that exists in every cell.

An example of loss of length control is a specific mutation found in the yeast *Kluyveromyces lactis* that results in telomere elongations of up to 100 times beyond normal (McEachern and Blackburn, 1995, p. 403). Some of the many mutations discovered that cause abnormal telomeric elongation cause immediate elongation, whereas others cause elongation *only* after a latent period of hundreds of

generations. Mutations that cause immediate changes directly affect the proteins involved in controlling telomerase activity. Conversely, McEachern and Blackburn proposed that the “genetic time bomb” effect is due to a negative regulation system normally controlled by one or more protein factors that bind to the telomeric repeats.

Along with telomerase that elongates telomeres, an inhibitory double-stranded telomere-binding protein (DS-TBP) is also normally produced. DS-TBP interacts with the terminus specific binding protein to *prevent* the uncontrolled elongation of the telomeres (McEachern and Blackburn, 1995, p. 407). DNA replication also causes a progressive loss of telomeric sequences which *also* causes damage to the genes that produce DS-TBP protein.

Mutations of the DS-TBP regulatory protein can cause both immediate and delayed telomere lengthening. Mutations causing *immediate* telomere lengthening often interfere with the telomere regulatory system located at the DNA terminus. This may cause a change in the DNA sequence, preventing the proper binding of the terminus-specific binding DS-TBP protein. As a result of this change, telomerase is able to bind to the telomere when it normally should not, causing excess elongation.

For the *delayed* elongation phenotype, the telomeric DNA-sequence changes affect the DS-TBP protein binding site. Terminus-specific binding protein is then able to function *only* when a DNA molecule loses a large proportion of its functional DS-TBP. When the wild type DS-TBP's become too few due to loss of telomeric repeats, unregulated telomere lengthening may then occur. As the telomeric terminus is moved progressively away from the region where some DS-TBP remains, normal regulatory interactions become more unlikely, thus favoring a run-away telomeric growth. Another cause of uncontrolled elongation is a disruption of the structure at the terminus of the chromosome which causes it to no longer respond to the inhibition system normally mediated by the DS-TBP system.

## Other Mechanisms Used to Maintain Telomere Length

Several other mechanisms exist which can prevent telomeres from progressively shortening. One such system is utilized by certain types of flies and involves structures called *retroelements* which are normally clustered around the telomeres. Retroelements are periodically added to the chromosomes ends, usually several kilobases at a time, preventing telomere shortening. It is not known if a similar mechanism exists in humans. Bacteria avoid the problem of chromosomal shortening that telomere structures are designed to prevent because both their chromosomal and plasma DNA are circular (Lewis, 1998, p. 981).

## Implications for Creationism

Paley's thesis is eloquently demonstrated by the complex cell clock system controlled by telomeres. Only a minuscule amount of knowledge about the biological world was known in Paley's day compared to what is known today, and nothing was known about telomeres then. We now realize the level of complexity of the cell exceeds that existing at the gross anatomical level. An estimated over 100,000 different proteins are made by the human body, each which has specific and specialized function(s) and must interact appropriately with all of the other cell proteins. If a protein is altered, it could have adverse consequences for the cell due to causing damage or interfering with other structures. Each one must achieve its own function, and must not interfere with the function(s) of other proteins and cellular processes.

An understanding of telomeres provides a bases for understanding longevity both today and in the past. Claims that it was impossible in the past for humans to live much beyond a hundred years or so are now being seriously challenged, not only by the Scriptural record but also by science. We now realize various reports in the Bible that Methuselah and others lived to be many hundreds of years old are feasible, given that Methuselah was closer to perfection than humans are today. Modern humans are genetically degenerate, but our vastly improved level of knowledge about the biological and physical world has helped us to ameliorate enormously the effects of this degeneration. At some point in history human longevity could have changed as a result of some alteration of the telomerase system.

If Paley had written his opus today, it could consist of hundreds of volumes, and one complete volume alone could be on the telomere system as an excellent example of irreducible complexity. It cannot function until all of its parts are in place. An extensive literature search has found that so far no one has even attempted to speculate on a theoretical scenario regarding how the telomere mechanism could evolve. The system is almost identical in all eukaryotes and shows no evidence of evolution; it either exists in total or another totally different system exists.

One theory of telomerase/telomere evolution includes the idea that telomeres originated in early eukaryotes from retrotransposons which were supplied by a retrovirus, and that the unusual *Drosophila* telomeres reflects a relatively recent transposition of retrotransposons to somatic cells that preferentially inserted at the chromosome ends (Eickbush, 1997, p. 911). One of many major problems with this theory is “How did the chromosome ends protect themselves until this fortunate event occurred?” Another method must have existed, and this retrotransposon event must have occurred very early in evolution because the telomere system is evidently uni-

versal in eukaryotes and prokaryotes. Furthermore, retrotransposons are a complex system and parsimony would rule out convergent evolution to explain their similarities. Eickbush concludes that among the many problems with this theory include:

In order to support this origin of telomerase, it would be necessary to show that non-LTR retrotransposons date back to the origin of eukaryotes. Resolving the ultimate origin of reverse transcriptases will be difficult because of the low level of sequence identity among polymerases. In the meantime, the discovery that the catalytic subunit of telomerase is a reverse transcriptase fuels the argument that retrotransposons have had major influences in shaping the eukaryotic genomes (1997, p 912).

Furthermore, telomerase is necessary for survival and research has found that removing the telomerase gene compromised:

chromosome stability and the integrity of cells that normally divide often. Their telomeres became shorter than normal, their chromosomes broke, and some nonhomologous chromosomes fused to form translocations. The animals' fertility plummeted, reproductive organs shrank, and highly proliferative tissues, such as testis, spleen, and bone marrow, degenerated. These results therefore confirmed that telomerase is important for maintaining highly renewable tissues (Lewis, 1998, p. 983).

The earliest cells were believed to have circular chromosomes which would have confirmed immortality on them. This finding argues against macroevolution because the telomere system is a complex system which usually *ends* the life of each cell, and eventually the life of the entire organism. It would not confer increased but a *decreased* fitness and a shorter reproductive life span for the animal. Consequently, this system would not be selected for but would rather be selected against. If the whole purpose of life is to produce the next generation of genes, as argued by Dawkins (1976), why would a complex mechanism exist to cause the end of the gene? And when the telomerase system is damaged as occurs in cancer, the end result is also the end of the gene line.

Some evolutionists argue that the telomere system usually does not affect the cell until after the animal's reproductive age is over. This is not entirely true because a longer life span would allow evolution of a longer reproductive life span (Kipling and Faragher, 1999, p. 191–193). Many cells are destroyed early in life by this system and in many cases it would not confer a survival advantage to the organism. Nor would it contribute to the survival of those cells which it destroyed. Evolution cannot explain the origin of this telomere mechanism, but intelligent design can: it is a designed mechanism which controls cell longevity for metamorphosis, developmental changes, and

alterations. When damaged, it contributes to cancer and certain other diseases.

## Acknowledgements

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## Book Reviews

*The Star of Bethlehem* by Michael Kidger  
Princeton University Press, Princeton, NJ. 1999, 306 pages, \$23

There is a long list of possible natural explanations for the Star of Bethlehem:

- A comet, perhaps Halley
- A conjunction of planets
- Venus
- Nova or supernova explosions
- An occultation of a star or planet by the moon
- A single meteor or meteor shower
- A hoax

Author Mark Kidger is an astronomer working in Spain. He presents a good Biblical description of the Christmas Star, taken from Matthew 2. He concludes that the Lord was born between 7 and 5 BC, and most probably around March–April, 5 BC Kidger thoroughly analyzes each of the natural star explanations. There is much detail given on ancient observations, calendars, dates, and traditional stories.

In Kidger's final conclusion, the Christmas story involved four separate celestial events: *First*, in 7 BC there was a triple conjunction of the planets Jupiter and Saturn. That is, as these planets *wandered* through the night sky, they approached each other three times, once to within a distance of two moon diameters, or one degree. This took place in the constellation Pisces the fish, of special interest to Jewish people. Kidger suggests that this conjunction first alerted the magi to something special about to happen. *Second*, 6 BC brought another conjunction, this time between Mars, Jupiter, and Saturn. This planet gathering was again in Pisces, although this time spread across 8 degrees of sky. For comparison, the open side of the Big Dipper bowl is 10 degrees. *Third*, in 5 BC the crescent moon passed close to Jupiter, as it frequently does. Kidger suggests that this near

occultation convinced the wisemen to start packing for the journey! *Fourth*, also in 5 BC, for good measure, a nova or erupting star appeared in the predawn Eastern sky between the constellations Aquila and Capricorn. Stars rise about two hours earlier each month due to the earth's orbital motion. If the magi arrived in Jerusalem after a two-month trip, the nova would now rise four hours earlier, placing it high in the southern sky. Since Bethlehem is located about five miles due south of Jerusalem, the nova led the seekers to the house where the Christ child was.

Some novae repeat their energy outburst periodically. Kidger suggests that such a recurrent nova might eventually be identified in the Aquila – Capricorn region. He names one possibility, *DO Aquilae*, a very dim star of apparent magnitude 18. Kidger predicts that we someday may be able to detect a growing cloud of gas around this star, with a radius in light years equal to the timespan since 7–5 BC Then “the case of the Star of Bethlehem genuinely would be closed and our star identified” (p.275). Present technology does not allow such a measurement.

What are we to think of this hybrid description of the Lord's star? It is very interesting, but probably a futile effort. As William Canton wrote in 1899, “Regarding the character of the marvelous star, speculation has exhausted itself in fruitless conjecture.”

I was disappointed at Kidger's doubt that Matthew actually wrote the gospel named for him. Instead Matthew, “may have been one of its sources; some of the rest of the story came from written accounts, some came from the very early Christian oral tradition” (p. 5). The author struggles to understand what led the wisemen to travel to Jerusa-

lem, after their ancestors probably had watched the heavens for such a sign for centuries. Apparently he rejects Matthew 2:12, where the Lord spoke to the magi in a dream, warning them not to return to Herod. A similar divine communication may have gotten them started them on their journey.

Kidger also fails to suggest or consider the possibility that the Christmas star was a temporary, supernatural light. At this point, I must agree with Martin Gardner. Gardner often writes anti-creationist material, but he has a refreshing approach to the Christmas Star: “[Why] even try to find natural explanations for what the Bible clearly describes as divine supernatural phenomena (Gardner, 1999).” The star clearly *was* a miracle, perhaps the *Shekinah* glory, or glory of God, often seen in the Old and New Testaments as

a visible manifestation of God’s presence. Afterall, Christmas was a time of miracles, including the special star.

The real question is not the identity of the star. It is the question of why the magi were chosen to follow the light to the Messiah. And also, why we are given that same invitation today.

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### *God's Promise to the Chinese* by E. R. Nelson, R. E. Broadberry, and G. T. Chock Read Books Publisher, Dunlap, TN. 1997, 140 pages, \$8.99

Records of the beginning of the world and of the human race have been found in ancient Chinese character writing. Because there have been continuous modifications in Chinese characters over time, the three authors of this book had to find a place where the ancient characters had been preserved. They examined the earliest known writing incised on bones and tortoise shell plastrons which was called “oracle bone writing” because such writing was used for divination purposes.

According to the authors, Moses’ record of the beginnings of earth’s history

was written about 1500 B.C., more than 200 years after the start of the Shang Dynasty which produced the earliest extant Chinese writing, the oracle bone inscriptions (p. 13).

Thus, anything in the Chinese version of world beginnings could not have been copied from the Hebrew Bible. Nevertheless, there are amazing similarities in the two sets of records.

Christians believe in a Triune God, or three persons in one God. The symbol used by the ancient Chinese for “the manifestation of God” or the “God radical” includes the symbol for three complete persons. Also the symbol for “Hoiy Spirit” employs three vertical lines representing three complete persons.

Christians believe that God was the Creator of all things. The authors of this book say:

....did you know that the ancient teachings of the Chinese reveal that the first man and woman on

earth were stately, intelligent, specially created beings? They even resembled their great Creator God, ShangDi. According to the Chinese, ShangDi made not only people, but the earth and all life in it, as well as the entire universe (p. 7).

The book includes extensive examples of the makeup of ideographs. The term for “covet or desire” consists of a woman kneeling between two trees. The authors say that this could be interpreted as Eve turning away from the tree of life and coveting the fruit of the tree of knowledge of good and evil. The oracle bone character for “negative, no, or not” depicts a serpent in two trees, which could be interpreted as a serpent hiding in the tree of life and the tree of knowledge of good and evil.

*God's Promise to the Chinese* is the second of two books by Dr. Nelson. *The Discovery of Genesis*, written with co-author C. H. Kang and published in 1979, also reported on pictographs and ideographs. In the two books readers will see some duplication but both books are needed for a better understanding of the concordance of Genesis and ancient Chinese writing.

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Clifford L. Lillo

## Lunar Crater Giordano Bruno

Don B. DeYoung\*

### Abstract

There is growing evidence that a major lunar crater formed in recent historical time, A.D. 1178. The feature is now called crater Giordano Bruno, located just beyond the moon's upper right limb. The

evidence includes eyewitness accounts, crater appearance, and lunar vibrations. This lunar impact conflicts with long-age assumptions and fits the recent creation view.

### Introduction

Our moon has been described as a museum of the early solar system. Its geologic activity and cratering are often assumed to have completely ceased over three billion years ago. However there are occasional current observations of various transient lunar phenomena, or TLPs (Whitcomb and DeYoung, 1978). These events include volcanic activity in the form of luminous spots and also outgassing. TLPs are denied by those who assume the moon has long been inactive (Sheehan and Dobbins, 1999). Nevertheless, observed TLPs number in the hundreds. Related to this, there is a historical report of a large-scale cratering event on the moon. The result is crater Giordano Bruno (GB), located on the hidden side of the moon just beyond the northeast limb. This impact event and the host of TLPs challenge the assumption of an ancient, unchanging moon.

### Historical Background

A very unusual event was recorded more than eight centuries ago by Gervase of Canterbury, in southern England. Gervase (A.D. 1141–1210) was a monk who compiled history for the royalty of early England. In his medieval chronicles, written in Latin, Gervase describes a dramatic lunar observation by fellow Catholic monks:

In this year, on the Sunday before the Feast of St. John the Baptist, after sunset when the moon had first become visible a marvelous phenomenon was witnessed by some five or more men who were sitting there facing the moon. Now there was a bright new moon, and as usual in that phase its horns were tilted toward the east; and suddenly the upper horn split in

two. From the midpoint of this division a flaming torch sprang up, spewing out, over a considerable distance, fire, hot coals, and sparks. Meanwhile the body of the moon which was below writhed, as it were, in anxiety, and, to put it in the words of those who reported it to me and saw it with their own eyes, the moon throbbed like a wounded snake. Afterwards it resumed its proper state. This phenomenon was repeated a dozen times or more, the flame assuming various twisting shapes at random and then returning to normal. Then after these transformations the moon from horn to horn, that is along its whole length, took on a blackish appearance. The present writer was given this report by men who saw it with their own eyes, and are prepared to stake their honor on an oath that they have made no addition or falsification in the above narrative (Stubbs, 1879).

This "fire on the moon" actually took place on June 18 or 19, A.D. 1178, Julian calendar. The moon was a thin waxing crescent, just 1.6 days past the new moon. The splitting of the upper horn of the waxing crescent moon apparently was caused by debris ejected from the lunar surface by an asteroid or comet collision. The observed flames and sparks were actually incandescent gases. A shimmering of the lunar image also would have resulted from the refraction of light through the produced gases. Great amounts of dust caused an overall darkening of the moon for some days or weeks. Figure 1 pictures the unusual lunar event.

The resulting crater was named in the 1970s, in honor of the Italian rationalist philosopher Giordano Bruno (1548–1600). He was not an astronomer like his contemporaries Copernicus and Galileo, though he championed their heliocentric ideas. Bruno was a brilliant Dominican priest who later became a pantheist and major opponent of the Catholic hierarchy. Condemned for heresy, immoral conduct, and blasphemy, Bruno was burned at the stake in

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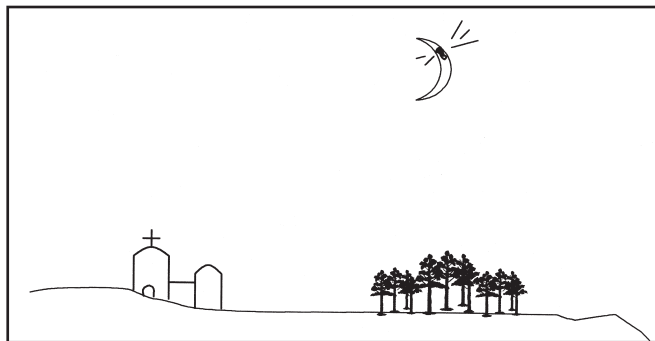


**Figure 1.** A sketch of what was seen when lunar Crater Giordano Bruno was formed in A.D. 1178.

Piazza Campo dei Fiori in Rome on February 19, 1600. Astronomer Jack Hartung, formerly with the State University of New York at Stony Brook, has been the chief promoter of the connection between crater GB and the chronicler Gervase (Hartung, 1976).

Here is a summary of the chronology of events related to crater Giordano Bruno:

- 1178 Lunar explosion is observed by monks and recorded by Gervase of Cantebury.
- 1600 Philosopher Giordano Bruno is executed.
- 1610 Galileo discovers lunar craters with his telescope.
- 1959 Backside of the moon is first photographed by the Soviet spacecraft, Luna 3.
- 1960s Consensus is reached that lunar craters have an impact origin.
- 1968 The Apollo 8 lunar mission photographs crater GB.
- 1970s Giordano Bruno crater is named. The Clementine spacecraft studies the lunar surface, including crater GB.
- 1976 Astronomer Jack Hartung relates crater GB to the 1178 observation.

## The Result

What remains today from the A.D. 1178 impact event is a fresh crater, about 22km (13 miles) in diameter. It is located on the far side of the moon, just beyond Mare Crisium. As you look at the moon, GB is just behind the upper right edge, at a lunar latitude of 36° north and longitude of 102° east. Zero degree lunar longitude is measured from the center of the moon's nearside. The collision site is shown in Figure 2, taken in 1968 during the Apollo 8 lunar orbital mission. GB has a high reflectivity which implies a recent formation. The freshly excavated material is mixed with surrounding older soils (Pieters, et al. 1994). Most "recent" lunar craters have bright, radial rays of ejected material. Exposure to sunlight, radiation, and

micrometeorites gradually darkens and smoothes the rays. In 1976 the Russian probe Luna 24 landed on a ray of Bruno in Mare Crisium, 1,200 km from the crater itself. Bruno has the longest rays for its size of any lunar crater. Luna 24 returned samples to earth, showing typical lunar soil rich in plagioclase feldspar (Al-Ca silicate).

During the 1969–72 Apollo space program, several laser reflectors were left on the lunar surface. For several decades these devices have allowed the precise monitoring of the earth-moon distance and also lunar vibrations. Such studies have revealed an unexplained, extra "ringing" oscillation in the lunar *libration*. Basic libration is a "rocking" motion of the moon such that we see slightly more than half the lunar surface, about 59 percent. This geometric effect is caused by the inclination of the moon's orbit and equator. Libration was first noted by Galileo three centuries ago. The tiny excess libration, of interest here, is based on more recent lunar laser ranging, and is consistent with an origin from the GB impact (Calame and Mulholland, 1978). The motion is measured as an extra longitude variation of about 14 meters, over a long period of about three years. That is, about 14 extra meters of surface can be seen at the lunar equator, or 1.8 arc seconds of longitude. This perturbation apparently was induced relatively recently and is consistent with the 1178 lunar collision. Thus, after eight centuries the moon still staggers from this particular impact event. The observed perturbation in lunar motion does not *prove* a recent lunar collision, but is supportive of it.

The space object which impacted GB is estimated to have been about 2–3km (1.2–1.8 miles) in diameter. Its

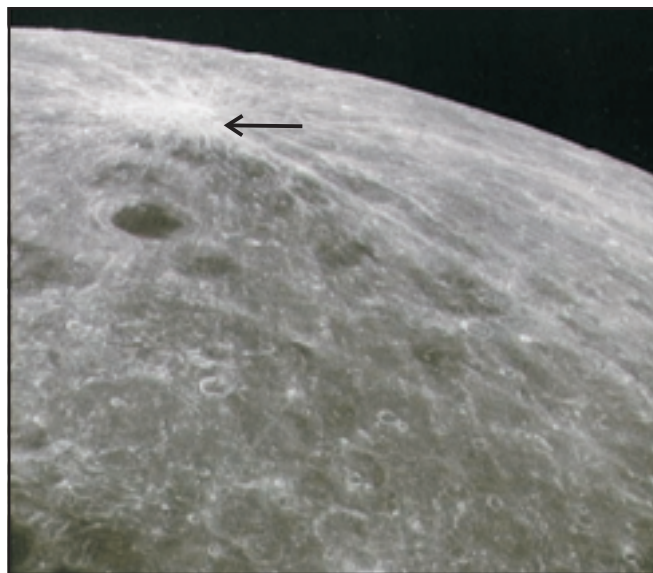


**Figure 2.** A photograph of crater Giordano Bruno taken during the 1968 Apollo 8 lunar mission (NASA photo). Available online at [http://www.lpi.usra.edu/expmoon/Apollo8/A08\\_MP.Orbital5FS.gif](http://www.lpi.usra.edu/expmoon/Apollo8/A08_MP.Orbital5FS.gif)

speed may have been about 16 miles/sec (26 km/sec), typical for space objects. The energy released, much of it initially in the form of kinetic energy, was equal to about 50 billion tons of high explosives. For comparison of relative energies, Table I lists several major energy events. A space object of this size would cause a similar crater on earth. On the moon, less gravity would cause a smaller free-fall speed, but the impacted matter could fly further. The two effects nearly cancel one another. There are many terrestrial craters of GB size and larger, but all are assumed to have formed in “deep” evolutionary time, millions or billions of years ago.

## The Natural Science Reaction

Many astronomers doubt the recent formation of GB for two main reasons. *First*, an evolutionary time scale leads to a very small probability of anyone observing a major lunar impact. A crater of GB’s size is estimated to occur only about once every million years (Wood, 2000a). This gives a 1-in-1000 chance that it happened during the last thousand years. The probability drops still lower that the impact would occur during night hours, on or near the lunar front side, and would be observed and reported by sky watchers. As further examples of the immense time assumption, the visible lunar craters Tycho and Copernicus are respectively dated at 100 million and 800 million years old. These craters are both about four times larger than GB.

A *second* challenge to the recent formation of crater Bruno comes from the U.S. Navy’s Clementine spacecraft. It has provided high-resolution images of lunar details, including crater GB. Figure 3 shows a 1994 Clementine photograph of the crater and rays. The very light semicircle in the center is the crater rim. Although not visible in this photograph, it appears that the edge of GB’s floor has accumulated considerable weathering products (Pieters et al., 1994). This material results mainly from down-slope movement, or slump of the crater walls. However, such extensive weathering on a short timescale is completely unexpected. The standard conclusion is that GB is much older than 800 years, or else lunar weathering is far more rapid than thought. It has been suggested that the medieval monks who reported the collision event simply were mistaken. They may have actually seen a meteor entering the earth’s atmosphere, along the line of sight between Canterbury and the moon. Of course, this counter-explanation is itself very unlikely.

## Creationist Reaction

In contrast to conventional science, crater Giordano Bruno is seen as freshly formed, for at least five reasons:

**Table 1. Relative energies of major events. A megaton is defined as  $5 \times 10^{15}$  joules of energy. “Energy expended” is in terms of high explosives.**

| Event                     | Energy Expended |
|---------------------------|-----------------|
| Hiroshima bomb            | 20 kilotons     |
| Barringer Arizona impact  | 10–20 megatons  |
| Mount St. Helens eruption | 10–20 megatons  |
| Tunguska Siberia impact   | 90 megatons     |
| Largest hydrogen weapon   | 100 megatons    |
| Crater Bruno              | 50,000 megatons |

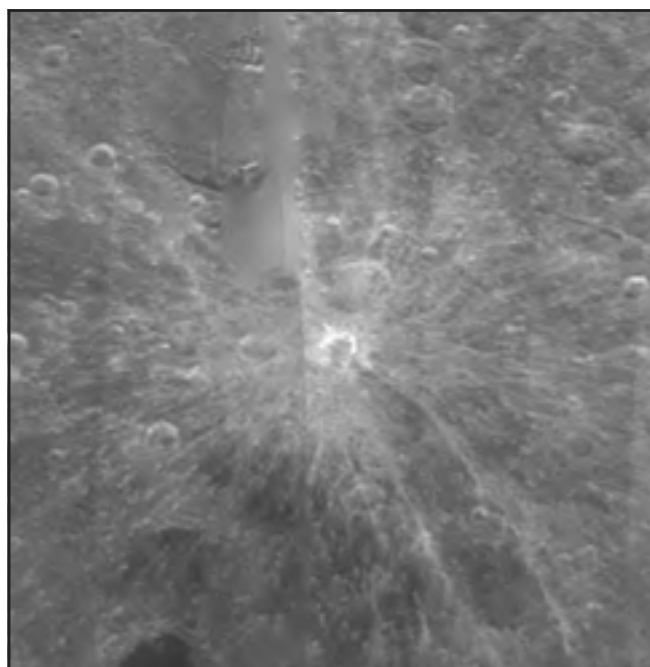


**Figure 3. Crater Giordano Bruno photographed in 1994 by the Clementine lunar orbiting spacecraft. Available online at <http://www.nrl.navy.mil/clementine/clib/multires.pl>**

- The event was observed and reported by multiple witnesses in 1178. In Gervase’s words, the monks were “prepared to stake their honor on an oath that they have made no addition or falsification in the ... narrative.”
- The crater still looks very fresh, with ejected material overlying older sediment.
- The moon continues to vibrate or “ring like a gong” that was struck by a mighty blow, just a few centuries ago.
- The creation view is not constrained by the bias of required long ages and low probability of impact occurrence.
- Korean astronomical records indicate a major meteor shower on earth, 3.5 months after the GB impact. Calculations show that the earth may have caught up with lunar ejecta fragments at this time (Mims and James, 1982). Others have collected many worldwide reports of unusual sky phenomena eight centuries ago (Spedicato,

1996). This implies that the earth-moon system may have passed through a vast cloud of space debris.

Creationists see the moon as a young, dynamic satellite. Certainly, most large craters were formed in earlier history, many perhaps connected with the Flood catastrophe (Froede and DeYoung, 1996). However, the frequency of large lunar crater formation may still be 1,000 times greater than usually assumed, leading to a major event every millennium or so. If true, a creationist prediction is that the moon is due for another major impact anytime within the next few centuries. There is ongoing discussion of lunar impact history by both creationists and naturalists (Faulkner, 1999; Ryder, 2000).

### Future Research

Crater Giordano Bruno may not be the only large lunar crater that has formed recently. A number of lunar craters do not appear on early hand-drawn maps. The crater Linné located in Mare Serenitatis, is one such example waiting for study (Wood, 1999). Lalande A is another crater with a very fresh appearance (Wood, 2000b). Additional lunar vibrations from recent impacts may be extractable from collected libration data.

Efforts have been made to link the GB impact with fragments from the annual beta-Taurid meteor shower, occurring in late June (Hartung, 1993). These fragments may originate from comet Encke. The resulting meteor shower may be responsible for GB, the June 1908 Tunguska event, and a major meteoroid shower noticed on the moon in June 1975. Further correlations also might be possible between other lunar blemishes and earth observations.

A 20 km diameter crater is assumed to occur just once every one million years on either the moon or the earth. Continued creationist study is needed of both lunar and terrestrial craters, to evaluate their possible recent ages.

Much lunar data is available online to anyone interested, including evidence for rapid weathering processes. In particular, the Clementine lunar orbiter has accumulated vast numbers of photographs. Such data awaits detailed creationist evaluation.

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## Birds and Dinosaurs

The theory linking dinosaurs to birds is a pleasant fantasy that some scientists like because it provides a direct entry into a past that we otherwise can only guess about. But unless more convincing evidence is uncovered, we must reject it and move forward to the next better idea.

Larry D. Martin, professor of systematics and ecology at the University of Kansas and head of the vertebrate paleontology division in the university's museum of natural history. *Sunday World-Herald*, Omaha, NB. January 19, 1992, p.17B.

## Notes from the Panorama of Science

### Origin of Closed Canyon, Trans-Pecos Texas: A Comparison to the Black Canyon of the Gunnison River, Colorado

Emmett L. Williams\*

Along the beautifully scenic, but mostly desolate highway 170 in southwest Texas, is found an interesting notch canyon cut into massively-welded Santana Tuff (Figures 1 and 2). Closed Canyon is about 0.7 mile in length with sheer walls extending approximately 160 feet high (Figures 3 and 4). This canyon in the Colorado Mesa is an arroyo today, but it is obvious that greater amounts of water flowed through the narrow slot in the past.

Discussing the history of the region as well as the origin of Closed Canyon, Alloway (1995, p. 25) stated:

At one time, the valley the River Road (Texas highway 170) goes through was much more filled in and the ancestral Rio Grande was at a higher elevation than now. The stream that chiseled Closed Canyon also started its flow to the ancestral Rio Grande at a much higher elevation. As the river cut downward, the tributary followed suit, slicing through Colorado Mesa and forming Closed Canyon (parentheses mine).

Henry (in press) discussed the origin of the canyon within the regional setting:

Several arroyos are superimposed; that is, their courses were determined at higher elevations in different rocks from what they traverse now. Closed Canyon, a steep, narrow canyon cut through Santana Tuff in Colorado Mesa, is the most notable example of a superimposed stream... Closed Canyon arroyo must have drained across Colorado Mesa to the Rio Grande when soft, basin-fill sedimentary rocks completely covered the mesa. As the Rio Grande and the Closed Canyon arroyo cut downward, they cut into the buried mesa. Downcutting was sufficiently fast that the arroyo cut through the mesa instead of being diverted around it.

#### Young Earth-Flood Model Concepts

Consider a model for the origin and development of Closed Canyon using Flood postulates. As Floodwater receded from the Trans-Pecos region of Texas, one of the directions taken by retreating water was generally along the present path of the Rio Grande (see Williams and Howe, 1996). Flood currents generated considerable erosion in the locality of Closed Canyon. As water with suspended



Figure 1. Closed Canyon in southwest Texas along highway 170 is somewhat funnel-shaped (broad at the top and a narrow slot at the base) indicating that greater amounts of water flowed through it in the past.



Figure 2. A view of the slot in highly-welded Santana Tuff that forms the narrow base of Closed Canyon (Photograph by Carl R. Froede, Jr.).

debris drained from the adjacent highlands, it eroded through any recently deposited soft sedimentary material and continued to cut downward into the welded Santana Tuff as it flowed toward the "ancestral Rio Grande" (a Flood retreat channel).

#### Black Canyon and Closed Canyon

A similar mechanism was offered for the formation of the Black Canyon of the Gunnison River (Williams, 1998). Sediment-laden Floodwater moving in regional

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currents sliced through any existing softer overburden into the metamorphic and igneous rock that now forms the side walls of the Black Canyon. As the water level dropped, the flowing abrasive particulate-laden water continued to cut downward into the crystalline material. In both cases (Black Canyon and Closed Canyon), downcutting must have been sufficiently rapid so that the moving water sliced through hard rock rather than being diverted around it.

#### Appendix: Origin and Lithology of Santana Tuff

Santana Tuff varies lithologically from a nonwelded to thoroughly-welded vitric-crystal material depending upon location. The tuff contains a high per-

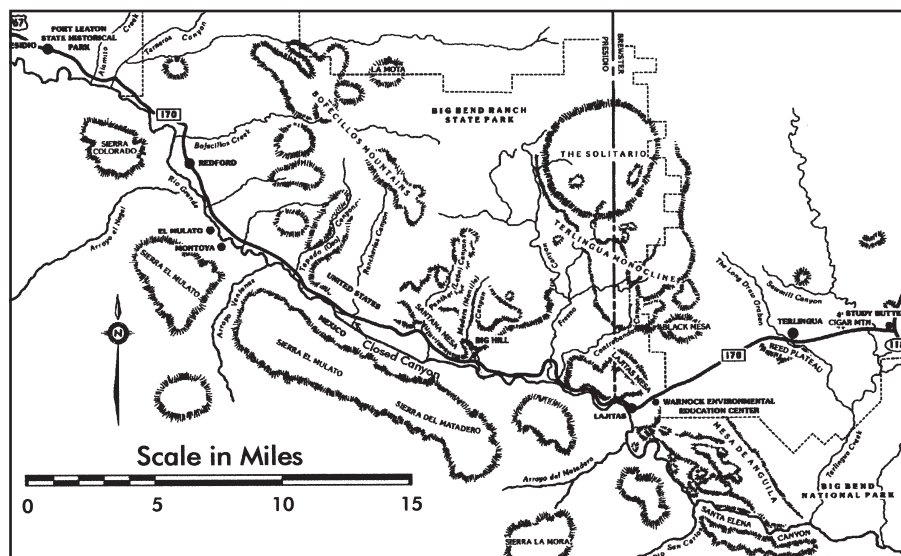


Figure 3. The location of Closed Canyon along highway 170 in southwest Texas near Big Bend National Park. The canyon is between highway 170 and the Rio Grande directly south of the Bofecillos Mountains. After Alloway, 1995, pp. 26, 27.

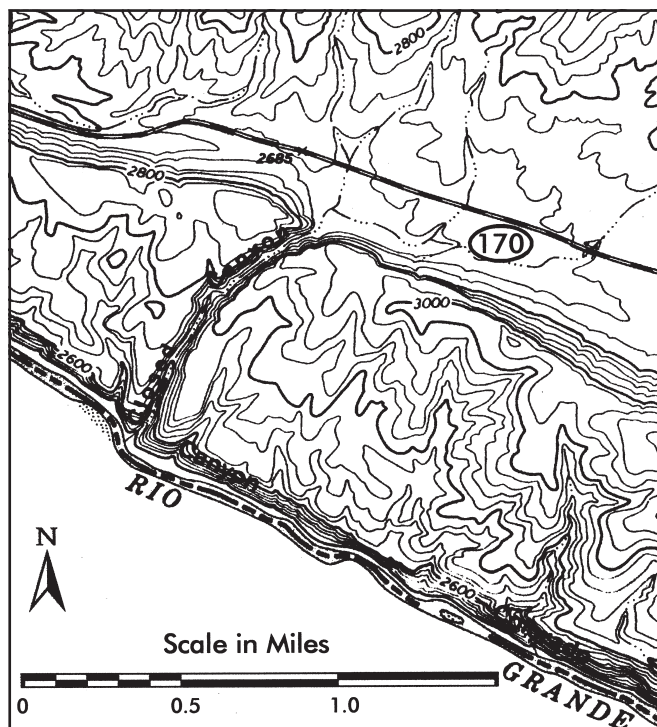


Figure 4. Closed Canyon, from the USGS Redford SE Texas-Presidio County quadrangle, 1971.

centage of glassy luster sanidine crystals (Barnes, 1979). Santana Tuffs erupted from Santana calderas in Chihuahua, Mexico (Figure 5). The Santana Tuff flowed into the Bofecillos Mountains from the south and pinches out southwest of Fresno Canyon, where it is entirely nonwelded. The Santana Tuff is petrographically distinct,

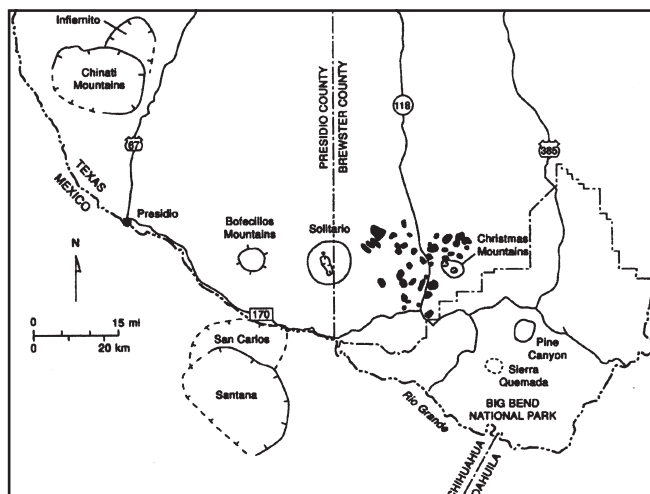


Figure 5. Several calderas and other volcanic centers in southwest Texas and adjacent Chihuahua, Mexico are shown. The black areas are intrusives around the Christmas Mountains. Santana Tuffs erupted from the Santana calderas in Mexico. After Henry and Davis, 1996, p. 82.

lacking quartz phenocrysts and the large scoriaceous pumice (Henry and Davis, 1996, p. 100).

#### Acknowledgments

Appreciation is expressed to Carl R. Froede, Jr. for his work on the graphics for this note. I also wish to thank the many donors to the Creation Research Society Research Fund, interest from which financed a portion of these studies.

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## Do the Microcontinents Between Greenland and the British Isles Fit With Plate Tectonic Theory?

Jim Honeyman\*

What happens to a theory if physical facts logically predicted by it are not found? For example, a basic assumption of Plate Tectonic Theory states that if North and South America separated from Europe and Africa, the North Atlantic Ocean would have been generated between them as the continents moved apart. The problem with this model are the multiple continental islands and ridges which lie between Greenland and the British Isles.

### Problems Along Continental Margins

Talwani and Eldholm (1974, p. 361) stated: “The margins have been complicated by the interpreted splitting off of the continental fragment comprising the Jan Mayan Ridge...” They proposed that this ridge split off of Greenland and “rotated” to its present location north of Iceland, and about 300 km east of Greenland. No force was suggested which might cause this movement.

According to Roberts, (1974, p. 343) “Farther to the west, the Faeroe Islands and Rockall Plateau *microcontinents* are separated from the margin...” (emphasis added). Also (1974, p. 343) “The Rockall Plateau is the only major microcontinent in the North Atlantic Ocean...” These structures are not considered to be thin, basaltic ocean floor.

There are large differences between continents and ocean floor. “These surveys showed that the undersea crust in both the Atlantic and the Pacific is only 4 to 6 kilometers thick, compared with the 25 to 40 kilometer thickness of the crust beneath the continents.” (Ericson and Wollin,

1967, p. 246). Also, “...the crust is differentiated into two separate general rock types with different densities... Sialic rock is sometimes termed continental or granitic... continental masses have a density of about 2.7, whereas the density of the oceanic crust is 2.9. (Davis, 1977, pp. 20–21). The rock of the ocean floor is basaltic, and the density and chemistry are similar to the mantle rock which underlies both ocean and continent. The great depth of lower density continental rock penetrates deep into the higher density mantle and obtains buoyancy which supports the continental surface above sea level. The principle is exactly the same as a ship which sinks into and displaces water in order to float.

If continents are 25–40 km in depth, then as they moved apart, a deep chasm would open between them. Since the Atlantic ocean crust is only about 5 km thick, hot, plastic mantle rock would have to rise this distance to form new ocean floor. Therefore, all of the ocean floor between Europe and North America should be thin, basaltic rock. The facts already presented, however, show that between Greenland and Ireland there are substantial structures identified as continental by geologists.

### Problems with Iceland

Iceland presents an interesting problem. The water depth between Iceland and Greenland is less than one km. If it is continental, then it may be joined to Greenland by a great depth of granite. However, on the National Geographic map of the Arctic Ocean floor, (1989) Greenland is shown to be a part of the North American continent. It is firmly attached to Canada in the north by continental rock under the Nares Strait and in the south by rock under the Davis

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Strait. Between these straits is Baffin Bay, where the water is so deep that it may have a true, basaltic ocean floor. The question arises, if Greenland is part of North America and Iceland is attached to it, is Iceland also part of the North American continent?

The answer, according to the National Geographic map of the North Atlantic ocean floor, (1988) is that there are continuous continental structures from Greenland to the British Isles. These include Iceland, the Faroe-Iceland Ridge and the Faroe Islands, and the Faroes appear to be attached to the continental shelf of Europe which underlies the North Sea. South of Iceland are the Reykjanes and Garder Ridges, and south of the Faroes, the Wyville-Thomson Ridge and Rockall Plateau. North of Iceland are the Kolbiensey and Jan Mayan Ridges. All of these are located where according to the theory, only thin, basaltic ocean floor should be found.

One kind of evidence illustrates the difference between Iceland and true ocean floor. South of Iceland there are thousands of kilometers of mid-ocean rift, which ends at the south end of Reykjanes Ridge. Scheidegger (1982, p. 19) refers to the rifts: "These are huge 'mountain' ranges rising above the abyssal plains, sometimes (in the form of islands) reaching to the surface of the sea." After the rift opened, the floor on both sides was elevated. This elevation, however, increased the diameter of the earth at that location, increasing the circumference along the central rift. The force elevating the ocean floor was so powerful that it opened fractures perpendicular to the central rift which permitted the increase in circumference. These fractures are prominent on every map of the ocean floors.

However, the force which opened the mid-ocean rift also forced a fracture or earthquake fault from the south end of Reykjanes, through Iceland and past the north end of Jan Mayan, a distance of about 2200 km. In all this distance, there are no perpendicular fractures. The implication is that the fracture passed through continental granite

which was there before the fault was generated. As though to certify the difference from thin, basaltic ocean floor, the rift continues north into the deep Norwegian Sea where the floor was elevated with perpendicular rifts. Evidently following the path of least resistance, the rift turns left through the Spitsbergen Fracture Zone, which again must be deep granite because it is not elevated. Emerging into the Arctic Ocean, the rift turns right about 70°, elevates the thin ocean floor and dies out at the Siberian coast.

Evolutionists assume that millions of years were available to introduce continental fragments between Greenland and Europe. That assumption has this limitation: Iceland was in its present location before the mid-ocean rifts were elevated and the perpendicular fractures generated.

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## Book Reviews

### *Molecular Biology of the Cell*, Third Edition

by Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, Keith Roberts, and James D. Watson  
Garland Publishing, New York. 1999, 1291 pages, \$75.95

Lest the reader think that only general public textbook authors use outdated or misrepresented facts, I would like to draw your attention to this new textbook, with James Watson (of Watson and Crick DNA helix fame) as the senior author. As a surgeon now 21 years out of medical school, I enjoyed Wayne Friar's article, *Embryology and Evolution* (1999). I remember learning Ernst Haeckel's "biogenetic

law" and his illustrations in medical school in 1975. It surprised me to learn from Dr. Friar that these were known to be fraudulent 85 years ago. It surprised me even more to see the exact same illustrations displayed again on page 33 of this book, which one would expect to be up to date. Statements in the Preface to the First Edition include, "The broad coverage expresses our conviction that cell bi-

ology should be at the center of a modern biological education. This book is principally for students taking a first course in cell biology, be they undergraduates, graduate students, or medical students." And "On the other hand, we hope that it will also be useful to working scientists in search of a guide to help them pick their way through a vast field of knowledge." This therefore is a textbook for up to date medical and biologic education.

Before the creationist turns aside in disapproval, I would strongly endorse this book to be read by anyone with a one-year college chemistry course or better. It is extremely well written and contains statements both amazing and wonderful. The entire first chapter is a paean to Evolution, but shows its value with the statement, "Clearly, there are dangers in introducing the cell through its evolution: *the large gaps in our knowledge can be filled only by speculations that are liable to be wrong in many details.*" (p. 3, italics mine). The reader must brace himself against the constant ode to Evolution echoed throughout, yet he learns figures and facts that are an astounding tribute to the genius of design of our Lord. Examples include the number of possible proteins of a typical length of about 300 amino acids,  $10^{390}$  (p. 119); the length of DNA in a typical animal cell, 1 meter with  $3 \times 10^9$  nucleotides, (p. 102); the error rate in DNA replication, fewer than one mistake in  $10^9$  nucleotides added, due to proofreading mechanisms (p. 103); the complexity of protein synthesis, translated from mRNA strands by ribosomal complexes of more than 50 different proteins each (p. 107), at the rate of 20 amino acids per second, (p. 108), arranged in a row as polyribosomes on the endoplasmic reticulum, (p. 238), like a Ford automobile assembly line with the mRNA being passed through one ribosome to the next like a ticker tape so that a single mRNA can produce 10 to 20 protein molecules si-

multaneously (p. 238), every 20 to 60 seconds (p. 237). "The complexity of a process with so many interacting components has made many biologists despair of ever understanding the pathway by which protein synthesis evolved" (p. 241). Indeed!

The reader learns that proteins "have precisely engineered moving parts whose mechanical actions are coupled to chemical events" (p. 195). They work as atomic sized levers (p. 200), motors, switches, clocks, and jigs (p. 211), clamps (p. 257), gates (p. 262), and pumps (p. 513) to name a few. My favorite is the protein complex that makes up human DNA polymerase. This has parts that unzip the DNA helix by means of a ratcheting lever (p. 256), forward stitches a copy of one strand and "backstitches" the other (p. 253), proofreads the copy while correcting errors (p. 254), and holds itself from falling off by means of a sliding curtain rod-type clamp (p. 257) which releases as soon as the polymerase stops. The authors offer this tribute, "This complex can be likened to a *tiny sewing machine* composed of protein parts and powered by nucleoside triphosphate hydrolyses" (p. 257, italics mine). For the creationist reader, there is materiel galore from the evolutionist's own camp with which to refute the "just so" argument of chance and support the "And it was so" evidence of our Designer.

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### *In Search of Deep Time—Beyond the Fossil Record to a New History of Life* by Henry Gee Simon and Schuster, New York. 1999, 267 pages, \$26

The subtitle promises more than the book delivers, but only by two letters—A new "story" of life's origins would be more appropriate. The bottom line up front: There is not very much meat in the book. Nevertheless, Henry Gee weaves personal anecdotes with insider views of the paleontology community to provide a fair description of *cladistics*. Along the way he pokes considerable fun at the traditional story-telling genealogies that dominate the popular and educational literature of evolutionism.

The crux of the cladistic argument is that fossils reside in *deep time*, separated from each other by perhaps millions of years in time and strewn about not only the countryside, but the entire planet. It is therefore the height of arrogance to develop detailed stories of adaptation, competition, ecology, and—especially—lineage. Our natural in-

clination is to spin historical tales regarding family or national history based on events in recorded history. Extending this habit to "geological" time scales does not constitute science, according to Gee. The cladist is engaged in pattern-building, not linear narration. "Classification should not be a search for ancestry and descent . . . but an identification of the sister-group relationships between organisms (p. 147)." (Quote attributed to Willi Hennig, an East German entomologist a few decades back.)

The uninformed argument goes . . . Since tetrapods use their legs for walking, legs *must* have evolved *for* walking. Similarly, feathers *must* have evolved *for* flying. Gee delights in debunking these assertions and uses his imagination to construct alternative scenarios, all the while disclaiming that scenarios have any significance at all!

The most entertaining part of the book (biased as I am with my engineering heritage) is Gee's account of his field work with Meave Leakey in the Great Rift Valley. He joined their team for a season as a grunt laborer, looking for scraps and shards of hominid bones or artifacts. What struck me is the pitifully low return — in bits of bone — when measured against the huge back-aching investment of such field work. I am amazed that evolutionary paleontologists are not laid low by the admission (quoting Gee) . . . "Each fossil represents an isolated point, with no knowable connection to any other given fossil, and all float around in an overwhelming sea of gaps (p.32)."

Creationists will find a fair amount of quotable ammunition throughout the book. He points out, for example, that Darwin built the case for natural selection "by analogy", assuming that macroevolution follows from abundant examples of variation. By the way—I find that creationists too often yield ground unnecessarily by equating variation that is obviously resident in the genome with "microevolution." The term "microevolution" should be used only when it can be *demonstrated* that variation arises from mutation.

Gee leaps the analogy canyon himself by asserting that Deep Time "is time enough for species themselves to transmute (p. 34)." Such assertions are easier made in prose than in mathematics when one considers the millions of mutations required to bridge any significant pair of 'branches' in the animal kingdom. Even so-called "geologic time" falls short by countless orders of magnitude.

Cladistics is all about defining related groups by morphology and/or molecular biology. The proud cladist disdainfully refuses to get tricked into playing Dawkins-like story-telling games. Gee illustrates the approach by constructing a cladogram that includes himself and Fred, his cat: "That Fred and I have a common ancestry is not in dispute, not because of fossils, but because of features we share thanks to our common evolutionary birthright . . . we know just by looking at Fred and me, and knowing that all vertebrates have a backbone, a skull, and paired sense organs, that our common ancestor must have had these features, too (p. 35)." Gee can be so dogmatic about this, of course, because he allows only a materialistic view of origins. Similarity necessitates kinship.

In developing more serious examples, Gee condemns such traditional evolutionary views as the belief that *Ichthyostega* is a missing link between fish and tetrapods. Such stories reveal prejudices based on our limited view of reality. He suggests that limbs may have evolved for reasons entirely apart from a quest to conquer the land. Here, as in many other places, Gee cannot resist yielding to some story-telling himself. Regarding lobe-finned fishes: "*Acanthostega* probably lived in shallow, weed-choked pools and streams. Perhaps a fringe of digits would have helped the animal negotiate such clogged waterways. Perhaps legs with digits were useful...(p. 58)" Richard Dawkins, himself, would be proud of Henry Gee's imagination!

The immense diversity of extinct life produces far more questions than answers in "Deep Time." Trying to fit together a picture that includes conodonts and echinoderms and pteraspids changes "the way we look at the past"—especially regarding the Cambrian explosion. But that is just code for "we don't have a clue." If the stakes were not so high, we could almost pity the poor evolutionist who cannot imagine how to fit billions of strange observables into a dysfunctional *theory*—so-called. In these discussions, however, Gee does provide ammunition in the form of a fair collection of unanswerable questions. He basically throws up his hands at the mystery of the evolution of sex, for example.

One point that Gee makes implicitly without realizing it is that cladistics fosters employment and publications for an army of paleontologists who prefer not to address such embarrassing topics as gaps in the fossil record. When the cladist is confronted by one of those nasty gaps, he happily brushes it aside. Cladistics to the rescue! The important work is in building cladograms from what we *do* know, and let's not bother with what is missing!

Gee argues that much of evolution was driven by the pressures of parasitism and disease. Now there is a wonderfully *untestable* hypothesis! But therein lies a strong argument against adaptive story-telling. Parasites, bacteria, and viruses may be pervasive, but they leave no trace in the fossil record. Arguments from adaptation are frivolous without detailed ecological knowledge.

Perhaps the most telling anecdote is from the author's collegiate days, when he was assigned summer work classifying pteraspid fishes. Losing self-confidence, he appealed to his advisor that he was not qualified to make such important judgments. To which his advisor replied, "Don't worry about it. Taxonomy is only a matter of opinion (p.154)."

The author makes a plea that cladistics—from a completely evolutionary point of view—may have immense payoffs in combating parasite-driven disease. It is difficult to 'culture' parasites for tests outside of the host. But 'sister-group' parasites that are free-living could be employed for laboratory testing. The point is well-taken, but *entirely independent of evolution*. Cladistics is about patterns and similarity. All the evolutionist is doing is claiming that similarity derives from kinship. The medical scientist can do his work happily from a creationist point of view. Plus engage the power of prayer!

Should you buy this book? Only if you read heavily on both sides of the creation/evolution war. There is not enough meat if you have limited time in your life for 'fun' books. I would change my recommendation if the author had invested in some photographs to illuminate his arguments. Henry—if you happen to read this—take some pictures! Your average reader (me, for example) is not automatically familiar with the morphological nuances of conodonts and echinoderms!

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Lazella M. Lawson\*

This title/author index covers articles, panorama notes and other features. For items with two or more pages, the reference is to the first page only. After the page number, a letter indicates which type of entry is involved:

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L: letter to the editor  
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## Cornelius Van Til on the Evidence of God

To begin with then I take what the Bible says about God and his relation to the universe as unquestionably true on its own authority. The Bible requires men to believe that he exists apart from and above the world and that he by his plan controls whatever takes place in the world. Everything in the created universe therefore displays the fact that it is controlled by God, that it is what it is by virtue of the place that it occupies in the plan of God. The objective evidence for the existence of God and of the comprehensive governance of the world by God is therefore so plain that he who runs may read. Men cannot get away from this evidence. They see it round about them. They see it within them. Their own constitution so clearly evinces the facts of God's creation of them and control over them that there is no man who can possibly escape observing it. If he is self-conscious at all he is also God-conscious. No matter how men may try they cannot hide from themselves the fact of their own createdness. Whether men engage in inductive study with respect to the facts of nature about them or engage in analysis of their own self-consciousness they are always face to face with God their maker.

*The Defense of the Faith*, third edition, p. 195, 1967.

## Letters to the Editor

### Five Letters about Gentet's CCC Model (CRSQ 37:10–21) Followed by a Response from the Author

In a recent article in the *Creation Research Society Quarterly*, Mr. Gentet proposed his conceptual Creation/Curse/Catastrophe (CCC) model as a means of possibly defining young-earth creationist stratigraphy within the framework of the evolution-based uniformitarian stratigraphic column (Gentet, 2000). Mr. Gentet posed some very striking ideas. I have some questions and comments that I request Gentet address in order that I might better understand his model, especially how it applies to the real world.

#### Defining The CCC Model

I will begin with the “CCC Model” section (pp. 12–14) where Mr. Gentet defines the tenets of his model.

Mr. Gentet stated:

...this paper acknowledges the reality of the order of the stratigraphic column.

In previous articles, several creationist geologists including me have questioned the accuracy, reality, and use of the global uniformitarian stratigraphic column in defining young-earth Flood stratigraphy (Froede, 1997, 1998; Froede and Reed, 1999; Reed, 1998; Reed and Froede, 2000; Woodmorappe, 1999). We have consistently written against following this approach and have asked the advocates of the uniformitarian-based Flood model to offer specific locations which verify the combining of the evolution-based stratigraphic column with Bible-based Flood geology. Mr. Gentet neither cites this work nor contrasts his model with the young-earth Flood framework which has been proposed. In presenting the conceptualized uniformitarian-based stratigraphic column he did not show a single location which supported his theoretical construct. How can any theory be advanced without supporting evidence?

The “reality” of the global uniformitarian stratigraphic column does not exist except as a conceptual framework. Uniformitarian geologists acknowledge that most of the rock record is missing at any single location than is present (see Ager, 1993, pp. 43–54). A full stratigraphically complete section represented vertically by the succession of all of the “type” localities in one specific location does not exist anywhere on earth. It is a composite conceptional construct built on unidirectional evolutionary organic processes.

Gentet needs to reinforce his highly theoretical effort with specific examples that can stand up to detailed analysis and scientific scrutiny. Failure to do so would confirm the CCC model to be bankrupt, and subsequently should be abandoned.

In section number one, Mr. Gentet stated:

In contrast with the Flood model: considerable pre-Flood geologic evidence is preserved in the stratigraphic record.

Mr. Gentet is not clear in what he defines as the “Flood model” which he contrasts with his concepts of pre-Flood geologic evidence. I hope that he will clarify this. There is no proof of his assertions which might require young-earth creationists to hold to this singularly odd position, and to make statements like this requires some level of physical evidence. None was offered. I look forward to reading about a specific pre-Flood stratigraphic location representative of this CCC model concept. If a site can be provided and validated as having formed during the pre-Flood time frame it would define an *in-situ* paleocommunity which would help us better understand the antediluvian world. This would be an important discovery for young earth creation geologists.

In section number three, Mr. Gentet stated:

The “Curse” on the pre-Flood earth was God’s direct method of dealing with sinful humanity. It was progressive in intensity and left a fossil record of God’s acts in history.

I find this statement to be completely *ad hoc*. Where is the physical evidence (please provide a specific locale) where it can demonstrate that God’s acts have left a *pre-Flood* stratigraphic record? How much of the stratigraphic record is pre-Flood and how can we tell the difference between it and the overlying Flood and post-Flood formed deposits? This conceptual arm-waving creates confusion for anyone attempting to define the stratigraphic record as a result of a destructive high-energy global Flood.

In section number four, Mr. Gentet stated:

Geologic “Periods” are, in reality, ecosystems each having characteristic life forms.

This is a broadly generalized and meaningless statement. The uniformitarian periods have different forms of life which follow the concept of unidirectional evolutionary processes. Each of the periods are subdivided by the “type” flora and fauna which evolutionists suggest accurately age-date the strata. We cannot make the evolutionary uniformitarian column successfully fit any Bible-based model of earth history. Evolutionary progression will not fit with creation by direct acts of God and a Flood-formed stratigraphic model. Personally, I question whether any of the flora and fauna which are said to define evolutionary time in the historic “Periods” represent *in-situ* paleocommunities. I have yet to find even one example in all of my

field studies which supports this concept. I challenge Mr. Gentet to present one such location in support of his model.

Also in section number four, Mr. Gentet stated:

Geologic events throughout the pre-Flood times locally stratified changing ecosystems (later interpreted as “Periods” by early geologists).

It is at this point that Mr. Gentet presents his CCC model in support of the Tranquil Flood Theory. How else can he define all of these uniformitarian periods as forming in a pre-Flood world unless he creates all of them *in-situ* before the global Flood? If they were created before the Flood and survived the massive energy and destruction (as I envision it) associated with this worldwide event then the Flood was not much of an energy expending event in his model. I thought (incorrectly) that the Tranquil Flood Theory had been abandoned by most young-earth creation geologists. However, if Mr. Gentet believes it to be a viable theory for young-earth creationists then he should present at least one site which can defend his CCC model and the Tranquil Flood Theory.

In section number six, Gentet stated:

Fossil correlation between distant areas was made possible by the systematic changes of the earth’s past ecosystems. Burial and fossilization of these ecosystems resulted from the intensified Curse during the pre-Flood earth, the GFE, and post-Flood happenings.

Please explain how in your pre-Flood setting materials could be eroded from some location (with no paleocommunity?) and bury paleocommunities in another location and not mix the floral and faunal assemblages in the process—thus creating the *in-situ* paleocommunity of the CCC model. It would be helpful if Mr. Gentet would pro-

vide real world examples where I can observe stratigraphic sections representative of the three different times in earth history (i.e., pre-Flood, GFE, and post-Flood).

I have other serious issues with Mr. Gentet’s CCC model which may be raised in an additional letter once Gentet has responded to these initial questions.

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The subject of creationist stratigraphy in recent years has manifested both a lively interest and a healthy divergence of opinion. In CRSQ 37(1), there are both articles and letters to the editor addressing this topic. Among the articles is a proposal called the “Creation/Curse/ Catastrophe” (CCC) model, by Mr. Robert Gentet. If I understand his model correctly, he accepts the proposed structure of the uniformitarian stratigraphic column, but interprets the sequence as successive paleoenvironments rather than time-rock units.

What is the relationship between the physical reality of the rock record and the conceptual validity of the uniformitarian stratigraphic column? How does this new model affect the ongoing debate? I offer several observations that we believe require clarification and additional investigation.

## Creationist Stratigraphy

Mr. Gentet appears to regret the state of flux that exists in creationist stratigraphy, and believes that resolution of these differences is a prerequisite to progress. He states, “Without such resolution, the young-earth creationist cannot understand the stratigraphic record in an orderly way.” (p.11). However, this position assumes that the ‘solution’ is the top-down imposition of the right model, and less dependent on field investigation in a looser context of the biblical worldview. In doing so, he dismisses the most significant aspect of the debate—the applicability of the uniformitarian column as a conceptual framework for creationist study. As much as he might disagree, there are credible creationist geoscientists who do not accept a “compressed time” version of the geologic column. I, for

one, am a creationist looking at alternatives to the geologic column. My discomfort with the column has always been its dependence upon time as the key parameter in stratigraphic analysis—whether the time is long or short. Even a brief consideration of the amount of geological activity during the Genesis Flood compels me to abandon time, and discover a new fulcrum for stratigraphic investigation. Ironically, it appears that Mr. Gentet accepts the general structure of the stratigraphic column, but agrees that time cannot function as its key parameter. He suggests preserved paleoenvironments as that integrating parameter.

Mr. Gentet's model is now on the playing field with several others (e.g., Walker, 1994), and must meet the test of explaining disparate historical data. We urge him to follow this article with specific examples of the CCC model's application to the rock record. But first, we ask that he clarify several other issues.

### Where's the Flood?

Perhaps the most significant departure in the CCC model from previous creationist interpretations is the strong implication that the Genesis Flood (GFE *per* Mr. Gentet) was not responsible for significant portions of the rock record. He states that strata representing all geologic periods of the uniformitarian column coexisted since the creation—thus there can be no part of the geologic column that is a distinctive signature of the GFE *per se* (e.g., Flood = Paleozoic and Mesozoic). The succession of the uniformitarian column is merely the record of the same ecological succession that we see operative today. Any remnant of the Flood is pictured as erosive, not preservational: "The CCC model would interpret the large, regional erosion as the continental evidence of the GFE." (p. 19). Reinforcing this concept, he states that the North American Mesozoic would be pre-Flood, as would presumably all the Paleozoic strata that underlie the Mesozoic. Combined with his statements that the Cenozoic also represents pre-Flood strata in many places (p.20) the CCC model runs the risk of asserting that there really is no overwhelming *geologic* evidence for the GFE—a position reminiscent of the "tranquil flood" theory.

This implication is obviously at odds with the position of many creationists (e.g.; Whitcomb and Morris, 1961; Reed et al., 1996; Woodmorappe, 1999). I find it difficult to accept that the biblical Flood—arguably the single greatest geological event since creation—would dissipate without leaving a trace (other than erosional surfaces). It is my understanding that the physical work envisioned in the Flood is entirely consistent with Scripture and is supported by numerous reasonable extrapolations from hydraulic, atmospheric, geophysical, and geological studies. In contrast to Mr. Gentet, I believe that the Flood left significant depositional evidence, not just erosive.

The existence of widespread (and arguably correlative) marine "Paleozoic" strata over much of North America (recognized by Mr. Gentet) supports continent-wide deposition by the GFE. Identifying it as a remnant of a pre-Flood paleoenvironment implies that the Flood was not unique in its scope, as taught by Scripture. Mr. Gentet later suggests that the slow speed of floodwater recession relative to transgression would also imply lower energy conditions, not conducive to vigorous geologic activity. To the contrary, the length of time available for marine processes of chemical precipitation, erosion, and clastic sedimentation, as well as submarine volcanism, all at the incredible rates of the Flood, argues instead for greater representation of these regressive deposits in the continental rock record. And in keeping with the suggestion of Whitcomb and Morris (1961) that Flood regression involved late-stage tectonic realignments, significant tectonic and related igneous activity would also be associated with the later stages of the Flood as shown on the energy curve of Reed et al. (1996). I do not dispute that much of the continental margin sediments are a result of late Flood deposition, but we dispute the contention that they are the bulk of the sedimentary record from the Flood.

This problem could be partially resolved by Mr. Gentet by answering a crucial question: what are the criteria for identifying GFE strata from non-GFE strata in the CCC model? Another related question that needs an answer is this: if the uniformitarian geologic periods are paleoenvironments, then why is there a unidirectional order in the sequence? Why is there not a random distribution of say, Precambrian, Cenozoic, Paleozoic, Mesozoic at least in some locales? Is it because the sequence and global correlation claims of the column are not necessary?

### Is the CCC Model Required by Scripture?

Mr. Gentet offers a theological justification as the basis for his model. While I applaud his emphasis on the primacy of theology, I would suggest that Mr. Gentet has allowed the great weight of his historical model to rest on shaky theological foundations. Although varying physical intensity of the curse is interesting speculation, the passages cited in support of that contention can be satisfactorily interpreted absent that conclusion. I also believe that there is a leap of logic to assume that variations in the curse need equate with geologic activity similar in scope to the GFE before the Flood.

### Conclusion

I hope that Mr. Gentet will clarify these and any other issues surrounding the CCC model. If it can be demonstrated to rest on a solid scriptural foundation, then I hope that Mr. Gentet will pursue investigations that will apply

his model to specific field data, allowing direct competition between this and other models of creationist stratigraphy. This work would advance the dialog in this discipline—a dialog that should be encouraged rather than repressed.

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In a recent article (Gentet, 2000), Mr. Robert E. Gentet proposed a model of Earth history that significantly differs from the general research and conclusions of many Flood proponents. Most people realize that science is not a vehicle governed by majority vote and novel thinking is welcomed in the arena. However, I believe that the Creation/Curse/Catastrophe (CCC) model has inherent structure that would be extremely difficult to scientifically defend. Many areas of agreement exist among most of the diluvialists' camps and Mr. Gentet's article, such as the authority of Scripture, reality of the Flood, and the need for research to find answers within the context of good science and Biblical constraints. Not desiring to minimize these many areas of agreement or cause any consternation in the camp, I would like to mention some proposals in the CCC model that I believe would seem difficult to support and perhaps even be deleterious to Flood geology in general.

An important focus for Flood geology is revealed from Scripture (Genesis 6:13). Here God is speaking to Noah and begins to reveal what lay ahead at that time. God said that He was going to destroy "all flesh" on planet Earth. God not only indicated that He would destroy the sources of violence that had become rampant, but He said, "I will destroy them *with the earth*" (emphasis mine). Special words in the original Hebrew and Greek autographs were designated for the Flood, indicating the uniqueness of this traumatic, Earth-covering cataclysm. From this Deluge, many believe that the necessary energies were initiated to completely restructure (destroy) the entire surface and significant subsurface components of the Earth. From evidences that can be studied today, the Flood was accompanied by geologic upheavals on a scale dwarfing anything that has happened since.

A majority of Flood geologists would likely attribute most stratigraphy and geomorphological features to this single catastrophe and its aftereffects on planet Earth. In

contrast to the young-Earth Flood model, the CCC model necessitates that many disasters were prevalent in the pre-Flood world (Gentet, p. 15). As a result of these disasters, the CCC model postulates that the particular ecosystems existing in the pre-Flood world were locally stratified. Those stratified ecosystems appear today in the rock record as resulting in the geologic "Periods" interpreted by early geologists. The CCC model indicates that all of the geologic "Periods" or ecosystems were present to some degree from the time of Creation Week (Gentet, p. 12).

From my personal study of the stratigraphy of north Alabama, I have found that much of north Alabama is covered by Paleozoic rock structures that include most of the Periods associated with this Era. (Please note that I do not hold to the uniformitarian geochronological time frames, but use them only for reference.) A Pennsylvanian sandstone cap is exposed over a large area of northern Alabama and below that is Mississippian limestone, etc. (Osbourne, et al, 1989). The Pennsylvanian sandstone (Pottsville Formation) is as thick as 1,000 feet in places. The sediments from several Periods of the Paleozoic in northern Alabama extend in some locations to a depth of approximately two miles (Akridge, 1998).

Each of several ecosystems (Periods) in this area of what is now Alabama would have flourished in the pre-Flood world according to the CCC model. Considering the depth of the sediments and the number of vertically successive ecosystems represented in the stratigraphy presents a serious and difficult problem with only 2,000 years or so of time with which to work from the Creation Week to the Flood. Adequate amounts of time for the maturation of each succeeding ecosystem would have been necessary. After each ecosystem matured, a localized disaster would have had to bury the ecosystem and provide the elements necessary for fossilization of the organic material. In this example, each disaster would have to encompass most of

northern Alabama with the burial of each of the sequentially mature ecosystems.

Extending the thought mentioned above, the CCC model would need many localized disasters over most, if not all the pre-Flood Earth. The CCC model proposes that the geologic "Periods" are "limited ecosystems with characteristic forms of life" (Gentet, p. 13). In today's world, certain sedimentary beds can be stratigraphically correlated by fossil content over many thousands of square miles. This would mean that a colossal localized disaster would be necessary to stratify a fossil-correlated ecosystem of that size. Based on that observation, the number and intensity of localized disaster events necessary to leave the Earth's extant stratigraphy would seem highly improbable.

The CCC model places "the North American "Mesozoic" strata with its dinosaur fossils, tracks, nests, etc. as pre-Flood" (Gentet, p.19, emphasis his). The writer indicates that the dinosaur nests and tracks do not lend themselves chronologically to either a Flood or post-Flood setting. He states that a satisfactory answer has not been found to explain the preservation of multiple layers of tracks and nests in traditional Flood geology either during or after the Flood. His answer is that "when dinosaur tracks and nests are seen as preserved from pre-Flood events, the whole question is more simply understood" (Gentet, p. 19). From the CCC model, the ecosystems where the dinosaurs lived were buried again and again by time-separated sequential disasters as they carried out their lives. This would (according to the CCC model) explain the tracks, nests, and other fossils now found in multiple layers. However, this explanation would initiate new problems that are difficult to solve. Again, time would be needed between successive events for maturation of the dinosaurs' ecosystems. For some of the large sauropods to reach the colossal sizes found in the fossil record would require perhaps more than a hundred years. Overlapping ages of dinosaurs in a local area would extend the age of their ecosystem considerably. Once more, not enough time is apparently available between the Creation week and the Flood to begin,

establish, and decimate many pre-Flood "Mesozoic" ecosystems.

Multiple layers of nests and tracks can also be interpreted as having been preserved within a relatively short time frame by rapid burial during cyclic perturbations occurring in an Earth-covering Deluge. Tidal effects from the Floodwater rising on the Earth, coupled with tsunami shock waves and other forces, could explain the multiple dinosaur fossil layers as well as other unusual features associated with ichnology.

It is an encouragement to realize that a myriad of scientific and theological studies involving the Creation and the Flood is ongoing. Congenial debate among many competing ideas in this field should be welcomed as this promotes a sharper focus on common goals. While not all answers to the difficult questions may be discovered in this life, the hard work of so many involved in this arena is sincerely appreciated. Because of recent scientific discoveries being evaluated through the lenses of Biblical truth and good science, this really is an exciting time for creationist research.

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In CRSQ 37:1, Mr. Robert Gentet presents a new model that he calls the "Creation/Curse/ Catastrophe" model. There are many new readers to the *Quarterly*, and they may be unaware that certain issues raised by Mr. Gentet have been resolved long ago. It is for their benefit that I am writing this letter to the Editor.

Gentet quotes Snelling as affirming the geologic column. However, readers should also be aware of my written response to Snelling (Woodmorappe 1996) where I challenge some of his conclusions. However, Snelling's posi-

tion and mine are not as far apart as might seem from Mr. Gentet's quote. Elsewhere, Snelling et. al. (1996) recognize that the geologic strata become progressively more interpretive with increasing geographic distance, and they reject all time-stratigraphic connotations associated with the geologic column.

It is unfortunate that Mr. Gentet disparages within-Flood explanations for dinosaur tracks as "creative explanations." Actually, these considerations are quite prosaic. As discussed elsewhere (Woodmorappe 1996, p. 285), if in

a 1 kilometer deep Flood a meager 1 degree change in slope over a tract of 100 kilometers occurs, it will expose 43 of these 100 kilometers to the air, and provide a substrate for dinosaurs to walk on. (Of course, larger tracts of land and/or greater slopes will vastly increase the available area for dinosaurs to walk on). It is obvious that, with ever-changing slopes, large areas of land will be alternatively flooded and then re-exposed over and over during one Flood. So long as all of the land is not *all* covered by water in a given area (drowning all of the animals), there will be land vertebrates available to colonize the emerged surface and produce many footprints. Remember also that one animal can easily make thousands of tracks on one day. Thus it is easy to accommodate large numbers of tracks, occurring in many horizons and over large areas, over the course of one Flood. There is absolutely no need to relegate track-bearing strata to some mythical post-Flood or (in Mr. Gentet's case) pre-Flood period.

Two centuries ago, Baron Cuvier diminished the Flood's inferred geologic effects to progressively smaller intervals of rock strata, and it is unfortunate that Mr. Gentet is doing the same. As with all neo-Cuvierist ideas, his paper is divorced from reality in that it simultaneously converts the global Flood to a virtual geologic nonevent while tacitly ascribing almost magical geological-process rates to a quasi-normal pre-Flood period.

Let us focus on the latter. I assume that Mr. Gentet adheres to an Ussher-type chronology. (If not, then there is no basis for claiming to be a Biblical literalist). There are thus approximately 1650 years between the Creation and Flood, and, according to the CCC model, most of the Phanerozoic strata must be deposited in this short period by normal geologic processes. We know that normal geological sedimentary processes (in rivers, deltas, lakes, continental shelves, etc.) will deposit, at most, a regionally-averaged net few feet of sediment during 1650 years of normal sedimentation. Mr. Gentet, however, dramatically expands the effects of normal geological processes by several orders of magnitude. His model implies that thousands to tens of thousands of feet of sediment must have been de-

posited by normal geologic processes in just 1650 years. No matter how much greater normal processes could perhaps have been before the Flood, it is inconceivable that this could happen. If, however, we had regional catastrophes, then we would need so many of them that the entire 1650 year pre-Flood period would be a virtual Noah's Flood. Any way it is approached, the model is completely unworkable.

The same can be said for rates of volcanism, plutonism, and tectonism. Imagine not only geosynclines filled up by normal sedimentary processes in only 1650 years, but also the sediment lithified, uplifted, and folded into mountain chains during this brief period of time. It is difficult to imagine how pre-Flood people would have lived in such a world, experiencing these phenomena as well as the colossal earthquakes that would have accompanied mountains being built at kilometer-per-millennium rates.

It is clear that if Mr. Gentet's model is an example of neo-Cuvierist thought, it can make no sense in the context of the Bible's teaching about the Flood. In saying this, I am not being personal, since all neo-Cuvierist ideas, of whatever type, suffer from this fatal defect (Holt 1996) to one degree or another. Let us creationist scientists free ourselves from the neo-Cuvierist delusion once and for all and do all our work in the context of a single global-destroying Flood as the cause of virtually all of Earth's sedimentary rocks.

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These are exciting days for creationists in the field of stratigraphy. The June, 2000, issue of the *Quarterly* featured several contributions that complement or conflict with the new, empirical approach to stratigraphy I and others promote (Klevberg 1999, 2000a; b). Perhaps the most notable contrast is Gentet's natural history model (Gentet, 2000). Unlike many creationists, Gentet believes that the Deluge did not eradicate antediluvian deposits and that antediluvian deposits are not only considerable in extent, but reflect actual faunal successions. These are not evolutionary successions of genetic change but displacement of some organ-

isms by others. That what is proffered is a *natural history model* and not science is not a condemnation but is a critical distinction. What Gentet presents is a scenario of Earth history with resulting implications for geologic processes. If these processes occurred as he believes, they will have produced certain formations and structures that science can identify or fail to identify. Other natural history models may generate other predictions. The *science* of geology can be used to test many of these predictions (Klevberg, 2000a).

Gentet takes what has been the traditional approach among creationists, a “reinterpretation” of the geologic

column. He promotes ecologic zonation, *a la* Harold Clark (Clark, 1968), as the primary source of the fossil order found in the geologic column. Where he deviates from Clark is in viewing these as *successive* ecosystems, an idea identified with Georges Cuvier and popular among contemporary deists, but uncommon among today's creationists (Mortenson, 1997a; b; 1998; Taylor, 1991).

Notice that I say *fossil order found in the geologic column*. I have found no such order in the rocks, and it is illogical to assert the order from the evolutionists' "data" (Klevberg, 1999; 2000a; Reed, 1996a). It is amazing that a mental construct derived from evolutionist presuppositions should seem so convincing to creationists that some would consider it indisputable (Gentet, 2000, p. 12; Klevberg, 2000a; Snelling *et al.*, 1996). Should additional *field work* establish that most local (i.e. real) stratigraphic columns show similar fossil sequences, it may be safe to infer that this order is probably present in most places, but to rely on evolutionists for "data" to reach this conclusion is like asking Earth First to provide data favorable to logging. Thankfully, some creationists have recognized this (Froede, 1998; Klevberg, 2000a; b; Reed, 1996a; b; Reed and Froede, 1996; Reed, Froede and Bennett, 1996; Woodmorappe, 1981).

Some of the criticisms of research by creationists are justified. In some cases, the research has been shoddy, but often it is the logic that fails. The reason is a philosophic one. Most scientists have never been taught to distinguish between science and pseudoscience on an epistemological level; they have never been shown the "mixed question"<sup>1</sup> nature of most stratigraphic problems (Klevberg, 1999, 2000a; b; Reed, 1996a). This is obvious, as terms such as "Cenozoic," "Pleistocene," and "Permian" are tossed about as if they actually had *scientific* significance. This is not a question of communication. It is difficult to evaluate macroeconomics effectively when only Keynesian economic philosophy is permitted. It is difficult to participate in literary criticism when postmodernist nihilism dominates the field. It is difficult to rationally discuss the sanctity of human life with people who accept evolution. One may honestly claim that one believes in kinetic theory while using the language of caloric theory, but it is more than terminology that then hampers one's efforts. What is the use of attempting to "communicate" when the terminology simply embodies concepts incompatible with one's espoused geologic paradigm? Without recognizing the philosophic limitations, one who utilizes these terms has already introduced errors into the evaluative process.

<sup>1</sup>The term "mixed question" was used by Mortimer Adler (1965) to describe an interdisciplinary problem, which is what a natural history study constitutes. Mixed questions require input from more than one discipline (for example history, not just science).

Gentet's speculations may be more plausible than suggestions that the geologic column has *geologic* significance, since he posits that the geologic column has *biologic* significance, the fossil assemblages representing biomes or ecosystems. Nonetheless, I find his paper significantly lacking in distinguishing science from nonscience in regard to stratigraphy, his assertions to the contrary notwithstanding.

There is a place for natural history speculation. Gentet's scenario and that of Tyler and Garner are only two of many. Yet it is essential that one recognize the "mixed question" nature of these natural history models. Historical elements require historical analysis. For example, the CCC model needs a critique by a Hebrew scholar. If we can understand the biblical meaning of the terms used, we can apply our knowledge of hydrology and geomechanics to test the geologic predictions of the CCC model or other scenarios. In the case of Genesis 6–8, the word "Flood," even with a capital *F*, appears inadequate to describe the catastrophe. Even *Deluge*, a stronger word, is insufficient according to some scholars, who prefer *Cataclysm* or simply the transliteration *mabbul* for this unique event in earth history (Morris, 1996). This event could have been relatively tranquil only by miraculous intervention (Baumgardner and Barnette, 1994). Paleohydrologic studies indicate that extremely violent events of at least regional scale have occurred that are responsible for the present land surface (Klevberg and Oard, 1998). If it was as violent as most scholars understand the biblical text to imply and paleohydrology would lead us to believe, how many antediluvian deposits could survive? There are other points to the CCC and other models that are at least partly testable despite the current paucity of stratigraphic *data*.

Froede and Reed (1999) applied foundational concepts of stratigraphy to the northern coast of the Gulf of Mexico. Their paper provides a very tractable example of a scientifically and philosophically sound approach to stratigraphy and exposes the incompatibility of the geologic column with both the diluvial geologic paradigm and science itself (Reed, 1998). Tyler and Garner took issue with Froede and Reed (Tyler and Garner, 2000) and defended the traditional or accommodationist approach. The reply by Reed and Froede (2000) is very clear and well reasoned and should be read by every creationist interested in geologic research.

There are other encouraging signs in geology. Berthault (2000) has a recently published paper providing evidence from sedimentation that undermines the foundational assumptions of stratigraphy that all of us were taught in school and encourages us to understand stratigraphy from the perspective of sedimentation processes. Although I cannot share his degree of enthusiasm for sequence stratigraphy, he has contributed much toward the new view of stratigraphy expressed by a growing number of diluvialists. In addition to our French colleague and recent work by

some prominent American researchers (Froede, 2000; Oard, 2000a; b; Woodmorappe, 2000), some Australians are also showing a willingness to look critically at stratigraphic questions (Lawrence, 2000; Walker, 1996). As the number of geologists breaking free of rigid, uniformitarian thinking increases, geologic research will flourish.

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## The CCC Model: A Reply to Froede; Reed; Akridge; Woodmorappe; Klevberg

Many of the questions raised by Froede, Reed, Akridge, Woodmorappe, and Klevberg are based upon the application of the CCC model. My paper itself (Gentet, 2000), while applying the model to certain instances of North American geology, was primarily written to show the Scriptural and geological reasons for a new model.

In many ways the CCC model agrees with the current Flood model, as the paper itself clearly specified. It disagreed on one primary factor: the geologic activity between the beginning of the Curse and the Flood. The current Flood model makes little or no allowance for pre-Flood strata preservation. Indeed, if only slight geologic activity occurred between the pronouncement of the Curse and the commencement of the Flood, I would agree that such pre-Flood remnants would probably have been destroyed. The CCC model takes the opposite view that so much had been deposited in the pre-Flood world, due to the effects of the Curse, that some portions of the pre-Flood world survives in the geologic record.

We all agree that the world started with only two people. It would take time for them and their descendents to move outward from the area of Eden. The CCC model recognizes the Eden ecosystem ("Cenozoic") as starting small and gradually expanding outward to other areas of the world. That is envisioned as a gradual process. Much of the world, it seems, was of the "Paleozoic" ecosystem or, to a lesser extent, the "Mesozoic" ecosystem immediately after Creation Week. The human sustaining "Cenozoic" ecosystem with its mammals and angiosperms seems very limited in geographic area at the time of Adam's and Eve's creation.

This means that even though we find large regional deposits of *pre-Cenozoic* strata, humans did not thrive in such ecosystems because they offered mankind little in the way of food. I doubt that pre-Flood man ate dinosaur meat, cycads or trilobites!

The objection that my CCC model "converts the global Flood to a virtual geologic non-event" is baseless. The CCC model envisions the Flood as being very catastrophic and worldwide in extent. It left widespread geologic fingerprints. It was an unique event in human history. While we yet today – and at other times since the Flood – have had large scaled catastrophes, none parallel the universal Flood of Noah. And, perhaps more importantly, none had the same source: *40 days and nights of unending rain around the Earth! Because of this, we should expect the geologic signature of the Flood to be unique.*

What are the criteria for identifying the Genesis Flood Event (GFE) from other catastrophes in the CCC model? My paper already mentioned North American – where I have done all my fieldwork – wherein the GFE is noted by massive regional erosion. Deposition seems to be mainly

offshore. I suspect that some of the western USA continental material may have been recycled into granite due to plate movement on the Pacific Plate. The Gulf of Mexico also contains huge amounts of strata from off the continent.

What additional criteria for identifying the GFE strata may be for other areas of the world remains to be seen. Right now the best I can say is: look for something that does *not* contain time indicators such as footprints, nests, and other *in situ* remains. To say that the GFE could preserve such time indicators makes the Flood into something Scripture seems to totally disallow. Scripture is clear that the entire earth was universally covered by water. Furthermore, the Flood consisted of intense, worldwide rains of unique proportions for an unending 40 days and nights! To speculate that dinosaurs, for just one example, would be putting down nests, laying eggs in them, etc. during such an event is beyond my comprehension! It would seem to me that the current Flood model must not have been as violent as it purports to be to allow such happenings.

The question has also arisen about the orderliness of the geologic column in each region of the world. As my paper clearly pointed out, I do *not* use the stratigraphic column in a time-related fashion. The CCC model identifies the so-called geologic "Periods" as *distinctive ecosystems* – not as worldwide time units. Furthermore, those who devised the "Periods" were non-evolutionists. The "Periods" were already set in geologic circles before the time of Darwin's publication. Although this data has now been reinterpreted in an evolutionary manner, evolutionary theory does not negate field investigations and descriptions of fossils and rock composition by thousands of trained geologists!

The time between the beginning of the Curse and the Flood (1656 years?) presented a grand opportunity for the all-powerful God to act out His rulership on the Earth in a way that preserved large amounts of geologic material and fossils. My paper presented various Biblical reasons for believing this to be true and I can only urge the reader to once again review the paper in that regard.

A paper has now been submitted for peer review for the Quarterly where the CCC model is applied to a specific region (Calaveras County, CA). This paper is a continuation of my previous papers on the artifacts and human remains found in these California "Tertiary" gold deposits. Let it be an indication of how the CCC model may be applied to a specific region. It is my desire that others too will apply the principles and assumptions of the CCC model and see how it may begin to solve otherwise perplexing geologic questions.

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## Trematode Parasites: Design

In my recently published paper (Armitage, 2000), I referred to a foundational parasitology text (Schmidt and Roberts, 1989) five times to support the thesis that trematode parasites show design and that evolutionists are baffled with respect to their phylogeny. The text has been revised into a new edition (Roberts and Janovy, 2000), but all of the quotes I used in my paper remain the same in this later edition. This is remarkable in light of the many inroads that creationists have made in exposing a faulty logic employed by our evolutionary colleagues.

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## Fossils and the pre-Flood/Flood Boundary

Most young-earth creationist writers who ascribe a Flood origin to any of the Precambrian (Archean and Proterozoic) strata do so on the basis of the fossil content of the strata (Woodmorappe, 1983; Snelling, 1983, 1991; Baumgardner, 1990; Wise, 1992; Austin, 1994; Austin and Wise, 1994; Froede, 1999a, 1999b).

These writers use four a-priori assumptions, viz.:

1. The presence of fossils in Precambrian strata identifies them as Flood deposited strata.
2. There is an identifiable pre-Flood/Flood boundary in the observable geologic record.
3. The absence of fossils, in the lower parts of the older Precambrian (Archean) strata identifies them as pre-Flood strata.
4. The first appearance of abundant fossils (the "Paleontological Discontinuity" of Austin and Wise, 1994) in Precambrian strata is one of the main characteristics marking the beginning of Flood deposited strata.

Assumption 1 is, in my opinion, the only one of these four assumptions which is valid. Assumption 2 is, I believe, invalid, in view of what I believe regarding the Flood origin of the Precambrian strata and the underlying transition zone and outer mantle rocks, and the location of the pre-Flood/Flood boundary at the 660 km. discontinuity at the base of the transition zone (Hunter, 2000). I am particularly concerned that assumptions 3 and 4 are causing creationists to incorrectly classify the non-fossiliferous earliest Archean strata as pre-Flood, on the basis of lack of fossils, when in fact they are Flood deposited strata.

Such logic is evident in most analyses of this aspect of Flood geology. Froede et al., (1998, p. 19) for instance apply this logic when they say:

There are several creationist proposals which explain how the Precambrian strata might fit within the Young - Earth Flood model. Snelling (1991) and Woodmorappe (1983) have suggested that any fossil organic matter found within the Precambrian strata should relegate them to Flood deposits. *Precambrian strata which do not contain any former evidence of life would then date to the creation week.* (Emphasis added)

Also Froede (1999b, p. 111) says, "Precambrian plant fossils provide excellent evidence of Flood deposition within the young-earth Flood model." These writers thereby unquestioningly assign the non-fossiliferous Precambrian strata as Creation Week on the basis of their lack of fossils. This neglects consideration of the distinctive geological processes which characterized the origin of the earliest Archean (earliest Flood) strata, and which, I believe, may have prevented the preservation of fossils during deposition of these strata. (Hunter, 1992; 1996; 2000). The a-priori assumption in this logic is that if some level is found in the Archean below which there are no fossils, then this level is the pre-Flood/Flood boundary, and the strata below this boundary are pre-Flood (Creation Week).

Some comments regarding the distinctive origin of the Precambrian strata should be instructive regarding the probable cause of the lack of fossils in the earliest, lower

Archean, portions of the sequence. Snelling et. al. (1996, pp. 333–334) noted:

As we have gone from one locality to another looking at the rocks of the Earth, we have ... become convinced that ... correlations are possible, and *global patterns in lithology, palaeontology and chemistry really exist.* (Emphasis added)

“Global patterns in lithology ... and chemistry” are probably best demonstrated by the Archean lithostratigraphic associations, which are probably the most distinctive of all lithostratigraphic associations throughout the globe. They occur in the cores of the eight Precambrian shields throughout the globe and consist of older “high grade” metamorphics (gneisses and schists) and a younger low grade “granite-greenstone” association (Condie, 1981; Salop, 1983). Salop notes that many of the large Precambrian stratigraphic units can be divided into lithostratigraphic complexes that can be traced in many regions of the world.

Salop (1983, pp. 58, 63) describes the physical conditions during the earliest Archean (Katarchean) as follows:

...the plutonic processes of the Katarchean were extremely intensive ... with lava outflows appearing to have been underwater. 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 large ocean ... that at times covered the major part of the Earth’s surface or the whole planet...

The Precambrian strata are thus seen to have a distinctive origin which distinguishes them from all other strata. Some of the factors which may have prevented the preservation of fossils in the earliest Archean strata are as follows:

#### 1. Heat.

Costa et al. (1980; 1981) have noted that mineralogical evidence suggests that ocean temperatures in early Archean times may have exceeded boiling point. The earliest Archean strata are dominantly high magnesian, high temperature, submarine komatiitic volcanic lavas, which were extruded at about 1650°C. The Floodwaters into which these lavas were extruded would thus have been extremely hot. Such high temperatures would have “cooked” the flesh of any dead creatures, thereby contributing to their disintegration and dissipation.

#### 2. Turbulence.

Extreme turbulence of water and entrained clastic sediment, possibly derived from the mantle, during the extrusion of the Archean lavas and the initial up-welling of the “fountains of the great deep” would have resulted in destructive attrition of any organic remains.

#### 3. Corrosion.

The initial Floodwaters may have been acidic, containing sulphates, phosphates, carbonates, etc., in solution and this may thus have tended to dissolve any organic remains.

#### 4. Volcanism.

Archean sequences in Russia, South Africa, Canada, and Australia comprise volcanic sequences commonly in excess of 10 km thickness, with little or no interbedded sediment. Obviously no fossils could be preserved in such thick volcanic sequences.

#### 5. Elevated Water-Level.

The up-welling waters of the “fountains of the great deep” in the Archean portions of the Precambrian shields would, I suggest, have created localized elevated surfaces on the rising Floodwaters, thereby causing the waters to flow away from these areas. Any organisms in the water would thus have been carried away from the shields, possibly to be preserved in sediments of the Paleozoic “platforms.”

#### 6. Metamorphism.

Subsequent metamorphism of Precambrian strata would tend to obliterate any fossils preserved.

In summary then, the lack or paucity of fossils in the earliest Precambrian (Archean) strata should not, in my opinion, be used as a criterion for assignment of these strata to pre-Flood/Creation Week. The lack of fossils results, I believe, from the distinctive geo-hydrologic conditions which characterized the earliest stages of the Flood and prevented preservation of fossils.

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## Article Review

“Fast Fossils” by Dick Lehman  
*Ceramics Monthly* 48(3): 34–37. March 2000

*Raku firing* is a popular ceramics technique with Oriental roots. The process gives ceramic forms an attractive surface, often with a red-blue metallic appearance. The clay item is covered with glaze and fired in the usual way at a kiln temperature of 1600–1800°F (871–982°C). The piece is then pulled from the kiln and cooled for several seconds to a dull red color. Then comes the raku technique. The piece is thrust into a container of sawdust, pine needles, or dried leaves. A lid is applied to produce a reducing atmosphere. That is, there is insufficient oxygen to consume the carbon emanating from the hot glaze and clay. Carbon monoxide forms, which then pulls oxygen from the body and glaze, forming colorful surface oxides.

Author Dick Lehman is an artist in northern Indiana. His article describes a serendipitous extension to raku. He had just placed a hot clay bottle into a metal trash can, covered it with sawdust, and replaced the lid. A sudden wind “blew the trash can half a block away, and the still-thousand-degree bottle rolled... through some grasses, and came to rest against a fence post” (p. 34). Lehman was amazed to see that the copper-stained surface had retained perfect images of the grasses. He has since perfected this method of recording plant images on glass complete with veins, delicate branches, and worm holes.

Lehman explains that the rapidly heated vegetation turns into activated charcoal. A film of carbon is also released which is absorbed by the hot porcelain. This process closely mimics the formation of fossils by carbonization, hence the article title. This particular type of fossilization is usually assumed to occur very slowly in nature. The standard explanation is that volatile elements (H, O, N) are vaporized from buried organisms, and chemical action then somehow changes the tissue into a thin carbon film (p. 36). Such *distilled* fossils include leaves, insects, worms, and larger creatures such as fish and an ichthyosaur. Much of the fauna of the Burgess shale of British Columbia are preserved this way.

Lehman's artistic results clearly challenge the assumed slow nature of carbonization. His results appear in mere minutes. One can imagine extreme conditions of heat, pressure, and fluid dynamics, which have caused similar rapid carbonization to occur in nature. The resulting fossils may be a testimony to catastrophism rather than to a long time scale.

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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.