



QUARTERLY

Volume 46 Winter 2010 Number 3

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OF THE DINOSAURS**
- **THE ORIGIN OF
GRAND CANYON — PART I**
- **THE HUXLEY-WILBERFORCE
DEBATE MYTH**
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Haec Credimus

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

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"The Death of Darwinism"

July 23, 2010, at 8:00 p.m.

On the campus of the University
of South Carolina Lancaster



Editorial

And the Creation Weeps

On the evening of October 25, 1994, a young mother placed her two small children (ages 1 and 3) into the back seat of her burgundy 1990 Mazda Protege, and drove to nearby John D. Long Lake (South Carolina). Once there, she positioned the car on the lake's boat ramp, put the car in neutral with the headlights still on, released the brake, exited, and let the vehicle roll into the lake, her two small children still strapped into their car seats. At the subsequent murder trial of Susan Smith, prosecutors described how the two boys (Michael and Alexander) would have struggled for up to six agonizing minutes before the car finally filled with water, ending their agony and their lives. Six minutes that they would hardly have understood what was happening as their little bodies struggled against their restraints. A rescue diver who found the car several days later said the little hand pressing against the window was heartbreaking. Susan Smith's motive for killing her sons has remained clouded, but based on the letter found in her car, the popular suggestion has been that she was trying to win back her rich boyfriend who did not want her children.

The world pauses and asks, how could a loving God have allowed this to happen? And the creation weeps.

A search of related news articles finds the following headlines: "Mother Throws Infant Against Wall for Crying, Breaks Spine"; "Mother Throws Newborn into Trash"; "Mother Throws Baby Down Flight of Stairs, Five Times"; "Mother Throws 2-Month Old Against Car During Argument"; "Mother Throws 6-Month Old onto Concrete, Crushes Skull"; "Mother Throws Baby into Latrine."

Again the world asks why a loving God would allow such terrible things to happen. And the creation weeps.

In fact, certain words and phrases (and the fateful image they project) have become part of our vocabulary: Son of Sam, Kennedy assassination, 9/11, Columbine, Virginia Tech, Jonestown, Ted Bundy, "going postal," Helter Skelter, Boston Strangler.

Andrew Kehoe, the largest single mass murderer in American history, blew up a school building, killing dozens of little children. His motive? Greed and anger. Ironically, found in the fence of Kehoe's farm was a wooden stenciled sign that read "CRIMINALS ARE MADE. NOT BORN" (http://en.wikipedia.org/wiki/File:Kehoe_sign.jpg).

The questions of "why?" resonate throughout all of human history. If God is sovereign, why would He allow

such evil and suffering? If God is the creator of the universe, then evil must exist only because He created it. Or, perhaps evil exists because God is not truly sovereign and His power is limited. Perhaps it proves there is no loving god, or that such a god is indifferent or has disappeared. Obviously, as this reasoning goes, *if* God exists, and *if* He is loving and all-powerful, *then* He would surely not allow all the evil in the world.

Perhaps more than any other facet of human affairs, the continued occurrence of suffering and evil has caused the most doubt and questioning of who and what God is. Many critics challenge that the very reality of evil proves there is no loving God (e.g., Harris, 2004). In his *Summa Theologiae*, Thomas Aquinas admits that the existence of evil is the best argument against the existence of the Christian God. Certainly, one has only to see the suffering of a small child to wonder why a loving God would ever allow such a terrible thing.

The Real Question

While such questions are neither simple nor trivial, answers can be found. God provides some very clear insights throughout the Bible. For instance, the book of Job provides an example of the

suffering of an innocent man. However, as with Job's friends, many people view personal catastrophe and disaster as God's punishment of a sinner. Nowhere in the account, though, did God embrace this philosophy; He even chastised Job's friends for this attitude (Job 42:7–8). When asked whose sin had caused a particular man's blindness, Jesus answered that the blindness was not the fault of him or his parents (John 9:1–4). What is more, the Bible is very clear that God cannot cause evil (James 1:13–18). However, bad things do happen to "good" people, and innocent victims are not shielded from the consequences of a sinful world (Matt. 5:44–45).

It is also interesting to note that God never directly answered Job's repeated questioning of why this had happened. Some suggest that God avoided the question because even He has no answer, or He is too removed from human affairs to have a concern. On the contrary, God informed Job (and therefore us) that he was asking the wrong question. Job was asking the "why" of creation. Just like Job, every generation has asked the "why" of creation. Why am I here? Why did this happen? Why is there misery? Why is there evil?

Philosophers call such "why" questions the *universals*. Throughout the millennia they have pondered them, discussed them, debated them, argued them. Invariably, though, they have failed to answer them because they have sought their answers only from human wisdom and intellect. Like many philosophers, we too seek our answers for the "why" of creation only from within the creation itself. Some even hope for visits by space-traveling aliens, whom they think may hold some special insight. But the creation, for all its beauty and vastness, has no answers to offer. In fact, the writer of Ecclesiastes warns that searching for answers in this world will only prove to be a search in vain. Despite popular, so-called scientific claims, the creation is not its own creator. Thus, it

does not know or even hold claim to answers for "why?" The knowledge and wisdom within the creation is limited; as a result, so are its answers.

So, how can we find the answers to the "universals"? Instead of asking the "why" of creation, we first need to ask the "who" of creation. God answered Job's questions of "why" with a lesson in creation (Job 38–41), causing Job to acknowledge that as a created being his knowledge of the creation and the Creator was limited. As with Job, we also are limited in our understanding and cannot comprehend the answers to "why?" because we do not yet comprehend the answer to "who?"

When we view the creation, we can either focus upon the flaws and blemishes or recognize that these are aberrations within a beautifully made universe. Consider, for example, the famous Cologne Cathedral in Cologne, Germany. During World War II, the magnificent structure was heavily damaged by aerial bombing. Anyone visiting the cathedral soon after the war would have noted the pulverized sections of the walls and roof and the cracked and broken pieces of the magnificent stained glass windows. However, even though a visitor may never have seen the cathedral before, no one would have asked why it was designed and built that way. Instead, even in its damaged condition, visitors would have noted that the walls, roof, and windows had originally been beautifully designed and painstakingly constructed.

Such it is with God's creation. When scientists look at a cancer cell, they do not ask why it was originally made that way. Instead, the researcher considers all the complex and marvelous workings of a normal cell and contemplates what went wrong to cause it to become cancerous.

Thus, the question is not why God created an "ugly" universe. Like the cathedral or the cancer cell, the beauty and marvel of the creation is too apparent,

even in its damaged condition. Instead, the real question is why God allowed His originally beautiful creation (Gen. 1:31) to be damaged. To answer that question, we have to seek the "who" rather than the "why" of creation.

True Love

Many confuse their concept of a sovereign, all-powerful God with the suggestion that it must be His will for suffering and evil to exist. Still others confuse their concept of a loving God with the assumption that He must be powerless to stop evil, or that somehow He fails to anticipate its occurrence (e.g., he was not aware of an impending murder, thus was unable to prevent it). However, just as God warned Job, we find ourselves confused about these concepts because we do not really understand who God is.

When God created the universe, only humans were made in His image (Gen. 1:26–27). Thus, the pinnacle of His creation was humans, who were capable of giving and receiving His love. A loving God could desire nothing less for His creation (1 Cor. 12:31–13:13). Anything less would be a creation lacking the greatest of all gifts (1 Cor. 13:13).

However, true love is always a matter of free will. It is not possible to force someone to love you. When Amnon fell in love with Tamar—or so he thought (2 Sam. 13)—he determined to force Tamar to return his love. In the moment force was used, Amnon's love turned to hate. What he had failed to realize was that the tenderness of love is only possible as a voluntary choice. Force is driven by lust, not by love. Thus, for us to love God, we must have the ability to choose to love Him. Despite His omnipotence, God will not force us or "program" us to love Him. True love must be a choice; it cannot arise from coercion. Neither will God overwhelm us with His power and majesty, since true love does not result from fear or trepidation.

Instead, the Bible uses the example of marriage to describe God's relationship with His people (e.g., Jer. 3:14–20; Eph. 5:22–33; 2 Cor. 11:2). Just as a man wins the love of a woman by patiently wooing her, God patiently seeks our love (John 3:16; 2 Peter 3:9) and our return to Him (Isa. 44:21–23; Jer. 3:7–12; Joel 2:12–13; Zech. 1:3; John 3:17).

However, freedom to choose to love God also means freedom to reject Him (Prov. 1:24–30; 1 Peter 4:3). Rejection of God results from a desire to disobey and ignore His will for us. God is angry with those who reject His truth and desire only evil (Rom. 1:18–21). But since they have made the choice to do evil, God will not prevent them from following their hearts' evil desires (Rom. 1:24–32). In fact, because everyone must have the freedom to choose, God will not prevent anyone from choosing to sin.

While making a choice to sin is currently referred to as “freedom of expression,” such an attitude ignores God's warning that these actions have consequences (Prov. 1:24–32; Gal. 6:7–8). For humans, beginning with Adam and Eve, the consequence of sin is death, both physical and spiritual (Rom. 6:23; 8:10). For the creation, the consequence of human sin is separation from the source of love, joy, and life—the Creator (Gen. 1:14–19; Rom. 8:20–22). Thus, hatred, suffering, and death now fill the void caused by our separation from God. Just as darkness is the absence of light, death and suffering is the absence of God (John 1:1–9). The effects of this absence can be seen each night on the evening news.

Evil is a choice. People choose to do evil (Gen. 6:5; Prov. 21:10; Matt. 15:19; James 1:14–15), despite the horror of the consequences. However, were God to protect us from the consequences of our own sin, He also would be eliminating our freedom of choice. What does this give us? When a murderer reaches for a gun—*Zap*, he gets shocked? When a child molester approaches a

child—*Thump*, he gets tripped? When a distressed mom attempts to throw her infant child, her arms suddenly become paralyzed?

It really does not stop there, though. Does pain and suffering result only from these types of violent actions? From God's vantage point, He also sees the dire consequences of the far more common actions of greed, gossiping, lying, cheating, envy, and lust (Rom. 1:29–30). To truly stop evil, He would have to stop these actions also. What is more, evil thoughts lead to evil actions (Matt. 5:28; Matt. 15:18–19; James 1:13–15), so God would even have to control our thoughts. Such a god becomes more like an Orwellian “big brother” than a loving Father, monitoring and preventing all unacceptable behavior and thinking. Humans are reduced to nothing more than mind-controlled automatons.

But consider further: even if God allowed the murderer to act and simply protected the victim (e.g., blocked the bullet, shielded the bomb blast, etc.), He would still be preventing our sinful actions from having consequences. As a result, these actions would be rendered irrelevant to human affairs. We would no longer be truly free to choose to sin. Ultimately, a murderer would no longer attempt to kill, not because of a changed heart, but simply because that choice is no longer available. There is no freedom of choice if there is no ability to act upon the choice. (I do not control the weather, so I cannot choose to make it rain.) Therefore, once the freedom to choose to reject God is lost, so is the freedom to choose to love God. The freedom of one choice must always accompany the other.

The Cost of Love

Should God have made the world, knowing that people would reject His overtures of love, choose to do evil, and ruin His beautiful creation? Again the Bible's

comparative use of marriage provides some insight. When a couple marries, they vow for better or worse. Would you marry if you knew your spouse would become an invalid? Couples also vow “till death do us part.” Would you marry the love of your life if you knew he or she would soon die?

The famous Christian writer C. S. Lewis married late in life and lost his wife after only four years of marriage. In his book, *A Grief Observed*, Lewis notes that even if he had known she would die so soon, he still would have married her 100 times over. He proceeds to observe that one day of love with his wife gave him something he could never get anywhere else on earth. Even in his pain, he realized that one day of such love is better than an entire lifetime without; thus it was worth the price of pain later.

The “who” of creation is a God of love. He would rather have one day of true love with His creation than an eternity of our mindless servitude. The love of one soul is worth the price of all the temporary tribulations of this world. The love of one soul is worth the price of Himself (John 3:16–17).

In *The Problem of Pain*, Lewis (1962) observes that the major reason we cannot reconcile human suffering with a loving God is because we often attach too trivial a meaning to the word “love” and judge God's wisdom by human standards. As an example, he suggests that an artist may expend little energy or passion in the painting of a simple sketch. In contrast, Lewis (1962, p. 42) concludes:

Over the great picture of his life—the work which he loves ... he will take endless trouble ... One can imagine a sentient picture, after being rubbed and scraped and recommenced for the tenth time, wishing that it were a thumb-nail sketch whose making was over in a minute. In the same way, it is natural for us to wish that God had designed for us a less glorious and less arduous destiny; but

then we are wishing not for more but for less.

God does not promise health or wealth, but He does promise to make all things work for good if we love Him (Rom. 8:28). God does not ignore human pain and suffering (1 Peter 5:7); there are examples of healing throughout the Bible. He is fully aware of our needs and pains (Matt. 6:8; 7:10–11; 10:29–31). But when the apostle Paul pleaded for God to ease his physical suffering, God refused (2 Cor. 12:8–9). Perhaps by so doing, God was making the point for all subsequent generations that our focus needs to be upon things beyond the temporary (2 Cor. 4:16–18).

God knows the ultimate glory and joy that awaits us, and these are far beyond our meager understanding (1 Cor. 2:9). After just five minutes in heaven our worst nightmares will have already been forgotten (Rom. 8:18–21; 1 Peter 5:10). Why? Because we will be with the “who” of creation.

Serving a life sentence in prison, Susan Smith now claims to be a Christian. If so, she has the promise of being able to spend all eternity loving and being loved by Michael and Alexander, no more carrying the horrible pain of what she did. Only a loving God can do that. What an awesome God we serve. Only the “who” of creation can give us com-

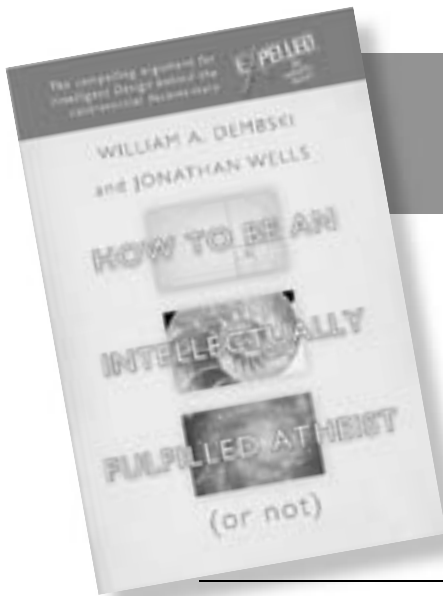
plete answers to our questions of “why.” Only the “who” of creation can restore a broken mother to her children. And the creation will rejoice forever.

Kevin Anderson, Ph.D.
Editor

Creation Research Society Quarterly

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- Lewis, C.S. 1962. *The Problem of Pain*. The Macmillan Co., New York, NY.
Harris, S. 2004. *The End of Faith*. W.W. Norton, New York, NY.



Book Review

How To Be An Intellectually Fulfilled Atheist (Or Not)

by William A. Dembski
and Jonathan Wells

Intercollegiate Studies Institute,
Wilmington, DE, 2008, 149
pages, \$12.00.

The title of this book (IFA) may seem to be misleading, but the text packs a powerful wallop. IFA constitutes an expansion of “The Origin of Life” chapter in an earlier 2008 book, *The Design of Life*, also authored by Dembski and Wells.

Using what arguably is the most impregnable of biologically-supported Intelligent Design, Dembski and Wells veritably clinch their case. They write, “conditioned by a materialist outlook that denies design, many scientists find it difficult to acknowledge design even

when they are using it, imagining that it is merely an illusion.... Biologists use the assumption of design with such success as a working tool precisely because design in biology is not an illusion but real” (p. 114).

The 25 chapters in IFA are relatively short, some only two pages. They are followed by a one-page Epilogue: Atheism as a Speculative Faith, and 19 pages of helpful references and notes. IFA does not have an index. There is a single page

about the authors, each holding two earned doctorates.

IFA should be understandable by college and university students trained in biology and biochemistry, as well as by those with similar high school training. IFA belongs on the shelves of libraries used by these students.

Wayne Frair, Ph.D.
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Basking Ridge, NJ 07920

Genesis and the Demise of the Dinosaurs

Joel D. Klenck*

Abstract

The taxonomic divisions presented primarily by God in the Bible differ in part from the Linnaean classification system, which is familiar to modern biology. An evaluation was completed of the usage of the Hebrew terms for each division during the Creation week, after the Fall, during the Flood, and later in Biblical history. The analysis suggests that dinosaurs declined significantly after the Fall and before the Noachian Deluge. Conversely, after the Fall, mammals increased markedly. This conclusion runs contrary to other creationist theories that suggest that most dinosaurs died during or after the Flood. The Bible suggests these trends may have occurred for theological reasons: the danger that dinosaurs posed to the existence of mankind, their susceptibility to demonic influence, and their capabilities under infernal control.

Introduction

The prevailing theory held by many creationists is that the majority of the dinosaurs perished during the Flood and subsequent glaciations (Ham 2006; Morris 1989; Oard 1990, 1993). This theory coincides with the majority belief that the Noachian Deluge and its attendant events caused “most of the geological formations of the earth” (Gish, 2006, p. 49). The debate concerning the pre-Flood/Flood boundary follows this premise with researchers placing this horizon in strata at the beginning of Phanerozoic or Proterozoic eras—before the Cenozoic, Mesozoic, and Paleozoic (Austin, 1994; Hoesch, 2007; Austin and Wise, 1994; Wise and Snelling, 2005;

Oard and Froede, 2008). Many regard the period between the Fall and the Flood as having a minimal impact on the extirpation and fossilization of terrestrial animal kinds and its impact on geological strata (Reed et al., 1996; Froede, 1995; Walker, 1994; Reed et al., 2006). Others postulate that pre-Flood deposits were either degraded or removed by the Flood (Austin and Wise, 1994, p. 584; Morris, 1994, p. 106; Walker, 1994, p. 584). Still, there are a persistent few who object to the minimalization of the Fall and maximalization of the Flood, especially in regard to the curses God made on the ground, serpent, and on Adam’s descendants after the Fall (Gentet, 2000;

Watts, 1984). Both authors cite Biblical passages which describe the impact of the Fall, namely that God cursed the serpent (Genesis 3:14–15) and the ground (Genesis 3:17), creation groaned (Romans 8:22), sin and death entered the world (Genesis 3:19, 4:8; 1 Corinthians 15:22; Romans 5:12–14), all flesh became corrupted and the earth was filled with violence (Genesis 6:10–13), and carnivory began (Genesis 1:29–30; 9:3–4). God’s curse of the ground during the antediluvian period is repeatedly mentioned by Cain when he is judged (Genesis 4:10–12), in the statement by Lamech after Noah is born (Genesis 5:28–29); and by God after the Flood: “Never again will I curse the ground...” (Genesis 8:20–22). Furthermore, flood geologists cite examples today where natural disasters, such as the recent eruption of Mount Saint Helens, caused the rapid buildup of stratigraphy. They

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apply these observations to the effects of volcanism during the Noachian Deluge (Morris and Austin, 2003). Conversely, no mention is made of similar events after the Fall and before the Flood. Since modern natural disasters can cause the rapid formation of stratigraphy, in an era when God does not curse the ground, it is likely these same catastrophes were more pronounced after the Fall and before the Flood, when God cursed the earth, and this curse was readily noticed by the antediluvian patriarchs. Watts (1984, p. 21) notes that the pre-Flood world should be considered as “a possible era of fossilization.” Gentet (2000, p. 19) places “the North American Mesozoic strata with its dinosaur fossils, tracks, nests, etc. as pre-Flood.” The analysis below lends support to the minority view that most dinosaurs perished in the period after the Fall and before the Flood.

Major Taxonomic Classifications of Terrestrial Animals in the Bible

Klenck (2009) provided an analysis of the major taxonomic groups of terrestrial animals as defined by God in the Bible, especially in Genesis, Leviticus, and Deuteronomy. The major terrestrial animal groups are shown below, with the animal kinds assigned to each group, their Hebrew spelling, English pronunciation, Strong's Concordance number and translation(s).

1. Every bird [עוף] *with wing* (Gen 1:21)
עוף 5775
2. The beasts of the earth [הארץ-הית] (Gen 1:25)
הית 2416
ארץ 776
3. The *cattle* [הבהמה] (Gen 1:25)
בהמה 929
4. Every thing that creepeth [רמש] (Gen 1:25)
רמש 7430
5. Man [אדם] (Gen 1:27)
אדם 120

Table I. Animal kinds attributed by God to *ohf*, or bird.

Bird, עוף, <i>ohf</i> , 5775					
Book	Chapter	Verse	Hebrew	English Pronunciation	English Translation
Lev	1	14	התרים	hatorim [8449]	Turtledoves (6), turtledove (3), turtles (3), turtle (3).
Lev	1	14	היינה	hiyanah [3123]	Dove (14), pigeons (9), doves (5), doves' (2), pigeon (1).
Lev	11	13	הנשר	ha'neshar [5404]	Eagle (19), eagles (5), eagle's (1), eagles' (1).
Lev	11	13	הפרם	ha'perem [6538]	Ossifrage (2), black vulture (1).
Lev	11	13	העזניה	ha'ozniyah [5822]	Osprey (2), bearded vulture (1).
Lev	11	14	הדאה	ha'da'ah [1676]	Vulture (1), red kite (1), kite (1).
Lev	11	14	האיה	ha'ayah [344]	Aiah (6), kite (2), black kite (1), vulture's (1), falcon (1).
Lev	11	15	כל-ערב	kol erev [6158]	Raven (6), ravens (4).
Lev	11	16	בת היענה	ha'ya'anah [3283 & 3284]	Owl (9), ostriches (5), ostrich (1), eagle owl (1).
Lev	11	16	התחמס	ha'tach'mas [8464]	Nighthawk (2), screech owl (1), great owl (1).
Lev	11	16	השחף	ha'shachaf [7828]	Cuckow (2), gull (1), bat (1).
Lev	11	16	הנץ	ha'netz [5322]	Hawk (3), small hawk (1).
Lev	11	17	הכוס	ha'kos [3559]	Little owl (2), owl (1).
Lev	11	17	השלך	ha'shalach [7994]	Cormorant (2), Egyptian vulture (1).
Lev	11	17	הינשורף	ha'yan'shuf [3244]	Great owl (2), owl (1), eared owl (1).
Lev	11	18	התנשמת	ha'tinshemet [8580]	Swan (2), white owl (1).
Lev	11	18	הקאת	ha'ka'at [6893]	Pelican (3), cormorant (2), desert owl (1).
Lev	11	18	הרחם	ha'racham [7360]	Gier eagle (2), owl vulture (1), osprey (1), carrion-vulture (1).
Lev	11	19	החסידה	ha'chasidah [2624]	Stork (5), heron (1), ostrich (1).
Lev	11	19	האנפה	ha'anafah [601]	Heron (2)
Lev	11	19	הדוכיפת	ha'dukiphat [1744]	Lapwing (2), hoopoe (1).
Lev	11	19	העטלף	ha'atalef [5847]	Bat (2), bats (1).
Deut	14	13	הראה	ha'ra'ah [7201]	Glede (1), red kite (1), hawk (1).

6. Every beast of the field [השדה
היה] (Gen 2:19)
היה 2416
שדה 7704

Birds, or *ohf*, were the first group of terrestrial animals that God formed during the fifth day of creation (Table I). This taxon comprised most likely both flying and flightless birds, due to the possible attribution of *ya'annah* to ostrich. Most translations of Lamentations 4:3 translate *ya'annah* as ostrich, which has continued into Modern Hebrew. The description of both flying and flightless birds as *ohf* generally corresponds to the Linnaean class *Aves*. In addition, the bat, or *atalef*, is included in the group *ohf*. The translation of *atalef* as a bat is uniform throughout the Bible, and in Modern Hebrew, the word *atalef* continues to be translated as bat.

On the sixth day of creation week, God created the terrestrial creepers and swarmers. The Genesis accounts use the word *remes* as the primary designator of these creeping animals; however, in Genesis 7:22, *sheretz* is used. God first uses these words to describe marine animals, which He created on the fifth day (Genesis 1:21–22). These verses show the interchangeability of *remes* and *sheretz* and how the root word transitions from nouns to verbs to describe this taxon of creepers / swarmers. In Genesis 1:22, the taxon is described as *שרצו המים* or “that is creeping which swarmed the waters.” *Romeset* is an active participle and *shertzu* is a plural third-person perfect verb. This phrase in Genesis 1:21 reflects the creative directive by God in Genesis 1:20: “God said *let swarm the waters swarmers*” or *ישרצו המים שרץ*. Here, *sheretz* is an imperfect verb and a noun. To reiterate in less wooden English, God declares “*let the waters swarm with swarmers*” in 1:20, and in 1:21 God creates each “*living soul that is creeping which swarmed the waters*.” Both the mechanics of 1:21 and the context of 1:20–21 exhibit how *שרץ*

(swarmer) and *רמש* (creeper) are used interchangeably, and their descriptions *creep* literally from nouns to different verb tenses. The terrestrial animals that comprise this group make it the most diverse of the major classifications. Leviticus 11:21–22 mentions *remes* that fly and lists four “clean” creepers, which are translated as species of locusts, crickets, or both. Leviticus 11:42 notes that this group comprises animals that crawl on their belly and have many feet.

In Leviticus 11:20–23 the word *ohf* also is used with *sheretz*. However, *ohf* can be translated as bird, flying, or flieth. Here, *שרץ העוף* is literally *swarmer the flying or swarming thing which flies*. Only those unfamiliar with Hebrew grammar would state that Leviticus 11:20–23 refers

to birds since the phrase *שרץ העוף* exhibits clearly *העוף* is the genitive as shown by the article *ה* and describes *שרץ*, which is in the construct state (Weingreen, 1959, pp. 43–47). Hence, the swarmer is being described as flying. *Ha'ohf* or *העוף* describes the swarmer and is not the object of description. If the verse read *עוף השרץ* then the text could be translated as “bird which is swarming” or “swarming bird,” which would indicate that insects are part of *ohf*. However, the passage clearly indicates that *שרץ* is in the construct state and is described by *העוף* and hence, is correctly translated in every Hebrew translation of the text as “swarming thing which flies” or “flying swarmer.”

Leviticus 11:29 broadens the taxonomic group of *remes* / *sheretz* to

Table II. The animal kinds attributed by God to *remes* or *sheretz* (creepers or swarmers).

Creeper or swarmer, רמש או שרץ, <i>remes</i> or <i>sheretz</i> , 7430 or 8313					
Book	Chapter	Verse	Hebrew	English Pronunciation	English Translation
Lev	11	22	הסלעם	ha'salam [5556]	Bald locust (1), katydid (1).
Lev	11	22	ההרגל	ha'hargol [2728]	Long horned grasshopper (1), cricket (1), locust (1), beetle (1).
Lev	11	22	החגב	ha'chagav [2284]	Grasshopper (1), locust (1), short horned grasshopper (1).
Lev	11	29	החלד	ha'heled [2467]	Weasel (1), mole (1), rat (1).
Lev	11	29	העכבר	ha'akbar [5909]	Mice (4), mouse (2), jerboa (1), jumping rat (1).
Lev	11	29	הצב	ha'tzav [6632]	Lizard (1), tortoise (1), great lizard (1).
Lev	11	29	האנקה	ha'anakah [604]	Ferret (1), gecko (1).
Lev	11	29	הכח	ha'kuach [3581]	Chameleon (1), monitor lizard (1), any kind of lizard (1).
Lev	11	29	הלטאה	ha'leta'ah [3911]	Lizard (1), wall lizard (1), gecko (1).
Lev	11	29	החמט	ha'chumet [2546]	Snail (1), skink (1), sand lizard (1).
Lev	11	29	התנשמת	ha'tinshamet [8580]	Mole (1), chameleon (1).

Table III. The animal kinds attributed to *behemah*, which includes medium to large mammals.

"Cattle," בהמה, <i>behemah</i> , 929					
Book	Chapter	Verse	Hebrew	English Pronunciation	English Translation
Lev	11	4	הגמל	ha'gamal [1581]	Camels (45), camel (5), camels' (3), camel's (1).
Lev	11	5	השפן	ha'shafan [8227]	Shaphan (30), conies (2), coney (1), cony (1), rock badger (1).
Lev	11	6	הארנבת	ha'arnevet [768]	Hare (2), rabbit (1).
Lev	11	7	החזיר	ha'chazir [2386]	Swine's (4), swine (2), boar (1), pig (1)
Deut	14	4	שור	shur [7794]	Ox (54), bullock (11), oxen (8), cow (2), bullocks (1), bull (1).
Deut	14	4	כשבים	kesavim [3775]	Sheep (8), lamb (3), lambs (1), ram-lamb (1), young sheep (1).
Deut	14	4	עזים	ezim [5795]	Goats (40), goats' (10), kid (7), goat (5)
Deut	14	5	איל	ayal [354]	Hart (9), harts (2), deer (1), young stag (1).
Deut	14	5	צבי	tzevi [6643]	Roe (8), roebuck (4), gazelle (3), roes (3), roebucks (1).
Deut	14	5	יחמור	yach'mur [3180]	Fallow deer (2), roebuck (1), roe deer (1).
Deut	14	5	זמר	zamer [2169]	Mouflon (1), chamois (1), mountain sheep (1), gazelle (1).
Prov	30	30	ליש	layish [3918]	Old lion (2), lion (1).
Ec	3	18	אדם	adam [120]	Man (390), men (109), Adam (20), man's (16)
Zec	14	15	הסוס	ha'sus [5483]	Horses (97), horse (35), horseback (2), on horseback (2)
Zec	14	15	הפרד	ha'pfered [6505]	Mules (8), mule (6), mules' (1).
Zec	14	15	הגמל	ha'gamal [1581]	Camels (45), camel (5), camels' (3), camel's (1).
Zec	14	15	החמור	ha'chamor [2543]	Donkey (55), donkeys (39), donkey's (1), male donkey (1).
Jer	15	3	כלבים	ha'kelevim [3611]	Dogs (16), dog (14), dog's (2).

include small mammals such as *heled* and *akbar*, the weasel and mouse, respectively. Also, *chumet*, which is commonly translated as snail also belongs to *remes*. Furthermore, God assigns *tzav*, *anakah*, and *leta'ah*, which are

translated as lizards and turtles, to this group. Hence, *remes / sheretz* is the broadest taxonomic group created by God, comprising insects, arachnids, snails, small reptiles, and small mammals (Table II).

God created the *behemah* on the sixth day, a word commonly translated as "cattle." However, a comparison of Biblical passages shows that God includes a wide array of terrestrial animals in this group including the camel, rock badger, hare, swine, sheep, goat, oxen, deer, and ibex (Table III). Zechariah 14:15 notes that horses, mules, camels, and donkeys belong to this group. Deuteronomy 28:26 and 1 Samuel 17:44 notes that *behemah* comprise non-avian carnivorous animals that consume the remains of humans. Proverbs 30:30 notes that the lion is from the *behemah*. To reiterate, while God associates small mammals with *remes* (Leviticus 11:29), He attributes mammals that are equal to or larger in size than hares to the *behemah* group (Leviticus 11:3–7; Deuteronomy 14:4–5).

Of all the created animal groups, the beasts of the earth are the most enigmatic with regard to Scripture. Although mentioned during the Creation week, very few references after Creation are associated with this taxonomic classification. These mostly comprise prophetic passages without associations with specific animals. Thallon (1984) adroitly suggests that beasts of the earth were a large taxonomic grouping that comprised the beasts of the field, a smaller array of created kinds. Hence, specific animals associated with beasts of the field also belong to the more inclusive category of beasts of the earth.

Another association is found in Job 40:15–24, which describes the "Behemoth." Behemoth should not be confused with *behemah*. The former refers to a specific animal kind and the latter, a taxonomic group (Leviticus 11:3–7; 11:26–27; Deuteronomy 14:4–5). In addition to the differences in Hebrew spelling there is the pronounced divergence in the description of Behemoth compared to other animal kinds which God associates with the *behemah* taxon. The description of Behemoth resembles that of a large herbivorous sauropod,

Table IV. The animal kinds attributed to the beasts of the field or *chayat ha'sadeh*.

Beast of the field, חַיַּית הַשָּׂדֶה, <i>chayat ha'sadeh</i> , 2416 & 7704					
Book	Chapter	Verse	Hebrew	English Pronunciation	English Translation
Gen	3	1	נָחָשׁ	nachash [5175]	Serpent (25), serpents (4), serpent's (2)
Is	43	20	תַּנִּין	tannin [8577]	Dragons (16), dragon (6), serpent (2), serpents (1).

such as an *Apatosaurus*, in that its tail is described as hanging “like a cedar” (Job 40:17) and its enormity blocks the flow of rivers (Job 40:22). Furthermore, the Behemoth is associated with the beasts of the field (Job 40:20) and is described as “the first in the ways of God” (Job 40:19). In Genesis 1:25–26, God first created the beasts of the earth. Since Job 40:19 describes Behemoth as first in the ways of God and Genesis 1:25 notes that God first created the beasts of the earth on the sixth day of creation, it appears that the Behemoth should be associated with the beasts of the earth.

The last major taxonomic group created by God was the beasts of the

field. Biblical passages note that these animals prefer desolate land, carnivory, and are associated with hell (2 Samuel 21:10; Ezekiel 31:13, 39:17; Jeremiah 12:9). Beasts of the field are noted in prophetic passages but are not associated with specific animal kinds, with two noted exceptions (Table IV). Genesis 3:1 describes the serpent or *nachash*, as being the wisest of all the beasts of the field. After the Fall, God cursed the serpent stating that it would in the future move on its belly and eat dust all the days of its life (Genesis 3:14). The verse suggests that before the Fall, the serpent must have stood upright and was not near the ground. After the Fall, the term

nachash is mostly associated with snakes, specifically vipers or *sh'feefone* (Genesis 49:17; Psalms 140:3; Isaiah 14:29). That *nachash* usually refers to snakes is evidenced by other Biblical references that cite their venomous qualities (Numbers 21:6; Psalms 58:4); habitat on rocks, in walls, and in the desert (Proverbs 30:19; Ecclesiastes 10:8; Amos 5:19; Deuteronomy 8:15); aptitude for biting (Numbers 21:9; Proverbs 23:32); ability to be charmed (Ecclesiastes 10:11; Jeremiah 8:17); and their mode of travel by crawling on the ground and licking the dust (Micah 7:17). However, Isaiah 43:20 associates beasts of the field with *tannin*. In several Biblical passages, *tannin* is portrayed as a terrestrial animal and is translated as dragon, serpent, or monster (Psalm 91:13; Isaiah 34:13; 35:7; Jeremiah 49:33; 51:37). In Genesis 1:22 *tannin* denotes a sea monster. The association between *nachash* and *tannin* is further clarified in Isaiah 27:1. In this verse, both *nachash* (serpent) and *tannin* (dragon or monster) are used to describe Leviathan, which in Job 41 depicts a very large animal with terrible teeth (v. 14),

Table V. Comparison between major terrestrial faunal groupings from Scripture and Linnaean classifications.

Major Taxa Defined by God	Common Translation	Proposed Linnaean Classifications
Behemah	Cattle	Class: Mammalia larger than or equal to the size of hares.
Remes / Sheretz	Creeper / Swarmer	Class: Mammalia smaller in size than hares. Phylum: Arthropoda (insects, spiders, lice) Class: Gastropoda (land snails and slugs) Reptilia Order Squamata, Suborders Lacertilia (lizards) Class: Reptilia, Orders Sphenodontia and Testudines (turtles and tortoises)
Ohf	Bird	Class: Aves Mammalian Order: Chiroptera (bats)
Chayat Ha'Aretz	Beast of the Earth	Supraorder: Dinosauria, Order: Ornithischia Supraorder: Dinosauria, Order: Saurischia, Suborder: Sauropodomorpha
Chayat Ha'Sadeh	Beast of the Field	Supraorder: Dinosauria, Order: Saurischia, Suborder: Theropoda Reptilia Order Crocodylia (crocodiles and alligators) Reptilia Order Squamata, Suborders Serpentes and Amphisbaenia (snakes and worm lizards)

Table VI. A numerical comparison of mentions of *behemah*, beasts of the earth, and beasts of the field from Genesis through Deuteronomy.

Books in the Bible	Behemah	% Behemah	Beasts of the Earth & Field	% Beasts of the Earth & Field
From Creation to the Fall (Genesis 1:1 to 3:24)	5	41.7%	7	58.3%
After the Fall and throughout the Flood (Genesis 4:1 to 9:29)	13	81.3%	3	18.8%
After the Flood to Joshua (Genesis 10:1 through Deuteronomy)	85	96.6%	3	3.4%

scales (v. 15), moving in the deep sea (v. 31), whose exterior cannot be penetrated by spears, arrows, or swords (v. 26–29). Hence, the totality of Biblical passages suggests that *nachash* can describe both smaller snakes and much larger dragons or monsters with reptilian attributes. Furthermore, that God describes small reptiles such as lizards and turtles as being part of *remes*, strongly indicates that the beasts of the field comprised larger reptiles. To sum, the beasts of the field taxon included dragons and legged serpents, and incorporated large carnivorous reptiles that moved above the ground. These descriptions of beasts of the field suggest a correlation with sauropods, especially theropods.

Table V compares the major terrestrial faunal groupings created by God with the more familiar Linnaean classification scheme. When God created *ohf*, these comprised all birds and bats. God created *behemah*, which included mammals with sizes equal to or larger than hares. God created *remes*, a broad group that included small mammals, small reptiles, terrestrial snails and slugs, and the entirety of the Linnaean phylum *Arthropoda*: insects, arachnids, millipedes, and similar fauna. Finally, God created the beasts of the earth and field: the river-stopping behemoth, legged serpents, and dragons, which included the supraorder *Dinosauria*.

Demise of the Beasts of the Earth and Field

There is a trend in the Biblical citation of major terrestrial taxonomic groups. From Creation to the Fall (Genesis 1:1–3:24), there is much mention of the beasts of the earth and field. After the Fall and throughout the rest of the Pentateuch (Genesis 10 through Deuteronomy), the beasts of the earth and field are largely absent from any narrative (Table VI).

The decline of Biblical references to the beasts of the earth and field after the Fall is striking in several respects. At Creation and in Eden prior to the Fall, the beasts of the earth and field are given primacy by God. On Day 6, God *first* created the beasts of the earth, before any other animal group (Genesis 1:25). In Eden, God *first* mentions the beasts of the field and brings these kinds to Adam to be named (Genesis 2:19). The serpent was *more* cunning [ערום] than all [מכל] the beasts of the field (Genesis 3:1).

Despite the early prominence of the beasts of the earth and field, they are hardly mentioned after the Fall, as shown by the following texts.

1. Genesis 6:7. When God contemplates the destruction of all terrestrial animals before the Flood, He plans to destroy men, *behemah*, *remes*, and birds. The

beasts of the earth or field are not mentioned.

2. Genesis 6:18–20. God orders Noah to take the following groups onto the ark: Noah's family, *behemah*, *remes*, and birds. Again, the text does not mention the beasts of the earth or field.
3. Genesis 7:2–3. God commands Noah to put seven of every clean *behemah* and bird and two of every unclean *behemah* on the ark. Again, the beasts of the earth and field are excluded.
4. Genesis 7:7–8, 13–14. When Noah enters the ark, he enters the ark with his family, *behemah*, *remes*, and birds. The beasts of the earth or field are not mentioned.
5. Genesis 7:21, 23. When all terrestrial life is destroyed by the Flood, the following animal groups are mentioned: birds, *sheretz* (creepers), *behemah*, and men. Here, God notes that animals [חיה] died, but again no mention is made of the beasts of the earth or field.
6. Genesis 8:16–19. When Noah and the animals leave the ark, the following groups are mentioned: birds, *remes*, *behemah*, and Noah's family. Neither the beasts of the field nor the beasts

of the earth are included in the debarkation description.

7. Genesis 9:2, 9–10. Only after the Flood, when God states that all animals will fear man and establishes a covenant with Noah, is there mention of the beasts of earth. However, in these passages the grouping is mentioned with the prefix *col* or “all” [כל-הית הארץ], which might infer a general statement about all the terrestrial animals on earth. No mention is made about the beasts of the field.

After the Pentateuch, beasts of the earth and field are noted in mostly prophetic texts associated with the destruction of the enemies of God, divine punishment, and hell. These passages discuss spiritual and symbolic animals and rarely mention the beasts of the earth or field as actual earthly animals.

Also, after the Fall, the phrases “beast of the earth” and “beast of the field” change. Before the Fall, beasts of the earth and field appear as *chayat ha’aretz* and *chayat ha’sadeh*. After the Fall, the phrase at times changes to *behemat ha’aretz* (Deuteronomy 28:26, Jeremiah 15:3; 16:4) and *behemat ha’sadeh* (1 Samuel 17:44), again reflecting the rise of the taxon associated with mammalian fauna.

Ham (2006, pp. 135, 143) notes passages about terrestrial dragons after the Fall (Psalm 91:13; Isaiah 34:13; 35:7; Jeremiah 49:33; 51:37; Ezekiel 29:3; 32:2; Malachi 1:8 [sic—Micah]). However, some of these references could be translated as crocodile (Ezekiel 29:3). The mention of Behemoth, the river-blocking sauropod in Job 40:15, occurs only in this passage. Also, legends concerning the slaying of dragons or dinosaur-like creatures after the Flood are relatively few in number but widely promulgated. Saint George slew one dragon and Beowulf dispatched one Grendel, yet the iconography and retelling of these two events permeate Western culture even

today (Cooper, 1995). Assuming their earthly existence, the concern is that the notoriety given to the hunters of these rare creatures, after the Fall, makes dragons appear more numerous than they actually were. Furthermore, mentions of terrestrial dragons and Behemoth in the Bible are dwarfed by references to other taxonomic groups. For example, in the Old Testament, sheep are mentioned in 145 verses.

The Impact of the Fall

That the Fall had a tremendous negative impact on flora and fauna is attested to in other Biblical passages. After the Fall, God cursed the ground (Genesis 3:17). God allowed thistles and thorns to spread throughout the earth (Genesis 3:18). Sin and death entered the world (Genesis 3:19; 4:8; I Corinthians 15:22; Romans 5:12, 14). Romans 8:22 describes all creation as groaning because of the Fall. Genesis 6:10–13 states that all flesh became corrupted, and the earth was filled with violence. Finally, after the Fall, carnivory began (Genesis 1:29–30; 9:3–4).

God also cursed the serpent. The serpent is described as the wisest of the beasts of the field (Genesis 3:1). God cursed the serpent with future-tense verbs: “You shall go on your belly, and you shall eat dust all the days of your life” (Genesis 3:14). These verbs strongly suggest that, before God cursed the serpent, it was *not* crawling on its belly or eating the dust of the earth.

There are two ways to interpret this curse. God may have: (1) cursed only this serpent, which Satan had possessed, or (2) this curse extended to all the beasts of the field and earth. In light of the sharp proportional decline of references to these taxa after the Fall, I suggest the latter.

There are two methods by which God could have exacted His curse. (1) He could have changed the individual serpent, or (2) He could have allowed

most beasts of the field and earth to go extinct, with the exception of the kinds that crawled on the ground and ate the dust of the earth. The latter would continue to survive as viable populations. Again, in lieu of the marked decline of mentions of beasts of the field and earth after the Fall, the latter method seems more likely.

Possible Causes for the Decline of the Beasts of the Earth and Field after the Fall

Genesis 3 provides an indication as to why God allowed the destruction of the beasts of the field and earth after the Fall. If Satan could possess the serpent, he and his minions would presumably be able to possess other beasts of the field and earth. After the Fall, with sin permeating the earth, the ability of evil spirits to possess beasts of the field and earth may have been augmented. The only other time in the Bible where evil spirits possessed animals occurred when Jesus cast a legion of demons into a herd of pigs, an animal kind belonging to the *behemah* (Mark 5:8–13). After He did so, the pigs panicked, ran into the sea, and died. Conversely, when Satan possessed the serpent, a kind belonging to the beasts of the field, its abilities were seemingly augmented as it proceeded to communicate with and tempt Eve (Genesis 3:1–5). Furthermore, it is possible that the beasts of the field had better communication ability and were perhaps more intelligent than other taxonomic groups, especially in their ability to collaboratively hunt in packs (Diegert and Williamson, 1998; Carpenter, 1998). Lastly, it is obvious the physical danger that the beasts of the field and earth would have posed for men, whether or not they were possessed, given the size, speed, and protective armor of *Dinosauria* species, if God had allowed them to thrive intact, as they did at creation and before the Fall.

To sum, it is suggested that God dispatched the beasts of the field and

earth because they could be more readily possessed by evil spirits, these possessions would augment their abilities, and because their physical size, speed, cunning, and communication ability would have jeopardized the survival of Adam and his descendants.

Summary

From the Biblical passages, several conclusions can be made. Comparing the proportion of Biblical references between the beasts of the earth / field and the *behemoth*, we see a marked decrease of references to the former after Genesis 3. It is significant that the proportional decline in references to the beasts of the earth and field occurs *before* and not after the Flood. Conversely, the proportional increase in references about the *behemoth*, the taxon comprising mammals with sizes equal to or larger than hares, occurs before the Flood. Although some beasts of the earth and field survived the Fall and Flood, they continued to exist on earth in markedly diminished numbers, were rarely mentioned, and were largely inconsequential to human and other animal populations. Their continued earthly existence today is questionable since Biblical authors, mostly prophets, refer to these animals in spiritual and symbolic terms, often as instruments of God's judgment, not as earthly animals.

The rapid decline of references to the beasts of the earth and field in Biblical passages, after the Fall and before the Flood, supports the notion of a decline of these taxonomic groups during this antediluvian period. This textual support is in addition to other Biblical passages which describe the impact of the Fall, namely that God cursed the serpent and the ground, creation groaned, sin and death entered the world, and carnivory began.

We have a tendency to focus on the effects of the Fall on Adam and his descendants and not recognize the im-

port of this event on animal kinds. The totality of Biblical evidence suggests that the Fall, as well as the Flood, severely affected animal and human life on earth.

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Some Implications of the Demise of the Demarcation Problem

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Abstract

Two court cases, *McLean v. Arkansas* (“Arkansas”) in 1980 and *Kitzmiller et al. v. Dover Area School District et al.* (“Dover”) in 2005, showed how decisive philosophy can be when wielding the demarcation argument, as both creation science and intelligent design were denied victories because they were judged to be unscientific based on demarcation arguments. However, since the *Arkansas* decision and before *Dover*, the demarcation problem has generally come to be viewed by philosophers of science as intractable (i.e., “unsolvable”). The corollary of the intractability of the demarcation problem is that anything and everything can claim to be science without fear of being proved otherwise and that, therefore, the term “science” has no meaning. This has some clear implications for the creation project, including the renewed prospect for success in the courts and powerful answers to anti-creationist rhetoric.

Introduction

Reed et al. (2004) noted that forensic arguments alone cannot win the battle against naturalism, and that philosophical arguments are needed as well. Creationists should note that the court cases *Arkansas*, in 1980, and *Dover*, in 2005, showed how decisive philosophy can be when wielding demarcation arguments; the philosophical testimony was more influential in the judicial decisions than the scientific testimony and was quoted verbatim at length in the judi-

cial opinion. Demarcation arguments attempt to distinguish between science and non-science; demarcation is used by creationists, who argue that the theory of common ancestry is not science because it has not been observed or documented in the fossil record, and by evolutionists, who argue that creation isn’t science because only arguments based on methodological or metaphysical naturalism are “science.”

The intractability (i.e., “unsolvability”) of the demarcation problem

was generally accepted by philosophers at the time of *Dover* (Meyer, 1994). The philosophical strategy used by the defense in *Dover* was sound, but the defense made several tactical errors that prevented the court from discerning the status of the demarcation problem. One of the foremost experts on the problem, Larry Laudan, published an article about demarcation (Laudan, 1983) that is widely regarded by philosophers as definitive (Fales, 2005; Koperski, 2008; Meyer, 1994; Monton, 2006). Robert Pennock, a philosopher who was an expert witness for the plaintiffs, testified about Laudan’s work on the demarcation problem. Pennock answered the question equivocally, thereby giving two false impressions:

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- (1) That demarcation is not intractable and was used by most philosophers to distinguish science from non-science, and
- (2) That Larry Laudan would have considered intelligent design to be non-science because Laudan would have used demarcation to do so, which was contrary to fact, since Laudan had shown the error of that strategy (Laudan is an anti-creationist who thinks that creation science is bad science; cf., Laudan, 1983).

This paper will review and assess Laudan's (1983) paper, "The Demise of the Demarcation Problem," and will discuss some implications that follow from it that may impact future creationist/intelligent design court cases and the creation/evolution debate.

Revisiting Laudan's "The Demise of the Demarcation Problem"

Following the 1980 *Arkansas* case, Laudan reviewed the history of the demarcation problem in 1983. (All references to Laudan in this section refer to his 1983 paper unless otherwise indicated.)

According to Laudan, science was initially defined as those disciplines in which there was apodictic (demonstrable) certainty. It was knowledge, not mere opinion. In contrast, "craft," which seeks methods to accomplish a specific purpose, is also demonstrable, and philosophers of science needed a way to distinguish science from craft. The earliest philosophers (e.g., Aristotle) used *first causes* as their demarcation criteria. *First causes* were thought to be those events that were independent of other causes, such as natural laws. Laudan (1983) used astronomy as an example of something that could be both science and craft, depending on whether it searched for first causes. Seventeenth-century scientists discarded the first causes idea as essential for science

when Newton was able to describe the behavior of gravity without finding its cause. Eighteenth-century philosophers of science maintained demonstrability as the essential criterion for defining "science."

Laudan notes that the view that all theories may be fundamentally flawed—a view called *fallibilism*—became prominent in the nineteenth century. Laudan found that foundationally organized progress of scientific theories was no longer a certainty, as many theories were overturned or seriously amended during that period. These theories had been developed gradually and systematically, with newer theories built on the earlier ones. With the rejection of some of the more foundational, earlier theories, the whole progressive view of science was in jeopardy. Science was no longer apodictically certain, but was a work in progress.

Philosophers then began to rely upon methodology—such as methods of reasoning and researching observable entities—for their demarcation criteria. However, this is not what scientists were actually doing. Nevertheless, despite the philosophic failure in demarcation, rhetoric was used against what was perceived as superstition under the pretense that effective demarcation criteria existed.

After examining historical attempts at defining demarcation criteria, Laudan lays out questions that he believes must be considered in demarcation:

1. How shall we determine if the demarcation criteria are adequate?
2. What are the necessary and sufficient conditions for demarcation?
3. What rationale for calling things "scientific" or "unscientific" is precise enough to be useful?
4. What is our motivation for applying demarcation?

Laudan concludes that the question of adequacy must allow for current scientific practice, although I believe he is

begging the question. The demarcation plan must identify the methodological or epistemic criteria sufficiently clearly to give the desired result.

In dealing with the second and third questions, Laudan shows that sufficient conditions are used to make sure that things thought to be "scientific" are not excluded by the demarcation criteria and that a failure to meet necessary conditions is used to exclude things that are in fact "scientific." Both types of conditions are essential for any demarcation plan and must be precisely specified in order to be useful.

In answering the last question, Laudan uses historical examples of demarcation attempts. He evaluates the motivations of Aristotle, the logical positivists (e.g., Carnap), and Karl Popper in their efforts to determine demarcation criteria. Laudan states that Aristotle used demarcation to attack the followers of Hippocrates, the logical positivists did the same against the metaphysicians, and Popper aimed at discrediting Marx and Freud through demarcation. Laudan recognizes the power of labeling and categorizing—stressing that philosophers should be careful to do this correctly. Laudan notes that the motives of philosophers should not corrupt their philosophical reasoning when applying demarcation. He might have been thinking of Michael Ruse's testimony in *Arkansas* as an example of motives corrupting correct reasoning.

In the final section of his paper, Laudan turned to modern demarcation attempts, beginning with the logical positivists. Logical positivists insisted that scientific statements must be exhaustively verifiable. However, many scientific conclusions cannot be exhaustively tested (e.g., all universal physical laws), while many other ostensibly nonscientific laws are testable (e.g., the statement that the earth is flat). Popper's sophisticated falsificationism lacks discrimination—many things that are ostensibly "unscientific" (e.g., the flat-

earth hypothesis) are falsifiable, while some scientific propositions (e.g., that atoms exist) are not falsifiable.

Laudan considers whether “scientificity” might have the property of degree and whether theories might be compared based on their testability. He notes that there are technical difficulties with this approach, and only Popper’s theory is articulated well enough to evaluate “testability.” Furthermore, it can only be used when one theory implies another competing theory and is, therefore, useless for demarcation. Another concern is that Popper sees testability as a semantic notion, while demarcation relies on epistemic principles. Again, if anything is falsifiable, according to Popper, it is scientific, even if it is falsified, including the flat-earth theory or the statement that the moon is made of Limburger cheese.

Next, Laudan looks at some current (as of 1983) candidates for demarcation strategies. These include fruitfulness and progressive development, whether a theory has been well tested, accuracy of predictions, pragmatism, and coherence. He asks (and I paraphrase), “Can ostensibly ‘unscientific’ things be well tested, including literary theory, carpentry, and football strategy?” (Laudan, 1983, p. 325). Laudan observes that some disciplines that are speculative and investigate first principles may not be well tested when compared with disciplines that are not speculative and are well tested. He also shows that many ostensibly “unscientific” disciplines make cognitive progress and many ostensibly “scientific” disciplines do not make much progress by comparison. The conclusion of Laudan’s survey paper is that the current-as-of-1983 status of the demarcation problem in the philosophy of science is that it is intractable (i.e., unsolvable).

Laudan’s conclusion is still generally uncontroversial in philosophy of science (Fales, 2005; Koperski, 2008; Meyer, 1994; Monton, 2006). His conclusion means that philosophy

cannot specify what is not science. This startling development has a number of major implications for creationists and intelligent design (ID) advocates. One of the most important is that the basis for the defeat of ID and creation in *Arkansas* and *Dover* was philosophical malpractice.

Philosophical Malpractice

After Ruse testified against creation science in Arkansas in 1980, Laudan (1982) responded, essentially accusing Ruse of philosophical malpractice. Intelligent design philosopher Stephen Meyer (1994) also found fault with Ruse’s work. Ruse (1982) answered Laudan, arguing that the overwhelming need to defeat “creationism” can excuse any philosophical errors. Philip Quinn (1984) responded to Ruse’s defense by caustically inquiring whether it was proper behavior for a philosopher to perjure himself in a secular setting as long as he washed his hands in academia.

Robert Pennock likewise committed philosophical malpractice in *Dover* and was taken to task by Fales (2005), Monton (2006), and Koperski (2008). Plantinga (2006) likewise attacked Pennock’s idea that methodological naturalism as a shaping principle in science can be used as a demarcation criterion.

In both *Arkansas* and *Dover*, heavy reliance was placed on the categorization of creation and intelligent design as non-science, based on demarcation criteria. The judicial decisions were based on the philosophical error that valid demarcation criteria have been found and that one of them—methodological naturalism—excludes the supernatural from science.

This makes Laudan’s assessment that demarcation is intractable vitally important to both creationists and proponents of intelligent design. If the current inability to define clear demarcation criteria were properly communicated in court, increased prospects of success in

obtaining advantageous court decisions for creationists and intelligent design advocates may result. If it can be shown that secularists cannot adequately and conclusively define “science,” then their options for prevailing in other cases will rest on naked judicial fiat.

Let us be very clear—as far as philosophy of science is concerned, demarcation is dead and long buried these twenty-odd years since Laudan’s 1983 paper was published, notwithstanding the philosophical malpractice by Ruse and Pennock at the bar. No adequate reply to Laudan has been published.

Heterogeneity of Science and Laudan’s Proposed Legal Review of Science

As part of his overall argument, Laudan (1983) also made two other important, but ultimately problematic points. First, that science is wildly heterogeneous, and second, that some a posteriori demarcation is possible between good and bad science based on evidential arguments. In the second statement, Laudan implicitly suggested that the courts should judge between good and bad science. His first statement is absurd, and his second statement holds the potential for disastrous consequences.

If the courts were given the power to judge between good and bad science, they would be taking on the responsibility of professional peer review—which is likely to stultify science. Science has thrived for centuries on the principle of peer review. Since law and science are different disciplines, applying different methods, review by lawyer rather than review by peers would eliminate the cooperative and piecemeal nature of scientific discovery that has proven fruitful over many centuries. There is no reason to think that judges would be more competent than scientists in reviewing scientific work. If legal review were to be applied to creation and ID, it could have the effect of stifling open

inquiry; scientists and professors might forever be under the threat of legal action for their communications. Political considerations would drive science, as was seen with the ideas of Lysenko in the Soviet Union (Bergman, 2009; Feyrabend, 1975). This situation would be undesirable for both science and law.

Laudan's acceptance of the heterogeneous status quo in the definition of "science" ignores the damage it does to disciplines that have built their reputations on technological achievements—e.g., physics, chemistry, and biology. When the technological contributions and epistemic credibility of some disciplines are diluted by association with disciplines that have not produced many technological achievements, such as economics, political science, sociology, psychology, meteorology, and paleontology, the reputation of the technologically-prolific disciplines suffers from the association. We see this in the complaints of physicists and chemists when climatologists and experts from the "social sciences" claim to speak for science; physics and chemistry have a cornucopia of technological benefits to their credit, but climatology and the "social sciences" not so much. Conversely, many disciplines have enhanced their reputations simply by claiming to be "science," but without gaining their credibility by making significant technological contributions. Hence the historical increase in "science's" heterogeneity and the accompanying dilution of its reputation.

Asserting that a discipline's reputation can be enhanced by technological fruit does not rely on a claim that demarcation criteria exist. Such claims ignore Laudan (1983). This paper makes no claim that physics, chemistry, and biology are "science" or that technological contributions by a discipline constitute demarcation criteria; this paper merely asserts that there are certain ethical reasons for these disciplines to be jealous of their reputations; those ethical

reasons flow from their technological contributions.

In order to show that Laudan's statement, "science is wildly heterogeneous," is absurd, we must revisit the demarcation (of science from nonscience) problem. Laudan (1983) concluded that philosophy of science has so far been unable to define a list of properties that will always separate science and nonscience. This means that philosophy of science cannot clearly distinguish science from nonscience. This vagueness means that philosophy of science will be unable to prevent anything from claiming to be "science" since philosophy of science has shown that demarcation criteria do not exist that can be used to prevent anything from claiming to be "science" (e.g., astrology, carpentry, and art could claim to be "science," which is counterintuitive; we shall examine astrology and art later in this paper). If this is true, then "science" ceases to have a clear or even useful meaning.

If the demarcation problem is intractable, then we must consider whether "science" therefore has *any* meaning. This is a very counterintuitive question, because we think of specific disciplines such as physics, chemistry, etc. as "science." However, philosophy deals with knowledge; our intuition about what is "science" may merely be opinion. Without demarcation criteria, how can philosophy of science rationally support any definition of "science"?

Laudan (1983) has shown that no demarcation criteria exist to prevent any craft, art, or philosophy from claiming to be "science." Suppose that sewing and football coaching wanted to designate themselves as sciences alongside art, astrology, and carpentry. How should we stop them? We have seen that no demarcation criteria exist to do so. What meaning does "science" have if the list of things that are acknowledged as "science" includes diverse human interests that may have no common properties? Aren't we forced to admit that if this were

to happen, "science" would have no real meaning? Yet we know that due to our current knowledge about the status of the demarcation problem, we cannot prevent this scenario from occurring. Thus, even without the list of "sciences" being expanded absurdly, we see that the definition of "science" is so vague as to be meaningless.

If "science" cannot be defined in a way to give it meaning, then Laudan's (1983) statement about the "heterogeneity of science" is clearly meaningless, since it relies upon "science" having meaning. In fact, "philosophy of science" and "history of science" also would be meaningless phrases. Hence, Laudan's (1983) statement about the "heterogeneity of science," being meaningless, is absurd.

Why Laudan's Failure to Find Demarcation Criteria Was Predictable

Laudan examined demarcation criteria against examples of science from history. Laudan essentially granted history the privilege of defining "science." This created inevitable problems for philosophy, because the history of science had no governing criteria for demarcation; rather, the reputation of "science" likely led to many disciplines riding the coattails of "science" by claiming to be "sciences." Thus, where originally there were only physics, chemistry, biology, and geology, we see in history that many other disciplines later claimed to be "sciences," including:

- the "social sciences" of psychology, sociology, and political science,
- economics,
- engineering,
- medical science, and, lately,
- history.

This conflation, which occurred historically, was independent of any plan to maintain meaning for "science" through common criteria. Thus, it was

to be expected that Laudan's historical tests of demarcation criteria would be unsuccessful.

Laudan's Implicit Acceptance of Scientism

Since Laudan accepted the heterogeneity of "science," he also necessarily accepted the claims of various disciplines to be "sciences." The aim of such claims is to enhance the disciplines' reputations. We see from the failure of demarcation criteria that there is no necessary reason for such a claim based on a set of common criteria from a definition of "science." Rather, the more likely reason for these claims is due to the reputation enhancements that they gain from the assumption that science has epistemic power; by successfully claiming to be "science," a discipline is able to claim this same epistemic power, and its reputation is enhanced. The original aim of scientism was to rely only on "science" for epistemic truth. A weaker version of scientism claims that "science" produces the strongest claims for epistemic truth, rather than exclusive claims. In practice, this weaker version is almost indistinguishable from the stronger version, since "science" is advancing into many areas of human life, including explanations about religion and sexual attraction. By accepting the historical status quo (heterogeneity) for his definition of "science," Laudan therefore implicitly must accept scientism.

Meaninglessness, Demarcation Criteria, and the Definition of "Science"

Meaninglessness Theorem

1. For any definition of something, we should be able to find at least one thing that does not fit that definition.
2. If a definition cannot find anything that is excluded by the

definition, then that definition is meaningless.

Rather than try to prove this theorem at this point, let us assume its validity and use it to prove that the word "science" is meaningless.

Suppose we take a field that intuitively is removed as far as possible from science, such as astrology, and attempt to find actual demarcation criteria to exclude it from science. Laudan (1983) showed that any potential demarcation criteria that we might use to exclude astrology from science will fail, because the same criteria also would eliminate other fields that we would intuitively call "science." Bear in mind that with demarcation, we are applying criteria based on a set of properties in order to dismiss something as nonscience so that empirical tests are unnecessary. If we cannot exclude something like astrology as nonscience, how can we exclude anything? If we cannot exclude anything as nonscience, then the definition of science is meaningless.

What are the potential demarcation criteria that we might apply to astrology? Does astrology make risky predictions? Certainly. Is it falsifiable? Sure. Does it have a specified causal mechanism? No, but neither does gravity. Does its knowledge progress? Astrologers think so. Does it investigate phenomena? Yes, it investigates the relationships between astronomical bodies and their effects on people's lives. Is astrology quantifiable? In some ways. The degrees of angle of the planets and stars from the sun can be measured. Some properties in biology cannot be measured, such as properties like "cat-ness." Are there anomalies in astrology? Sure, but there are also many anomalies in other things we think of as science, including the placebo effect, evidence for variation in the fine-structure constant, and cold fusion, which was recently reproduced by a number of researchers (Brooks, 2007). Thus, we see that no demarcation criteria exist that can be applied to astrology that do

not also exclude things that we consider to be scientific.

Let's consider another example. Suppose an artist were to assert that art is science. He might argue that art uses geometry, as does astronomy, because it studies perspective and form. The artist asserts that he is very empirical—he studies his subjects carefully, examining form, shadow, color, and lighting. He says that he performs experiments. He experiments with pen studies before committing to paint and experiments with mixing different colors of paint before committing the paint to the canvas.

It might be asked, "What knowledge is gained from art?" The artist would reply that he investigates human conceptions of beauty, form, nature, and the human experience. His studies sometimes overlap with biology, geology, psychology, and sociology, which intuitively are regarded as sciences. Thus, we see that even art cannot be excluded by demarcation criteria.

We've seen that philosophy has problems trying to define "science." Do nonphilosophers do any better?

Problems with the Definitions of "Science" Outside Philosophy

Let's start our examination of attempts by nonphilosophers to define "science" by considering the idea that "science" might be defined as a list of disciplines: physics, chemistry, biology, etc. Whose list are we to use? The list of the National Academy of Sciences (NAS), which includes economics, sociology, psychology, and engineering? The list of the National Science Foundation? The list that physicists might create? The list that creationists might create? The list that evolutionists might create? What is the rationale for which items to include in the list? Will that list be universally acceptable? Will that list even be useful in the future, when new disciplines arise? What justification can then be given for refusing to accept applications for

entry from current disciplines that are not on the list, seeing as we've just seen philosophy's failure to validate any demarcation strategy? Is the determination to be based simply on ad hoc rationale and brute force?

A couple of textbooks define "science" in terms of the "scientific method." (Dickson, 1995; Thompson and Turk, 1998).

Let's next consider the idea that we can look at definitions from various disciplines for a definition of "science."

Science is the concerted human effort to understand, or to understand better, the history of the natural world and how the natural world works, with observable physical evidence as the basis of that understanding (Railsback, 2009a).

This definition relies on the claim that one can use "science" to understand "history." This definition forces a conflation of disciplines. Furthermore, it limits the domain of "science" to the natural world, which conflicts with the list from NAS, which includes disciplines that don't primarily study the natural world in whole or in part (e.g., engineering, economics, and much of sociology).

Let's continue looking at various definitions:

1. the systematic observation of natural events and conditions in order to discover facts about them and to formulate laws and principles based on these facts.
2. the organized body of knowledge that is derived from such observations and that can be verified or tested by further investigation.
3. any specific branch of this general body of knowledge, such as biology, physics, geology, or astronomy (Morris, 1996).

Science is an intellectual activity carried on by humans that is designed to discover information about the natural world in which humans live and to discover the ways in which this information can be organized into meaningful patterns. A primary aim of science is to collect

facts (data). An ultimate purpose of science is to discern the order that exists between and amongst the various facts (Gottlieb, 1997).

The investigation of natural phenomena through observation, theoretical explanation, and experimentation, or the knowledge produced by such investigation (Pickett 2005, p. 554).

Science is a discipline that asks and answers questions about the working of the physical world (Trefil and Hazen, 2004, p. 2).

Notice that these definitions also limit the definition of "science" to nature, which conflicts with the definition implicit from the NAS list. They also conflict with the following, broader definitions:

Science consists simply of the formulation and testing of hypotheses based on observational evidence; experiments are important where applicable, but their function is merely to simplify observation by imposing controlled conditions (Dott and Batten, as quoted in Railsback, 2009b).

I stress that my use of the term "science" is not limited to the natural sciences, but includes investigations aimed at acquiring accurate knowledge of factual matters relating to any aspect of the world by using rational empirical methods analogous to those employed in the natural sciences (Sokal, 2008).

The preceding definitions allow for disciplines in the NAS list such as engineering, sociology, psychology, and economics. Sokal actually endorses rationalism and scientism in his definition of "science." The preceding definitions reject the idea that experimental controls are essential to "science." If the epistemic claims resulting from reliance on experimental controls are stronger than those which do not rely on experimental controls, then this definition seems to reduce the strength of the epistemic justification for claims

of "science," which necessarily decreases the reputation of "science."

Science is the pursuit of knowledge and understanding of the natural and social world following a systematic methodology based on evidence (The Science Council, 2009).

The preceding definition conflicts with some definitions since it includes knowledge from the social world and omits engineering.

Science is the systematic enterprise of gathering knowledge about the universe and organizing and condensing that knowledge into testable laws and theories (American Physical Society Council, 1999).

This ambiguous definition lacks any explicit reference to historical study (though the authors may have assumed it) and conflicts with the definition implicit from the NAS list. This definition also assumes the existence of laws, which are absent from most other definitions of "science" that we have considered.

Thus, from the examples above, we see that nonphilosophers are unable to agree about a definition of "science."

Ernst Mayr considers the question, "What is science?" historically, and notes that it cannot be reduced to a precise definition. He even states that science, during one period, was extrapolated from Christian theology (Mayr, 1997).

Richard Feynman was asked to speak about the question "What is science?" Essentially, he stated that the total experience of man (i.e., "science") cannot be reduced to a definition, that we (society) should not be blindly submissive to experts, and that attempts to reduce experience to a definition have resulted in intellectual tyranny (Feynman, 1968). Reducing this further, Feynman is arguing that the term "science" is meaningless except for rhetorical purposes.

The Role of Philosophy in Demarcation

Since many people believe that they can and do define science, even if intuitively,

the question of authority in demarcation will inevitably arise. Who is fit to judge what is “science” and what is not, except scientists—those who actually *do* science?

At least four reasons exist that cause us to question this intuition. First, demarcation is an epistemological question. Epistemological questions are within the domain of philosophy. To deny this is to deny philosophy one of its most basic functions.

Second, the definition of “science” is in question, which is an ontological question, and that is also within the domain of philosophy.

Third, if the definition of “science” is in question, then the definition of “scientist” is equally in question, and who is an authority cannot be established with certainty. The statement that scientists are fit to judge what is “science” is merely begging the question. Are sociologists, political scientists, psychologists, and economists allowed to participate in the definition of “science?” If philosophy cannot show that astrology, art, and carpentry are not science, then why not allow astrologers, artists, and carpenters to determine what is “science?” We can determine who gets to vote on the definition only if we already assume which disciplines are part of “science.” Thus, the statement that “scientists” determine what is “science” is really question begging.

Fourth, “science” is composed of many specialties with many methodologies. Do any of the specialists understand enough about the broad scope of “science” to be able to define it? That is where philosophy excels.

An individual scientist is a specialist who knows a particular field. He may be compared to a jockey who rides a thoroughbred, which is a specialized breed of horse. The jockey knows a great deal about how to get the particular horse to perform. The philosopher has at least two roles: he is like an equine veterinarian who knows more generally about all

horses as well as more particularly about the horse’s anatomy and physiology, and he is like the race judge who can tell the jockey when he has strayed out of bounds during a race.

Epistemological Particularism

It could be asserted that this argument for the meaninglessness of the term “science” might not be valid if one rejects epistemological methodism. Epistemological methodism asks the question, *How do we know?* prior to asking the question, *What do we know?* Epistemological particularism, by contrast, reverses the order of the questions. As an epistemological particularist, Moreland (1994) notes no inconsistency between his assertion that clear cases of science can be recognized and his acceptance of the intractability of the demarcation problem, which would be a problem for the epistemological methodist. However, he has not made it clear what function the word “science” serves in his system of particularism or how that particularism should be distinguished from mere opinion

Conclusion

We are left with the conclusion that the word “science” currently is meaningless in the context of philosophy of science and that its meaning is undetermined due to contradictory opinion in other contexts, with the accompanying confusion and controversy accompanying this vagueness. One of the uses of philosophy is to help define things in order to avoid confusion and controversy; however, it is not currently able to help us by defining the term “science.”

Aspects of what we have called “science” were once known as “natural philosophy” and involved a conflation of methods of investigation in certain disciplines (e.g., physics, chemistry, and biology) and knowledge specific to those disciplines. This conflation of method

and knowledge resulted in ontological (what exists?) and epistemological (what do we know and how do we know it?) confusion and inevitably led to the current failure of the demarcation project and the confusion of what is meant by “science.”

In order to avoid perpetuating this confusion, philosophy must de-conflate “science” and begin the ontological scheme again. There is an opportunity for creationist philosophers to get in on the ground floor of a new ontology project (as some have—e.g., Klevberg, 1999; Kofahl, 2002; Reed and Froede, 1996). The conflation implicit in our conceptions of “science” includes ideas about:

- How to investigate nature
- Testing
- Experimentation
- Theories
- A set of specific disciplines
- A body of knowledge
- Professional societies

The foundational ideas must be defined and organized into a coherent ontological and epistemological scheme. Adler (1965) provides an example of such a project.

With the demise of demarcation, the notion that “the only meaningful statements are scientific statements”—scientism—has received another proverbial “nail in the coffin.” Scientism can also be recognized by the claim that “Science has the ultimate say in all questions it addresses, including historical questions.” Not only has scientism been shown to be self-refuting, but the “science” edifice it has sought to build also has been shown to be evanescent, if philosophy of science is correct in saying that the term “science” is meaningless. We must be vigilant to the presence of scientism and be diligent to expose it, for it is still a threat to clear thinking.

Scientism often creeps up in unexpected places, such as assertions that science has disproved religion. The proper attitude against scientism is exemplified

by Feyerabend's (1975) applause for the "fundamentalists in California who succeeded in having a dogmatic formulation of the theory of evolution removed from the textbooks and an account of Genesis included." Feyerabend's point is that dogmatic scientism stifles freedom. He also cautions that dogmatic fundamentalism could stifle imagination and that free thought should be heeded by creationists. His ideas highlight for us the need to understand the relationship between science, freedom, and Christian doctrine and theology.

The most critical implication of this paper for creation science is that existing court cases were decided on criteria that have been shown by secular philosophers to be incorrect. Furthermore, the legal strategy of the anti-creationists has been severely undercut. They are left without a definition of "science" and any potential demarcation strategies that might exclude creation. This information must be communicated to creationist attorneys, and we must have creationist philosophers prepared to answer the faulty demarcation-based arguments previously presented in court. Otherwise we shall see more legal setbacks based on the pretense that effective demarcation criteria exist.

It would seem to follow that the science and popular science news media also must be educated that the demarcation criteria that they have assumed to exist are invalid. Biblical and scientific creation science must develop strategies to engage and persuade the media. We must appeal to academic freedom and freedom of investigation. If we are to persuade the media, we must reference sources that the media considers reliable, such as noncreationist philosophers (e.g., Bradley Monton) and evolutionary scientists such as Allen MacNeill. Perhaps we also should engage reporters like Susan Mazur, who has shown that she is sympathetic to fresh, unconventional approaches by her reporting about the Altenberg 16 conference. We must build

bridges to the ID community without minimizing our creationist distinctives. Steven Meyer seems to be very approachable and might be persuaded of the appropriateness of skepticism regarding the age of the earth if creationist philosophers can develop an adequate philosophical defense of skepticism about the age of the earth.

As another consequence, creation science will no longer be able to rationally uphold a distinction between "origins science" and "operations science" if the word "science" cannot be defined by philosophy of science, since any such distinction involves philosophy of science. Instead, creationists will need to make epistemic distinctions between different methods of investigation and offer epistemic analysis of and justification for different methods of investigation.

The impact is widespread. How will educators organize their disciplines and curricula, given the problems with the word "science" as discussed above? Surely, they cannot ignore philosophy of science indefinitely. Also, many theologians have built careers by seeking to accommodate "science." If "science" is meaningless, then what is the point of accommodating it? It would seem that they must rethink their work.

Opponents in the creation/evolution debate will no longer be able to rationally use demarcation-based strategies. Rhetoric based on the reputation of "science" will no longer be rational. The opinion of a large group of "scientists" will have no rhetorical force, rationally speaking, if there is no such thing as "science" as commonly defined. Creationists have long sought to have their arguments engaged openly. The anti-creationists have sought to avoid engagement by appealing to demarcation and preventing the publication of articles by creationists in secular journals. With the demise of demarcation, the first objection is removed. Creationists will need to conclusively show systematic prejudice by secular journals against creationist

papers in order to overcome the second objection and attain our goal of the open engagement of our ideas. This will likely require the assistance of some sociology of science researchers.

Until the problems with the term "science" are acknowledged by those who rely on ad hoc and vague definitions of "science," there will be conflicts with others who have different definitions of "science"; the term "science" will be a communications obstacle. As ad hoc definitions for "science" collide, people will be forced to accept the conclusion of philosophers of science that "science" has not been adequately defined. Those in academia and non-governmental organizations who are ideologues and possess power and influence due to the illusion that "science" has useful meaning will not submit easily to the ideas that the common perception of "science" is an illusion and that their ideologies limit human freedom of expression. Many people have gained political power and professional influence due to the conflation of disciplines that are called "science" (e.g., the National Science Foundation and the National Academy of Sciences), and their ideological corruption and tyranny must be exposed in order for people to work in their disciplines and investigate freely without the suppression of the communication of their ideas by the tyranny of ideology.

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Glossary

Demarcation: Distinguishing between things in a category and things that are not, for example, between science and nonscience. Often, a list of properties that belong to things in a category are specified, as well as a list of properties that may not belong to things in a category. The category properties must only include items that belong in the category, while they must not include any items that do not belong in the category.

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Book Review

God's Universe

by Owen Gingerich

Harvard University Press,
Cambridge, MA, 2006, 139
pages, \$17.00.

Some outspoken testimonies of faith are tolerated in the secular science world. Examples include Francis Collins, John Polkinghorne, and Owen Gingerich. All three promote a theistic evolution worldview. Author Owen Gingerich is a science historian, now retired from a productive career at Harvard University. This book summarizes a series of lectures relating science and faith.

Gingerich is not impressed with the intelligent design (ID) movement, although he is gracious in his critique. He faults ID for not offering a fully comprehensive explanation of nature: ID “does not explain the temporal or geographical distribution of species”

(p. 73). He appears to be asking for far more than the ID movement promises. Gingerich accepts intelligent design with “lower case *i* and lower case *d*” but rejects the overall movement (p. 68).

A major topic in the lectures concerns alien life. Gingerich believes that average galaxies are populated by scores of earth-like planets (p. 14). Life probably exists “out there,” and if so, God had a hand in it. Regarding fossil extinctions, a process theology or open theology viewpoint is expressed. This is the defective view that God is not omniscient. That is, things are set up in such a way that God does not know the future or how things will turn out. Thus,

“fossils of extinct creatures show...a universe that makes itself...the powerful transcendence that brought the universe into being...has self-imposed limitations” (p. 116).

The book includes a sarcastic rewriting of Genesis 1 by astronomer George Gamow (p. 53), and Gingerich rightly challenges such an approach to Scripture. Owen Gingerich does not fit the Creation Research Society young-earth position. However, he has spent several decades on the front lines of Christianity and carries his own share of scars.

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The Huxley-Wilberforce Debate Myth

Jerry Bergman*

Abstract

The history of the now famous debate between Samuel Wilberforce, Bishop of Oxford, and Thomas Huxley, a disciple of Darwin, is reviewed. The debate, which occurred at Oxford University (June 30, 1860), is widely regarded as a critical coup for science in the putative war of religion against science. The myth is that Huxley made a fool of Wilberforce and carried the day. The actual debate was very different than this common version. In fact, the debate involved several individuals, of which Huxley was not even considered one of the primary advocates of Darwinism.

Introduction

One of the most widely publicized accounts in the history of the conflict between science and religion is the debate between Samuel Wilberforce, Bishop of Oxford, and the man called “Darwin’s Bulldog,” Thomas Henry Huxley. The debate occurred at a meeting of the British Association in Oxford in June of 1860 (Howell, 2003; Gauld, 1992). Kenneth Howell (2003, p. 41) called the debate one of the most “celebrated episodes” in the history of the science-religion conflict in the English-speaking world. Others called it the “first battle” in the long war of religion against science (Livingstone, 2009, p. 152). Gould (1991, p. 386) called it one of the “half-dozen greatest legends of science.” Carroll (2007, p. 1427) wrote:

“The Lord hath delivered him into mine hands.” Those are the words that Thomas Huxley, Darwin’s confidant and staunchest ally, purportedly murmured to a colleague as he rose to turn Bishop Samuel Wilberforce’s own words to his advantage and rebut the bishop’s critique of Darwin’s theory at their legendary 1860 Oxford debate.

This putative version of the debate is repeated ad infinitum in sources that range from scientific books to popular historical accounts of the biological origins conflict. The most common telling of the account was summarized by Thompson (2000, p. 210) as follows:

Bishop Wilberforce is supposed to have asked Huxley sarcastically

whether “it was through his grandfather or his grandmother that he claimed descent from a monkey.” Huxley supposedly whispered an aside to Sir Benjamin Brodie, “the Lord hath delivered him unto my hand,” and then responded, “If then the question is put to me whether I would rather have a miserable ape for a grandfather or a man highly endowed by nature and possessed of great means of influence and yet employs these faculties and that influence for the mere purpose of introducing ridicule into a grave scientific discussion, I unhesitatingly affirm my preference for the ape.” Or words to that effect.

This episode is often placed in the first chapter of books written against Darwin skeptics in order to hook the reader. For example, historian William Irving in his best-selling *Apes, Angels, & Victorians*, begins his study of the religious opposition to Darwinism with the Oxford debate, an event he

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calls the “intellectual holocaust” that formally birthed evolution. It is even used as “the introductory anecdote in many histories of evolution” (Smout, 1998, p. 33). Allen Powell (2006), who added quotes that indicate the account was taken from a stenographic report, wrote in a *Herald-Mail* op-ed piece that the creation-evolution debate

today in the United States is similar to the situation in England when the British Association for the Advancement of Science met on June 27, 1860 to debate Darwin’s ideas. The highlight of the meeting pitted Bishop Samuel Wilberforce against a certified genius, Thomas Huxley. Wilberforce chortled to friends that his real desire was to ‘smash Darwin.’ During the debate, the Bishop looked at Huxley with a demeaning smile and asked, “Mr. Huxley, I beg to know was it through your grandfather or your grandmother that you claim to have descended from a monkey?” Huxley then made his now-famous reply. “I assert that a man has no reason to be ashamed to having an ape for his grandfather. If there were an ancestor whom I should feel shame in recalling, it would rather be a man, a man who, not content with a success in his own sphere of activity, plunged into scientific questions with which he has no real acquaintances only to obscure them by aimless rhetoric and distract the attention of his hearers from the real point at issue by eloquent digressions and skilled appeals to religious prejudice”

This, or very similar accounts, have been repeated authoritatively in thousands of sources for the last century and a half, rarely with accurate information about the details of the debate (Gauld, 1992; Livingstone, 2009). A Google search found 214 examples of how this debated is currently presented. It is often claimed that this exchange was “the end of an era—biology had dared challenge



Oxford Bishop Samuel Wilberforce at the time that he debated Huxley. He was then about 55 years old. From *The Life of the Right Reverend Samuel Wilberforce, D. D.* by Reginald Wilberforce. John Murray, London. Reginald was Samuel’s son, and Murray was Darwin’s publisher.

religion, and biology had won” and “Christianity shifted to accommodating rather than fighting Darwinian thought” (Wrangham, 1979, p. 450). Livingstone (2009) opined that the debate is the embodiment of the worldview war and science won, and Gauld (1992) concluded that the purpose of quoting the Wilberforce account was to “provide an example of the triumph of Darwinism over uninformed religious prejudice” (p. 406). In the story, Huxley is usually “the archangel Michael of enlightenment, knowledge, and the disinterested pursuit of truth” and Wilberforce is the “dark defender of the failing forces of authority, bigotry and superstition” (Gilley, 1981, p. 325).

An Evaluation of the Event

The eminent science historian, John Headley Brooke, wrote that this debate is a

story that would have to be invented were it not true. Actually, it probably was invented—at least in part. One answer to the question why this celebrated exchange occurred at all is that it didn’t—or at least that the legend is deeply misleading. Scholars who have tried to piece together what really happened have been frustrated by the paucity of contemporary comment and its lack of unanimity (Brooke, 2001, p. 128).

Historian J. R. Lucas, in a study of the event, concluded that the debate is a legend without much factual basis. Lucas explained that the common claim that Huxley’s simple scientific sincerity humbled the obscurantist bishop and scored a decisive victory, both for the independence of science from the church and the primacy of science in Britain and in the West, is false. Thompson (2000, p. 212), quoting from a contemporary source, claimed that Huxley in this pre-electronic amplification era did not even speak loud enough to be heard by many there, nor did he “command the audience.”

The account is often given in quotes—indicating that it was taken directly from a stenographic report by a meeting attendee—such as in a *New York Times* special section on evolution (June 26, 2007, p. F8). In fact, no verbatim account was taken by anyone, although summary reports of the whole meeting were published (Thompson, 2000, p. 210). No one knows exactly what was said, and the first published record of the debate account most familiar to readers today appeared in *MacMillan’s* magazine a full 30 years after the debate occurred.

One reason for this long delay was because the Wilberforce-Huxley exchange “went virtually unnoticed at the time,” and, in fact, major contradictions exist in the earliest discussions of the debate (Lindberg and Numbers, 1987). For example, botanist Joseph Hooker claims that it was he, not Huxley,

who responded most effectively to the bishop. A writer covering the meeting for the *Athenaeum* magazine did not even mention Huxley's alleged riposte to Wilberforce (Lindberg and Numbers, 1987, p. 146).

It is well established that Wilberforce and Huxley did exchange words "but the words became memorable only with the passage of time, as victorious Darwinians begin reconstructing the history of their struggle for recognition" (Lindberg and Numbers, 1987, p. 146). A major false conclusion is that Huxley scored a decisive victory over his creationist opposition at the debate, but "contemporary records indicate otherwise: Wilberforce's supporters included not only the majority of clerics and laypeople in attendance, but 'the most eminent naturalists' as well" (Lindberg and Numbers, 1987, p. 147). A letter by Balfour Stewart, a distinguished scientist, written after the debate concluded that the "Bishop had won the debate" (Gould, 1991, p. 389). Furthermore, Wilberforce convinced at least one evolutionist, Henry Baker Tristram, to switch sides (Livingstone, 2009, p. 156).

Another major myth is that "Huxley's mild-mannered scientific detachment was contrasted with Wilberforce's bombastic imposition of uninformed authoritarianism" (Howell, 2003, p. 44). Accounts of the debate typically portray Samuel Wilberforce as a misinformed theologian entering into a foray in which he had no knowledge or training. In fact, Wilberforce was well informed about the origins controversy. For example, he wrote a strident review against *The Origin of Species* for the prestigious scholarly journal *Quarterly Review*. The review was so effective that Charles Darwin himself acknowledged it. Although the debate is most always pictured as a victory of Huxley's rationalist science against Wilberforce's theological dogmatism, Wilberforce was a professor of mathematics and a well-known scholar in his own right.

Samuel Wilberforce was no country preacher but the son of the distinguished parliamentarian, William Wilberforce, who brought the end of the slave trade in England. Wilberforce inherited many of his famous father's traits and was widely respected in his day. It was only because he took umbrage at what he called Darwin's "flimsy speculation" that many modern historians, and especially Darwinist apologists, picture him as a narrow-minded ignoramus.

Portrayed as antagonists, as is common in the creation-evolution controversy today, in fact the two men were on amicable terms of mutual respect after the episode. Samuel Wilberforce was nicknamed Soapy Sam because, when he was accused of inappropriate behavior, investigations always cleared him, i.e., he came out clean. His opponents used the expression to signify their claim that he was "too slippery" to catch in an impropriety (Browne, 2002, p. 113).

Ever since the debate, Darwin supporters have capitalized on the controversy in articles, pamphlets, and journals that attempt to show that religion is not only foolish but also repressive to scientific progress. Howell (2003) noted that what is "striking is the growth of military metaphors to describe this event throughout the late nineteenth century and into the twentieth" (p. 44).

Wilberforce's Review

The editor of the *Quarterly Review*, Whitwell Elwin, first read Darwin's *Origin of Species* in manuscript form from a copy that Darwin's publisher, John Murray, sent to him. Elwin disagreed strongly with Darwin's conclusions and, since the *Origin's* publication he "had been searching for someone who would deliver it a crushing blow. He found his reviewer in Samuel Wilberforce" (Browne, 2002, p. 112). John Murray himself suggested Samuel, whose father was an occasional *Quarterly* writer. Meacham wrote that Wilberforce was

not an unexpected choice "in view of his lifelong interest in natural history," his vice presidency of the British Association, and his service on the Geological Society council (as quoted in Browne, 2002, p. 112).

Although Wilberforce's critics claim his arguments were all, or largely, theological, in fact thirty-one pages of his article document his conclusion that Darwin's arguments were scientifically wrong and were not science but philosophy. Wilberforce devoted only three pages to argue that Darwinism was anti-Christian and would be dangerous to the Christian worldview. His review was candid "about evolution's dangers," noting that evolution is "absolutely incompatible not only with single expressions in the word of God but with the whole representation of that moral and spiritual condition of man which is its proper subject matter" (Quoted in Browne, 2002, p. 114).

The underlying conflict between Wilberforce and Darwin was "who had the correct explanation for the origin of humans and all life—Genesis or Darwin." His review also was in part "directed towards those areas of Darwin's theory for which the evidence of that time appeared to be weak, absent or negative" (Gould, 1992, p. 409). In an analysis of Wilberforce's review, Young and Largent (2007, pp. 99-100) concluded that he

understood Darwin's argument and provided an accurate account of certain evidence for his readers ... Where Darwin seemed determined to account for change, Wilberforce noted that most of nature exhibited remarkable stability. In domestic breeding, few species retained the hard-won characteristics breeders sought when individuals were allowed to breed without human guidance. Over thousands of years of human history, examples of the kind of change Darwin described seemed nonexistent... as paleon-

tologists generally argued, the lack of progressive recent evidence, for Wilberforce, undermined the notion of evolution.”

Furthermore, a number of eminent scientists, including Adam Sedgwick, Cambridge anatomy professor William Clark, and other men of science “ultimately grounded their work in doctrines of divine order and the created plan. They deplored the way that Darwin’s book” drew conclusions that they considered unwarranted (Browne, 2002, p. 117). Furthermore, the conflict was between both the “Darwinian evolutionists and the liberal churchman” who were joined together against the traditional view of a creator God (Livingstone, 2009, p. 159).

The Debate

One event that triggered the debate was the presentation of a paper by Dr. Charles Daubeny of Oxford “on the final causes of sexuality in plants, with special reference to Mr. Darwin’s work on *The Origin of Species*” (Irving, 1955, p. 4). The common impression is that the debate was Huxley against Wilberforce, when, in fact, the meeting involved lively debate among many scientists. Actually, Huxley did not even plan to attend because he knew a large number of those attending were anti-Darwinian “intellectuals who had a strong interest in science” and could effectively challenge him (Howell, 2003, p. 43; Phelps and Cohen, 1973, p. 56). It was Robert Chambers, an evolutionist who preceded Darwin, who goaded Huxley by accusing him of deserting the cause.

After the presentation, the greatest anatomist of his time, Sir Richard Owen, rose and pointed out what he felt were some scientific problems with Darwin’s theory. For example, Owen asserted that “there was no anatomical evidence for evolution, and that the brain of a gorilla was very different from the brain of humankind” (Browne, 2002, p. 119).

Even Daubeny, a professor of botany at Oxford who introduced the topic, “came down on the side of the angels.” The topic drew a number of people in attendance—variously estimated at between 400 and 1,000 (Browne, 2002, p. 121).

The real conflict was less Wilberforce against Huxley than Wilberforce against John William Draper. Draper, the first speaker, was an English-born and London University educated man who was a bitter ex-Catholic historian. He was “well known for his denunciation of organized religion” and argued that “human progress depended on science vanquishing theology” (Browne, 2002, p. 121). Desmond and Moore (1991, p. 494) claimed that Draper was the “star attraction, because he was applying Darwin’s theory to society,” an approach called social Darwinism or eugenics.

Wilberforce was asked to respond to Draper’s pro-Darwin paper, not Huxley’s (White, 2001, p. 99). After a few questions and comments by the audience, Wilberforce spoke for around 30 minutes, using the “same scientific arguments that he had used in his evaluation of Darwin’s book published in *The Quarterly Review*” (Phelps and Cohen, 1973, p. 57). Wilberforce argued that Darwin’s science facts did not warrant acceptance of his theory: the chasm between humanity and animals was both obvious and very distinct, and there was no tendency on the part of lower organisms to become either self-conscious or intelligent (Browne, 2002, p. 121).

It was during this speech that Huxley allegedly made his now infamous comments. As Browne states, “No one could afterwards remember exactly what Wilberforce did say. One witness, possibly no more reliable than the rest, recorded that Wilberforce expressed the ‘disquietude’ he should feel if a ‘veritable ape’ were shown to him as his ancestress” (Browne, 2002, p. 122). It was then that Huxley allegedly whispered to a man on the bench beside him the “Lord hath delivered him into mine hands” and then

stood up on the platform, contradicting Wilberforce. Huxley is commonly credited with proclaiming that he would rather be a monkey than a bishop.

It was evidently only after Wilberforce’s lecture that the riposte came (Jensen, 1988). Then, one by one, Joseph Hooker, John Henslow, and John Lubbock rose to defend Darwin, a man who could not defend himself because he was too ill to attend the debate (Irving, 1955, p. 3). Huxley claimed, for example, that the brains of men and apes do not differ much, a judgment made on the basis of superficial external morphology. This claim was irresponsible given the fact that little was known then about how the brain functions, and even today it is still considered largely a black box. For this reason it was difficult for anyone to make an informed response at the debate.

Although no transcript of the talk exists, “many people felt that the Bishop had been ill treated—that Huxley was much too vulgar in his reply” (Browne, 2002, p. 123). Huxley’s version was “substantially different” than Hooker’s (Desmond and Moore, 1991, p. 496). One witness claimed that Huxley “turned white with rage,” barely managing to keep his temper (White, 2001, p. 101).

Phelps and Cohen (1973) quote several different accounts that illustrate the range of versions of the event (e.g., see Philips and Cohen, 1973, pp. 60-62). Lucas (1979) summarized all previously known versions of the Huxley-Wilberforce account, including two written by reporters for British periodicals who personally attended the debate. Lucas systematically discredited most of the details in the standard account, even concluding that it was not Huxley, but Joseph Hooker who was the main defender of evolution, and that Wilberforce focused his attack not on the religious implications of evolution as commonly concluded, but rather on its scientific problems (Thompson, 2000, p. 212). Gould (1991, p. 392) concluded

from a detailed study of the event that Huxley's "oratory was faulty," he was "ill at ease," and projected so poorly that "many in the audience" could not even hear what he said.

Lucas added that Wilberforce's criticisms were so effective that, in letters to friends, Darwin himself praised Wilberforce's evaluation and acknowledged the weak spots that Wilberforce noted, inspiring Darwin to deal with these problems. Lucas concluded that Wilberforce did in fact ask Huxley whether it was his grandfather or grandmother who had descended from apes, but this statement was taken by some observers as a lapse in Wilberforce's normally good manners, though not for the reason often supposed. The reason Wilberforce asked this was because it "offended Victorian notions of femininity by applying bestiality to a grandmother rather than a grandfather" (Smout, 1998, p. 36).

The Bishop's talk must have been somewhat effective because, as a result of his presentation and the debate that followed, Henry Tristram, who had published one of the first articles that used natural selection as an explanation for a biological phenomenon, "changed his mind about Darwin" (Browne, 2002, p. 123). Tristram exclaimed to Alfred Newton, who was sitting next to him, that he had converted to the anti-Darwinian view. He commented that he objected to a "guardian of the nation's soul shouted down by a mob hailing 'the God Darwin and his prophet Huxley'" (Browne, 2002, p. 123). Furthermore, Wilberforce himself felt very positive about the results of the debate, and Darwin and Wilberforce remained on good terms after it occurred (Gould, 1991). In fact, a majority of the audience was in support of Wilberforce (Thompson, 2000).

Wilberforce indicates in his published review that he believed it was inappropriate to attack Darwinism on the basis of theology. Wilberforce also argued that if Darwinism can be adequately defended on the basis of empirical

and scientific evidence, theologians will have to dismiss their pride and accept the theory with humility (Smout, 1998, pp. 36-37). In summary, Wilberforce did not attack evolution because it contradicted his religious beliefs but rather because, in his judgment, "it failed to qualify as science" (Smout, 1998, p. 37).

Darwin understood Wilberforce's claims, not as dogmatic objections based on creation science, but rather as an invitation to "explain more clearly and prove more carefully several important aspects of his theory" (Smout, 1998, p. 37). Cambridge University research fellow Richard Wrangham wrote that several of the "Bishop's sermons and essays show he was far from ignorant, and he was known to his peers as an ardent naturalist" (1979, p. 450). The debate was not lost to history because, in order to win public support, every potential triumph of Darwinism was

talked up by the evangelical Darwinians. Feeling themselves beleaguered, they needed visible gains. Thus it was that a witty bit of repartee on Saturday 30 June 1860, at a section meeting of the British Association for the Advancement of Science, was destined to be blown out of all proportion to become the best known 'victory' of the nineteenth century, save Waterloo (Desmond and Moore, 1991, p. 492).

History Embellishes the Story

As the years passed, accounts of the meeting became more sensationalized, dichotomizing the controversy into rationality versus obscurantism, the triumph of reason over rhetoric, science verses church, and old versus new. The writings of Andrew White were especially important in spreading the conclusion that Wilberforce's rhetoric was the "final effort of theology" to "annihilate the kind of scientific progress evident in Darwin's *Origin of Species*" (Howell, 2003, p. 46). White's motive in casting a warfare im-

age between the Bible and science was part of his goal to reduce the influence of Christianity because he believed that "the Bible has been the greatest block in the way of progress" (Numbers, 2009, p. 2). The fact is that each side was "convinced that its claims about the natural world were credible and trustworthy" and that its view was the "only valid account of reality" (Browne, 2002, p. 124). How important the debate was in shifting popular and scientific opinion to an "evolutionary viewpoint is as unclear as what was actually said" (Thompson, 2000, p. 210).

Smout (1998) noted that "the famous debate between T. H. Huxley and Samuel Wilberforce" shows how "convictions of truth are created through particular rhetorical strategies" (p. 33). He adds that this story now has "attained the status of a cultural myth" and has even been "a topic for British Broadcasting Corporation specials about Darwin and the progress of science" (Smout, 1998, p. 33). The putative debate is "regularly retold ... with an evolutionist cast as the hero and a creationist as the villain ... who must be overcome if civilization itself is to be kept from destruction" (Smout, 1998, p. 33).

In most contemporary accounts, there is a deliberate effort to demean Wilberforce. An example of these put-downs is the claim that Wilberforce (who was a math professor before he became a bishop) worked in Oxford, England, a rural area where "the building, and minds [are] as empty and dreamy as the spires and quiet country air" (Irving, 1955, p. 3). In contrast, Huxley's laboratory was in downtown London, "which was as crowded and busy as Professor Huxley's own intellect" (Irving, 1955, p. 3).

Irving also argued that Wilberforce's rhetorical skills were due to "his intellectual inferiority, political opportunism, religious immorality, and political danger" (as quoted in Smout, 1998, p. 34). Irving also claimed that Wilberforce's

“chief qualification for pronouncing on a scientific theory derived, like nearly everything else that was solid in his career, from the undergraduate remoteness of a first in mathematics” (Irving, 1955, p. 6). He added that “the Bishop did not really know what he was talking about” and was obviously “ignorant of the sciences involved” (Irving, 1955, pp. 6–7). Smout (1998) concluded that Irving implies not only that “Wilberforce is a master of deception who prefers performance to substance and style to truth” but that Wilberforce “poses an immediate danger to the state” (p. 34). Smout (1998) documents other examples of the use of rhetoric, as opposed to fact, penned for the purpose of demeaning Wilberforce.

As noted, the historical account shows Wilberforce concluded that Darwinism was based on inadequate evidence, a conclusion widely accepted by science historians today (Livingstone, 2009; Gale, 1982). Smout (1998) concluded that the Huxley and Wilberforce debate was a “bid for power made in the name of truth by a small group of scientists who feel that their superior rationality entitles them to control what Irving calls ‘human life itself’” (p. 35).

Why the Account Is Popular

Smout (1998) concludes that the popularized story of the debate was passed on to us today because it was useful to discredit Darwin skeptics. It discredits creationists because Wilberforce’s response was judged as “disgraceful,” yet Huxley’s attacks against Wilberforce were far worse. For example, in 1873, Wilberforce was thrown from a horse and tragically died from his injuries. Huxley wrote that for the first time “reality and his brains came into contact and the result was fatal,” a cruel comment that was far more vicious than any alleged snipe of Wilberforce toward Huxley (Clark, 1968, p. 117).

One reason for the common “mythical interpretation” of the event’s “as-

tounding popularity” is because naturalistic Victorian scientists wanted to bring the solution to social problems into their own realm of authority and remove it from the church’s realm (Smout, 1998, p. 36). Historian James R. Moore actually argues that the debate was the “Trojan horse of naturalism entering the fortress of the church” (Moore, 1982, p. 194). It has been “Exhibit A” in the idea perpetuated by White and others that “over the ages there had been nothing but conflict between scientists and Christians, with the latter always the villains of the drama” (Coleson, 1981, p. 9). As Smout (1998, p. 38) concludes, the debate is a “compelling example of some terminology battles that occur throughout the creation/evolution controversy: ... some evolutionists have attempted to depict this controversy as a straightforward effort by religious dogmatists to obstruct scientific truth.”

For example, Irving (1955, p. 8) claims not only that Huxley was victorious but also that science could provide a more solid and tangible means than religion to achieve goodness in society. This narrative is similar to the subsequent debates between the two sides, which continue today. Even if the putative account were completely true, Huxley’s words are hardly earth shattering, nor do they display a profoundness of thought that deserve the status of being some of the most widely quoted words in the history of debates about the conflict of science and religion.

How the Official Version Came into Existence

Of much interest in this case is the fact that the “official” version of the Huxley-Wilberforce debate was “successfully promoted” by Huxley himself (Gould, 1991, p. 398). This version was first published in Francis Darwin’s 1892 edition of his biography of his father Charles Darwin. In it, Francis Darwin included an account contributed by Huxley that contained the famous lines

“The Lord hath delivered him into mine hands” (Browne, 1978, p. 362). Hooker, who wrote the account, admitted that it was impossible to be accurate some 30 years after the event and that he wrote an account that “suited his purposes (and probably, by then, displaced the actual event in his memory)” (Gould, 1991, p. 398). Hooker openly stated that his goal was to vivify and vivisect the bishop (Browne, 1978, p. 361). Yet this version was published as an eyewitness account!

Much later, when Leonard Huxley wrote a book about his father, he paraphrased Francis Darwin’s account of the Wilberforce event and pictured it as a clash between science and the church (Livingstone, 2009, p. 155). Gould (1991, p. 398) concluded that the result was that two “dutiful sons presented the official version as constructed by a committee of two—the chief participants Huxley and Hooker—from memories colored by thirty years of battle.” Thus they “forged a legend” that remains today, and an account openly written for the purpose of “vivifying and vivisecting” the bishop cannot be trusted (Browne, 1978, 362). For these reasons Browne (1978) concluded that it is “fruitless” to continue to attempt to reconstruct the actual events that transpired at the Huxley-Wilberforce debate at Oxford.

Wilberforce Commonly Demonized and Huxley Glorified

Huxley was not a dispassionate scholar as is often claimed, but a man who was “spoiling for a fight” and, although his mind was “razor-sharp,” his “shaking temper” could “reduce his effectiveness, and Owen had bettered him on occasions” in the past (Desmond and Moore, 1991, p. 494). Eyewitnesses reported that Huxley “was ‘white with anger,’ too wrought up to ‘speak effectively,’ His hot-head had stymied him again” (Desmond and Moore, 1991, p. 497). Furthermore, Huxley did not deal

with the substance of Wilberforce's talk but resorted to character assassination to demean Wilberforce (Desmond and Moore, 1991, p. 495). It is a pity we do not have a corresponding personal account of the debate from the more sober-minded Wilberforce to balance the Hooker/Huxley account mentioned above.

As noted the falseness of the popularized version is common knowledge among the small group of scholars who have studied the event (Gould, 1991, p. 390). The account is so useful, though, that even though thoroughly exposed as largely legend, it is still being used, although often prefaced by expressions such as "it was reported," and "according to legend," or "the story goes" (Carlisle and Smith, 2006, p. 162) to dispel accusations of presenting false or undocumented information as true. The story lives on because it can be used to support the false but common archetypes of truth-seeking science versus dogmatic, repressive religion, reaction versus enlightenment, dogma versus truth, and darkness versus light (Gould, 1991, p. 399). The fact is, Huxley's "extreme anticlericalism led him to an uncompromising view of organized religion as the enemy of science" (Gould, 1991, p. 399).

Summary

Professor Coleson (1981, p. 8) concluded that the Huxley-Wilberforce debate is "one of the most celebrated episodes of the conflict of science and religion in the English speaking world" and also "one of the most damaging pseudo-scientific myths to gain wide credence in the West in the last century or two." A more accurate summary of the clash is "legends depicted a bloody clash, with Wilberforce scotched if not slain. But the first play-by-play account received by Darwin painted a very different picture" (Desmond and Moore, 1991, p. 494).

This inaccurate legend has been used to discredit not only Darwin critics but also Christianity in general. The story has been widely repeated, not only by atheists and anti-Christian scientists, but also by Christians and even in books used at Bible colleges as textbooks (Coleson, 1981, p. 8). In spite of recent research showing its inaccuracy, "the story continues to have symbolic currency within the scientific world" (Livingstone, 2009, p. 154). If the account is used at all, it should be used to illustrate the "contention which Darwin's theory aroused at the time" and to "develop an awareness of its deficiencies in the eyes of his critics" (Gauld, 1992, p. 409).

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Book Review

Nature's I.Q.: Extraordinary Animal Behaviors that Defy Evolution

by Balazs Hornyanszky
and Istvan Tasi

Torchlight Publishing Inc.,
Badger, CA, 2009, 159 pages,
\$25.00.

This is a beautiful and disappointing book. There are more than 300 color photos of animals, beautifully laid out. Many photos are unusual, such as an ant carrying a computer chip (cover), a grass snake playing dead to appear less appetizing (p. 31), and a frog with fake, protective eye marks on its rump (p. 30). Throughout, the book challenges naturalistic evolution. The writing is on a popular level but will not appeal to noncreationists. Evolution is described as nonsense (p. 14), having zero probability (p. 19), impossible (p. 38), inconceivable (p. 89), and illogical (p. 95). Discussion topics include animal

language, symbiosis, reproduction, and intelligence.

The authors as listed above are respectively a bioengineer and a cultural anthropologist. Both reside in Hungary, where the book was first published. Why, then, is this “classy” book a disappointment? The clue is the publisher, which produces works from India promoting Hinduism and the ancient Vedic culture that preceded it. The final ten pages of this book are dedicated to the revealed knowledge of swami leaders, Vedic scriptures, and reincarnation. In this worldview, people come originally from paradise. The soul “takes on bodies

of aquatic animals, then those of plants. One is reborn again and again as ... insects, amphibians, reptiles, birds, and mammals” through millions of years (pp. 141, 145). This reverse evolution finally gets the soul back to where it started in paradise. If it “does not take advantage of opportunities” (p. 141), the soul gets knocked back down to a lower level. Also included in this muddled worldview are advanced beings on other planets. All this confusion appears at the end of a beautiful nature book.

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The Origin of Grand Canyon

Part I: Uniformitarianism Fails to Explain Grand Canyon

Michael J. Oard*

Abstract

This is the first of a five-part series on the origin of Grand Canyon. It will address numerous uniformitarian problems. Despite nearly 150 years of study, uniformitarian scientists remain mystified as to its origin. Part of their difficulty stems from the necessity of explaining both the canyon and its geological context within the surrounding Colorado Plateau. Data gathered at present do not support any uniformitarian hypothesis. The three most credible uniformitarian hypotheses all can be shown to create intractable problems. These are: (1) the old antecedent stream hypothesis, (2) the stream piracy hypothesis, and (3) the revived lake spillover hypothesis. None are viable. Thus, any reasonable earth scientist should be open to exploring the possibility of a recent catastrophic origin.

Introduction

Grand Canyon is considered a showcase for uniformitarian geology and against the Flood paradigm (Strahler, 1987). It also lies within the frontlines of competing ideas on its origin:

The famous landscape of the Grand Canyon lies along the front lines of competing scientific and non-scientific [i.e., creationary] views of Earth's antiquity and evolution

(Pederson et al., 2008, p. 1,634b, brackets added).

Therefore, it is important for uniformitarian scientists to develop a viable theory for the origin of Grand Canyon (Figure 1).

I am aware that most mainstream scientists consider themselves "actualists" and not uniformitarians. Actualism is similar to uniformitarianism, except

that the former believe in a few large catastrophes sprinkled throughout earth history, such as meteorite impacts. They also admit that the present is not necessarily the key to the past but that geology must always believe natural processes operated in the past. I believe this philosophical point of view (i.e., naturalism) can be used as an excuse when deductions from the rocks and fossils are contradicted by present processes. But since few people understand the distinction between actualism and uniformitarianism, I will continue using the term "uniformitarianism," especially since this latter doctrine was the philosophical principle used in geology to throw out the Flood.

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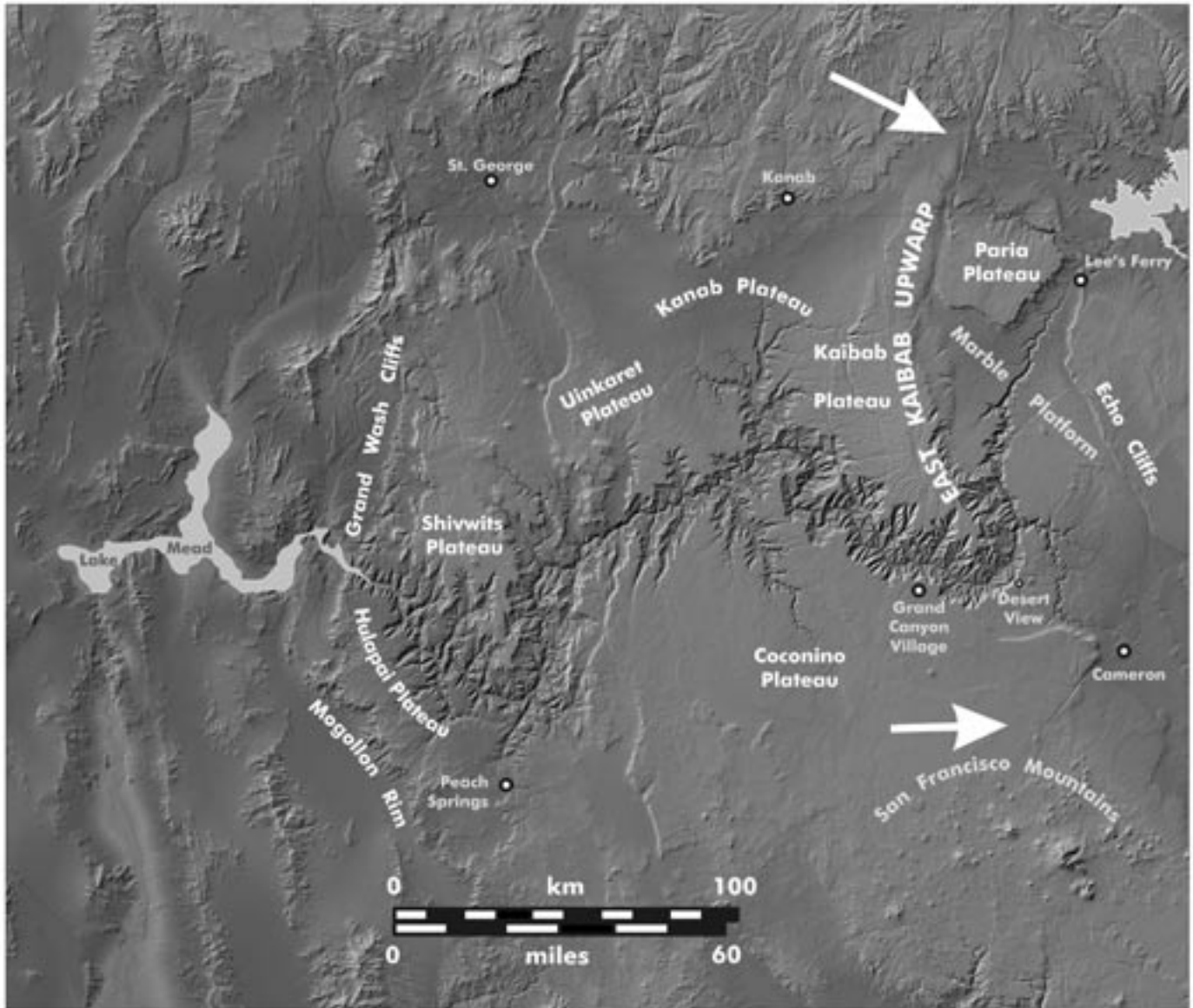


Figure 1. The Grand Canyon and the surrounding area with the main plateaus and prominent topographic features. The low point of about 5,750 ft (1,753 m) of the northern Kaibab Plateau and the low point a little above 6,000 ft (1,829 m) on the eastern Coconino Plateau marked by arrows. Map background provided by Ray Sterner and figure drawn by Peter Klevberg.

Uniformitarian Scientists Mystified

One would think that uniformitarian geologists would easily be able to figure out how Grand Canyon originated—if uniformitarianism is the correct starting point. They have spent an inordinate amount of effort to do so, ever since John Wesley Powell's (1961) first courageous trip down the Green and Colorado Riv-

ers in 1869. However, their hypotheses have come and gone—none fit the data. Despite great advances in knowledge, the origin of Grand Canyon is still a major mystery of geomorphology, the study of the surface features of the earth.

Regional geological knowledge of the Grand Canyon is especially rich and detailed, but it is already prone to unnecessary controversy and is

frustratingly difficult to synthesize and communicate to the public (Pederson et al., 2008, p. 1,634b).

In a popular book on the geology of Grand Canyon, Greer Price (1999, p. 7) admits: "But while the principles of erosion, like so much of geology, are simple, the detailed history of the Colorado River and its canyons remains elusive and difficult to grasp." In another recent



Figure 2. The Colorado Plateau with its adjacent geomorphological provinces of the southwest United States. Map background provided by Ray Sterner and figure drawn by Peter Kleberg.

book, Wayne Ranney (2005) repeatedly notes how little is actually known about the origin of Grand Canyon.

The canyon's birth is shrouded in hazy mystery, cloaked in intrigue, and filled with enigmatic puzzles. And although the Grand Canyon is one of the world's most recognizable landscapes, it is remarkable how little is known about the details of its origin (Ranney, 2005, p. 11).

The Colorado Plateau

The Grand Canyon is cut through the high southwest edge of the Colorado Plateau, a roughly circular area (Figure 2) that covers southeast Utah, southwestern Colorado, northwestern New Mexico, and northern Arizona. The plateau has an area of about 148,000 mi² (383,000 km²). The altitude is nearly all above 5,000 ft (1,524 m) msl with precious little vegetation. The Colorado River drains about 90% of the area.

The Colorado Plateau has sharply defined boundaries that separate it from neighboring provinces (Graf et al., 1987). On the west it is separated from the Basin and Range Province by faults and perimeter volcanic plateaus. The Grand Wash Fault forms a vertical cliff about 3,500 ft (1 km) high along the western edge of Grand Canyon. The Grand Wash Fault becomes the Hurricane Fault in south central Utah, separating the Colorado Plateau from the Basin and Range in Utah. The eastern boundary is the Rocky Mountains and the northern boundary is the Uinta Mountains.

To the south, the boundary is formed by the Mogollon (pronounced: muggy-yohn) Rim that stretches from northwest Arizona, east-southeast, into north central New Mexico. The Mogollon Rim is generally linear, although it is scalloped and rather ill defined in northwest Arizona. It is a spectacular escarpment up to 2,000 ft (610 m) above the streams

just to the south. North of the Mogollon Rim, the land dips gently north. The Mogollon Rim is *not* the result of faulting but is an erosional escarpment (Holm, 2001; Patton et al., 1991; Williams et al., 1999). The Mogollon Rim runs into the Grand Wash Fault in northwest Arizona.

The Colorado Plateau is only slightly deformed into gentle folds with near-horizontal sedimentary rocks compared to the surrounding provinces. Since the area is so large, these gentle folds result in great, eroded upwarps, such as the San Rafael Swell and the Monument Upwarp. The upwarps are separated by deep basins filled with sedimentary rocks, such as the San Juan and Uinta Basins (Baars, 2000; Hunt, 1956; Rigby, 1976; 1977). Steeply inclined beds are limited to a few great monoclines that border several uplifts. The exposure of strata and the unique landforms make the Colorado Plateau home to eight national parks, many national monuments, and abundant state parks.

The landscape is strongly stepped in places, consisting of cliffs called escarpments, separated by wide, gentle slopes—all the result of differential erosion and *not* faulting (Patton et al., 1991). The Grand Staircase, located north of Grand Canyon (Morales, 1990) and forming the northwest edge of the Colorado Plateau, is the most significant example (Figure 3). The height of the plateaus range from the lava-capped Aquarius Plateau on the northeast at about 11,400 ft (3,475 m), to the Kanab and Uinkaret plateaus just north of Grand Canyon. The Kaibab Limestone is exposed over most of the area around Grand Canyon. In the Grand Staircase, the strata above the Kaibab Limestone are about 10,000 ft (3,048 m) thick and dip gently to the north (Baars, 2000; Rigby, 1977).

The Colorado Plateau shows evidence of significant erosion. Based on geological clues, mainly the amount of measurable erosion on anticlines or large uplifted areas, an average of

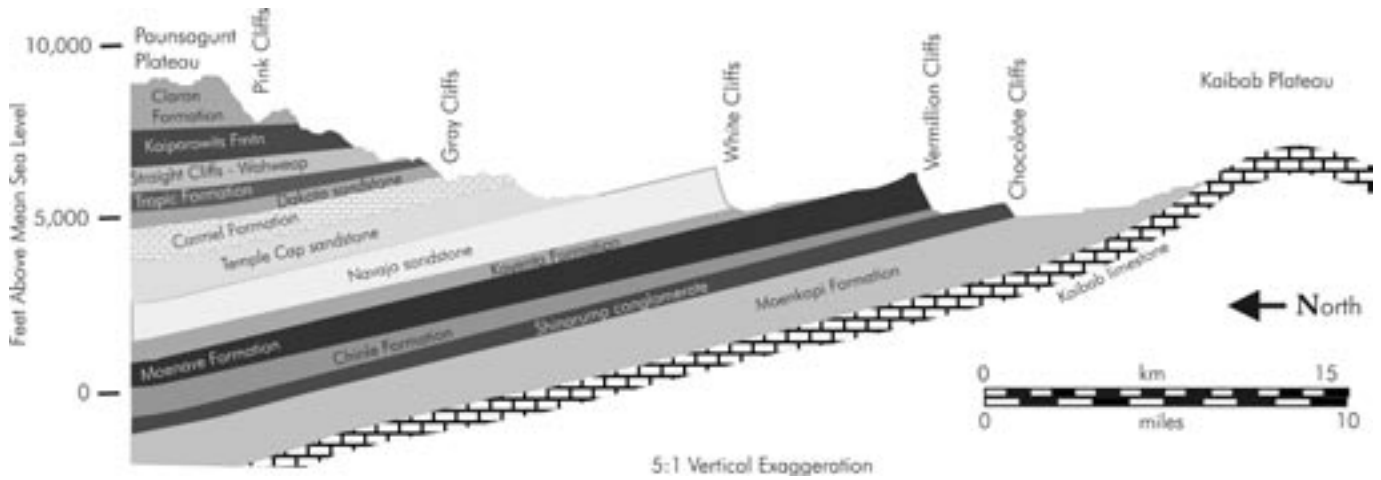


Figure 3. The Grand Staircase north of Grand Canyon showing the five prominent cliffs formed by erosion. The slope of the sedimentary rocks is north to north-northeast at less than 3 degrees. Vertical exaggeration is 5:1. Drawing by Peter Klevberg.

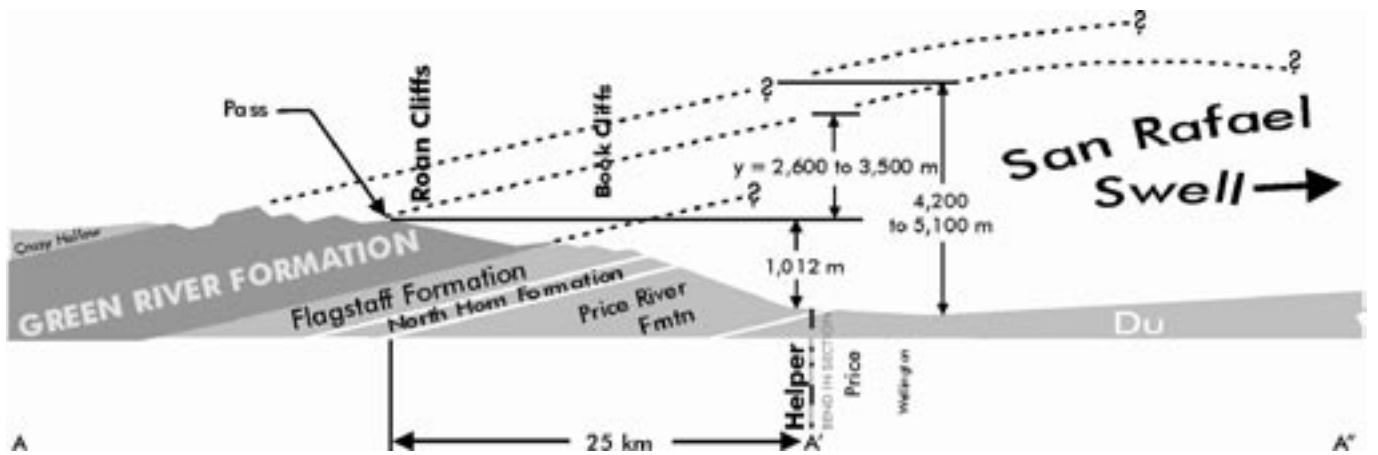


Figure 4. Cross-section of the sedimentary rocks of the north limb of the San Rafael Swell. Dashed lines with question marks show the strata projected up over the San Rafael Swell, assuming no change in thickness. Du means diluvial undifferentiated. Note that the total erosion is about 14,000 to 17,000 feet (4.2 to 5.1 km). Drawing by Peter Klevberg.

8,000 to 16,000 ft (2.5 to 4.9 km) of erosion has occurred over the *entire* Colorado Plateau (Schmidt, 1989). Up to about 17,000 ft (5.2 km) of erosion has occurred on the north limb of the San Rafael Swell (Figure 4). The uppermost remaining formation beneath this erosional surface is the Green River Formation, strongly suggesting that the

Green River Formation is a Flood deposit (Oard and Klevberg, 2008). This tremendous erosion has created unique landforms, creating perplexing courses for all the major rivers of the Colorado Plateau. Uniformitarian scientists place nearly all this erosion in the Cenozoic, the last major era of the uniformitarian geological timescale.

The Grand Canyon

Grand Canyon is perhaps the most spectacular canyon readily observable anywhere in the world (Vail, 2003; Vail et al., 2008). The Grand Canyon section of the Colorado Plateau consists of relatively small plateaus, which comprise one large plateau (Austin, 1994a). North of Grand Canyon, running from west to

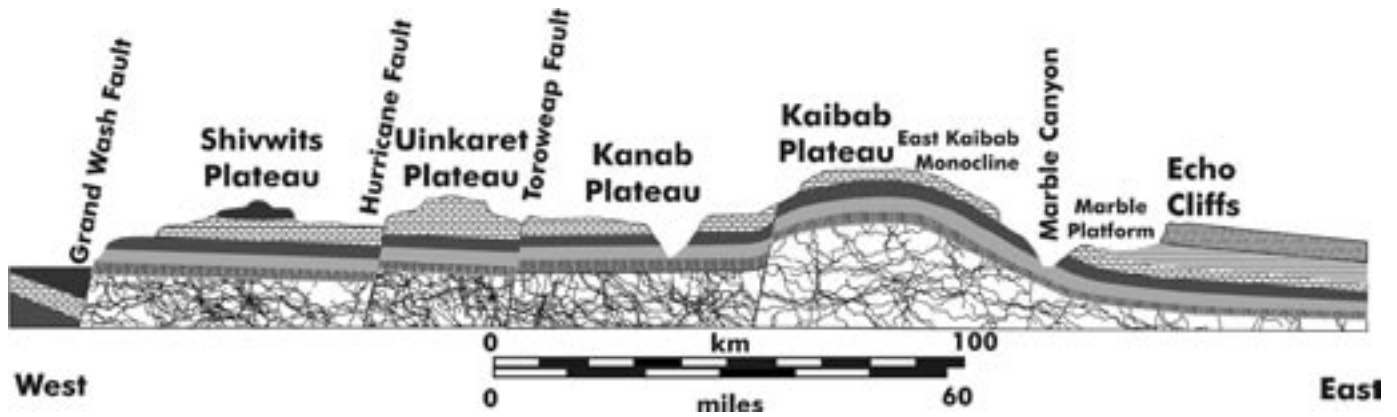


Figure 5. East-west cross section showing faults and monoclines. Drawing by Peter Klevberg.

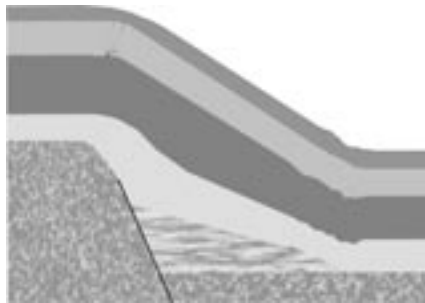


Figure 6. A monocline in which the beds bend downward. Monoclines are often cored by faults in the subsurface.

east, these small plateaus include the Shivwits, Uinkaret, Kanab, and Kaibab Plateaus (Figure 1). South of the canyon are two plateaus: the Hualapai Plateau in the extreme west and the Coconino Plateau over the rest of the area.

The small plateaus are generally bounded by faults on their western sides and monoclines on the eastern boundaries (Figure 5). A monocline is a local or regional steepening in the dip of sedimentary beds due to folding (Figure 6). The East Kaibab Monocline forms the east boundary of the Kaibab Plateau

and has a vertical drop of about 3,000 ft (914 m). Faults are present throughout the region. From west to east, the major faults include the Grand Wash Fault that forms the western boundary of Grand Canyon, the Hurricane Fault that stretches northwest as far as Utah, and the Toroweap Fault that merges with the Sevier Fault in Utah.

The elevations of the plateaus range from about 5,000 to 9,000 ft (1,524 to 2,743 m). Volcanism has spread late Cenozoic lavas over the plateau surfaces in some areas, especially south of Grand Canyon. The San Francisco volcanic field is located near the Mogollon Rim, and other fields exist on the northwest rim of the Grand Canyon.

Grand Canyon is 277 river-miles (446 km) long, if the 60 miles (97 km) of Marble Canyon are included. Its depth varies from 3,000 to 6,000 ft (914 to 1,829 m), and its average depth is 5,280 ft (1,610 m). The canyon’s width from rim to rim (Figure 7) ranges between 4 and 18 miles (6.4 to 29 km). The total amount of rock eroded from the canyon was 800–1,000 mi³ (3,335–4,168 km³) (Austin, 1994b; Potochnik, 2001; Ranney, 2005). There is no main fault parallel to the Grand Canyon that would have aided erosion, contrary to the opinion of Burdick (1974). There are, of course, minor faults, mostly perpendicular to



Figure 7. Grand Canyon (view north from Mather Point). The inner canyon is at the bottom foreground. Bright Angel Canyon is to the lower right.

the Grand Canyon, which could have aided erosion.

The highest plateau in the region is the Kaibab Plateau, located near the eastern Grand Canyon, which exceeds 9,000 ft (2,745 m) msl. This is important because before Grand Canyon was carved, this plateau would have blocked the Colorado River. Uniformitarians believe the Kaibab Plateau is about 70 million years old. Evidence that the plateau existed before the carving of Grand Canyon will be presented in Part II. In every uniformitarian terrestrial scenario, the Kaibab Plateau should have diverted the Colorado River. Before Grand Canyon was carved, the south side of the Kaibab Plateau sloped gently downward toward the south and included the eastern Coconino Plateau south of Grand Canyon. But one mystery of the canyon's origin is that the Colorado River appears to have cut right through the south side of the Kai-

bab Plateau at an *intermediate* altitude (Austin, 1994a, p. 85).

The Grand Canyon cut through the Kaibab Plateau at about the 8,000-foot (2,438 m) level on what is now the North Rim and at the 7,300-foot (2,225 m) level on what is now the South Rim. This is *not* the logical path for water to have taken across the plateau. The lowest path across the plateau is a little more than 5,700 ft (1,737 m) well north of the highest point (see arrows on Figure 1). Another reasonable path is south of the current canyon, which is a little above 6,000 ft (1,829 m) msl. The river in the eastern Grand Canyon is at 2,400 ft (732 m) above msl. Why was the Grand Canyon eroded at an *intermediate* altitude? This is the major problem.

Marble Platform, shown in the middle background of Figure 8, is the eastern extension of the lower part of the East Kaibab Monocline. Marble Platform is deeply incised by Marble Can-

yon and its several deep side canyons. Marble Canyon is generally considered the north to northeast extension of the Grand Canyon. Interestingly, Marble Platform slopes northeast and downward toward Lee's Ferry, where rafters put in to float the Colorado River. But the Colorado River flows southwest—*opposite* the slope of the top of the Marble Platform.

Looking toward the northeast in Figure 8, the 2,000-ft (610 m)-high Vermillion and Echo Cliffs can be seen. Vermillion Cliff is the lower part of the Grand Staircase, composed of a series of cliffs and plateaus north of the Grand Canyon area. The sedimentary rocks seen in Vermillion Cliff, as well as the Grand Staircase, at one time stretched south over the Grand Canyon area before being eroded away. Up to 1.5 miles (2.4 km) of these sediments were eroded in a sheet fashion prior to canyon formation. This event is called the Great



Figure 8. Marble Platform from Point Imperial with the 2,000-foot (610 m) high Vermilion and Echo Cliffs in the background. The dissection of the Marble Platform by Marble Canyon seen in the middle. Photo courtesy of Tom Vail.

Denudation and is described in Part IV of this series.

Uniformitarian Speculations Abound

Information provided at Grand Canyon National Park relates the origin of the canyon to erosion by the Colorado River over millions of years. The essence of this hypothesis is uniformitarianism—present-day rates operating over eons. This can be called the *little-water-over-a-lot-of-time* hypothesis. (The recent and speculative spillover hypothesis described below would be considered a legitimate actualistic example and exception to this description.) This axiomatic aspect is, in fact, the only thing about which uniformitarian geologists agree regarding the origin of Grand Canyon (Ranney, 2005). On the actual details of the canyon's origin, it seems that no two geologists agree (Powell, 2005).

However, even their foundational premise of extended, low-energy erosion by the Colorado River presents numerous insoluble problems for uniformitarian scientists. Given the supposed open-ended nature of science, these difficulties should open the door to alternative ideas—even those advocating a catastrophic option—the *lot-of-water-over-a-short-time* hypothesis (Austin, 1994a; Vail, 2003; Williams et al., 1991). However, since uniformitarianism is a philosophical commitment before it is a scientific principle, geologists dismiss

these options a priori, in spite of the fact that a catastrophic origin is usually the *first* thought that comes to people's minds when they first see the Grand Canyon (Powell, 2005; Ranney, 2005).

The local geology of the Colorado Plateau presents what is perhaps the most fundamental question that *any* theory must address. That is: Why does the Colorado River flow through the high plateaus on the southwest Colorado Plateau rather than around them? There was no fault system that forced the canyon's path, except possibly for short segments such as the section of the canyon southeast of the Shivwits Plateau that may have been influenced by the Hurricane Fault or an offshoot of this fault. It is no trivial matter that the river breaches the high Kaibab Plateau.

A related problem is the fact that Grand Canyon is *not* located at the lowest point through the plateau but at an *intermediate* altitude, as discussed above. Ranney (2005) described the puzzle:

Oddly enough, the Grand Canyon is located in a place where it seemingly shouldn't be. Some twenty miles east of Grand Canyon Village the Colorado River turns sharply ninety degrees, from a southern course to a western one and into the heart of the uplifted Kaibab Plateau... It appears to cut right through this uplifted wall of rock, which lies three thousand feet above the adjacent Marble Platform to the east. (p. 20)

Furthermore, at this point, the Marble Platform is over 3,000 ft (914 m) higher than the Colorado River. This leads to another fundamental question: which came first, the canyon or the river?

Geologists have developed three explanations for the origin of the Grand Canyon: (1) the antecedent stream, (2) stream piracy, and (3) lake spillover (Austin, 1994a; Douglas, 1999; Hunt, 1976; Powell, 2005; Ranney, 2005; Williams et al., 1991; 1992; Young and Spamer, 2001). Early on, a few geologists thought it might be explained by superimposition—the hypothesis that rivers maintain their course while eroding vertically down through underlying rocks (Figure 9), resulting in a river flowing through ridges and mountains. This idea was quickly discarded.

Geomorphologically, the Grand Canyon is a water gap. A water gap is defined as “a deep pass in a mountain ridge, through which a stream flows; esp. a narrow gorge or ravine cut through resistant rocks by an antecedent stream” (Bates and Jackson, 1984, p. 559). This definition applies to any perpendicular cut through any topographical barrier, including a plateau (Douglas, 2005). Many geologists examine the canyon through the lens of sedimentary or structural geology. As we will see, it is vital to maintain a geomorphological focus.

Each of the three explanations for the origin of Grand Canyon has flaws that render it highly improbable. We

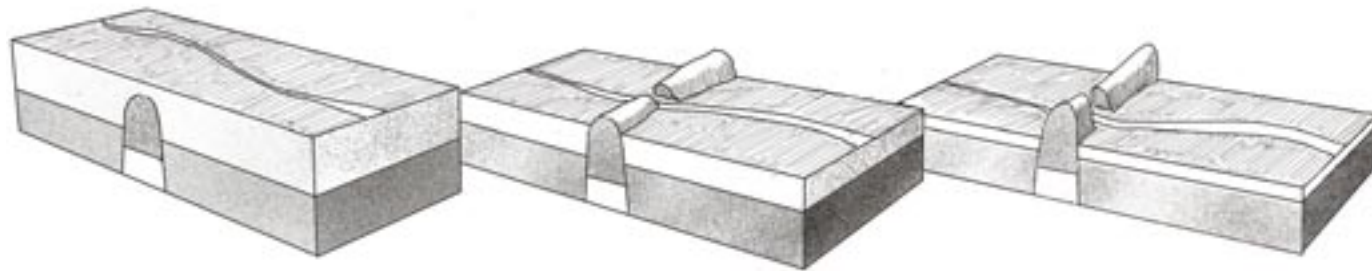


Figure 9. Block diagram of the superimposed stream hypothesis. The stream maintains its same course as most of the covermass (top layer) is eroded. Drawing by Bryan Miller.

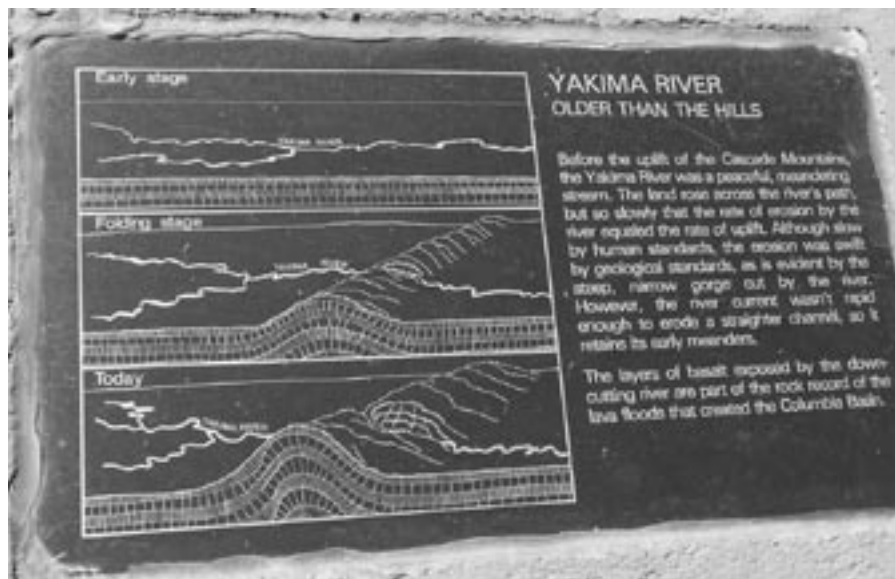


Figure 10. The antecedent stream hypothesis from a plaque near one of the Yakima River water gaps, Washington. The stream is first established, then the ridge slowly uplifts while the stream is able to erode through the barrier.

will now examine each of the three main hypotheses and demonstrate those flaws.

Powell's Antecedent Stream Hypothesis

John Wesley Powell (1961), who was wedded to the uniformitarian paradigm, simply explained the Grand Canyon (as well as the Green River water gap through the Uinta Mountains) as a result of an antecedent river that had existed for many tens of millions of years “before” the uplift of the Colorado Plateau. An antecedent stream is technically defined as “a stream that was established before local uplift began and incised its channel at the same rate the land was rising; a stream that existed prior to the present topography” (Bates and Jackson, 1984, p. 22). In other words, there was a river in place *before uplift* of a landscape of low relief (Figure 10). Then a barrier, such as a mountain range or plateau, rises in the path of the stream, but does so at such a slow rate that the stream or river maintains its course by eroding down at

the same rate as the uplift of the rising landscape. Powell was convinced the Colorado River was able to maintain its present course for tens of millions years while the mountains and plateaus slowly uplifted across its path. Powell and other early advocates of this hypothesis were *dogmatic* in their insistence on this hypothesis, despite the absence of evidence (Powell, 2005). Their conclusion was a logical but arbitrary deduction based on their uniformitarian model.

The antecedent stream hypothesis is thought to account for perpendicular gaps across great mountain ranges (water gaps) that were uplifted late in geological time. These include the Himalayas, the Alps, and the Cascade Mountains of the northwest United States. In fact, most mountain ranges are believed to have been uplifted late in the Cenozoic (Ollier and Pain, 2000), so this hypothesis *should be* widely applicable. Furthermore, since uniformitarians see vertical earth movements as generally quite slow, rivers should be easily capable of rapid vertical incision (Small, 1978), if uni-

formitarianism were true. Antecedence applies mainly to *large* rivers, because only large rivers seem to have enough erosive power to keep up with uplift (Ahnert, 1998).

Serious Problems with Antecedence

In spite of its superficial plausibility, and in spite of its congeniality with the uniformitarian paradigm, the mechanism of antecedence is now considered *rare* (Twidale, 1976). Geologists shy away from this hypothesis because it has encountered many difficulties since it was formulated (Oard, 2008). If geological evidence suggests that the barrier is “older” than the river, clearly the hypothesis cannot be applied. Furthermore, uplift must be so slow that the river’s course is not deflected (Ranney, 2005). This requires a *special conjunction of time and erosion*. If the river is flowing through an enclosed basin and the mountains rise too fast, a lake should form with lake-bottom sediments, shorelines, etc. These features are not found near Grand Canyon.

If a water gap through one barrier is difficult to achieve, *aligned water gaps* through multiple ridges in a generally straight line is that much more improbable. It is notable that many water gaps first explained by the antecedent stream hypothesis have been “reinterpreted” as additional data are collected. Other mechanisms are now suggested, replacing the antecedence hypothesis, indicating that there was little or no evidence for it all along. Twidale (2004) admitted that in reality antecedence was difficult to demonstrate.

It is fair to state that though many rivers of tectonically active regions are probably of such an origin [antecedence], but like warping in relation to river capture, it is difficult to prove. The ages of the river and of the implied tectonism have to be established, and this is rarely possible. (p. 193)

Antecedence Does Not Work for the Grand Canyon

In the mid and late 1800s, antecedence was asserted to be the mechanism for the origin of the Grand Canyon. It was widely accepted for about 60 years—until a more detailed examination forced its rejection (Austin, 1994a; Lucchitta, 1990; Morris and Austin, 2003). The problems were not limited to Grand Canyon; geologists have encountered many problems with the antecedence hypothesis in general (Austin, 1994a; Powell, 2005; Ranney, 2005; Williams et al., 1992).

The fatal flaw of this hypothesis in regard to the Grand Canyon is that uniformitarian dating methods claim that the Colorado River is much younger than the plateaus that it bisects. Many years ago, geologists thought that the canyon was 70 million years old; now they accept an age of only 5–6 million years. They base this conclusion upon dates of the Muddy Creek Formation and the overlying Hualapai Limestone. These strata are several thousand ft (about 1,000 m) thick and are visible just west of the mouth of Grand Canyon. Since there is no evidence of the Colorado River ever flowing through these formations (Longwell, 1946), the river must be younger than 6 million years old, assuming the uniformitarian dating system. Lucchitta (1990) concluded:

The establishment of through-flowing drainage along the lower Colorado River in its Basin and Range course occurred between four and six million years. No lower Colorado River existed before that date. (p. 328)

Although the eastern Grand Canyon is thought to be older, there is no sedimentary evidence for the earlier existence of the Colorado River in Utah, Arizona, or Colorado (Meek and Douglass, 2001).

Interestingly, the age of the western and central Grand Canyon has recently come under debate. There are several

new age estimates of the Canyon that are much older than 6 million years (Oard, 2009). Some scientists now believe that a proto Grand Canyon is about 55 million years old (Flowers et al., 2008). This means that the Grand Canyon could have started eroding by 65 million years ago—a time when the last of the dinosaurs may have seen it, as an Internet science news service stated.

How could everyone have gotten it so wrong? New research indicates that the Grand Canyon is perhaps 65 million years old, far older than previously thought—and old enough that the last surviving dinosaurs may have stomped along its rim (Berardelli, 2008).

Clearly, the explanations of the origin of Grand Canyon cannot be presented with any certainty if the relative ages of the river and its surroundings cannot be established. It should be interesting to see if the antecedent stream hypothesis makes a comeback, based on these new ages.

But simply increasing the age of the river does not solve all the problems. If both the river and the Colorado Plateau have existed for over seventy million years, their current elevations—and even their very existence—are a puzzle. Over that time, erosion should have wiped away the entire Colorado Plateau! That is because measurable erosion rates would denude all of North America down to sea level in as little as 10 million years or a maximum of 50 million years (Roth, 1998; Oard, 2008). Granting the uniformitarian paradigm, there is no reason why erosion should have been less active in the past. What's more, there are few signs of linear (river) erosion on the plateaus surrounding Grand Canyon; the plateau top is a planation surface caused by sheet erosion. That would require a far more energetic environment, which in turn demonstrates that the surface is probably much younger than seventy million years. This conclusion is supported by digital elevation models

that show that the Kaibab Plateau and its margins are geomorphologically *young* (Mayer, 2000).

The Stream Piracy Hypothesis

As a result of the failure of the antecedent stream hypothesis, many uniformitarian scientists have embraced the stream piracy hypothesis. Its acceptance, however, is not based on large amounts of supporting data. Rather, it seems one major reason for its acceptance is simply that there is no other hypothesis, except the spillover hypothesis; and even the revised version of that controversial idea (described below) has not convinced many geologists. Thus, they cling to the stream piracy idea, which is also known as “river capture.”

Serious Problems with Stream Piracy

Summerfield (1991, p. 410) explained how stream piracy is supposed to work: “River capture occurs when one stream erodes more aggressively than an adjacent stream and captures its discharge by intersecting its channel.” The higher rate of erosion by the capturing or pirating stream is attributed to: (1) a steeper slope, (2) greater discharge, (3) less resistant rocks, and (4) more precipitation feeding the pirating stream than the adjacent stream. Figure 11 shows a schematic of how stream piracy is supposed to work.

The idea seems like a reasonable process given millions of years of denudation, yet in reality it is often more complicated. Many proposed examples of stream piracy have ignited disputes among geomorphologists (Small, 1978). Many assert that the mechanism has been applied too liberally (Small, 1978). Some researchers believe the process is rare and occurs only on a small scale (Bishop, 1995; Pederson, 2001). For instance, the origin of the transverse drainage of the Zambezi River in Africa was once assumed to have been caused

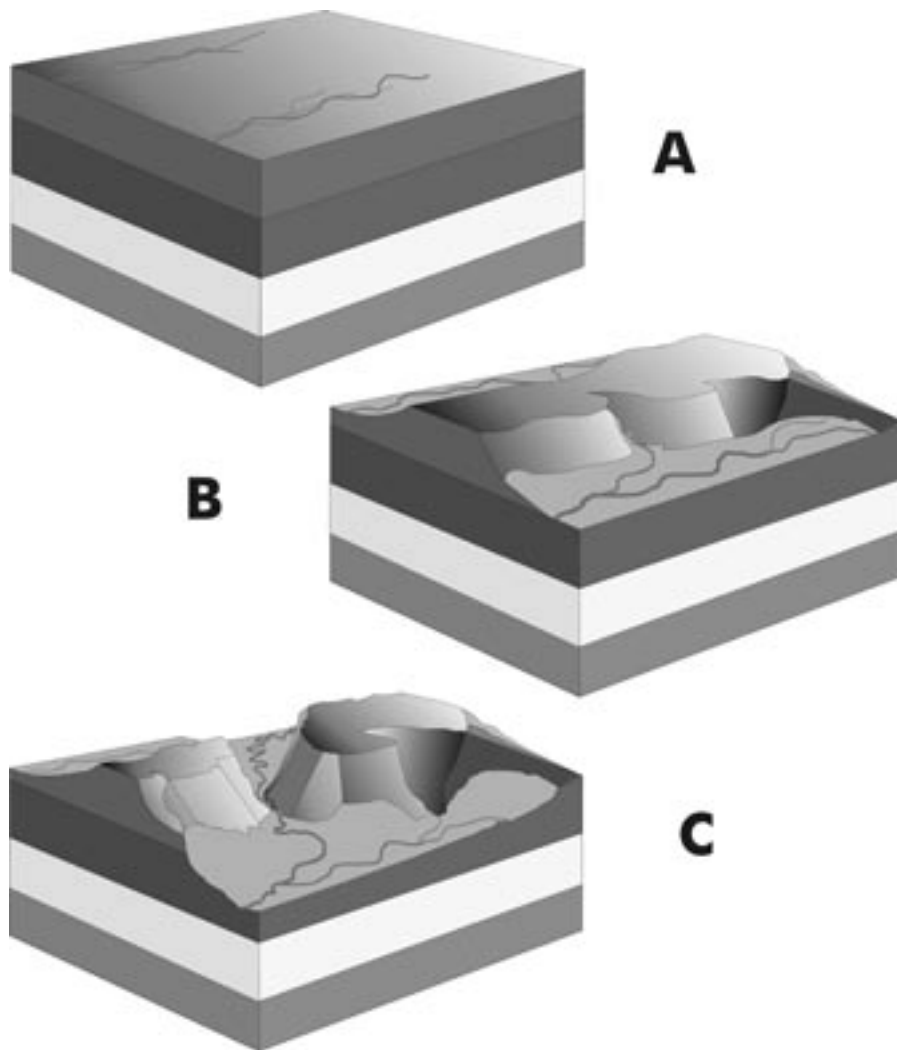


Figure 11. Schematic of stream piracy. Drawing by Peter Klevberg.

by river piracy, but that deduction was largely speculative (Thomas and Shaw, 1992). Ironically, it has since been suggested that this example of river piracy was caused by a catastrophic flood, not by slow processes acting over millions of years. This flood was believed to have been caused by a breached paleolake. In the case of the Zambezi, the spillover hypothesis makes sense, since geological evidence of the paleolake and its breaching exist.

Small (1978, p. 229) stated that rarely is there direct evidence for stream piracy; it is practically always an *inference* from more general features: “It

must be apparent from this discussion that the phenomenon of river capture cannot be ‘taken on trust.’” Otherwise demonstrating stream piracy requires researchers to show that the pirating stream was incised to a significantly lower level than its victim. But evidence of past erosion is often eliminated by subsequent erosion. Even if the hypothesis is plausible, it does not seem easy to support with field evidence.

Theoretically, stream piracy can occur after the Flood when the divide between two streams is low, for instance the Atchafalaya River would have captured much of the flow of the Mississippi River

upstream in northern Louisiana, if the United States Army Corp of Engineers had not intervened. Such instances would be rare after the Flood.

Stream Piracy and the Grand Canyon

The stream piracy hypothesis is problematic when applied to the Grand Canyon (Austin, 1994a; Williams et al., 1992). It asserts that a stream from the uplifted or uplifting Colorado Plateau plunged into the Lake Mead area, eroded headward between 100 to 200 miles (161 to 322 km), and then captured the *ancient* Colorado River. But evidence of this “ancient” Colorado River is lacking. Most supporters of this hypothesis think that the ancient Colorado River was flowing east of the Kaibab Plateau. However, two versions of this hypothesis (Hunt, 1976; Lucchitta, 1990) assume that the Kaibab Plateau had already been breached by the ancient Colorado River.

One of the keys to this hypothesis is whether the capture occurred east or just west of the Kaibab Plateau. If it happened to the west, the Colorado River had already breached its highest point—thus the hypothesis *ignores* the most difficult problem. If the capture was to the east of the Kaibab Plateau, the pirating stream would have had to erode eastward through the plateau, including the high Kaibab Plateau, which would take a much longer time than eroding through a flat plateau. Eroding through topographical divides is much slower than away from divides because water flows downhill and there is less water volume available for erosion in the headwaters.

In addition to the apparent impossibility of headward erosion for up to 200 miles (322 km), there seems to be a surprising lack of evidence for such an event on the western edge of the Colorado Plateau. We should see many other long canyons eroded eastward from the western edge of the Colorado Plateau, but we do not. Given an arid

to semiarid climate, this scale of erosion seems unlikely.

Also, the slope of the Kaibab and eastern Coconino Plateaus in the vicinity of Grand Canyon is generally southwest, while the “precocious gully” (as dubbed by Hunt, a critic of the hypothesis) had to erode eastward, which is roughly *perpendicular* to the expected surface flow of water. It is not surprising that many other geologists see 200 miles of headward erosion perpendicular to the topography as untenable (Dallegge et al., 2003; Young and Spamer, 2001).

Speculations on the Path of the “Ancient Colorado River”

Another significant problem with the hypothesis is the mysterious “ancient Colorado River.” There are differing ideas on the path of the ancient Colorado River and the precise location of its capture by the “precocious gully.” Since the Kaibab Plateau is believed to have uplifted 70 million years ago, the ancestral Colorado River east of the Kaibab Plateau theoretically must have existed for at least 60 million years, but there is not a trace of this river (Austin, 1994a). Within the uniformitarian paradigm, the first trace of the ancestral Colorado River is only 10 million years ago in Colorado (Larson et al., 1975). The whereabouts of the Colorado River prior to 10 million years ago is enigmatic.

Another date discrepancy exists. Given the young dates from the western Grand Canyon, advocates of stream piracy must explain how the upstream segment of the Colorado River east of the Kaibab Plateau is ten million years old or more, while the downstream segment is only five to six (Young and Spamer, 2001).

One version of the stream piracy hypothesis speculates that the Colorado River used to flow southwest through Marble Canyon east of the Kaibab Plateau and then turned southeast through the valley of the Little Colorado River to exit into the Rio Grande River. Then a

stream that flowed from the east into the Lake Mead area rapidly eroded eastward 100–200 miles (161–322 km) in five to six million years (Ranney, 2005) to intersect the ancestral upper Colorado River, forcing the river to divert west. The slope of the Little Colorado River valley then was reversed to what we see today. Thus, this version would postulate that the terrain in eastern Arizona and New Mexico was once much lower. However, there is a problem. The top of Marble Platform now slopes northeast—the opposite of the claimed flow of the ancestral Colorado River.

A second version of the stream piracy hypothesis suggests that the ancestral Colorado River, instead of flowing southeast through the Little Colorado River Valley, somehow crossed the Kaibab Plateau and then turned northwest through the Kanab Creek Valley into southern Utah (Lucchitta, 1990). But, this idea cannot explain the major problem for the origin of the canyon: How did the Colorado River manage to breach the Kaibab Plateau? Moreover, the slope of Kanab Creek, which starts on the high plateaus of south central Utah, also would have had to reverse, something most geologists do not accept.

A third version speculates on an ancient path that somehow breached the

Kaibab Plateau and passed southwest through Peach Springs Canyon to Needles, CA (Hunt, 1976). This hypothesis is also unlikely. Peach Springs Canyon, east of the Hualapai Plateau, is filled with deep deposits of gravel, volcanic ash, and other sediments with paleocurrent indicators showing drainage toward the northeast (Lucchitta, 1972; Powell, 2005; Young, 2001).

Any of these versions of the hypothesis sees the pirating stream eroding eastward from near Las Vegas, NV to the location of the ancestral Colorado River (its pre-capture path is uncertain), diverting it into the current Grand Canyon. Some of the many problems with the stream piracy hypothesis are summarized in Table I (Austin, 1994a; Hunt, 1976; Lucchitta, 1990; Powell, 2005; Ranney, 2005; Spencer and Pearthree, 2001; Williams et al., 1992).

The Lake-Spillover Hypothesis

Geologist Eliot Blackwelder (1934) proposed that the Grand Canyon was eroded by the spillover from a lake northeast of the Kaibab Plateau (Meek and Douglass, 2001). His suggestion remained obscure for many years, but has recently been revived (Douglass,

Table I. Problems with the Stream Piracy Hypothesis for the Origin of Grand Canyon

1	No evidence for ancestral upper Colorado River
2	Headward erosion by a small stream in a semiarid climate is not efficient
3	Not enough time for headward erosion, even by uniformitarian timescale
4	No evidence of other headward eroding streams cutting 100-200 miles into plateau
5	The “precocious gully” supposedly eroded east, but slope of plateau surface is often to south
6	No fault or sag to aid headward erosion
7	Problem of breaching Kaibab Plateau remains
8	Stream capture is rare and usually on smaller scale

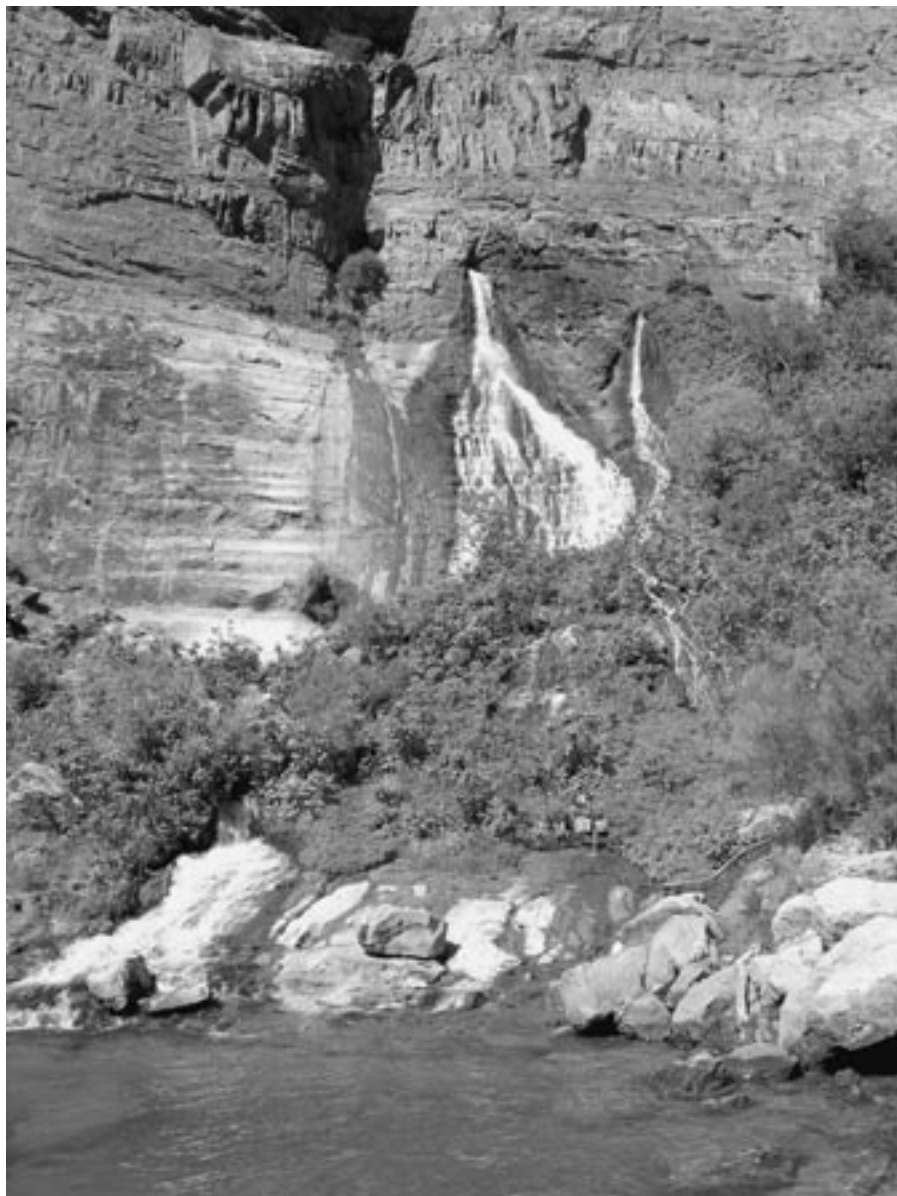


Figure 12. Cave with spring in Redwall Formation just above Colorado River in the Grand Canyon.

1999; Meek and Douglass, 2001; Perkins, 2000; Scarborough, 2001; Spencer and Pearthree, 2001). The hypothesis proposes that a lake called Lake Hopi or Lake Bidahochi developed in the region of the Little Colorado River area, with another lake possibly situated northeast of the Kaibab Plateau. Breaching of these lakes led to a catastrophic spillover, which cut through the Kaibab Plateau to form the Grand Canyon. However,

there are also many problems with this hypothesis.

First, there is no evidence for the proposed lakes (Meek and Douglass, 2001). Geologists cite the Bidahochi Formation in the northern and eastern Little Colorado River Valley, but only a part of this deposit is considered lacustrine (Dallegge et al., 2001), and even that interpretation rests squarely on one tenuous piece of evidence—that the

sediments are fine-grained (Dallegge et al., 2003). Recent work has reinterpreted these “lake” sediments as *shallow water* sediments formed in an ephemeral desert lake (Powell, 2005; Ranney, 2005). It is not clear how such a small volume of water could have eroded Grand Canyon.

Another serious problem with the hypothesis is that the elevation of the top of Grand Canyon as it runs through the Kaibab upwarp is significantly higher than the spillover point(s) for these supposed lakes. The lowest point of the top of the Grand Canyon through the Kaibab Plateau is 7,300 ft (2,225 m), while the lowest points through the Kaibab Plateau are around 6,000 ft (1,829 m), as discussed above. Again, the major problem is why the Grand Canyon was cut through the Kaibab Plateau at an intermediate altitude, when it should have cut through at points about 1,300 ft (396 m) lower. To get around this difficulty, a few geologists have interpreted caves in the Redwall Limestone in the Grand Canyon (Figure 12) as the remains of subterranean groundwater conduits from “Lake Hopi” which collapsed a preexisting cavern to form the Grand Canyon. This piping would have occurred as the water pressure built up against the barrier that held the lakes, until the pressure was sufficient for the water to be forced through cracks or tunnels. This mechanism of breaching is similar to one version of the creationary dam-breach hypothesis examined in Part II of this series.

Finally, if the lake ever did overtop the Kaibab Plateau, it would not have followed the current path of the Grand Canyon, because that path runs perpendicular to the topography (Hunt and Elders, 2001). Applying simple rules of hydraulics, the water would have run off to the southwest. That is completely at odds with the canyon’s turn to the northwest, once past the Kaibab Plateau. Some scientists have suggested the overspill followed a previous chan-

nel cut during the period of northeast water flow on the plateaus. In addition to the complete lack of field evidence for this proposal, it would not explain the morphology of the western Grand Canyon.

The overspill hypothesis is admittedly speculative, even by geologists who believe in it (Meek and Douglass, 2001). Powell (2005, p. 228) stated, “Thus, lake overflow and integration appears to be another speculative idea—an educated geological guess—without direct evidence.” Table II summarizes five major problems with the spillover hypothesis. One might almost say that the major problem with this hypothesis is that it overlooks the fact that water runs downhill.

No Viable Uniformitarian Hypothesis

Early geological pioneers thought it would be easy to determine the origin of Grand Canyon. After all, it was supposedly a simple deduction from the uniformitarian principle, which they “knew” was absolutely true. But, in a recent book, Powell (2005) lamented:

Surprisingly, what had seemed to the pioneers to be an easy geological puzzle to solve proved just the opposite.... Powell and Dutton would have been taken aback to learn that, sixty-five years after the Major’s [Powell] maiden voyage, the river’s age and history were still open questions. They would have been astounded to find that the origin of the Grand Canyon was the subject of a conference held in 1964, which reached consensus but not unanimity, and that yet another convened in the year 2000, with the *same* result. , (pp. 4–5, 161, emphasis and brackets added)

It is interesting that the 1964 “consensus” is no longer considered valid. One must be careful of scientific consensus, which history shows to be

Table II. Five Major Problems with the Spillover Hypothesis for the Origin of Grand Canyon

1	No evidence for a lake northeast of the Kaibab Plateau
2	Only a minor portion of the Bidahochi Formation is claimed to be a lake deposit
3	Supposed lake sediments in Bidahochi Formation now seen as formed in a small lake
4	Spillover points across Kaibab Plateau much lower than when Grand Canyon formed
5	Overspilling lake unlikely to have followed course of Grand Canyon

notoriously unreliable (Wells, 2006). The consensus by scientists for historical events is especially unreliable, because it rests on the worldview of those interpreting the evidence.

At present, the antecedent stream theory has been abandoned, and the stream piracy and spillover hypotheses are now competing, although a few investigators favor a combination of both (Young and Spamer, 2001).

Powell (2005, pp. 243–244) optimistically proclaimed that the 150 years of research is bringing geologists “closer” to the solution: “Clearly geologists grow ever closer to finding the solution to their grandest puzzle.” He likely believes this for reasons not related to evidence—the axiomatic acceptance of scientific “progress”: “Instead, we have to proceed by trial and error, getting a lot wrong and a few things right, slowly advancing science bit by bit” (Powell, 2005, p. 254). That is not the only presuppositional baggage that he brings to the canyon. He believes that sheer human reason, working with the assumptions of deep time and plate tectonics, will inevitably unveil the solution to the problem. But will it? Deep time was accepted when John Wesley Powell braved the Colorado River. The theory of plate tectonics has been with us for over fifty years.

Donald Baars (2000), a longtime researcher of the Colorado Plateau,

offers a more realistic appraisal. He believes that plate tectonics is irrelevant to understanding the Colorado Plateau. “There is no need to discuss plate tectonics principles when describing the interior of the continent, as there are no realistic direct relationships to be found” (Baars, 2000, p. x).

If deep time has been a paradigm for nearly two centuries, and human reason has been hard at work for nearly 150 years to unravel the mystery of Grand Canyon, then it appears that Powell’s optimism is naïve. A reasonable person might wonder if it is not time to start questioning the assumptions instead of looking for ephemeral data to support the “just-so” stories that pass for geological hypotheses today.

Grand Canyon is one of the most geologically visible features on Earth and one of the most heavily studied over nearly a century and a half, but uniformitarian researchers are no closer to understanding it than John Wesley Powell. They have no viable hypothesis for the origin of Grand Canyon. R.J. Rice (1983, p. 292, emphasis added) admitted: “After a century of study, we seem, if anything, to be *further* than ever from a full comprehension of how the Grand Canyon has evolved.” The situation has not changed in twenty-two more years, as Powell (2005) wrote in the introduction to his book on the Grand Canyon.

The story you are about to read has *no* definitive answer at the end, no “aha!” moment. We are frequently left with more questions than answers simply because the river continues to excavate away at the traces of its early history, leaving us behind in bewilderment as we scratch our heads in disbelief. There are few places where one can go to learn how the Grand Canyon formed. There are no interpretive signs inside the park that speak to the idea of how the canyon may have formed and most books say little more than the river carved the canyon (p. 16, emphasis added).

Conclusion

After decades of study by hundreds of geologists spending millions of dollars, uniformitarian interpretations of the origin of Grand Canyon have failed. None will admit the failure, and few seem inclined to see a problem at all! Yet in spite of their repeated and continuing failure, uniformitarian geologists are quick to circle the wagons when the one reasonable conclusion is suggested—that a new paradigm is needed.

If the slow erosion by the preexisting river cannot be made to explain the disparate data, then perhaps it is time to find another mechanism. The first impression of most people is that the canyon had a catastrophic origin. This is supported by analogies of catastrophic canyon formation at Mount St. Helens (Morris and Austin, 2003). Physical evidence supports the idea—the Grand Canyon has vertical walls and lacks talus (Vail et al., 2008). Given the failures of uniformitarian geology, what is wrong with suggesting a catastrophic alternative? Why not consider that the canyon formed with a *lot of water over a short time*?

There is only one real reason that such a possibility is automatically excluded. The worldview commitments of modern geologists cannot admit that

the foundation of their historical tale of Earth’s past—uniformitarianism—is of no help at their most visible monument. This is especially true since such an admission would open the door to the possibility of the Biblical Flood.

Because, after one considers the field evidence, a Flood explanation makes more sense than anything the uniformitarians have to offer, we will examine this possibility in other parts of this series. At present, there are two creationary hypotheses for the origin of the Grand Canyon. The first is the dam-breach hypothesis, caused by the post-Flood breaching of two or three lakes located east and northeast of Grand Canyon (Austin, 1994a; Brown, 2001; 2008; Vail et al., 2008). This hypothesis was developed in the late 1980s and has spawned three variations to date. However, as we will see in the next paper in this series, that idea is poorly supported by the evidence.

The second catastrophic model is the late-Flood runoff hypothesis. This idea assumes that the canyon was carved by receding Floodwater during the latest stages of the Flood, as the rising continents forced the water into large channels. A few subscribers to creation theory seemed to favor this idea (Gish, 1989; Whitcomb and Morris, 1961) but never developed the hypothesis. However, it is an idea that corresponds well to the available data as will be explained in Parts III–V of this series.

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Modern Geohistory: An Assault on Christianity, Not an Innovative Compromise

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Abstract

Martin Rudwick, noted historian of earth sciences, proposes that geohistory originated as an innovative compromise between two “unmodern” traditions: Biblical chronology and Aristotelian eternalism. According to his theory, Enlightenment intellectuals—particularly Georges Cuvier—found a third path that avoided the theological problems of Aristotle’s cosmology and the “empirical” problems of a short Biblical past. Although this analysis is interesting, it minimizes the fundamental anti-Christian spirit of the Enlightenment and fails to make a compelling case for any relevance of Aristotle’s temporal cosmology. Proposals for the eternity of matter arose not from Aristotle but because it is a logical metaphysical alternative to theistic creation. Rudwick fails to differentiate between Aristotle and the post-Christian materialism of the Enlightenment, which was quite dissimilar from Aristotle’s *Metaphysics*. More importantly, crucial relevant aspects of church history and orthodox theology compromise his theory. Thus, it should be rejected in favor of a historical interpretation of geohistory as part of an integrated secular attack on traditional Christianity—an explanation that better explains developments in Western culture, both then and now.

Introduction

A seminal moment for modern creation science was the 1961 publication of *The Genesis Flood* (Whitcomb and Morris, 1961). Its focus on geology, rather than evolution, emphasized the underlying conflict between secular geohistory and the history of the Bible over that of biological evolution. Scripture presents

time as a tapestry: the warp is man’s struggle in a fallen world and the woof is God’s providential provision for both present and future salvation. Secular geohistory did more than inflate the quantity of time; following the lead of Hume and Kant, it shredded the fabric of Christianity by eliminating the threads of

divine immanence. That is why Biblical history remains foundational to Christianity, and the theological issue forces our focus quite properly on the problem of the extended geological timescale (e.g., Reed, 2008a,b,c, d), even though there remains significant confusion over this issue (Reed and Oard, 2006).

Part of that confusion flows from an inaccurate historical understanding of the development of geohistory in the eighteenth and nineteenth centuries. Most people today believe the myth

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began by Charles Lyell, which only recently has been exposed as self-serving propaganda (e.g., Gould, 1987). Lyell created a legend of geology focusing on his British predecessors, James Hutton and John Playfair. Given the nineteenth-century belief that physical science developed by the sequential efforts of the giants: Copernicus, Galileo, and Newton; Lyell's attempt to create a similar chain for geology with himself as the final link strongly suggests that he saw himself as the "Newton" of earth science. His ploy worked, as evidenced by the ongoing adulation of geologists.

But historians (and a few geologists) have worked to correct the record. Gould (1987) identified some of the most glaring distortions. Mortenson (2004; 2006; 2008) resurrected the work of the scriptural geologists—orthodox Christian scholars who fought Lyellianism apart from the continental secular catastrophists whom Lyell sought to tar with the brush of "diluvialism." Mortenson (2006) also documented Lyell's animus toward Christianity and his scheme to attack the credibility of its historical foundations. But one scholar has dominated the discussion about deep time in recent decades—Dr. Martin J.S. Rudwick, arguably the foremost historian of the earth sciences in our day.

Dr. Rudwick built a stellar career at Cambridge and the University of California, San Diego. His books and articles demonstrate keen insights into the key figures of what he calls the "Republic of Letters"—the late Enlightenment intellectuals—which he gained by extensive research into their original writings. His work has done much to correct the simplistic myth of the "struggles" of Hutton, Playfair, and Lyell against a repressive church to bring the light of geology to the world. He replaces that tale with an interesting and realistic discussion of the complex web of people and ideas that gave rise to geology, extending back well before Hutton and Lyell.

Rudwick has always been particu-

larly interested in the development of deep time and geohistory. His book, *The Great Devonian Controversy* (Rudwick, 1985), explores the social and scientific interplay among the leading geologists of the early nineteenth century—providing insight into how ideas about time and rocks evolved, uncovering a large cast of characters in that enterprise, and exposing the scientific and social factors that drove their work. Recently, he has published a two-volume history of geology (Rudwick, 2005; 2008) that is destined to become a classic in the field.

However, Rudwick, like all human historians, is influenced by his own philosophical bias. Though more conscientious than most, his analysis has shortcomings that can be traced to crucial misconceptions about church history and Christian theology. These are especially evident in his proposed theory of the origin of deep time. Although it quite properly rejects the simplistic (but still popular) view of a repressive church struggling to keep a lid on empirical discoveries, it fails to account for: (1) the anti-Christian fervor among Enlightenment intellectuals (Stark, 2003), (2) the Christian consensus for a recent Creation and Flood prior to the eighteenth century, and (3) cultural developments in subsequent years contradicting his thesis.

The historical interpretation of a secular elite attacking orthodox Christianity provides a better explanation for the events described so ably by Rudwick. Though the waters are muddied by the social religiosity of many savants, inherent contradictions in human nature and the social dominance of Christianity at that time explains the dichotomy of their apparent "faith" and their antitheistic work. However, like today, Enlightenment thought was driven by the minority of atheistic materialists, not by some liberal version of Christianity. Geohistory was simply one facet—a crucial one—of an aggressively secular new worldview. The response of the church was not innovative; it was largely compromise after the fact.

Rudwick's Hypothesis

Rudwick (2005) argues that modern geohistory, which is characterized by a lengthy but finite prehuman past, originated as an innovative compromise between two unacceptable "unmodern" traditions—a short Biblical chronology and Aristotelian eternalism (Figure 1). He describes his concept as follows:

Above all, it should be noted that in stretching the timescale to even a million years they were transcending the stark alternatives available

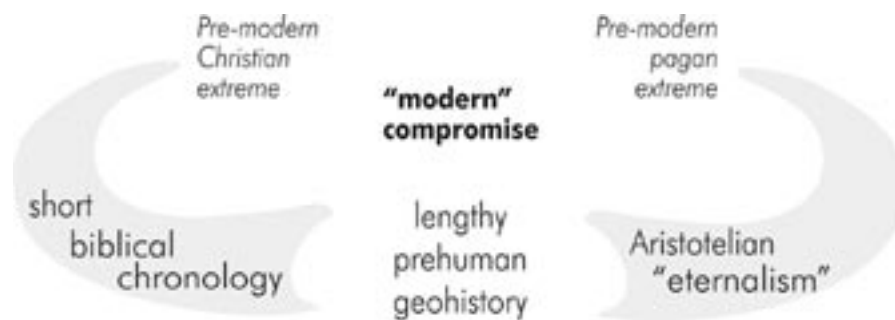


Figure 1. Rudwick proposed an Enlightenment dilemma that set the stage for modern geohistory, with one horn as the traditional chronology of the Bible, and the other as Aristotle's eternal universe. This dilemma was supposedly resolved by a lengthy but finite geohistory.

in earlier centuries, both of them profoundly unmodern in character. In contrast *both* to the short and finite timescale of traditional chronology *and* to the infinitely long perspective of traditional eternalism, they were beginning to open up the conceptual space for a third (and modern) option: the timescale might be unimaginably lengthy, *yet not infinite*. This novel option was a crucial precondition for the reconstruction of geohistory, as the rest of this book will suggest. (Rudwick, 2005, p. 131, emphasis in original)

That there might have been a lengthy prehuman world was not anticipated in either of the rival conceptions of time and history inherited from earlier generations. The picture of cosmic history derived from the Creation narratives in Genesis ... implied that the universe had had a human presence from the start, apart from a brief prelude to set the stage for its primarily human story. But the Aristotelian picture of an uncreated eternity ... likewise assumed that humans had always been part of the cosmic science: literally always, from all eternity ... Neither facilitated thinking about what was in effect a third alternative. This was that cosmic history—or at least the more accessible history of the earth and life—might have been very lengthy but not eternal and that human life might have appeared only at a late stage in the relatively recent past ... Yet the third alternative became increasingly plausible in the course of the eighteenth century, at least to savants who had seen or knew about the relevant empirical observations. (Rudwick, 2005, p. 176)

In Rudwick's theory, Georges Cuvier (1769–1832) emerges as the hero, navigating between the two “unmodern” extremes and charting a path for geology. In a series of public lectures presented in 1804, Cuvier (Figure 2) expanded far



Figure 2. Cuvier was the most prominent French naturalist of the early nineteenth century. The father of comparative anatomy and paleontology, he advocated a catastrophic geohistory linked to Noah's Flood by its final catastrophe. Modified from http://commons.wikimedia.org/wiki/File:Georges_Cuvier_large.jpg.

beyond the paleontological studies that had won his reputation as one of the leading savants in Europe and attempted to define geology as a new science. According to Rudwick, the challenge was great—Cuvier had to pick his way through the political, social, and intellectual minefield of an atheistic eternalism on one hand and a revived Catholicism (Napoleon signed a concordat with Pope Pius VII in 1801) on the other.

In this climate, although “geology” was among the natural sciences, what it was doing was open to question, because it claimed to have authority to pronounce on the relation of the human—and therefore social—world to the world of nature. Specifically, of course, it appeared to challenge more traditional origin stories, particularly those embodied in the Bible, and thereby raise questions about the authority of the church in civil society. (Rudwick, 2005, pp. 448–449)

Note Rudwick's bias. As always, his choice of words is significant. He diverts attention from the conflict between orthodox and heterodox by implying that the Bible was merely one of several “traditional origin stories” rather than the *only* pertinent “origin story” at the time. Every educated person at the time understood that Christianity was built on history; thus, any attempt to rewrite that history (lengthy or eternal) would have profound effects on Christianity—as the centuries since Cuvier have so amply demonstrated.

But Rudwick applauds Cuvier for his brilliant solution—an innovative geohistory preceding Genesis, yet finite and linked loosely enough to the Bible to allow the church to save face. In Cuvier's proposal, geology did not directly deny Christian history; “pre-history” simply ignored the first three words of the text and left the subsequent account intact, with an indeterminate earlier period of time to account for the strata and fossils.

Cuvier affirmed a catastrophic flood but chained it to a vast prehuman past, punctuated by catastrophes. This enabled him to avoid the overt atheism of the “Terror” during the French Revolution, while reserving earth history as a scientific, not theological, discipline. Rudwick offers Lamarck and Chateaubriand as the Scylla and Charybdis of Cuvier's voyage into modern geology.

In Cuvier's view his own conception of geology was threatened on two fronts. The Biblical literalism represented by Chateaubriand's resurgent Catholicism—like that of modern Protestant fundamentalism—would make the practice of geology impossible, by denying it the lengthy timescale that the observable features clearly demanded. But the eternalism represented by Lamarck's steady-state geology... would deprive geology of its claim to reconstruct the history of the earth. (Rudwick, 2005, p. 456)

Rudwick's theological weakness is seen in his emphasis on the quantity of time as the primary factor in displacing Christian history.

The vast timescale invoked by naturalists such as Montlosier and Desmarest was suspect, however, not only or even principally because it contradicted a traditionally-literal exegesis of Genesis. Much more significantly, as in the case of Hutton in Britain some years earlier ... it was widely suspected of being a scientific cover for an *eternalism* that would subversively deny the divine origin and grounding of the world altogether. (Rudwick, 2005, p. 451)

He fails to grasp that the "traditionally-literal exegesis" of Genesis was orthodoxy (Mortenson and Ury, 2008). Denying it impugned the integrity of special revelation and its Author. This has been demonstrated repeatedly since by the triumph of Enlightenment atheism in Western culture, something that was not supposed to happen given the "compromise" version of geohistory. Naturalism dominates our culture to this day, especially by perpetuating the Enlightenment tradition of the most anti-Christian thinkers controlling the intellectual levers of power (Bergman, 2008).

Critique of Rudwick's Theory

Any disagreement with Rudwick's theory of deep time should not distract from the overall quality of his work. Historians and earth scientists both owe him a debt of gratitude for clarifying the events surrounding the origin of geology. For example, he debunks the myth of James Ussher as an ignorant fanatic, showing that, to the contrary, Biblical chronologers paved the way for geohistory by emphasizing a theology of linear progressive time.

Ussher and his colleagues practised the seventeenth-century science of chronology; modern geologists prac-

tice the twentieth-century science of geochronology. The similarity of terms points to shared concepts and even methods. Both groups have been at the forefront of intellectual life in their respective centuries. In fact, far from being diametrically opposed, what Ussher and other chronologers were trying to do was the direct lineal ancestor of what earth scientists do in the modern world. (Rudwick, 1999, p. 250)

Rudwick also deserves credit, along with others (e.g., Glover, 1984; Hooykaas, 1972; 1999; Stark, 2003), for recognizing the role of Christianity in building the framework of history and so discounting the mythological "geology versus Genesis" story.

It is often claimed that on this issue [geologic time] "the Progress of Science" was retarded by the "repressive" influence of "the Church." In fact, the historical situation was more complex than that stereotype allows, and far more interesting. (Rudwick, 2005, pp. 115–116, brackets added)

However, his superlative scholarship can easily blind readers to interpretive errors. As Gordon Clark (1994) noted, history and philosophy are integral. No historian can ignore his own philosophical bent, especially when it is time to analyze the disparate facts he has uncovered. Rudwick's proposal for geohistory as an innovative compromise ignores larger but intrinsically related theological issues and is unable to explain important facts. These failures can be seen by first assessing the dilemma that he creates to sets the stage for Cuvier's compromise.

An alternative explanation to Rudwick's is the inherent conflict between naturalism and Christianity in the arena of history. Given the origin of modern naturalism in the Enlightenment, geohistory likely reflected the period's hostility to Genesis. In the following discussion, that view will be compared to Rudwick's, which narrows in on the

intellectual discourse about geological phenomena, seeing the issue as one of scholarly give-and-take and evaluating evidence in the light of reason and an evolving knowledge of the world and its past. Rudwick's portrayal of a gentlemanly exchange of ideas between relatively neutral parties minimizes the debate by:

- asserting a nonexistent hermeneutical flexibility that allowed long ages
- crediting Christianity with the historical framework used in geohistory
- downplaying inherent theological conflicts outside the span of time
- arguing that the rejection of Genesis rested on empirical evidence

The Real Threat of Genesis

Rudwick is correct in identifying the short Biblical timescale as a barrier to unrestrained geohistorical theorizing. But his failure to grasp the nature of orthodox Christian doctrine creates a crucial error in his theory, as it downplays real conflicts between Genesis and secular earth history, such as the integrity and authority of Scripture, the origin and nature of man, sin, and the foundations of marriage and family. Doctrinal conflicts extend far deeper than the mere span of time, and Rudwick should have more closely considered orthodox theological literature. There is a vast difference between the church's traditional understanding of Genesis and various aberrant textual devices used to make it palatable to modern naturalism. As a historian, Rudwick might have found firmer footing had he examined the timing of now-prevalent compromise positions—they originated in response to deep time, not in advance of it.

However, Rudwick is fixed on the issue being merely one of duration by claiming that "it was on this middle ground, expanded through the cau-

tious but progressive extension of the traditional short timescale, that the origins of modern geochronology can be found, rather than on the unlimited spaces of eternalism” (Rudwick, 2005, p. 119, footnote 77). But there is more to history than time. Compared to modern scientists, Enlightenment savants were experts in philosophy. Given the intellectual milieu of continental rationalism, British empiricism, Hume’s skepticism, and the resulting grandiose system of Kant, it is no surprise that natural history would follow the developing antitheistic path defined by these thinkers. Also, it is difficult to accept Rudwick’s “cautious, but progressive extension” of the Biblical history when it was the early savants like Buffon, Hutton, and Lamarck who advocated a full-blown materialistic eternalism and a steady-state earth.

Another way in which Rudwick wrongly minimizes the worldview clash is an emphasis on “new empirical evidence” in the 1700s that purportedly demanded vast time. He fails to note that similar evidence was known (though not to the same level of detail) to previous savants, such as Steno (1638–1686), who maintained the Biblical chronology. This “compelling” new evidence included multiple episodes of volcanism, the erosion of river valleys, and sedimentary strata. Ironically, modern observation has shown that all of these are easily explained by catastrophic or post-Flood processes. Thus, science has since shown that this evidence—so crucial to geohistory—was wrongly interpreted by the savants.

The time line also shows that Biblical history was abandoned by savants *before* the empirical evidence could be adequately assessed.

In the opening sentence of his *Alpine Travels* (1779), Saussure claimed that it was universally accepted—he meant, of course, among savants and other educated readers—that the earth’s past revolutions or major changes had occupied “a long suc-

cession of ages”... Likewise, Werner commented in print—casually and just in passing—that the Geognostic pile of rock masses must have accumulated “in the immense time span...of our earth’s existence”; and in manuscript notes for his lectures on geognosy he estimated that the whole sequence might represent perhaps a million years. Lavoisier suggested that the “period” (in the sense of frequency) of his hypothetical oscillation of the sea level was perhaps “several hundreds of thousands of years” and since he believed there had already been several such cycles, his conception of the earth’s total timescale must certainly have run into millions ... And Kant’s well-known earlier conjecture that “a series of millions of years and centuries have probably elapsed” in bringing the universe to its present state was almost a commonplace among cosmological theorists. (Rudwick, 2005, p. 125)

This pre-evidentiary disposition to reject the Bible is also revealed in a passing comment about the common attitude towards Genesis at the time. It was “ancient Jewish history, often scorned and dismissed by savants hostile to religion” (Rudwick, 2005, p. 276).

Since historical interpretation is driven by assumptions as well as observations, Rudwick should have searched more deeply for those factors. He would not have needed to look far. The philosophical influences on the early naturalists from the philosophers (especially Kant) were significant.

The pivotal figure contributing to the breakdown of classical apologetics was...Immanuel Kant. Though Kant has been dead for a century and a half, he still dominates the intellectual scene. He claimed that in the realm of the mind, he effected a Copernican revolution. In retrospect the claim was a modest one. Kant banished God from the world of pure

reason... Kant went beyond all previous refutations by laying his ax at the root of the tree of the knowledge of God. He tried to demonstrate ... that it is impossible to know God intellectually or to prove His being ... Kant attempted to establish his agnostic or metaphysical skepticism in three ways. First, he argued that *human knowledge only extends to the world’s phenomena and not to the noumenal realm of God.* (Sproul et al., 1984, pp. 29–30, emphasis added)

We usually do not associate Kant with the earth sciences, but, though indirect, his impact is greater than generally appreciated. Enlightenment science followed the paradigm of Newtonian physics. Early geologists thus searched for hard deductive “laws” that would explain earth’s past. Newton was famous for his method of allowing only observed causes as explanations—sometimes called the *vera causa* (true cause) method. However, Newton was a Christian. He understood that God can and does work in nature and that the invariance of causes or “natural laws” was contingent in the sense that God could work contrary to those principles at His pleasure. This almost-but-not-quite-absolute tension was unavoidable because God was the ultimate justification for Newton’s “invariant laws.”

Kant, in proclaiming the separation of the phenomenal realm from the noumenal realm, supplied the crucial idea that transformed contingent actualism to an absolute actualism, and this transformation emerged in the earth sciences. On the surface, it may have seemed a small step to the scientists, but in treating actualism as absolute, it became an a priori argument against Creation and providence. This was described by Glover (1984) as the step from the methodological materialism of Newtonian physics to the metaphysical materialism of Enlightenment intellectuals. Ironically, when Kant removed God from the equation (Figure 3), the

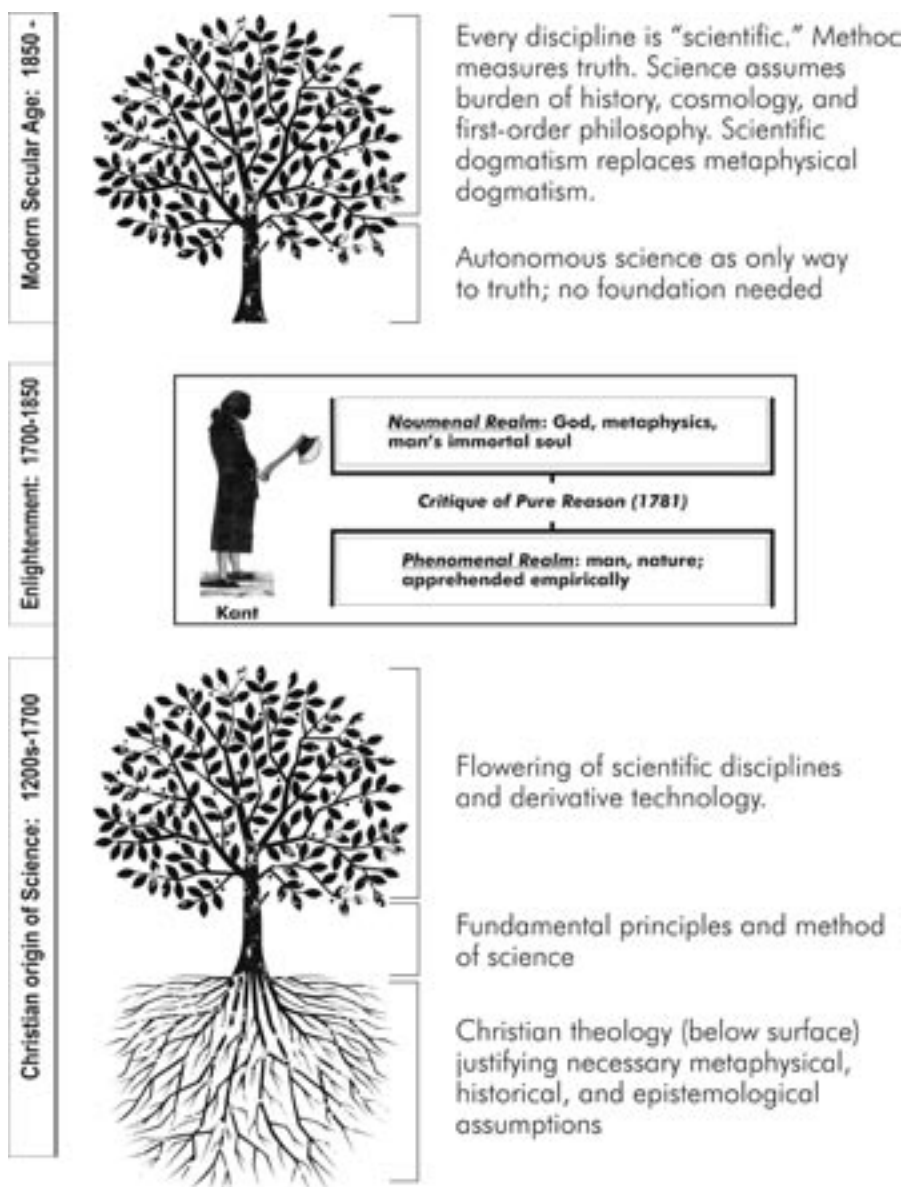


Figure 3. The worldview of the West changed radically during the Enlightenment; many attribute that change to Kant's separation of what he called the “noumenal” and “phenomenal” realms. In asserting the impossibility of intellectual knowledge of the former, he gave the scholarly of his day the excuse they needed to divorce themselves from Christianity. However, the root of science had always been Christian theology; the two were separated in terms of day-to-day practice but joined like a tree and its roots. The roots remained out of sight, but supported the “trunk” of science by justifying necessary assumptions. Kant summed up the Enlightenment mind-set by widening that practical distinction into a divorce. Now “free” from theology, science became the vehicle through which Naturalism defeated Christianity. This was further facilitated by the development of a “scientific” history that would displace Genesis.

scientists were too busy rejoicing in the expulsion of theology from their world to realize that *any* kind of actualism had just become logically impossible (since Newton and his predecessors had justified it theologically). Thus, with one small adjustment to “scientific method,” divine activity was denied *a priori*.

This transformation included an intermediate step that subtly shifted attention away from the Reformed doctrines of providence (God upholds the universe moment to moment) and immanence (God is closely involved in creation), beliefs that saw the most mundane workings of nature as “wonders” (Hooykaas, 1999). The first step in that shift was toward the idea of the “miraculous” (God intervenes in the natural order occasionally). That step, being more palatable to Christians, allowed the second, which was the total denial of God by arguments against “miracles.” Once a continuous providence was eliminated, “scientific” logic could next rid mankind of discontinuous “miracles.” This misdirection is still a favorite dodge of atheists today—natural history is defined as “science,” which in turn is defined as “actualistic”; thus any appeal to theism is “nonactualistic” and thus “nonscientific.”

By this two-step process, atheism wormed its way into the foundations of modern science. Enlightenment naturalists thus had a built-in (supposedly) methodological bias against Creation, the Flood, and the Incarnation. The influence of Kant on Europe's intellectuals has been well documented but is underexplored by Rudwick in its influence on early geologists.

The belief that science could explain the past caused this “scientific actualism” to become a part of natural history, ignoring traditional and logical distinctions between the two (Adler, 1965). Most scientists today still believe that “actualism” demands metaphysical materialism. By presenting natural history as a “scientific” discipline, the savants

convinced many that their approach was superior to the Bible, ignoring the obvious—that the study of unique past events was distinct from the study of general principles of nature. The drive for a “scientific history” has remained inherent in the earth sciences, and the tangled mess created by actualism and its British equivalent, “uniformitarianism,” is just one manifestation of that fundamental error (Reed, in press).

So, although Rudwick is correct that antipathy between orthodox Christianity and secular savants was a part of the Enlightenment landscape, the threat of the emerging naturalism was much more comprehensive than the span of time in Earth’s past. But an even weaker aspect of Rudwick’s theory is found in the other horn of his dilemma.

The Questionable Threat of Aristotle

Rudwick’s dilemma (Figure 1) evaporates if it only has one horn, and two facts suggest that is the case: (1) Aristotle’s outdated cosmology was no longer relevant, and (2) eternalist geotheries by naturalists grew out of a post-Christian materialism, the logical outcome of a nontheistic yet rational approach.

Despite Rudwick’s assertions, there can be little argument that the short Biblical timescale was the consensus of post-Reformation Europe, as it had been throughout the history of the church (Mortenson and Ury, 2008). Thus, Rudwick’s “threat” of Aristotelian eternalism rests on shaky ground, as even he must admit.

The traditional short timescale was not challenged by “the Rise of Science”, because it had been challenged far earlier by a much more radical alternative, that of the eternalism associated with Aristotelian philosophy. The spatial aspect of Aristotle’s conception of the cosmos, with the earth fixed at the center of a vast but finite universe, had been thoroughly absorbed into European

culture in earlier centuries. But its temporal aspect, with the universe existing in uncreated eternity, had been emphatically rejected, on the grounds that it was radically inconsistent with the Christian (and Jewish) conception of the created status of the world and everything in it, from atoms to humans, in relation to a transcendent Creator. The perceived threat to orthodox beliefs lay not so much in abandoning a literal interpretation of Genesis, but rather in undermining the foundations of human society by questioning the ultimate moral responsibility of human beings to their divine Creator. (Rudwick, 2005, pp. 117–118)

Rudwick undercuts his own case. While the church had always fought Greek cosmology, its victory had been won long before the Enlightenment. It is extremely difficult to see Aristotle’s eternalism as presenting a significant threat to European thought at that time. Note how Rudwick attempts to bolster his case by contending that jettisoning the “literal” interpretation of Genesis was much less important than opposing the dire consequences of a human morality based on Aristotle’s cosmos (despite the sophisticated approach of the *Nicomachean Ethics*). Ironically, it appears that Rudwick is attempting to use Aristotle’s “golden mean” to dismiss Aristotle! Despite the continued approval of aspects of Aristotle’s philosophy (cf., Glover, 1984), his temporal cosmology had never been popular in Europe. Even Rudwick (2005, p. 118) must admit that “given this profoundly religious objection, it is not surprising that eternalist ideas persisted in European culture largely as an ‘underground’ alternative, visible more often when repudiated by the orthodox than in any direct advocacy.”

Also, Rudwick fails to distinguish between the eternalism of Greek cosmology and that of modern secular materialism. Modern atheists (which included a significant proportion of

the naturalist “savants” of Enlightenment Europe) posit a metaphysical materialism; ultimate reality is matter. That position is not only far removed from Aristotle’s but also was roundly condemned by the philosopher.

Those, then, who say the universe is one and posit one kind of thing as matter, and as corporeal matter which has spatial magnitude, evidently go astray in many ways. For they posit the elements of bodies only, not of incorporeal things, though there are also incorporeal things. (*Metaphysics* I–8, 988b, 23–26 in McKeon, 1941, p. 703)

This essential difference between these varieties of eternalism can be seen in the geotheries of Buffon and Hutton. Both are better explained by the paradigm of Christianity versus naturalism than by Rudwick’s theory. For example, both men were driven by a desire to extend Newtonian physics to earth history, discovering deductive scientific rules that governed the planet’s past. Their mechanistic scientific approach was emphatically not Aristotelian. If there was any return to Greek cosmology on their part, it was to that of Democritus. But neither of these situations was really the case; Buffon and Hutton were operating in a Christian culture, and even though they were attempting to undermine orthodox Christianity with matter and “natural laws,” their fundamental mindset was Christian, not Greek.

Both men failed because in both we see the singular drawback of purely scientific history—the suicide of history. A rigid steady-state view of time eliminates history as a series of events on a time line. Since naturalism could not conquer Christianity without a credible secular history, secularists quickly retreated to a framework of linear time away from “Newtonian” history. They quickly discovered that long indeterminate time provided a bonus; it pushed the issue of origins conveniently into the background, avoiding a pitched *theological*

battle that the savants would probably have lost, even considering the inherent theological weakness of the church of their day. It is hard to imagine Buffon surviving the caustic genius of Luther or Hutton standing firm against the methodical brilliance of Calvin. Thus, though Rudwick portrays Buffon and Hutton as exemplars of an eternalistic cosmology, both better illustrate a growing animosity toward orthodox Christianity.

Buffon: Smart Enough to Retreat

Rudwick's philosophical template blinds him to several interesting historical questions about both Buffon and Hutton. Georges-Louis Leclerc, Comte de Buffon (1707–1788) enjoyed a long and productive career, paving the way for other secular naturalists (Figure 4). He was politically connected and thus protected, and he was prolific. Despite a few pro forma nods to the Catholic Church, his heretical work was published with impunity. During his career, he set out two geotheries. The first, proposed in 1749, advocated a steady-state earth in a heavy-handed attempt to impose science on the past.

As expected from an Enlightenment philosopher of his generation, Buffon based his Geothery firmly on a repertoire of physical causes that could be seen to have the relevant effects: as Newton had put it, imputed causes had to be “true causes” [*verae causae*]. Specifically, this meant that Buffon's method for explaining the earth was to be rigorously *actualistic*, based on “actual causes” or processes observably in action in the present world. (Rudwick, 2005, p. 140, emphasis in original)

As Buffon discovered, applying Newton's methods without Newton's God destroyed history. His insight is evident in his second geothery (cira, 1778), which featured linear progressive time. But he maintained a materialistic system; his shift from contingent to absolute actualism logically suggests atheism,

which is reinforced in another aspect of his work that Rudwick and most modern scholars regularly overlook. It is a point of logic that few grasp—thanks to Enlightenment apologists who insisted on a false dichotomy between “science” and “religion.” But if the affirmation of Genesis is a religious position, then the rejection of Genesis must also be religious. Whatever his personal views, his overt materialism opened the door



Figure 4. Georges-Louis Leclerc, Comte de Buffon. Modified from http://upload.wikimedia.org/wikipedia/commons/7/7f/Georges-Louis_Leclerc,_Comte_de_Buffon.jpg

for other secular savants; as “expressed in Buffon's famously eloquent prose, its persuasive naturalism had a profound impact on the way that savants thought about the earth in the middle decades of the century” (Rudwick, 2005, p. 140).

Despite its implicit eternalism, Buffon's first geothery does not fit Rudwick's template. First, any comparison of it to Aristotle's cosmology will find more differences than similarities. Second, it presented no “threat” to Enlightenment savants. Many, being atheists, could have cared less about theology. Time was simply a weapon to attack the church. It is true that eternal matter is a logical alternative to an eternal God, but if needed,

they could accept an indeterminate, lengthy, yet finite history as a fallback position. The anti-Christian unity of the elites is demonstrated in the muted criticism of the profound contradiction in Buffon's theory.

Buffon's earth was in a steady state of dynamic equilibrium, which might have been taken to be eternal; yet in fact he did not treat it as such. In a separate essay, the first in his “Proofs,” he set out an even more ambitious theory, which de Luc and others would have regarded as “cosmological” in the proper sense of that word. It offered an explanation of the *origin* of the earth and all the other planets, and indeed—at least by implication—of all other planetary systems anywhere in the universe ... At first sight, Buffon's suggestion breached the principles he had set himself in his explanation of the earth: this putative event was sudden and violent, and of course unparalleled in human experience. Yet it was impeccably natural in character, and fully conceivable as a physical possibility: in short, a respectable “hypothesis.” Still, there was a decidedly awkward disjunction between Buffon's general explanation of the earth, as a system that could well have been eternal, and his hypothesis to account for its origin, as an “accident” of cosmological chance at a specific moment in the remote past. (Rudwick, 2005, p. 141)

It is interesting that Rudwick labels a blatant contradiction an “awkward disjunction.” But the important thing to see is that despite this contradiction between method and system, Buffon's geothery was deemed “respectable.” Why? Because it was “impeccably natural.” Or put more plainly, by playing to the religious prejudices of his peers, Buffon could get away with severe logical defects in his work.

This contradiction illustrates one of the problems that haunt anyone attempt-

ing “scientific” history. Science demands knowledge of initial conditions. Without them, subsequent changes cannot provide scientific knowledge of the whole. If one therefore wants a “scientific” earth history, one must account for the initial conditions—or Earth’s origin. Perhaps it was this understanding that drove the clumsy attempts by Buffon and Hutton. Despite Kant’s argument to the contrary, the traditional cosmological argument made materialistic eternalism the only rational alternative to theistic creation (Figure 5). But as Lyell and Darwin were later to learn, antitheistic bias can deal with that problem if origins is simply set aside rather than explicitly addressed.

Buffon deserves credit for recognizing the flaws of his first cosmology and attempting to resolve them in his second.

Thirty years later, Buffon integrated the two components of his geo-

theorizing—and thereby remedied its major shortcoming—when he presented a quite different model of how the earth works ... It was constructed within the same genre of geothory: as before, it was a system that reconstructed the past, interpreted the present, and predicted the future, with the whole sequence operating under the same ahistorical natural laws. Again as before, Buffon’s work was divided between an exposition of the system itself and a long series of “notes justificatives”... Buffon distinguished three classes of evidence, which he called “facts,” “monuments,” and “traditions.” His facts were major observable features of the present earth ... Buffon’s monuments were various *natural* vestiges or relics of the *past*, again including fossils as prominent ex-

amples ... Third, Buffon’s traditions were the *human* textual records of events that provided evidence of the past condition of the earth; but in practice those were relegated to a minor position in his system, for the simple reason that he believed that human records only witnessed to the most recent phase in a far longer and largely *prehuman* sequence of changes. (Rudwick, 2005, pp. 142–143, emphasis in original)

Buffon believed that he could use the characteristics of present features to explain their history, absent assumptions and inferences. Thus his “facts” were not; they were *interpretations* driven by his anti-Christian predilections. His conclusion that there was a lengthy prehuman history was nothing more than an assumption papered over with erudite discussions of present-day physical phenomena and speculations on how they formed. As Solomon opined, there is nothing new under the sun.

Buffon’s bias was illuminated by his claim to have utilized human records, while clearly ignoring the most relevant record of the ancient world, the Bible, and its eyewitness testimony of the past back to the beginning. Even apart from its divine origin the Bible is the premier historical document of mankind even today, and during Buffon’s time, that status was actually higher because other ancient documents remained undiscovered or unreadable. This dismissal of the Biblical record absent anything other than the belief that its testimony was preceded by a lengthy prehuman past was another tradition that Buffon passed along to his successors.

Rudwick tries to avoid this rather obvious anti-Christian sentiment. He first suggests a tenuous link between Buffon and the Bible.

In the 1770s, Buffon defined seven successive ‘epochs’, or significant moments in the Earth’s history. In doing this, he offered, in effect, an updated and secularized version of

Four Options for Origins	Implications	True or False	Consequences
Possibility 1: Phenomena are illusions	Science and history are unreliable.	Ends in solipsism	Rejected by both Christian and Naturalist because solipsism is rejected. Field reduced to three options.
Possibility 2: Universe is self-created	Logic is unreliable. Thus, science is impossible.	Falsified by logic	Implied by Big Bang cosmology, but impossible if logic a method of testing truth. Field reduced to two options.
Possibility 3: Universe is eternally self-existent	Sensation cannot be trusted. Thermodynamics contradicts an absolute uniformity.	Falsified by both experience and logic	Implied by extreme systems of uniformity (e.g., Hutton), but falsified by science and common experience.
Possibility 4: Universe was created by an eternally self-existent entity	No violations of logic or science.	Does not violate logic or sense perception	Excludes metaphysical materialism. Affirms theism, logic, and science. History and science distinct, uniformity not absolute.

Figure 5. The cosmological argument, modified from Sproul et al. (1984), shows only three logical alternatives to theistic creation. The first two blatantly violate logic. This leaves a choice of theistic creation or eternal matter. The latter would be the initial default choice of scientific atheists, as illustrated by Buffon’s first geothory. But any discussion of ultimate origins is a minefield for atheism, and the savants soon found it preferable to ignore the topic and discredit the Bible with a lengthy geohistory.

the seven ‘days’ of the Creation story. By defining his last epoch as the first appearance of human beings—and no longer as God’s Sabbath rest!—he made explicit what other naturalists already suspected: that most of geology had been pre-human history. (Rudwick, 1999, p. 252)

What Rudwick cannot admit is that making an old earth “explicit” is not the same thing as demonstrating the truth of the proposition. Clearly, this weighs on Rudwick; he attempts to justify Buffon’s theological vacuity with an appeal to the day-age theory.

Buffon’s second geothory, with its strongly directional picture of the earth’s development, avoided the suspicion of eternalism that had hung about the first; but instead its explicitly vast spans of time invited comparison with the traditional short timescale of the world. Buffon simply adopted one of the standard solutions to this apparent problem: citing an earlier Benedictine scholar to support him, he claimed that the “Days” of the Creation story in Genesis were not to be taken literally, because that ancient text had been adapted to the understanding of the ordinary people to whom it was originally addressed, not to savants in the age of Enlightenment. He maintained that his sequence of epochs was broadly compatible with the events of the successive “days” of Creation, and indeed his delineation of seven epochs was bound to suggest a concordance with the Genesis story; if not a sly parody of it. (Rudwick, 2005, p. 148)

His two-pronged approach suggests that any link to Genesis—no matter how ridiculous—atoned for Buffon’s clear rejection of orthodox truth and that Buffon maintained sufficient theological integrity by rejecting the bogeyman of Aristotle. But the problem was not Aristotle; it was Buffon. Furthermore, citing an unnamed monk in defense of

Buffon is ludicrous. If his aberrant view of Genesis were a respected position among theologians, why can’t Rudwick even cite the monk’s name? More to the point, why could he not cite theologians recognized as orthodox, like Luther, Calvin, Aquinas, or Augustine?

And even Rudwick has to allow an anti-Christian attitude when he notes that Buffon’s seven epochs might have been a “sly parody” of the Bible, rather than a serious attempt to accommodate its history. At root is Rudwick’s failure to consider the Biblical mind-set of the church as a whole. He wants the rejection of Genesis to be a minor issue, not a major heresy. Attempting to minimize the Flood, he soldiers on:

As for Noah’s Flood—which of course had to be placed still later than the seventh epoch—Buffon claimed disingenuously that since it was acknowledged to have been a miracle it was futile to expect it to have left any physical trace, and he consistently declined to attribute any observable features to its action: diluvial theorizing, at least in its classic form, was eliminated altogether. (Rudwick, 2005, p. 149)

If Buffon’s dismissal of the Flood was “disingenuous,” then why praise him? At best, it was a cheap rhetorical trick. Buffon’s theory is immediately falsified by historical accounts in the Bible: why else did the disciples retrieve baskets of tangible food after the miraculous meals in Galilee? Feeling the weight of Buffon’s arrogance toward the church, Rudwick diverts quickly to the subject of Buffon’s “personal” beliefs.

Despite all this, Buffon’s own religious position remained ambiguous. Although he had marginalized the role of divine action in nature, he was—like most other leading philosophes—probably a deist rather than an atheist; yet in terms of religious practice he apparently regarded himself, to the end, and with whatever reservations as a

Catholic believer. (Rudwick, 2005, p. 149)

This is a fascinating historical question that Rudwick inexplicably avoids. When a prominent intellectual publishes a theory that contradicts orthodox Christian belief, and perhaps includes a “sly parody” of the Bible, why would such a man profess Christian faith? Did he fear the church? Did he fear the king? Was he schizophrenic? If Rudwick had spent as much effort investigating this question as he did trying to portray Buffon as a “religious” person, he might have found a truly interesting line of historical inquiry. Instead, by referring to other “leading philosophes,” it comes out as the lame excuse that “everyone’s doing it.”

But that excuse triggers yet another important historical question that Rudwick passes by. If “most leading philosophes” were anti-Christian, might that not have influenced their approach to natural history? Atheists claim that Christians are biased when they bring their belief system to geology, but they deny any bias when they do the same. One would expect historians would try to understand the faith commitments driving men whose ideas changed the world—Christian or not. Finally, Rudwick raises (but does not address) one last question about Buffon worthy of investigation.

Buffon’s models for the earth’s temporal development were highly conjectural and could easily be dismissed as no better than a form of science fiction. Yet although most of their details were later abandoned, both of Buffon’s geothories were to remain powerful and fruitful exemplars for the future. (Rudwick, 2005, p. 150)

If Buffon’s models were so easily dismissed, then why were they “powerful” and “fruitful” exemplars for the future? Blazing a trail for deists and atheists to attack Christianity comes to mind. Little else does.



Figure 6. James Hutton. Modified from www.uwmc.uwc.edu/geography/hutton/hutton.htm.

Hutton: Back to *no Future*

Rudwick interprets Buffon's materialistic flirtation with eternalism and his subsequent retreat to lengthy linear time as a compromise between Aristotle and the Bible, setting the stage for Cuvier's later geohistory. But Buffon's anti-Christian bias, exhibited in both of his theories, is a better explanation. Perhaps James Hutton better supports Rudwick's hypothesis.

When in the 1780s, the Scottish philosopher James Hutton claimed that the Earth had "no vestige of a beginning, no prospect of an end", it was his blatant eternalism that drew criticism. His implicitly vast sense of time was, by then, almost a commonplace among naturalists, even if it was still unfamiliar to the wider public. (Rudwick, 1999, p. 252)

At first glance, Rudwick's model seems to explain Hutton. After all, his deistic metaphysic was more similar to Aristotle's "first mover" than Buffon's materialism. His geothory was rife with teleology, a topic near and dear to Aristotle. Hutton's god was perhaps more immanent than the unmoved mover, but not by much—Hutton clearly saw Earth as a cycling machine with no need for ongoing providence. However, in

context Hutton's theory was no rebirth of Aristotle. First, any analysis must account for the cultural imprint of nearly two millennia of Christianity. Hutton's worldview was more Biblical than Pythagorean. Hutton is better seen as an early post-Christian thinker, not a reversion to Greek paganism, especially since "deism was not a genuine religious faith but a set of ideas congenial to the mind of the eighteenth century under the shelter of which the new humanistic faith developed" (Glover, 1984, p. 109).

Hutton was a renaissance man of geology, mathematics, medicine, agriculture, chemistry, and philosophy (Figure 6). His practical accomplishments, friendships with the elite, and connections within the "Republic of Letters" all testify to his Enlightenment status. A modern man who rejected the Bible, he was drawn to eternalistic geothory. But his was no peripatetic cosmology. It was a post-Christian theory of the earth that leaned on a heavy-handed Newtonian approach to history—a methodology foreign to Aristotle. Hutton waxed eloquent about the various natural laws that governed the endless cycles of the world and destroyed history in the process (Gould, 1987).

This raises another question that Rudwick does not address. If modern deep time was a *rejection* of eternalism, then why has Hutton continued to be so revered?

James Hutton's geothory has not suffered from historical neglect. On the contrary, it has received so much uncritical adulation that its place in the sciences of the earth of the late eighteenth century has been seriously distorted. Anglophone geologists have treated Hutton as their iconic "founder" or "father", with such pious veneration that his relation to his contemporaries has been obscured and misunderstood, despite a large body of fine research by modern historians. (Rudwick, 2005, p. 158)

Which theory fits this veneration better: Rudwick's or the anti-Christian efforts of Enlightenment intellectuals? The ongoing adoration of Hutton as the foe of Christianity makes more sense. Even today in the face of the "large body of fine research," the myth of Hutton's "defeat of the church" is still touted (e.g., Repcheck, 2003).

Like Buffon's first theory, Hutton attempted a Newtonian explanation of Earth's past and likewise found that it led to the death of history. But where Buffon retrenched, Hutton embraced his ahistorical vision: "Hutton would be concerned not with quantifying a timescale but rather with the earth as a body existing indefinitely in stable equilibrium" (Rudwick, 2005, p. 159). However, unlike Buffon, Hutton had a mania for deistic theology. So while Buffon's theories were praised despite their errors, Hutton's was a problem for his more philosophically minded peers, who detested teleology for its service to Christianity. As a result, the real Hutton was divorced from the legendary Hutton almost immediately. His successors kept his anti-Christian ideas of uniformity and deep time, but expurgated his teleology and ahistorical past, adding various myths to keep people away from his own work.

The hoary legend of Hutton's unreadable prose has served various ideological purposes during the past two centuries. Soon after Hutton's death, Playfair, *Illustrations* (1802), used it as a reason for bowdlerizing the work by detaching it from its teleological framework and suppressing its teleology. He has been followed by countless other scientific commentators ever since. (Rudwick, 2005, p. 161)

However, though modern geologists—like Playfair—remain "giddy" at Hutton's "abyss" of deep time, historians have accepted Hutton at face value.

So in every part of Hutton's system—all the way from the dynamic

equilibrium of continents and oceans to the enduring human presence that constituted its ultimate purpose—an assumption of eternalism was implicit, and indeed crystal clear to any informed reader...as he put it in his earliest summary, “with respect to human observations, this world has neither a beginning nor an end.” (Rudwick, 2005, p. 170)

The development of naturalism, with Hutton as an early pioneer who could not abandon theism, explains his work, the subsequent redaction by Playfair and Lyell, and the otherwise inexplicable veneration he receives to this day. Later savants largely followed Buffon’s second theory—not because they shied away from eternalism, but because they wanted to capture history, not destroy it. They wanted an atheistic history in its most literal sense, and Hutton—absent modification—could not provide it.

Other Problems in Rudwick’s Theory

Several other problems plague Rudwick’s explanation, all related to an incomplete appreciation for Christian theology and church history. Unfortunately, they are all understandable since they all have been propagated by Christians seeking compromise with the so-called scientific facets of naturalism. But why would a historian of Rudwick’s formidable skills not see that bias? Perhaps it is because he shares it. The sum of these errors is sufficient to show a deficient understanding of Christianity and to cast more doubt on his proposed origin of modern geohistory.

Error 1: A False Dichotomy

Rudwick pushes eternalism as a great fear of the eighteenth century. But if we consider history from a *metaphysical* perspective, rather than a temporal one, eternalism is merely a sidebar. There is a clear conflict between Christianity and atheistic materialism. Were the Enlightenment savants really more concerned with the length of time or with

toppling Christianity from its cultural dominance? It is hard to escape the latter answer in light of Hume, Kant, Spinoza, Leibniz; the experiment with atheism during the French Revolution; and the concerns of orthodox Christian apologists at the time.

The worldview conflict has become more apparent since, and this is where Rudwick’s theory experiences perhaps one of its greatest failures. Rudwick touted modern geohistory as an alternative to atheistic eternalism and its implicit morality. But Lyellian geohistory was quickly followed by Darwinian evolution, which was even more quickly applied to humanity. This resulted in bizarre social or psychological theories by men like Freud, Marx, and Nietzsche, which in turn led to disastrous social experiments in the twentieth century. In retrospect, it is impossible to differentiate between reality and what Rudwick claims was avoided by the “geohistory compromise.” As we look back over the past two hundred years, we can see exactly the same social and moral consequences springing from the “innovative compromise” of a merely lengthy, yet finite geohistory. That is because both are inherently anti-Christian. Rudwick’s inability to correctly assess the consequences of modern geohistory is a serious historical error. The real choice faced by Europe in the late eighteenth century was between orthodox Christianity and militant naturalism. Whether the latter included the more logical (in light of the cosmological argument) eternally evolving matter or the geohistorical option, the effect on culture was the same. Jesus’ wisdom in stating that men were either for or against Him has proven superior to Rudwick’s theory.

Error 2: “Unmodern” Christianity

Rudwick uses the age of Biblical revelation to portray it as an “unmodern” view similar to Greek paganism. But this conclusion is problematic. His focus on the time of the development of the

two ideas causes him to lose sight of the timelessness of truth—he almost slips into an intellectual relativism, where truth is suspended. Biblical history can be an “unmodern” impediment to intellectual development only if it is not true; Rudwick’s assessment boils down, at best, to chronological snobbery.

One also might nitpick the timing. Aristotle’s cosmology was developed in the fourth century BC, more than a millennium after the revelation of the Pentateuch to Moses. If, as some believe, Moses’ work was facilitated by even older written or oral records, then the age discrepancy would be even greater. Rudwick’s grouping the two is like classing modern astrophysics and eleventh-century cosmology. Unlike Aristotle, Moses claimed the imprimatur of divine revelation and supported that claim with miraculous proofs. If God is infinite, eternal, and unchanging, then the truth content of His revelation to Moses is also timeless. Aristotle made no revelatory claim for his *Metaphysics*. Thus, his ideas are products of a historical era in a way the Pentateuch is not.

Furthermore, Christianity rests on history. An assault on Genesis is a thrust into the heart of the system, not a minor scrape. Since the term “modern” can connote more than age, it appears that Rudwick uses those connotations to imply more. Labeling Genesis as “unmodern” might suggest that its truth content is deficient, given the common evolutionary view of modern culture. If so, it is also a swipe at the orthodox theology of revelation. God is truth (John 14:6) and cannot lie (Hebrews 6:18). Therefore, Rudwick seems to suggest that either God did not reveal Himself to Moses or that such revelation can be “upgraded” by subsequent human knowledge. Both views are heterodox and undercut his recognition of the importance of Christianity to history and science.

Also, in the context of the day, during the eighteenth century, Christianity was as modern as it got. It was the backbone

of European culture. Cuvier was little more than a century removed from Owen, Bunyan, Newton, and Pascal and only two and a half centuries from Luther and Calvin. Applying Rudwick's measure, Cuvier, Lyell, and Darwin are equally "unmodern."

Finally, there is little argument that Enlightenment savants used science to attack Christianity, despite Christianity being the foundation of science (Stark, 2003). Thus the "modern" science worshipped by the savants was linked to Christianity. If it was "unmodern," then so was its derivative science. Rudwick cannot have it both ways.

Error 3: Christianity and Genesis

At the root of Rudwick's misunderstanding of Christianity is a perception that the historical truth of Genesis was ancillary to the faith. Like many today, he takes a "cafeteria" approach to revelation. Also like many today, he has a litany of excuses to justify rejecting Biblical history. He starts with attempting to dismiss the Bible by context.

Many historians now project the literalism of modern fundamentalist religion back into the intellectual world of the eighteenth century, with gross anachronism. In fact, attitudes to Biblical interpretation—among those to whom such questions were matters of any concern—varied widely according to time, place, religious tradition, and above all social location. (Rudwick, 2005, p. 56)

As Mortenson and Ury (2008) have shown, this simply is not true. The bias that leads to this incorrect assessment is evident too. Note how orthodoxy is recast as "modern fundamentalist religion." This displays a shocking ignorance of church history. Orthodoxy is not a matter of "time, place, religious tradition," or "social location." Instead, it is measured by adherence to the truth claims of the Bible, including those describing God's works of creation and providence. This has been affirmed by the church in all

places and all ages. Furthermore, modern principles of Biblical interpretation were well developed as a result of the Reformation critique of the wayward fourfold view of earlier theologians. Rudwick's "variations" are typically traced to heterodox individuals who wished to use some innovation of "interpretation" to deny clear Biblical truth.

Despite these well-known facts, Rudwick joins modern compromising Christians in insisting on a theological smorgasbord.

There were of course some writers and preachers, both Protestant and Catholic, who claimed that the meaning of specific Biblical texts was obvious and unambiguously literal; and their readers and hearers often agreed with them. But there were other scholars who, following much older traditions, argued that those texts might have many layers of meaning, poetic and symbolic, allegorical and typological, which in religious terms might be far more significant. For them, the new Biblical criticism could have a further liberating effect: it could clarify what the original writers might have intended and what their original readers might have understood. (Rudwick, 2005, p. 56)

It is a small, but perhaps significant insight into the mind of Rudwick that he calls orthodox Christians "writers and preachers" and heterodox churchmen "scholars." His implication that "literalism" was an innovation that distorted the Bible's meaning is an insult to Biblical scholars of all ages. In the context of the Enlightenment attacks on Scripture, one is hard pressed to explain the open hostility of men like Kant, Voltaire, Rousseau, and Hume as simply resulting from their desire to find "layers of meaning" in the Bible.

Rudwick tries to illustrate the uncertainty of Biblical history through Biblical chronology. Though he admits that chronology was a vibrant science

with many participants besides Ussher, he implies that it was unable to reach consensus due to a "wide range" of dates, which he cites as from 3,616 BC to 6,984 BC. He fails to mention that this wide range is a function of method: dates older than 6,000 BC were either *secular* accounts or outliers. Those clustering between 5,000 and 5,500 BC were derived from the Septuagint translation. Chronologies derived from the original (and most reliable) Masoretic text have a very tight range. For example, Batten (2001) lists a range from 3,616 BC to 4,161 BC. And even that fails to show the greater general agreement among the majority of scholars. Jones (2005) lists 34 scholarly chronologers; the 29 relying on the Masoretic text provide a range for the date of Creation of only 356 years, from 3,836 BC to 4,192 BC. So while Rudwick (2005) asserts that chronology supplied uncertain results by presenting a range of 3,368 years, Jones (2005) shows that scholars working with the Masoretic Text produced results grouped a full order of magnitude closer together. Furthermore, of the 29 Masoretic dates provided by Jones (2005), 25 of them are *within 75 years of Ussher's famous 4004 BC date*—an incredible testimony to the exactness of Biblical chronology as a discipline that belies Rudwick's dismissal of Biblical chronologers.

Then Rudwick (2005, p. 116) tries to impugn the intelligence of "literalists" by claiming that "the short timescale was still taken for granted, throughout the eighteenth century and into the nineteenth, among less educated groups in society and in conservative religious circles (and it was of course revived in the twentieth century among American fundamentalists)." Implying that Enlightenment deists and atheists were more intelligent and educated than orthodox Christians merely because they were deists and atheists is nothing more than intellectual snobbery. He carries the same bias into the present, characterizing modern orthodox Christians as

“American fundamentalists” (in spite of the international and transdenominational appeal of creation science) when he need not have mentioned them at all in the context of his discussion.

But Rudwick seems to sense the weakness of his own position because he continues to search for other reasons to dismiss orthodoxy. He recites other excuses refuted by creationists over and over again. First, comes the old “67th book” argument.

Those who were religious believers assumed that Nature, “the book of God’s works”, could not ultimately contradict Scripture, “the book of God’s word”; so if the natural evidence seemed sound and persuasive, they simply inferred that the short timescale, in its application to *the age of the world*, must be based on mistaken assumptions. (Rudwick, 2005, p. 116)

Yet the orthodox position of the church throughout its history has always been that special revelation is superior to and more reliable than general revelation. Those who piously affirm “nature” as the “67th” book of Scripture typically do so in order to ignore the truth of the other 66. Rudwick’s logic seems to imply that either the Bible is wrong or that it does not speak to the age of the earth. “Science” is a better source of truth. But, of course, he supplies no theological justification or even discussion of this position. Instead, he moves on, demonstrating no more than his mastery of modern excuses: “The kind of analysis undertaken by chronologers was far less important than the imaginative impact of the Creation story and the religious perspective it sustained” (Rudwick, 2005, p. 116).

But was it the “imaginative impact” of Christianity that built Western culture and science? People do not sacrifice their lives for “imagination.” Truth always trumps it. So he moves on to the “day-age” theory.

Even if the text of Genesis were taken to be authoritative and divinely

inspired, it had been widely recognized among scholars—ever since Patristic times—that the seven “days” of creation were not necessarily to be understood as ordinary days: for example the first three of them were said to have preceded the creation of the sun itself, without which ordinary days were literally impossible; and in prophetic language “the day of the Lord” clearly did not denote a period of twenty-four hours but a time of decisive significance. (Rudwick, 2005, p. 117)

As a lengthy list of scholars have demonstrated, the context of Genesis demands actual days.

Furthermore, Mook (2008) demonstrates that the patristic scholars were nothing if not united behind the short timescale of the Bible, the historical reality of the Flood, and the importance of the Creation narrative. Hall (1999) likewise demonstrates that the position of the Reformed church until the Enlightenment was monolithically the same. Thus, the Christian church for 1800 years held to the truth of six 24-hour creation days and a global flood. Once again, Rudwick’s scholarship about the church proves deficient. So, he tries out the “gap” theory: “Alternatively, the initial act of creation out of ‘chaos’ was assumed to have been followed by an unrecorded period of vast, but indefinite duration, before the humanly more important events of the rest of the narrative” (Rudwick, 2005, p. 117).

But (again) as numerous orthodox theologians have shown, the only gap is that in Rudwick’s theology, which causes him to miss the major point—that God’s act of creation was not centered on the importance of human beings but on His own glory, a point that would have been familiar to European savants through Jonathan Edwards’s (1754) dissertation. But Rudwick remains firm:

If, at certain times and places, some guardians of orthodoxy grew alarmed at the new scientific claims about

the vast timescale of the world, it was not always because those claims contradicted the literal sense of Genesis; religious authorities were, quite properly, more concerned with theology and its practical implications than with literalism of the crude kind adopted by modern fundamentalists. (Rudwick, 2005, p. 117)

However, scholars such as Hall (1999) have long noted that little attention was paid to the “literal” truth of Genesis because it was so monolithically accepted by the church throughout its history up until the Enlightenment. What Rudwick fails to grasp is that the truth and integrity of the Bible are important *theological* positions in the church and always have been. He also fails to note that the “practical implications” of abandoning Genesis would include abandoning other “minor” concerns, like the trustworthiness of God, Creation ex nihilo, the Fall, sin, and redemption, just to name a few. Ironically, many of these were essential to the development of science (Glover, 1984; Hooykaas, 1999; Stark, 2003).

Conclusion

One of the reasons that Enlightenment atheism succeeded was that its proponents were masters of propaganda (Stark, 2003). They knew how to frame issues to their advantage and how to recast uncomfortable questions in a manner that minimized their impact. Their use of science—a Christian invention—to displace Christianity from both science and history, and their creating new rules in philosophy that would assure the absence of God, the Bible, and theology from their discussions were brilliant—in a “Screwtape” kind of way.

An increasing number of Christian scholars are beginning to see that the conflict of the Enlightenment was between Christianity and the emergent worldview of naturalism. Yet it is precisely this religious clash that Rudwick

must minimize to promote his theory of deep time as a compromise between the short timescale of the “literalist” interpreters of the Bible and the eternalism of Aristotle. The real dilemma that he faces is that if there really was an inherent spiritual conflict between orthodox Christianity and Enlightenment atheism beneath the proposition of modern secular geohistory, then his historical analysis has failed to grasp a crucial historical element of the era.

Furthermore, the presence of such a conflict would, of course, mar the “scientific” perspective and force a closer look at the faith commitments of figures like Buffon, Hutton, Cuvier, and Lyell. Closer investigation might find that Buffon was a closet atheist; Lyell, a Unitarian; Hutton, a deist; and Cuvier, a man with no religious convictions (near his death, his daughter, Clémentine, prayed for his salvation; Outram, 1984). It might even demonstrate that all of these men had a predisposition against orthodox Christianity and that bias affected their work. Religious commitments are among the strongest—as has been demonstrated repeatedly in history—but for a modern secular academic, writing about such commitments as if they really matter would be professional suicide. Such an analysis certainly would diminish much of what Rudwick finds interesting about the progression of secular prehuman geohistory from the initial cosmology of Buffon to the cementing of Lyell’s version of the past in the geological timescale in the mid-nineteenth century (Mortenson, 2006), hovering over the social and professional webs of events like some dark cloud.

Yet, for those interested in real historical truth, this battle of worldviews is the single most important aspect of the period because it provides the most accurate framework for explaining the motivations behind the complex web of personalities and events. In Europe, the growing animosity among the intellectual “Republic of Letters” toward ortho-

dox Christianity has been traced through philosophers—Hobbs, Leibniz, Spinoza, and Hume, finally culminating in Kant’s “Copernican revolution of the mind.” It would be a disservice to the savants interested in what we call today “geology” to assume philosophical ignorance or disinterest on their part. The naturalists understood contemporary philosophy and followed its lead, launching their own attack on Christianity at the point of their expertise—science and Earth’s ancient history.

Thus, Rudwick’s attempt to recast the development of modern geohistory as an innovative compromise between Christianity and atheistic eternalism misses the point. Aristotle was not the issue. There was no “two-horned” dilemma; there was only the conflict between orthodox Christianity and the new worldview of naturalism. Well-educated in Christian theology, the Enlightenment savants could not have misunderstood the importance of Genesis. The question of time was a direct attack on the integrity of Scripture. Once that wall was breached, only a hollow shell of pseudo-Christianity would remain. Their purpose was made clear in the writings of many, like Voltaire, and the consequences are crystal clear in retrospect—the decline from a Christian Europe to its present sorry state is a ringing testimony of the effects of the Enlightenment assault.

Thus, eternalism and an old Earth were not opposing positions; they were merely two prongs of the same overall strategy—to discredit the historical foundation of orthodox Christianity. That seems sufficiently clear in retrospect. That is why Rudwick’s theory—given Rudwick’s formidable historical skills—is so surprising.

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Book Review



The Grand Canyon, Evolution and Intelligent Design

by Richard S. Beal, Jr.

Lighthouse eBooks, Savage, MN, 2007, 218 pages, \$15.00.

The author of this book was trained in zoology and entomology and retired from Northern Arizona University, where he was dean of the graduate college. He claims to be “an evangelical Christian committed to the doctrine of Biblical inerrancy” (p. 2). While he was

in graduate school, a Christian professor convinced Beal to find a personal synthesis that released him from the chains that entangled his vision (p. 3). Further reading of this treatise reveals that these chains were a literal interpretation of the early chapters of Genesis. Unfortunately,

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the subsequent text evolves into a rant against the young-earth Flood model of origins. The author states, “I am fully convinced there is a beautiful harmony between Biblical faith and valid science, including science that measures the age of the Grand Canyon rocks in hundreds

of millions instead of thousands of years” (p. 10). This reviewer believes that the author either will not or cannot distinguish between scientific observations and the origin interpretation forced on these observations. For the author, evolutionary postulations and the ancient-earth hypothesis are the only real science that should be considered. He thus embraces modern scientism.

Beal examines various approaches to interpreting the early chapters of Genesis, and he appears to prefer what he calls “providential creationism” (theistic evolution), which has the Creator “responsible for every mutation and for every slight modification of the environment, so that every step in the evolutionary sequence is his personal choice” (pp. 167, 168). God had express designs for life, and every least evolutionary step was under His direction and conscious control. This is the correct definition of intelligent design (p. 193). In this view, the combination of evolutionism with theism is complete.

The author reasons that the creation account of Genesis 1 does not specify the time or method of creation (p. 27). The account likely is referring to a single Creator God to counter Egyptian polytheistic influences on the Israelites. Also, to say that there would be no possibility of change of the created kinds would have been meaningless to the early Israelites (p. 32). If the account states anything modern, it is that God is responsible for Mendelian genetics (p. 33). Man’s body could have been the subject of a long creative process (p. 35). The days in Genesis 1 carry a secondary, not a primary, emphasis (p. 36). The days represent themes or categories of creation (pp. 37 and 51–57). This thematic interpretation is actually the discredited literary framework hypothesis. Each

day does not depend on when the day occurred in time but on its significance (p. 53). Finally, dropping all attempts at objectivity, Beal states, “The view of an initial creation in six literal days is less well supported than any of the other interpretations” (p. 57).

The author believes that the creation accounts in Genesis 1 and 2 “were written by different hands” (p. 63). He continually casts doubt on any possible literal interpretation of the early chapters of Genesis. “*Genesis is simply not concerned with how God brought man’s body into being* [italics in original]. The second and third chapters are concerned with the relationship of man to his wife, with man’s need of obedience to God, and with the awful consequences of putting one’s personal desires and judgments above that of God’s” (p. 74). Beal embraces the double revelation theory. Of course, the revelation of the Creator’s attributes seen in the physical world needs to be correctly interpreted within an evolutionary framework (pp. 74–90). The Flood as the origin of the fossil record is foolish because such evidence demands an evolutionary explanation (pp. 90–128). Beal depreciates Steve Austin’s work in the Grand Canyon (p. 103) since the age of the earth has been proven to be measured in millions of years by radioactive dating (pp. 129–136).

I will comment on only one of Beal’s misconceptions, the first and second laws of thermodynamics. He mistakenly thinks that if the earth is an open system, the degeneration effects of the second law are avoided (pp. 142–150). However, all natural systems are open systems, and irreversible processes occur in them. Entropy always increases as a result of irreversible processes. Energy input alone generally accomplishes nothing except

destruction without already-existing order and complexity to utilize the energy flow. Designed conservation processes such as “reproduce and fill the earth” oppose degeneration. This relationship of conservation and degeneration is often overlooked by naturalists. Space, matter, and energy were created (He spoke and it was done, Psalm 33:9), along with created operational processes designed to continually stabilize the physical creation. The introduction of the concept of the Creator as a henchman for man’s ideas of an evolutionary beginning and development of the physical world is purely an invention of theists who accept naturalistic philosophy.

All so-called evidences for evolution and an ancient-earth hypothesis have been countered effectively in creationist literature. Beal honestly admits that he ignores creationist arguments (p. 191). Yet he claims that young-earth creationist proposals are “astonishingly empty” (p. 192). A closed-minded attitude is typical of this genre of naturalists. The author ridicules creationist speakers (pp. 196–197). Are vicious attacks against young-earth Flood creationism by theists who accept evolution obligatory so that they can maintain their professional status in a hostile environment? Or has the absorption of naturalistic philosophy affected their views? Whatever the reason, a plethora of books with this same theme is abundantly available.

“For if you believed Moses, you would believe Me; for He wrote about Me. But if you do not believe his writings, how will you believe My words?” (John 5:46–47 NKJV).

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Notes from the Panorama of Science

Irreducible Complexity Not Refuted

The concept called irreducible complexity (IC) has recently become a central idea in the creation-evolution controversy (Braun, 2005). To understand why, it is necessary to review the current scheme of evolution. The standard evolution theory postulates that multimolecular mechanisms, such as an organ of motility, evolved by means of the

progressive accretion of ancillary proteins onto some rudiment or foundation that was functionally useful but need not have been an organ of motility. This amplification took place, one gene at a time, under the guidance of natural selection: each modification conferred at least a small selective benefit (Harold, 2001, p. 204).

The problem is that, although scientists can mentally “construct schemes that sound plausible” and can in principle account “for the origins of crawling motility, mitosis or the secretory pathway,” they “have no better alternative to offer the inquirer” (Harold, 2001, pp. 204–205). It is clear, though, that design exists in the natural world, and evolution must account for it in order to replace creation as its origin (French, 1988).

Behe (1996) illustrated the enormous difficulties in explaining the evolution of the thousands of nanomachines and complex systems required for living cells by gradualistic mechanisms through natural selection of variations caused by mutations. Behe has documented that a certain minimum number of parts is required in order for both living organisms and nonliving things to function. He used the term IC to designate this concept. Removal of one part beyond

the minimum number required leads to loss of function (Behe, 2005, p. 33). Thus gradual evolution is impossible because, unless life already had the minimum numbers of parts required, it could not have reproduced, and thus evolutionary selection could not have occurred.

Before Behe, the term IC was used by Katz for structures in the natural world that cannot be “reduced to smaller or less intricate predecessor components,” and he cited the “human figure” as “an example of a pattern-assembly system that is irreducibly complex” (Katz, 1986, p. 27).

Behe’s example was the common household mousetrap, a machine that will not function unless it has a certain minimum number of parts. If it has fewer parts than this minimum, it does not simply catch mice less well—it does not catch them at all (Behe, 2005, p. 34). The independent parts function properly only within the whole functional unit, such that the “whole is greater than its parts.”

Critics have tried to refute this example by noting that if one discards the base of the mousetrap and fastens the remaining parts to the floor, the mousetrap will still function. For example, Ruse (2003, p. 315) concluded that:

Behe’s example of a mousetrap is somewhat unfortunate, for it is simply not the case that the trap will work only with all five pieces in place. For a start, one could reduce the number to four by removing the base and fixing the trap to the floor.

This is really not a legitimate alternative, though, since the floor now serves

as the base, which is still required as a frame to which the parts must be fastened in order for the system to work. Other critics argue that simple contrivances, such as mere holes in the ground, also can catch mice. But holes in the ground cannot function as conventional house mousetraps, nor are holes very effective in retaining mice that could simply crawl out. Holes do not provide a good illustration of the evolution of mousetraps either; holes utilize a very different design than a mousetrap, and did not serve as the technological first step of mousetraps. Thus the argument that a hole is a simpler mousetrap is both wrong and irrelevant.

Since a cell is the most complex known machine in the universe, I will use a more realistic mechanical example to explain IC, namely a television system. The first working television must have had a functional camera, a way of converting light variations into electrical signals, a method of broadcasting the signals into the atmosphere, a receiver system to pick up the signal, and a method to convert the broadcast signal into an electron gun signal in a cathode ray tube so as to paint the picture on a fluorescent screen.

The history of the television invention by Philo Farnsworth illustrates that this system would have been useless until every component was invented and perfected, which Farnsworth spent much of his life doing (Stashower, 2002). A certain amount of complexity is required before life can exist (Anderson, 1989). Until life exists, the physiology required to carry out repair, respiration, and reproduction, cannot occur.

IC involves an *irreducible core*, the part of the system in which the removal of one part causes the entire system to cease functioning. For a clock, all of the parts required for it to tell time make up the irreducible core. The noncore parts could include the crystal, the second hand, and the clock case. What the core actually consists of, however, depends on the demands put on the watch. If the watch were used to accurately time a footrace, the second hand would be part of the irreducible core required for that specified function. If the watch were to be used in wet environments, the crystal and waterproof case would become part of the core. The basic function is thus related to the demands put on the system.

Productive Use of the IC Concept in Research

The IC concept is used daily in molecular biology labs throughout the world. An example is what is known as targeted gene replacements, commonly referred to as knockout genes. This research technique removes or disables a gene, and then the results of its removal on the organism's functions are evaluated (Old and Primrose, 1994). We know that a gene is required if removal of the gene disables the function of one or more biological systems.

This research technique is used both to determine the function of a gene and to determine if this gene is required in order for a certain biological structure to exist. Another research technique is to remove select base pairs from a gene to determine which are critical and what role each section plays in a specific gene. Yet another technique is to use mutant genes called "natural knockout genes" to determine the function of a gene or a set of base pairs. Morange (2001, p. 4) noted that critically important information has:

been obtained from a vast number of studies of natural genetic mutations in both animals and humans,

and on the targeted inactivation of genes—"knockout" experiments ... [The] harvest of results they have produced is ... that these findings were often completely unexpected and sometimes even contradicted existing models.

The Minimum Requirements Necessary for Life

The simplest forms of life are single-celled organisms, but many life-forms are parasites that must live off of other life-forms because they have fewer than the required minimum number of parts to function independently. Viruses are simpler than the simplest known cell and are actually too simple to satisfy the minimum required to be alive. Viruses are, in essence, machines that transfer genes from a container (the virus protein shell) into a cell. The virus can reproduce only when its genes take over the host cell's reproductive machinery. Nonetheless, even viruses still require a minimum number of parts to carry out their limited functions.

If a critical component of any one of the many systems required for human life is absent, such as the circulatory system, the result is usually death—a fact that is a basic tenet of modern medicine (Glicksman, 2006). Scientific articles about cell design documenting this biological irreducibility now run into the millions. For objective observers, this research makes the naturalistic evolution theory of the origin of the living cell increasingly improbable. A nonparasite, nonviral life-form requires many billions of parts, all of which must be properly assembled in order for life to occur.

The systems necessary to produce the parts needed to construct a cell are like the assembly of parts into an automobile. They must be functional when assembled, requiring them to fit properly with the other parts, including the attachment points. Furthermore, the parts must be appropriately finished and maintained along with the rest of a

cell's parts, and they must be properly recycled. The tools that assemble a part, such as a jig that properly orients a set of parts for assembly, must all be compatible with the parts that it has a role in assembling and also with the proper placement of these parts in the cell. Likewise, all of the components of a cell (both the parts and the jigs) also must fit together and be adequately assembled to function as a unit.

Criticism of the Concept of IC

Ever since Behe popularized the term IC in 1996, the concept has been extensively debated. Although critics have proposed systems where a part that was originally believed to be required can be removed and the system will still function, this does not negate the IC concept. Often removing a part or two results in the unit not functioning as well. But even if it works just as well, this simply means that the number of parts required was really less than first assumed. The item is still irreducibly complex. It is also possible that a reduction in parts has no detectable loss of function in normal environmental or physiological conditions, but reduced functionality could occur under extreme conditions.

Criticism Based on Co-Option

The most common attempt to refute IC involves a concept called co-option. Co-option is said to occur when existing cell parts, such as proteins or glycoproteins can be selected and assembled in a unique way to produce a new structure. The bacterial flagellum, for example, utilizes ten proteins that are also used in the type III bacterial secretory system. Miller concluded from this observation that "irreducible complexity is nonsense" (1999, p. 150). He argued that since ten proteins are found in two very different bacterial devices, IC is nonsense because one structure can be built from parts used in the other structure.

Miller fails to note, however, that co-option actually supports the IC concept.

If co-option occurred, the cell in which the co-option took place must itself have been IC in order to live. This fact has proven to be an insurmountable obstacle for abiogenesis. What is more, loss of parts of the flagellum does not make it a secretory system, and adding more components to the type III secretory system does not make it a flagellum. They are not interchangeable systems. Co-option does not refute the irreducible complexity concept but simply defers it. In the case of the bacterium, co-option shows that the bacterial cell has the capability of producing one of two different irreducibly complex machines (a flagellum or a secretory system) from some of the same parts.

The fact that most of the parts in a television transmission-receiver system could have been used in other electronic devices does not negate the fact that a certain minimum number of parts are required in order for the TV to function. And the existence of the same electronic parts in other systems does not explain their origin, or the origin of the design of a functioning TV system.

The design, selection, and assembly of existing parts requires an assembly plan to insure that the parts are designed to fit together properly, that they are assembled correctly, and that they function as a unit. Cellular proteins called “scaffold proteins” are required as sites on which to place the correct cell parts in the proper locations at the correct times. Each part must be manufactured to the required specifications and in the correct number for use at the correct time. The parts also must be moved to the suitable assembly location in the *order* needed. The many complex enzymes required to install the parts at the correct place are also necessary.

Sanford (2005, p. 133) noted, “each *part* has no value except within the context of the *whole* functional unit, and so irreducible systems have to come together all at once, and cannot arise one piece at a time.” He added that, in

the case of a mousetrap, even if all of the pieces are sitting neatly next to each other on the inventor’s workbench, they could not properly assemble themselves together into a functional unit by any realistic evolutionary mechanism. They must first come together simultaneously as a functioning system in the mind of a designer. It is in the realm of *mind* that deep complexity first exists and becomes integrated (Sanford, 2005). This mental design must then be translated into the behavior that manufactures the required parts that meet the required specifications and allows proper assembly of the machine.

All of these concepts can be better explained in a creation origins model. Concerning changes observed, creationists suggest that alterations seen in some complex structures support the Genesis Fall. The Creator may have designed certain complex structures to continue to operate even if some of the original parts subsequently become altered or even missing. Thus, not only IC, but also some reducible complexity of the original created structure could have been part of God’s indescribable plan.

Co-option Supports IC

Co-option in the mechanical and electrical worlds clearly implies intelligent design and does not negate the fact that an object is irreducibly complex. When designing a new product, the engineer often selects parts from the millions that already exist to achieve the required function. Selection of the best components for a new application typically requires highly trained individuals to help determine the appropriate parts required from the large number of parts available for a specific application. These parts are then intelligently modified, often by engineers, to function together as a unit.

An examination of machines designed by humans reveals that co-option is extremely common—many mass-produced standard parts are used in a

wide variety of electrical mechanical contrivances. Common examples of standard generic parts manufactured for a wide variety of uses include various fasteners (screws, bolts, cotter pins, and rivets) and the family of microswitches. Many reasons exist for this practice, including lower cost, design efficiency, and reliability. Producing fifty million of one type of microswitch compared to one million each of fifty different types greatly lowers the cost for each unit. Also, utilization of a proven design with a documented reliability record is preferred over a new design that may potentially be superior but lacks a reliability history.

It is also far easier (and much more practical) to design equipment by assembling existing parts, which is how many electrical and mechanical devices first appeared on the market. The early VCRs were a conglomeration of a wide variety of standard parts that were obtained from many different sources. Design improvements have resulted in combining different parts and requiring fewer total parts until, today, a modern VCR uses a fraction of the parts used in the original (and also weighs a fraction of the original weight). This suggests that co-option in biology is likewise an example of excellence in design and not fortuitous evolution.

The mechanisms that produce most mutations are well understood, but, conversely, mechanisms that can systematically rearrange structural units in order to produce new functional structures are unknown. It is conceivable that many mutations of assembly regulation genes could produce beneficial effects, but it is difficult to even imagine a “just-so story” that explains how a naturalistic evolutionary mechanism could cobble together different existing parts by co-option to produce new functional structures (Sanford, 2005). Structures such as a bacterial flagellum contain thousands of proteins; each one in turn contains hundreds or thousands of parts; and each gene that

produces these parts has about 50,000 component parts (Sanford, 2005).

The only plausible known mechanism that could select existing parts to construct a new structure is a regulatory mechanism such as transposition (commonly called jumping genes). But transposition only shuffles existing genetic information around and does not rearrange the complex guidance system required to properly assemble a complete new structure from many different parts. Understanding how co-option could function in life requires an understanding of life's assembly instruction system and how it functions. No known way exists to cause individual parts to be reshuffled during evolution to systematically produce a new functional assembly arrangement. Even if a new structure did originate this way, it would virtually always produce a harmful or nonfunctional result, not a workable system that would aid survival. The only known feasible method is Hox gene mutations, which have, so far, produced only negative results (May et al., 2004).

The co-option theory is also very problematic in an evolutionary model because a cell is a complex, highly interconnected system consisting of many billions of parts. For this reason, a single change often affects many systems. Even if a mutation improves the function of one part in a particular unit, it often will cause dysfunction in other systems. This concept, called pleiotropy, is a major reason why a defect in a single gene can result in so many different body alterations, many of which are negative (Bergman, in press). Mutations often result in a wide variety of different health symptoms, many of which have no relationship with each other.

Co-option does not change the fact that "there are presently no detailed Darwinian accounts of the evolution of any biochemical or cellular system, only a variety of wishful speculations" (Harold, 2001, p. 205, italics added). Even

if a system existed that could produce new organs by selecting from the existing parts, in most cases it would produce damaging or lethal macromutations.

Some Darwinists have proposed that this problem could be partially solved if two complete sets of genes produced the same structure, such as in gene duplication, allowing one set to be modified to evolve a new specific structure and the corresponding gene to maintain the previous function. But if this condition existed, the excess structures produced may frequently cause the functional problems for the cell. This illustrates the major problem that we have identified, namely, how could the original arrangement have been produced without intelligent design? Once again the creation model proves to be a better basis on which to understand the origin of biological systems.

No evidence exists for the evolution of any of the original parts that were supposedly co-opted to explain the origin of new structures.

Among these great innovations in design, the crucial inventions of nature, the earliest have left no trace of their development in the fossil record. The organization of living material in a cell with a cell wall and a nucleus, the transmission of the blueprint of its design and its means of self-construction and the very important device of sexual reproduction, all developed in minute organisms which have left little evidence (French, 1988, p. 19).

The basic parts must first exist in order for co-option to occur, and until their existence is explained, it is premature to claim that co-option of existing parts can explain the origins of the systems that use those parts.

Conclusions

The evidence presented here falsifies Judge Jones's opinion that:

Professor Behe's claim for irreducible complexity has been refuted in

peer-reviewed research papers and has been rejected by the scientific community at large (Kitzmiller et al. v. Dover Area School District et al., p. 79).

The gradualistic co-option model of evolution is accepted because of philosophical constraints, not because of empirical evidence. As Harold (2001, p. 205) admitted, evolutionists "reject, as a matter of principle," not because of evidence, "the substitution of intelligent design for the dialogue of chance and necessity." This philosophy prevents scientists from researching all possible avenues to explain the origin of life, including IC. To fully understand reality, science must be free to explore all research avenues including research on IC.

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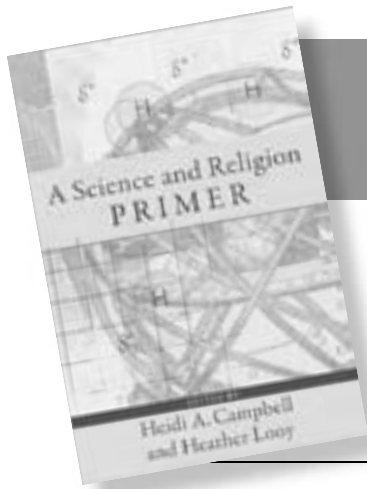
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Book Review



A Science and Religion Primer

edited by Heidi Campbell and Heather Looy

Baker Publishing Group, Grand Rapids, 2009, 230 pages, \$20.00.

The authors are professors—Campbell in communications at Texas A & M, and Looy in psychology at the King’s University College, Ontario. Their goal is a “respectful, intelligent conversation between science and religion” (back cover), and they have succeeded. Four introductory essays make clear the Biblical roots of modern science and also challenge the “warfare metaphor” between science and religion. The heart of the book is a compact encyclopedia of terms from history, philosophy, science, and theology. Seventy guest writers define and evaluate the terms, which range from altruism to the verification principle. The contributors are from such schools as Asbury, Azusa Pacific,

Bethel (Indiana), Calvin, Grove City, Fuller Seminary, Messiah, Notre Dame, and Westmont. Authors Campbell and Looy are to be complimented for bringing together the writing talents of so many colleagues.

The book treats young-earth creation with respect; however, the hundreds of references do not include a single creationist writer. Regarding limited creationist research, it is correctly stated that “the number of people doing the research is small, and it is difficult to find funding or journals willing to publish the results” (p. 72). Later, the book correctly challenges the myth that Galileo’s heliocentrism was a victim of religion: “A mythology grew up: Galileo was tortured (he wasn’t); he was imprisoned in the ‘dungeons of the Holy Office’ (he was never placed in a dungeon); he muttered after abjuring, ‘And yet it moves’ (a later invention); he was condemned ‘for demonstrating the earth’s motion’ (he wasn’t and he didn’t)” (p. 111).

This book is attractively printed; the writing and editing is crystal clear. The encyclopedia is a valuable reference with topics including chaos theory, ecofeminism, intelligent design, Kepler, miracles, Newton, William Paley, process theology, quantum theory, and the scientific method.

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Desert Plant Literature Demonstrates God's Creation

The Creation Research Society Herbarium Is Growing Steadily

The Creation Research Society has a growing herbarium plant collection discussed by Cockman (1988) and Howe (1988; 2006). The specimens are mostly from Arizona, Colorado, and California, with some from other states as well. Recently we have added 15 new plants, most of which are winter-flowering annuals from the eastern Mohave Desert. This is a desert with two separate plant groups, each flowering shortly after its two rainfall periods—the winter rains and the summer monsoon rains. We found most of these 15 specimens near Mohave County Route 15 (Alamo Lake Road) and Chicken Springs Road, between the towns of Yucca and Wikieup, AZ.

Scientific Evidence for Creation Was Present in the Books We Used

We studied desert plant books to help key and identify our specimens. In so doing, we noticed that many of the authors

reported features that clearly support the activity of an intelligent Creator. While in most cases the authors said nothing about creation, the long-standing facts speak for themselves. We will describe a few of these telltale creation trademarks evident in desert annual plants.

The Internet is likewise laden with information supporting intelligent design. There are many beautiful flower photographs online, as well, together with information on food and medicinal uses, all of which speak of God's providence for mankind in native plants. We focus here, however, on perspicuous plant features for which no evolutionary phylogenies exist and for which there are no adequate neo-Darwinian explanations.

The "Mohave Desert Star" Survives in a Dry Climate

If you wanted to design a plant to survive on very little moisture, you would make it small and set it just slightly above the level of the soil. It could then be

constructed so as to grow rapidly and produce drought-resistant seeds quickly, before seasonal rains have evaporated. The tiny Mohave Desert star (*Monoptilon bellioides*, sunflower family) was built on just such a plan (Figures 1 and 2). It possesses a physiological system controlling the size of the population and likewise of individual plants. The number of seeds that germinate and the size of the resulting plants are directly related to the amount of rain that previously fell during that winter. MacMahon (1985, p. 380) described this sensitive control feature as follows:

[Mohave desert star growth] depends upon the amount of rainfall. If winter rains are ample [they grow] in profusion, even obscuring the surface of the ground; but if rainfall is scant, the plant will be only a fraction of an inch tall, if it grows at all, with one head [flower] disproportionately large in comparison to the rest of the plant.

In personal correspondence, Margaret Helder (June 15, 2009) described for us the "phenotypic plasticity" of certain plants, allowing them to flower even if they are far below the normal flowering size.

When growing conditions are unfavorable, the ability to reach a mature enough state to flower, even if the plant is extremely small, is a phenomenon called phenotypic plasticity. This is a design feature, which allows many weedy plants, in other habitats, to survive adverse conditions. Most plants must reach a certain mature size before they flower, but not the plants with this particular design feature. (Helder, personal correspondence, June 15, 2009)

Plants like the desert star also show design in that only a fraction of the seed available will germinate in any

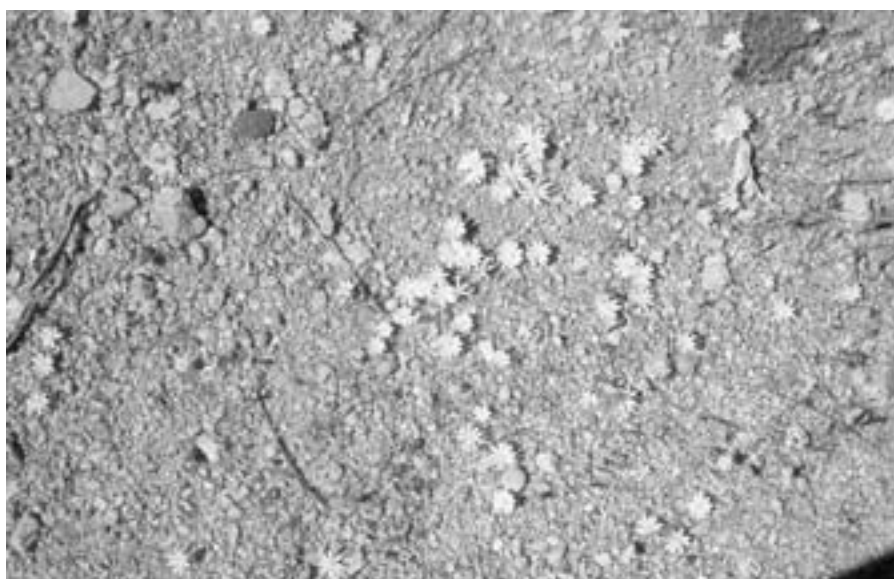


Figure 1. A display of *Monoptilon bellioides* (the Mohave Desert star). They control the number and size of plants each year in relation to the amount of rain that has fallen.



Figure 2. A little Mohave Desert star plant, at the right (only 1–2” tall), has been pulled loose to show that the entire plant is shaded underneath one inflorescence. These plants can thrive in deserts because they have been geared to grow rapidly and produce drought-resistant seeds while moisture is still available in the desert soil.

given year. About this, Helder (personal correspondence, June 15, 2009) has noted that

many weedy plants also exhibit phenotypic plasticity in their requirements for seed germination. In this

case only a fraction of the seeds will germinate under each specific set of conditions. This allows a reservoir of seeds to remain in the soil awaiting a variety of future conditions.

She is quick to point out that these



Figure 3. *Phoradendron californicum*, the desert mistletoe, is a hemiparasite seen here in a host tree. The delicate balance between sticky parasite seeds, transporting birds, and a defensive ironwood host tree is clear evidence favoring creation over naturalistic neo-Darwinian evolution.

design features are “quite widespread and well known,” having been evident for decades in the botanical literature. These long-understood phenomena are all strong support for a direct creation of plants.

Meanwhile, growing close to ground level, desert star plants are in a group of species called “belly plants” because one can best see them by lying stomach-down. Their species name *belloides*, however, has nothing to do with such a prerequisite study posture but with their resemblance to plants in the genus *Belus* (Jaeger, 1941, p. 270).

The “Mistletoes” Have a Clever Seed Distribution System

It requires considerable skill to build a parasitic plant with sticky seeds that can be unwittingly transported to new host trees by birds that then transfer the seeds to potential hosts by rubbing their beaks on the bark to remove the annoyingly mucilaginous little objects. This transport plan is present in the desert mistletoe (*Phoradendron californicum*, mistletoe family) (See Figure 3).

The fruit is a berry...containing several seeds embedded in very sticky juice; the seeds are dispersed when birds (notably cedar waxwings and phainopeplas) eat the fruit and remove the sticky seeds from the bill by wiping them on tree branches where they can germinate (Wikipedia, 2009).

Would it not then be providential to give the ironwood host trees their own defense system to prevent overinfestation by the mistletoe? Without this system, the mistletoe might obliterate the ironwoods. Dodge and Janish (1985, p. 63) noted that this mistletoe becomes a real threat, causing “damage and even death to host trees such as acacias and ironwoods.” But the eminent desert spokesman E.C. Jaeger (1941, p. 27) wrote about a remarkably protective balance involving the ironwood’s own defense system.

[Of mistletoe seeds that germinate on a host tree] the successful survivors are few, for most vigorous host plants show remarkable resistance to the inroads of the young seedlings. In the case of ironwood trees, many of the seeds are actually pushed away from the limb surface by a gummy substance exuded by the tree at the point of injury. The exudate eventually hardens and drops to the ground, carrying with it the young mistletoe plant.

No adequate evolutionary mechanism exists to account for the origin

of this stepwise interaction between bothered birds, sticky seeds, and a host tree's flushing system, which is capable of thwarting infestation.

The dwarf mistletoe (*Arceuthobium campylopodium*) grows on pine trees at higher altitudes than the deserts where we worked. Its seeds are quite effectively dispersed by a very different scheme. Sap pressure inside its white berries reaches the point where the berries explode, flinging the small seeds for distances up to 49 feet (Armstrong, 1999). Its seeds are covered with viscin, a sticky substance that enables them to remain on the

needles of nearby trees where they may grow, infesting new host trees (Mathiason et al., 2009). Neo-Darwinism offers no satisfactory explanation for the origin of these sticky "bullets" inside the dwarf mistletoe "firing system."

Ocotillo Has Its Own Mechanisms for Enduring Drought

The ocotillo, also known as coachwhip (*Fouquieria splendens*, coachwhip family—see Figure 4), copes with drought in its own multifaceted manner, as Jaeger (1941, p. 147) nicely reported, "Whenever rains really wet the soil, bright green leaves spring forth above the sharp, stout spines and hide the thorny stems in foliage." Indeed, a new set of coachwhip leaves grows out every time adequate rain falls! Ocotillo is able to produce as many as six new leaf crops in one year (Dodge, 1993, #63; Epple and Epple, 1995, p. 86.) When the habitat dries out again, the coachwhip promptly loses its leaves.

But even during the dry, leafless periods, there is an efficient backup plan to nourish the plant. With very little water loss, the green bark of the ocotillo stems carries out photosynthesis in the absence of leaves. A shallow and wide-spreading root system is one more frugal *Fouquieria* feature, "enabling quick utilization of shallow-penetrating rains" (Jaeger, 1941, p. 147).

Because of its thorns, some people mistakenly call ocotillo the "coachwhip cactus." But a careful look reveals that coachwhip thorns differ markedly from cactus spines, which attach to a furry pad. The Creator provided plants in many families with different types of thorns or spines, showing that similarity (homology) does not necessarily prove "kinship." Similarity does not demonstrate a "common ancestry," as Darwin mistakenly preached, but it certainly could have resulted from the work of the same Designer, a "common Designer" (Howe, 2009).



Figure 4. The ocotillo, *Fouquieria splendens*, has a cluster of bright red flowers and fruit. Important to the creation cause is the fact that ocotillo has been equipped to make a new crop of leaves whenever another generous rain occurs.



Figure 5. Flowers of *Larrea tridentata* have petals in a flat plane before they are pollinated—see blossom beyond white arrow tip.

The Survival of *Larrea tridentata* Provides a Puzzle for Evolutionism

By means of what plant physiologists call “allelopathy,” *Larrea tridentata* plants are able to conserve water. Allelopathy is a chemical “bad neighbor policy” in which the leaves of *Larrea* secrete organic compounds that are toxic to other plants. Hence, other plants are prevented from growing near it, and as a result the water from a wide surrounding area remains available only to the *Larrea* (Kearney and Peebles, 1951).

Larrea bushes have an amazing ability to endure drought for long periods of time—they are outstanding xerophytes, covering thousands of square miles in California, Arizona, New Mexico, Texas, and Mexico. When a prolonged drought ensues, they simply drop their leaves and remain alive in a dormant state (Andersen, n.d., p. 74).



Figure 6. After pollination, the petals of *Larrea* turn 90 degrees (see flower at arrow tip). Finding no explanation of this phenomenon, we predict that it plays a function in the interaction of bees with the flower. The disjunct distribution of *Larrea* in only two localities (the western United States and faraway South America) with no intervening populations is a problem facing evolution, as discussed in the text.

As reported by Epple and Epple (1995, p. 131), the petals on the flowers of *Larrea* rotate 90 degrees after the blossoms have been pollinated (Figures 5 and 6). We puzzled over what particular function(s) this peculiar petal rotation after pollination may fulfill. While we found no role reported in the literature, we predict that this rotation will be shown to play a part in the flower/insect relationship.

The *Larrea tridentata* plants growing in the North American deserts are probably the same species as their South American counterparts called *Larrea divaricata*, plants that exist thousands of miles away with no intervening populations between the two (Howe, 1996; Kearney and Peebles, 1951). All of this poses serious questions concerning how *Larrea* plants got to these two widely disjunct localities. One is also puzzled by the striking similarity between the two, since orthodox evolutionary ideology predicts that all disjunct populations ought to undergo extensive evolutionary diversification. These two *Larrea* populations appear to have experienced little or no diversification during the time they have been separated, a fact that negates evolutionary predictions.

“Mexican Goldpoppy” Is Another Plant with Explosive Fruits

Last but not least, consider the forethought required to craft the fruits of *Eschscholtzia mexicana*, the Mexican goldpoppy. Upon ripening, these fruits explode with a snapping action, flinging the seeds considerable distances from the parent plant (Coronado RC and D, 2002, #16). Such explosive splitting of pods to sow seeds is found in several other flowering plant groups as well, all of them quite distant from, and “unrelated” to, the poppy family. It would be asking very much for chance-based evolution to produce exploding seed pods just once in nature, but it would be exceedingly unlikely that they would arise many times in distant taxonomic



Figure 7. Stephen B. Austin, a taxonomist, keying out a desert plant specimen along the side of Alamo Lake Road, Mohave County, AZ. Austin has helped enlarge the herbarium collection with plants from Colorado and Arizona.

lines of angiosperms! As noted earlier, similarity does not necessarily mean “common ancestry” but instead may well indicate “the same Designer,” who used particular features like this one at various points throughout the creation outline as He chose.

We have no quarrel with the concept that variation is observable in plants, variation that may have led to some speciation—with the realization that differences between species is often more subjective than genetic. We object instead to the Darwinian extrapolation of these minor modifications, promoting them willy-nilly as proof for the macroevolution relatedness of all plants.

We also oppose the arrogant attitude manifested by many evolutionists who believe that alternative origins explanations deserve no serious investigation. Such behavior is both unethical and unscientific.

We look forward to more herbarium trips to study plants from other life zones and plan on working on more articles about creation evidences for those plants, unheralded evidences already present in the botanical literature.

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fostering the CRS herbarium and funding expenses related to this study. We are likewise grateful to Mark Armitage, M. S., an electron microscopist, for his assistance with our photographs, and to Linn Carothers, Ph.D., who provided us with some of the mistletoe literature. Jerry Bergman, Ph.D., deserves credit for improving this paper during the editing process, and so does Margaret Helder, Ph.D. (a botanist), who supplied us with several concepts while critically reading the manuscript. We appreciate the way factual evidence favoring creation is so astoundingly visible in nature so that “he may run that readeth it” (Habakkuk 2:2).

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Letters to the Editor

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

How Compatible Do Physicists Consider Science and Religion?

A very recent poll has been published by the Institute of Physics (IOP) in their society newsletter (Crease, 2009). Various categories of members' views on religion were surveyed. These consisted of four categories ranging from, "I am an atheist who sees no place at all for religion in the universe," which received 22.6%, to, "I am a religious person who thinks that science and religion are different ways of looking at the same thing. My faith enhances my appreciation of science," which received 18%. With 13.1% abstaining, the other two categories were, "I am a nonbeliever, but I think religion and science can coexist because they each deal with separate aspects of the universe" (30.3%) and "I am a religious person who thinks science and religion can coexist because they each deal with separate aspects of the universe" (16%). For the 505 responses, this means that the margin of error at the one standard deviation level is about 2% on each of these proportions. The IOP is headquartered in England,

and so the majority of members can be expected to be British; but the results are interesting to note, not only for them, but also to the extent that this could be reflective of other English-speaking countries or more.

It is interesting that these responses imply that the majority felt that religion and science can coexist (64%). Furthermore, using the null hypothesis that the "atheist" and "Christian" proportions are the same, this gives a z -score of 0.254, using the value given in Equation (1) from Brase and Brase (2003).

$$z = \frac{p_1 - p_2}{\sqrt{\frac{p_1(1-p_1)}{n} + \frac{p_2(1-p_2)}{n}}} \quad (1)$$

From this value of the z score, the probability of getting a score up to this value from a 2-tailed test can be found to be approximately 20%, meaning we can accept the null hypothesis that the two proportions are statistically indistinguishable (the probability of getting

a difference in proportions greater than this by chance if they are really the same proportion is approximately 80%).

From this it can be concluded that for IOP members, there are just as many who believe that science and religion are different perspectives of the same thing as there are those who believe there is no God. This does assume that the 13% who did not respond would not take positions skewing these proportions if they were to be given the opportunity to reconsider or otherwise change their answers.

Robert B. Hayes, Ph.D., CHP, PE

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CRS Conference Abstracts

July 10–11, 2009 • University of South Carolina Lancaster • Lancaster, SC

On July 10–11, 2009, the Creation Research Society held a conference at the University of South Carolina Lancaster campus. Below are abstracts of presentations given during this two-day conference. Voting members of CRS were allowed to author or coauthor abstracts. All submitted abstracts were accepted, as the conference was intended to provide a forum for the free discussion of a wide variety of ideas pertaining to the creation model of origins.

Coordinating Committee:

Danny Faulkner, Ron Samec, Don DeYoung, and Kevin Anderson

The Ultimate Proof of Creation Jason Lisle

The debate over origins is often framed as two competing scientific models. Proponents of creation insist that the creation model better accounts for the evidence than evolution, but proponents of evolution disagree. Such disagreement stems largely from the fact that creationists and evolutionists have different presuppositions and thus disagree on the “rules of interpretation” of evidence. Creationists or evolutionists may offer evidence that seems on the surface to challenge their opponent’s position. However, the opponent is always free to invoke an auxiliary hypothesis to account for what appears to be contrary evidence. How then can the debate over origins be rationally resolved?

The solution becomes obvious once we drop the assumption that creation and evolution are on the “same level.” Unlike evolution, creation is not *merely* a model. Rather, creation is the fact that makes scientific models possible.

The methods and procedures of science presuppose a biblical worldview—one in which God upholds the universe in a consistent and rational way that the human mind can discover. Even the laws of logic (the universal standards by which people reason) are ultimately contingent upon God as revealed in His Word. Thus, evolutionists must unwittingly rely upon the truth of the Bible in order to argue against the truth of the Bible. The fact that they are able to argue at all demonstrates that they are wrong.

Creation Models for Cosmology Require a Sensible Energy Model over Relativity

Joseph E. Brown

Relativity is central to the idea of explaining a young universe. There are a few creationist models that use relativity in order to model a young universe. However, from a creationist viewpoint, it is critical that it is a valid theory. After all,

Biblical proofs cannot stand on error. Although relativity is universally accepted, there are several problems that cause this author to reject it. Physicists have known of problems with relativity for nearly a century but have accepted the theory because “it works.” If a simpler model can explain the data and at same time eliminate the problems associated with relativity, then it should be considered. The model I am presenting eliminates the Lorentz transformation, the twin paradox problem, the problem with the energy equation not being invariant to coordinate transformations, and non-conservation of photonic energy. And it is much simpler than relativity.

In formulating an alternate scenario, the relativistic equations are taken as a good approximation of observed data; i.e., relativity appears to work. Therefore my model is compared to relativity to show the small differences and how they produce the same results for general experiments. I will show that both the relativity theory and this author’s scenario predict the same results for time dilation, the amount of light-bending in a gravity

field, the change in frequency of light due to gravity, the advancement of perihelion of Mercury, and aberration angles seen when observing distant stars.

The Moon's Recession from the Earth: Still a Valid Young-Age Indicator

Spike Psarris

The tidal evolution of the Earth-Moon system is examined. Creationists have shown that tidal processes imply a maximum age for the system that is far short of the 4.5 Gyr required by the standard evolutionary model. Evolutionists have countered that the creationist analysis is invalid and, furthermore, that there are additional lines of evidence to support an ancient age. Many of these rebuttals have not been addressed by creationists. This paper reviews the evolutionist arguments and shows why they do not solve the problems that tides pose for the long-age model. In addition, some recent developments are discussed that provide additional support for a young age of the system.

Lack of Sufficient Selection Pressure to Explain Nonrandom Patterns of Mutations Suggests Directed Mutations May Increase Genetic Diversity

Jean K. Lightner

Nonrandom patterns of genetic mutations in humans and animals are typically explained by selection since the underlying mutations are considered to be essentially random errors. Yet there are nonrandom patterns for which sufficient selection pressure appears absent. Evaluation of polymorphisms at the MC1R locus, coding a receptor influencing color, revealed many

nonrandom patterns in various taxa, including a bias toward non-synonymous mutations (mustelids), a bias toward synonymous mutations (native Africans), a bias toward in-frame indels (cats and mustelids), and a bias toward the same SNP in different taxa (resulting in an apparent selectable phenotype in some taxa but not in others). Loss of function mutations in MC1R are nonlethal and result in lighter color hair (red to yellow) and skin. In humans it is also associated with an increase risk of skin cancer; however, average age of onset is after 50, so selection should be weak. Evaluation of the dopamine D4 receptor (DRD4) revealed an unusual pattern of in-frame indels known as variable number tandem repeats (VNTR). This VNTR pattern is observed in DRD4 for most mammals, except rodents, with the size of the repeated segment often varying between taxa. A null mutation in human DRD4 is not associated with any serious impairment, at least in the heterozygous state. Again, this suggests that selection cannot account for this pattern. The inadequacy of selection pressures to account for these nonrandom patterns of mutations suggests that directed mutations may play a significant role in generating genetic diversity. Further study in this area, especially using epidemiologic data to help quantify selection pressure, will likely yield significant results that will build the creation model.

Rightly "Dividing" the Word about Peleg

James J. S. Johnson and John Morris

Was Earth's unusual "division" in Peleg's lifetime a linguistic event or a geological event? Is the "division" of languages, noted in Genesis 10:32, the same as the "division" of the earth, noted in Genesis 10:25, for which Peleg was named?

If the "division" Peleg was named for was a linguistic event, namely the

miracle of languages God injected at the Tower of Babel, Peleg's genealogical position provides us with a chronological context clue about when Babel occurred. Because recent analysis has clarified the chronological relevance of Genesis genealogy data, a linguistic "division" interpretation would sharpen the focus of Biblical history's timeframe for the post-Flood demographic migrations following the Tower of Babel miracle. However, if the "division" Peleg was named for was a geologic event (such as a geographic barriers-produced "division" of the earth's continental landmasses, due to rising water levels following the post-Flood Ice age), the geologic (i.e., geography-altering) "division" interpretation would sharpen the focus of creation science's understanding of post-Flood geologic history, with serious ramifications for interpreting the geologic record from a young-earth perspective. Either interpretation provides insights for future research about post-Flood events.

Proper philological study focuses on the two Hebrew verbs translated "divided" in Genesis 10:25 and 10:32, with extra insights from the Greek equivalents used in the Septuagint translation of Genesis. Philological analysis supports the conclusion that Peleg was named for something that occurred after the worldwide Flood, of a geological nature, that had global geographical significance. Lastly, alternative explanations of what that could have been (geologically speaking) are identified and analyzed from a young-earth creationist perspective.

Volcanism, Fountains of the Great Deep, and 40 Days of Rain

Hamilton Duncan

The Bible references the fountains of the deep and forty days of rain as contribu-

tors to the global Flood. Magmas are ideal candidates for fountains of the deep since water is the primary gas released during virtually all volcanic eruptions. The geologic record preserves volcanism on a level not observed today, especially with the existence of verneshots, which may have sent volatiles into suborbital trajectories. Moreover, the emplacement of large igneous provinces, along with the release of water from their magmas, significantly contributed to the Flood. The possible cause of the Flood and volcanism may have been from concentrated, global decompression due to multiple bolide impacts.

What Really Happened to Atlantis in the Days of Peleg?

William M. Curtis III

The purpose of this monograph is to draw all history into agreement with the one true history of the world given to mankind in the Scripture as revealed by the Creator of the world.

Plato's story of Atlantis will be seen to fit into the Biblical revelation both with regard to time and the historical and scientific evidence in ways not before understood. The evolutionist's position regarding the biogeographical problem with the various continents is a direct assault on the Biblical record and the Flood epoch. This study will show that a proper view of the animals both entering and leaving the ark, the events at Babel, and the continents dividing after the Flood in the days of Peleg will solve all of the questions and unbiblical positions.

Starting with the Biblical supercontinents of Cush and Havilah of Genesis 2, and moving to the precontinental drift pangea of Gondwanaland and Laurasia, the study moves from Biblical exegesis to science and history to develop a model of post-Flood events that fit the evidence from geology,

meteorology, paleontology, and biogeographical distribution. Geologically, the evolutionary view of plate tectonics will be addressed. The study of continental fit, paleomagnetic data, and mountain building in a time period consistent with Peleg, Plato's notes on Atlantis, and the latest satellite data on plate movements that show the rates incompatible with the million-year drift hypothesis. The acceptance in 1994 by the geologic community of catastrophic plate tectonics has further verified the thesis of this study.

The record of climates of the world both prior to and post-Flood are integrated into the scenario, which fits both the Biblical and the fossil record. The biogeographical distributions of fauna will favor the solutions of creationists Molen, Woodmorappe, and Northrup. The origin of the races and their dispersion throughout the world will be presented in a Biblical scenario consistent with the Genesis Flood and the history of the world ca. 2350 BC to today. With all of this research and study, we shall be able to understand what really happened to Atlantis in the days of Peleg.

Genetics, Developmental Biology, and Fossils Provide No Evidence for the Evolution of Teeth and Jaws but Support the Creation Model of the Original Kinds of Genesis

Don Moeller

Evolutionary theory is dependent on physical evidence (fossils) and biologic mechanisms to provide a reasonable explanation for character traits. The maxillary-dental complex has no fossil evidence for any transitional form, and there is no reasonable genetic or developmental cascade model that can account for the effectual gradual modification of either the jaws or teeth.

Trying to account for the dental enamel microstructure types observed throughout the fossil record faces the same theoretical and evidential problems. The sudden appearance in the pre-Eocene period of approximately 18 different orders (with highly disparate jaw and tooth forms) from a single hypothetical ancestor should provide an incredible opportunity to find millions of intermediate jaw and dental forms in this narrow fossil stratigraphic band. There are none.

To further complicate matters, the reproduction rates of the animals represented in these orders varies significantly, yet fully functional jaws and teeth seem to appear at the same time. The fine anatomical structures present in both jaw and tooth form in these orders cannot be produced by the operation of any known HOX genes. The fact that there are over 200 genes controlling jaw and dental developmental cascades presents intractable problems for any gradualistic evolutionary population genetics explanation (either with balancing selection or founder population models). The fact that there are at least ten interacting complex subsystems in the maxillary-dental system that must be mutated simultaneously to effect useful mutational changes precludes further mathematical explanation.

Lastly, pleiotropy affects all known cranio-maxillary syndromes, demonstrating the highly complex interaction of the genetic control of the developmental cascades. The pre-Eocene period should have millions of examples of dental and jaw pathology (a known result of mutations in the maxillary-dental system) as a result of pleiotropic actions. None are found. Also, had millions of years actually transpired, there should be untold examples of predominantly pathologic mutations demonstrating their effects on the jaws and teeth of transitional animals. None are found.

Some Perspectives on Neanderthals: What Do They Mean for the YEC Model?

Anne Habermehl and Danny Faulkner

Young-earth creationists rightly consider that Neanderthals were human beings but are divided on questions such as where Neanderthals fit into our history, why they looked as they did, why they disappeared, and what their significance is for the young-earth model.

In his book, *Buried Alive*, Jack Cuzzo examined Neanderthal skulls and found that Neanderthals were early post-Flood people who developed distinctive facial characteristics because they lived a very long time and disappeared from history because people no longer lived long enough to develop those characteristics. Neanderthals were therefore not a closely related tribe, even though many creationists continue to believe otherwise. The widely scattered locations of known Neanderthal sites have implications for Flood models.

Cuzzo's study of Neanderthal children has shown that they matured very slowly and therefore could have lived well over 100 years before becoming fathers, if their lifespan was many hundreds of years (LXX Gen. 11). This has implications for timeline and supports moving the Flood and Creation back farther than Ussher's calculation allows. Conclusions drawn from Neanderthal mitochondrial DNA in creationist literature are faulty because the human genome has deteriorated over thousands of years; also, mtDNA changes continuously over the human lifetime.

There is confusion about early post-Flood people because of so-called "homo" species (such as erectus) that are touted by many creationists as human. These are most likely complex, upright, ancient apes, now extinct.

Ecology: Truths and Solutions from the Bible, or the Vacuous Contradictions of Evolutionary Humanism

Rick Lapworth

A complete Christian apologetic includes the ecological implications and applications of the truths in the Creation account of Genesis chapters 1-6. Biblical ecology begins with: (1) the inherent value and glory of all organisms, (2) their use to man, (3) man as image-bearer (God's representative moral agent), and (4) man's role as "garden keeper," a manager/steward of the earth's resources (who is borrowing them from their absolute creator/owner, God), exercising wisdom (wise-dominion) through Biblical laws/mandates and inferred principles. All of this is set in the context of the overarching realities of the Curse/Fall and grace/redemption.

In contrast to these coherent, viable, and certain truths is the empty and contradictory rhetoric of evolution, materialism, and humanism, which, for example, believe extinction is a highly-probable outcome in the struggle for existence but want to protect species as "endangered." Yet, why should man (a mere higher animal, but the most adapted at resource acquisition) care at all about the status of other predators that most likely are competitors over an ever dwindling set of resources? Evolutionary theory gives no ontology, teleology, or moral rationale for ecological decisions. Only a worldview based on the Bible and Creation truths can provide a vital and logical approach to ecology.

Analyses of Petrified Human Brain

Suzanne Vincent and Larry Skell

Preliminary analyses of a rock show a number of features that are consistent with it being a human brain that has

become petrified. It may be partially permineralized or coated with aragonite and other minerals, as has been shown to occur in natural springs containing carbonates, silicates, sulphates, and chlorides of a number of mineral salts. Features that confirm it is likely to be a human brain are (1) what appears to be a correct size brain stem pushed up into the forebrain area and lost below the pontine level, (2) stone cerebellar folia on the inferior surface where portions of the brain stem and cerebellum are usually found, and (3) stone choroid plexus tissue emerging from the inferior location where the lateral apertures of the fourth ventricle are usually found. There is evidence of (4) frontal, temporal, parietal, and occipital lobes that have been compressed together under high pressure. (5) The brainlike rock is highly convoluted with evident gyri and sulci. (6) It is the typical size and shape indicative of a human brain, e.g., it has an evident occipital pole. (7) X-rays show five holes in the interior of this rock consistent with their being anterior and posterior horns of the lateral ventricles and a third ventricle. The X-rays also reveal significant surface sulci. A geological assay of its mineral content will allow further conclusions to be made of how it became petrified and conjectures about how old it is.

Rapid Cosmological Formation Processes in a Young and Initially Cold Universe

Keith Davies

Cosmological models that reject the hot big-bang scenario and instead assume a low-temperature origin to the universe were initially developed and systematized in the 1940s. The early versions of these models dealt almost exclusively with cosmological nucleosynthesis of the lighter elements in the first moments of

a creation era. Modern developments of these “cold origin” models have now reached a degree of sophistication that permits detailed quantitative analysis for the early cosmological nucleosynthesis of the heavier elements, the early formation of stars in a clearly defined but very brief creation era, and novel explanations for the existence of the cosmic background radiation.

The intent of this project is to provide a review of current research activities and publications regarding this remarkable class of cosmological models. The “cold origin” model is seen to include a number of striking examples of convergence with the Genesis account of the Creation week era. These examples include the existence of an early era of rapid radioactive decay that does not involve the excessive production of radiogenic thermal energy, a brief primordial nucleosynthesis era capable of forming elements at levels of abundance that match currently observed ranges of element abundances, the ultrarapid formation of planets and stars, and the sudden cosmological appearance of light from non-stellar sources within the first hours of a brief Creation era.

A New Approach to the Interpretation of Genesis Chapter One

Gorman Gray

Books have been written and conferences devoted to detailing proper methodology for Biblical hermeneutics. This presentation will attempt to emphasize the psychological barriers we humans encounter that sometimes prevent sound Bible interpretation. With that cautionary background, we will carefully observe the pattern of God’s procedures on each of the daily activities and apply it to the fourth day. This pattern constrains and explains the interpretation of Genesis 1:16, that very crucial verse of Scripture.

The pattern I refer to during the six day Creation is that God, in every case (1) *decides* to do something, then He (2) *does* what He decided to do, and finally He (3) *delights* in what He did after completion. This pattern effectively prohibits the commonly accepted interpretation that God created or made the two great lights and the stars on day four. Rather God established existing celestial bodies for signs, seasons, days, and years on day four. He created the stellar heavens and planet earth in verse 1 before any days were possible on our planet.

Matching the Age of a Galaxy with Its Rotation Velocity Profile

Keith Davies

In the past 50 years one of the biggest surprises in modern astronomy was the discovery that the velocity profiles of stars in galaxies did not fully match the expected velocity profile known as the “Keplerian Decline” distribution pattern. “Keplerian Decline” is the familiar pattern that is seen in the motion of the planets of a solar system whereby, when a solar system has achieved dynamical equilibrium, the outer planets move much slower than the inner planets and have longer orbital periods. In observation after observation, the “Keplerian Decline” pattern was seen to be present only in the central region of galaxies. In any particular galaxy, as we move outward from the central region, we come to a second region that comprises the rest of the galaxy, where the observed pattern deviates strikingly from the expected pattern. This paradigm-shaking discovery, that supposedly ancient galaxies were not revealing the patterns of dynamical equilibrium, soon resulted in an ongoing search for “dark matter,” which was hoped to offer a logical explanation for those unexpected stellar velocity profiles and similar anomalous observations

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involving the motions of individual galaxies within galaxy clusters.

The assumption of this study is simply that if the galaxies are recently formed, then there is no need for the dark-matter hypothesis, because the galaxies have not yet reached dynamical equilibrium and the stellar velocity profiles are just as would be predicted if the galaxies were all young. The goal of this study is to determine the extent to which the central stellar velocity profiles of a galaxy match the “Keplerian Decline” profiles. This would permit an estimate of the degree of “dynamical equilibrium” achieved in a particular galaxy and hence determine its dynamical equilibrium age. Initial findings regarding the dynamical equilibrium age of the galaxy and two nearby galaxies are encouraging from the standpoint of a creationist, young-universe perspective.

A Preliminary Hypothesis for the Origin of the Carolina Sandhills

**John H. Whitmore, Ray Strom,
and Danny Faulkner**

The Carolina Sandhills are a tertiary body of unlithified surficial sand on the upper coastal plain of the Carolinas, just west of the Orangeburg Scarp. Much of the sand is part of the Pinehurst Formation. Conventional interpretations indicate several different depositional environments, including eolian, subtidal sandwaves, intertidal, fluvial, and deltaic.

Ten samples of sand were collected and analyzed, including samples from “Sugarloaf Mountain” and “Horseshoe Mountain,” which are barchan-shaped dunes (with south- and southwest-dipping cross beds) in Chesterfield County, South Carolina. In this area many mound-shaped accumulations like this occur, which are up to 35 m high. Outcrop observations, bulk sieve

analysis, and thin section studies all show the sand is poorly sorted, angular, and immature. Grain sizes range from clay to large granules.

We propose that a large post-Flood hurricane(s) or hypercane(s) may be able to explain the unusual mix of features. The Orangeburg Scarp may represent a wave-cut cliff, cut by the high-standing post-Flood Atlantic Ocean (before the Ice Age). The angular, unsorted, and overall immature nature of the sand suggests deposition soon after erosion, close to its source (igneous and metamorphic rocks to the west). It is conceivable that the sand may have been eroded and deposited during the same storm. The unusual, poorly sorted nature of these dunes may suggest catastrophic wind-blown processes during a large storm, leaving little time for sorting. Cross bed direction might be explained due to counterclockwise circulation around a storm causing strong north or northeast winds. The confusing mix of so many depositional environments may be due to continental erosion processes coalescing with storm surge and strong coastal winds during a large storm. Perhaps the reason this formation has been so poorly understood is that it did not form by conventional means.

This study is being undertaken as part of the Flood-Activated Sedimentation and Tectonics (FAST) project of the Coconino Sandstone funded by the National Creation Science Foundation (NCSF) and Calgary Rock and Materials Services. We thank them for their generous support.

Double Beta Decay as an Indicator of Accelerated Decay

Gene Chaffin

Geological determinations of the half-life of Te-130 and Se-82 for double beta-decay are compiled and considered

as a function of geological time. On the conventional timescale of evolutionary geologists, between the Precambrian and the onset of the Paleozoic era, or more precisely about 10^9 years ago, a change in this half-life from about 25×10^{20} years to about 8×10^{20} years is found. A recent direct measurement of this half-life by the NEMO-3 group agrees with this trend, yielding 7.6 ± 1.5 (stat) ± 0.8 (syst) $\times 10^{20}$ y. I consider plausible interpretations of the changes in half-life in which the change in half-life occurs near the end of the Genesis Flood. Possible theoretical mechanisms for this change in decay constant, involving a change in the strong coupling constant, are examined and found to be credible. It is shown that very small changes in the coupling constant can lead to enhanced alpha particle tunneling and can also change the rates for forbidden beta decays dramatically by changing the predominate angular momentum transfer of the decay.

Post-Flood Ocean Cooling and the Ice Age

Steven Gollmer

Michael Oard has introduced an Ice Age model that fits within a recent creation time frame. This model begins with a well-mixed warm ocean and a stratosphere with a large amount of volcanic dust. The warm oceans provide a ready source of water vapor, and the volcanic dust provides a strong cooling mechanism not present today. This work was complemented by Larry Vardiman's modeling of precipitation patterns using the community climate model (CCM). Since the CCM focuses on the atmosphere, warm oceans are implemented as boundary conditions. Recent climate models use either a dynamic ocean interface or a complete ocean circulation model. This paper reports on progress made toward modeling

post-Flood conditions using a coupled ocean/atmosphere model. An initial study focuses on the cooling rate of the oceans, which has an impact on the time frame over which an ice age can occur. Future studies will implement a higher resolution model and will explore the circulation patterns of both the ocean and atmosphere.

Genesis 10 & 11: A Correlation

Stanley V. Udd

This paper will examine the relationship between chapters 10 and 11 of the book of Genesis. Exegetical connections will be emphasized, and the contribution of each will be considered. The so-called Table of Nations (Genesis 10) represents those family groups that participated in the dispersion of populations from the region of Babel, while the first part of Genesis 11 provides insight into the mechanism that caused said dispersion. To reconstruct those original 50-60 language groups is probably impossible, but the information in these two chapters gives one valuable guidance and direction into queries of anthropological and ethno-archaeological studies.

Genesis and the Demise of the Dinosaurs

Joel D. Klenck

The large taxonomic classifications of terrestrial animal kinds, as defined by God, are discussed during the Creation week, the Fall, the Flood, and thereafter. The analysis suggests dinosaurs rapidly declined after the Fall and before the Noachian deluge. Conversely, after the Fall, mammals increased markedly. A discussion follows as to the causations for the extinction of *Dinosauria*.

The Region of Eden: Analysis and Debate

Joel D. Klenck

The location of the region that contained the Garden of Eden is controversial. Several creationists suggest that it is not possible to locate the region of Eden due to the dramatic changes to the surface of the earth during the Noachian Deluge. However, I suggest that close analysis of relevant Biblical passages and archaeology and geology suggest a region for Eden in Southeastern Anatolia.

CRSforum

Phil Haymaker and Lane Lester

The purpose of the CRSforum is to provide a place for CRS members to discuss any topic of interest to them and that might interest other members. We will discuss the purpose, basic use, and method of registration for the CRSforum. We will also consider the CRSforum purpose statement and show the value of the CRSforum for all CRS members.

A Paradigm of Reality towards a Theory of Everything

Pal Asija

This paper and concomitant presentation explore a paradigm of reality as our best hope for achieving the illusive theory of everything. It is based on the premise that there is But ONE Reality in here and out there and its search is based upon the premise that truth agrees with truth regardless of its source or label. The chances of success are greatly increased by application of faith in science and application of reason and even experimentation in religion. One technique employed is the use of LCM (lowest common multiple) and

HCF (highest common factor) of what is common between science and religion and every truth in between.

Another helpful tool is to purge erroneous thinking from our construct of reality. This is especially important if this thinking originated from such icons as Aristotle, Galileo, Sir Issac Newton, and even Einstein, and if it originated from such other sources as popes and high priests, the claim that everything physical is virtual particles, the myth of closed systems in relationship to the second law of thermodynamics, 5-way miracles of light (seeing), life (entropy), gravitation as contact force of virtual particles, correction constants of nature, and resolution of paradoxes (such as the twin paradox, wave particle duality, etc.). What is more, GPS does not vindicate Einstein's theory of relativity, as it works not because of science but in spite of science.

Ancient Binaries In A "Young" Configuration: The Strange Story Of V409 Hya and GSC 2537-0520

Ronald G. Samec, Gregory Behn,
Heather A. Chamberlain, E. R. Figg,
Christa M. Labadorf,
and Danny R. Faulkner

Both V409 Hya and GSC 2537-0520 are extreme mass-ratio binaries thought to arise from billions of years of evolution. During their history, the systems began as detached binaries and have gone through semidetached and contact stages and finally an "over contact configuration" due to long ages of magnetic breaking as experienced by solar type stars and binaries. This causes a steady but slow loss of angular momentum in the binary system and its subsequent coalescence. Contact and magnetic breaking results in the slow absorption of the smaller companion by the larger star and an extreme mass ratio smaller

than 0.2. Eventually the system becomes unstable, leading to the formation of a single, fast-rotating subgiant FK Comae-type star. This is the leading explanation of the "blue straggler" population in star clusters.

Long contact of the two stars causes the stars to equalize in temperature, and the large star becomes the main source of energy. This configuration means that the eclipses have equal depths. However, in our study of eclipsing binaries, we have discovered two extreme mass-ratio binaries with EB-type light curves—that is, the eclipse depths are quite different, and the component temperatures differ by hundreds of Kelvins. The existence of such binaries calls into question the long-age interpretation of such systems. The two binaries and their creationary implications will be discussed.

Universe in Near Real Time

Steve Miller

There is speculation, even in secular circles, that the velocity of light has been much greater in the past. We are going to propose, due to observational evidence, that the velocity of light may be much faster in deep space right now. The observational evidence that galaxy clusters appear the same no matter what distance they are observed supports the possibility we are actually seeing the whole universe in near real time right now. This viewpoint will be tested by God Himself, and the evidence for this is in Revelation 8:12.

The Discovery of Design

Don B. DeYoung

The name *biomimicry* is often given to the discovering and copying of useful design ideas found in nature. The classic example is Velcro, based on the sticky

seeds of the cocklebur. Some conclude that the credit must go to millions of years of random mutations and natural selection. However, this approach to explain optimum design in nature fails for several reasons. An alternate approach sees practical design features as embedded in the material universe by supernatural acts of creation for our welfare. From a host of possibilities, eight examples of intelligent design are described.

The Origin of Grand Canyon by Late-Flood Channelized Flow: Words, Definitions, and Thoughts in the Battle of Worldviews

Horace D. Skipper

As we attempt to share the Creation message with others and why we believe it, the choice of words and stated or unstated definitions and implied thoughts are important tools. Often one of the contenders in the battle of worldviews has or at least seems to control the discussion based on word selections or excludes some participants by selective definitions. In order to be at the table or on critical committees in the public arena, we perhaps need to sharpen our swords, be gentle with our words, and persevere for the sake of our families and our country.

Words to be addressed in this presentation will be science, religion, evolution, and fetus. Have we elevated science to the level of “a god,” or is science OK? Are scientists the root of the problem? Why is one religion allowed to dominate the educational process and exclude any hints of disagreement? And what could Planned Parenthood learn from

Martin Luther? Since the Scopes trial, Christians in general have conceded much of the public arena to the atheists and evolutionary bulldogs. The control by these groups is grossly out of portion to their numbers in the population of the USA. Is it time to reenter the battle of worldviews?

The Origin of Grand Canyon by Late-Flood Channelized Flow

Michael Oard

The Grand Canyon is a fascinating place. Its origin is important to which paradigm of earth history is more reasonable: the little-water-over-a-long-time, uniformitarian paradigm or a huge-amount-of-water-over-a-short-time, catastrophic paradigm. However, uniformitarian scientists have had over 150 years to decipher its origin, and despite several hypotheses, which will be summarized, they fall far short in explaining the origin of Grand Canyon. Creationists possess two hypotheses: a post-Flood dam-breach hypothesis and a late-Flood channelized-erosion hypothesis. The dam-breach hypothesis comes in three versions but has numerous problems. Two of these problems seem fatal: (1) the lack of evidence for ponded lakes southeast and northeast of Grand Canyon and (2) the erosion of long, deep tributary canyons down to the level of Grand Canyon, both of which will be discussed. A new hypothesis for the late-Flood channelized-erosion origin will be fleshed out by showing from geomorphology that the Grand Canyon, being just another of over a thousand water gaps, very likely was cut late in the Flood. The erosion started with the Great Denudation that eroded 6,000 to

10,000 feet of sedimentary rocks from the Grand Canyon area during east-to-northeast-flowing sheet currents. This event fits the sheet-flow phase during the early retreating stage of the Flood. Then the Flood current reversed, probably because of the rise of the southern Rocky Mountains, and channelized, flowing vigorously toward the west. It was during this channelized-flow phase of the late retreating stage that likely carved Grand Canyon.

An Analysis of the Star of Bethlehem DVD

Danny R. Faulkner

Near Christmas in recent years the *Star of Bethlehem* DVD has been popular in Christian circles. We will discuss certain claims made in the DVD, and we will see that some of these claims are not supportable.

A New Solution to the Light-Travel Time Problem

Danny R. Faulkner

A number of solutions to the light-travel time problem have been proposed, but creationists have many problems with the various solutions. A new solution will be presented, drawing upon possible parallels of process between days three and four of the Creation week. This new solution to the light-travel time problem relies upon a miraculous mechanism but assures us that the light that we see from distant objects actually left those objects and that we likely see the entire universe in something close to real time.

Minutes of the 2009 Creation Research Society Board of Directors Meeting

The forty-sixth annual Creation Research Society (CRS) Board of Directors (BOD) meeting was held 18–20 June 2009, at the Embassy Suites LAX South. Present were Mark Armitage, Ted Aufdemberge, Gene Chaffin, Don DeYoung, Danny Faulkner, Russ Humphreys, David Kaufmann, Jean Lightner, Gary Locklair, Michael Oard, Ron Samec, and Glen Wolfrom. Unable to attend were John Reed and David Rodabaugh.

President Don DeYoung called the first session of the general board meeting to order at 19:07 on Thursday, 18 June 2009. His first order of business was to welcome the newest board member, Dr. Jean Lightner. President DeYoung outlined the logistics for the weekend: general board meeting on Thursday, committee meetings on Friday, a field trip to the La Brea Tar Pits on Friday between committee meetings, the second session of the general board meeting on Saturday, and a CRS supporters' banquet and reception Saturday evening. Don noted that the BOD had a full and busy weekend of work managing the business of the society. Mark Armitage was thanked for his work in securing the motel for our meeting. The motel was literally within walking distance of LAX and near the Saturday evening banquet facility.

President DeYoung read a number of letters addressed to the CRS, thanking the society for its contributions to the scientific understanding of the creation model. A letter from board member John Reed indicated his surgery rehabilitation continues, and he hopes to join the BOD at its next meeting. A letter from former

(right) Pictured from left to right: Russ Humphreys, Don DeYoung, and Michael Oard



(below) CRS Board Members. Pictured from left to right: Michael Oard, Gary Locklair, Danny Faulkner, Ronald Samec, David Kaufmann, Don DeYoung, Mark Armitage, Gene Chaffin, Ted Aufdemberge, Russ Humphreys, Glen Wolfrom, Kevin Anderson*, Jean Lightner, Diane Anderson* (*CRS Professional Staff)



board member Lane Lester brought the sad news that he must resign from the BOD due to several factors. A letter from emeritus board member Emmett Williams brought encouraging news of his recent successful surgery.

Recording Secretary Gary Locklair moved that the minutes of the 2008 BOD meeting be approved as printed in the winter 2009 issue of the *Creation Research Society Quarterly* (CRSQ). Motion was approved. Gary provided results from the 2009 BOD election: 183 ballots were received, and the following were elected to three-year terms: Mark

Armitage, Gene Chaffin, Jean Lightner, John Reed, and Glen Wolfrom. A list of potential future candidates suggested by the membership was presented. Secretary Locklair noted that the CRS constitution and bylaws were being updated and will be made available in digital form via the CRS website.

President DeYoung reminded board members of their duties. Those duties include participating in the CRS; working on committees; engaging in discussion; becoming better informed about activities of the CRS (via CRSQ, CRSnet, *Creation Matters*, CRS newsletter, and the CRS Web site); and considering

how their talents and training can be employed to promote CRS (e.g., when speaking). Between meetings board members continue to serve, promote publications and the society, write, review, recruit new members, and prepare for future meetings. It was noted that the CRS is unique with a working research laboratory, and we support this research financially.

Financial Secretary Mark Armitage provided an overview of finances and the budgeting process to be employed by committees. Mark stated that we are riding out a challenging financial situation.

Mark also previewed our trip to the La Brea Tar Pits. The museum provides a massive indoctrination of evolution to visitors. However, geological evidence actually shows that the site underwent a catastrophic deposition. Our tour guide will be creationary scientist Dave Phillips, who has worked at the tar pits.

Van Andel Creation Research Center (VACRC) director Kevin Anderson previewed the CRS appreciation dinner. Los Angeles is a strong support area for CRS. This banquet will allow us to thank our supporters and introduce the BOD. A similar banquet is planned for Phoenix next year.

Danny Faulkner provided information on the upcoming CRS conference at the University of South Carolina, Lancaster, from 10–11 July. Holding a creation conference at a state university is certainly rare. Twenty-six presenters are scheduled, including individuals from ICR and AIG. Up to 100 registered attendees are expected. Friday evening John Whitcomb will give the Henry Morris Memorial Lecture, to which the general public has been invited. The BOD thanked Danny for his hard work and planning for this first general meeting of the CRS.

Kevin Anderson provided an update on his status. Kevin has worked for the society part-time since December 2007. He is currently working as a research

supervisor in the Denver area.

Gary Locklair reported on his visit to the CRS archives during August 2008. The CRS archives are held at the Concordia Historical Institute on the campus of Concordia Seminary in St. Louis, MO. The Institute is prepared to continue receiving CRS archival materials; their facilities are ideal for archival storage. Ted Aufdemberge mentioned that the winter 2008 publication of the institute had an article on Lutherans as part of the CRS; this has given the society some positive exposure. After discussion, it was moved that the recording secretary look into procedures associated with our archives. The motion passed.

President DeYoung shared that we are the oldest creation organization and the only one doing research. We enjoy a good relationship with the other creation organizations. Next year's BOD meeting will be held in the Phoenix / Chino Valley, AZ area; tentative dates are 17–19 June. The first session of the BOD meeting adjourned at 20:35.

Friday, 19 June, was devoted to committee meetings and a trip to the La Brea Tar Pits. The internet and periodicals committees met in the morning, with constitution, publications, finance, lab, research, and membership committees meeting in the afternoon. During the mid-morning hours, the board visited the La Brea Tar Pits. Mark Armitage, Dave Phillips, and BOD member emeritus George Howe served as tour guides.

The second part of the general board meeting convened at 08:23 on 20 June 2009.

Ted Aufdemberge's devotion began with a hymn originally published in *Creation Matters*, "God Created Earth and Heaven" by Ralph Gillmann. Ted recalled being asked by a student to define the word "creationist." Ted replied that the best description is found in the beginning of the Creeds and in Luther's explanation of the First Article. Ted has been influenced by great leaders of the CRS and believes that "Biblical" is a

wonderful adjective. Ted's service with Laborers for Christ was recognized.

Constitution committee chairman Dave Kaufmann reported on their review of CRS documents (constitution, bylaws, position descriptions, etc.) and that the committee needs to update those documents that are available on the Web site. He reported on additional details related to the CRS archives at the Concordia Historical Institute. CHI does not charge us for the archives but can provide help with organization, cataloging, etc. The committee moved that \$500 be budgeted to pay CHI workers to assist in organizing the CRS archives. Gary Locklair will be making several trips to CHI during August and September to begin the organizational process. The committee will request a budget of \$500.

Internet committee chairman Gary Locklair reported on matters relating to CRSnet, CRSforum, and the CRS Web site. All three showed growth over the past year. There were 150,000 unique Web site page views recorded for the period June 2008–June 2009. Source traffic to the CRS Web site is broken down as follows: 27% direct, 27% referring site, and 46% search engine. Images on our site continue to be a good source of search engine traffic. The outstanding work of volunteer webmaster Fred Williams was commended. The BOD will solicit a volunteer assistant for Fred, as his workload continues to increase. The committee will request a budget of \$1000 for expenses related to the CRS Web site.

Don DeYoung, chairman of the lab committee, reviewed the state of VACRC facilities in Chino Valley, AZ. Some minor repairs are needed, along with several improvements (e.g., a fume hood). A city project to extend a major water line across CRS property is currently on hold, but we continue to monitor its status. Mark Armitage's SEM work, workshops, and internships were recognized. The committee

extended Mark's invitation to continue these efforts for another year. The committee renewed the contracts of Kevin and Diane Anderson and indicated that Kevin may be returning to full-time status this year.



(above) Pictured from left to right: Glen Wolfrom, Russ Humphreys, Mark Armitage

Glen Wolfrom, membership committee chairman, reminded the board of the "challenge" extended to it regarding recruitment of new CRS members. Glen's colorful report indicated that membership has decreased from last year. Globally, the total membership (1446) is allocated to 694 voting (+5), 740 sustaining (-19), and 12 student (-2). Library subscriptions also have decreased (-13), and new member renewal rates continue to show a loss of more than 40% after the first year. There was discussion regarding the reasons for the high rate of initial loss. Glen was commended for his readable, detailed report. The committee will request a budget of \$11,800, which is reduced from last year's approved budget.

Periodicals committee chairman Gene Chaffin shared reports from the editors of the *CRSQ* and *Creation Matters*. Kevin Anderson reported on an upcoming "editor's forum" (a written debate) in the *CRSQ*. The board thanked Kevin for his work and especially his editorial comments in the *CRSQ*. Six

issues of *CM* were produced last year, and a new regular feature, tentatively named "Q&A with Jean Lightner," will be introduced. Glen Wolfrom has asked to be replaced as the editor of *Creation Matters*. The committee is seeking a suitable replacement. The BOD thanked Glen for his hard work on *Creation Matters* over the years.

President DeYoung commented on the CRS display for the AIG museum. Board members with "milestones" of service



(above) Pictured from left to right: Gary Locklair, Ted Aufdemberge, David Kaufmann

were honored: Danny Faulkner, 5 years; Michael Oard, 10 years; and Dave Kaufmann, 25 years.

Publications chairman Mike Oard shared news of our beneficial relationship with Master Books. The CRS has a good working relationship with Tim Dudley and his crew at Master Books. Mike indicated that the committee had experienced very few problems this past year. Books slated to be published include *Rock Solid Answers*, *Rocks are not Clocks*, and a "coffee table" creation book. The committee has received and is reviewing a number of book proposals. Mike reported that publications showed a good profit margin last year, and book sales have increased even in the current poor economy. Last year Master Books assisted us by publishing our resource catalog. Mike will again ask Master Books about publishing the catalog. It

was noted that a number of our titles are available on Amazon.com. The committee will investigate issues related to books on Amazon.

Gene Chaffin, research committee chairman, indicated the committee has reviewed its policies and procedures. Extensions for three projects were approved: Grand Canyon geology, electron microscope studies of mosses, and electron microscope studies of blue-green algae. Two new electron microscope projects involving pyrenoids and diatoms were approved. It was noted that Mark's work with the SEM is producing wonderful images. A three-year extension on the service contracts for both microscopes was approved. The committee anticipates that all current research will be completed during the year. The CRS is the organization actually doing research, and there is some great research happening. Gene also shared some details of his new position at North Greenville University.

Treasurer Danny Faulkner presented information about fiscal year 2008–2009. The society will be close to a balanced budget (\$260,450) depending upon June income. Several questions regarding endowments and fund transfers were addressed.

Financial secretary Mark Armitage put forth a number of proposals at the recommendation of the society's accountant.

(1) At previous meetings, we designated endowment withdrawals as "loans." Mark moved that these "loans" be considered expenditure of capital and not tracked internally as "loans." Discussion over the original intent of the wording revealed two points: we wanted to make it difficult to use endowment funds, and such "borrowing" results in losing money for the society. It was passed that previous "loans" are now considered withdrawals. During discussion it was noted that executive board approval is needed before withdrawing endowment funds between

board meetings, unless the full board has preauthorized a withdrawal amount for the coming fiscal year. Ted reminded the BOD that we are not to spend the endowment monies themselves, only the interest generated by the funds.

(2) Mark indicated that some bills are not paid on a timely basis. It was moved that reimbursements, receipts, and bills be submitted within 30 days of the end of a quarter. The exception to this policy is research funding. Motion was approved. It was noted that original receipts are required. Diane keeps receipts for approximately 10 years. The BOD was reminded that approval for reimbursement should not come from the originator. We need to maintain an audit trail with checks and balances.

(3) There was discussion concerning the designation of subcontractor versus employee for society part-time workers. A motion to designate one of our part-time workers as a subcontractor rather than an employee was tabled. Further information about this will be requested from the society's accountant.

(4) It was moved that all information on CRS donations be sent to the professional staff in Chino Valley for complete tracking and recording. After discussion, this motion was approved.

(5) There was discussion concerning the timely transfer of information on memberships to the professional staff

in Chino Valley. Currently, the updated membership file is sent to Chino Valley on a 2–3 month interval. While this doesn't currently present a problem, we want to be responsive to member inquiries. If a member inquiry can't be handled by the professional staff at Chino Valley, the matter will be referred to the membership secretary.

Treasurer Faulkner and financial secretary Armitage led a discussion related to the 2009–2010 budget. Ted will provide Mark with endowment value figures so everyone is clear regarding the distinction between spendable and non-spendable amounts. Mark commended the work of the society's financial advisor, who has done a masterful job in managing CRS funds. Don reminded the board to be careful in budgeting. We've been financially blessed, especially when compared to some other organizations, and we want to maintain our high level of good stewardship.

The following committee budget requests were approved: research—\$30,000; periodicals—\$47,500; publications—\$52,100; membership—\$11,850; constitution—\$500; VACRC—\$150,500; finance—\$0; Internet—\$1000; executive/treasurer—\$14,000. It was approved to operate with an expense budget of \$307,450 for fiscal 2009–2010. The BOD authorized the professional staff to move up to \$25K of

nonendowment funds to pay expenses; the treasurer needs to be informed when such transfers occur.

Gary Locklair proposed Fellow status for member David Kaufmann. After Dave's many accomplishments and years of service to the society were reviewed, he was unanimously elected a Fellow of the CRS.

Election of BOD officers was held. Don DeYoung was elected president, Gene Chaffin was elected vice-president, Gary Locklair was elected recording secretary, Glen Wolfrom was elected membership secretary, Mark Armitage was elected financial secretary, and Danny Faulkner was elected treasurer. The membership secretary, financial secretary, and treasurer were elected for three-year terms. Their service will be confirmed annually.

The BOD submitted the names of Don DeYoung, Russ Humphreys, Gary Locklair, and Ron Samec as candidates for the 2010 BOD election.

While the meeting was adjourned at 12:15, board members remained in order to participate in the CRS banquet held at the Proud Bird Restaurant beginning at 18:00.

Respectfully submitted,
Dr. Gary Locklair,
Recording Secretary

Instructions to Authors

Submission

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

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

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

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

Appearance

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

Submitted manuscripts should have the following organizational format:

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

2. Abstract page. This is page 1 of the manuscript, and should contain the article title at the top, followed by the abstract for the article. Abstracts should be between 75 and 200 words in length and present an overview of the material discussed in the article, including all major conclusions. Use of abbreviations and references in the abstract should be avoided. This page should also contain at least five key words appropriate for identifying this article via a computer search.

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

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

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

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

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

Lipman, E.A., B. Schuler, O. Bakajin, and W.A. Eaton. 2003. Single-molecule measurement of protein folding kinetics. *Science* 301:1233–1235.

Margulis, L. 1971a. The origin of plant and animal cells. *American Scientific* 59:230–235.

Margulis, L. 1971b. *Origin of Eukaryotic Cells*. Yale University Press, New Haven, CT.

Hitchcock, A.S. 1971. *Manual of Grasses of the United States*. Dover Publications, New York.

Walker, T.B. 1994. A Biblical geologic model. In Walsh, R.E. (editor), *Proceedings of the Third International Conference on Creationism* (technical symposium sessions), pp. 581–592. Creation Science Fellowship, Pittsburgh, PA.

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8. Figures. All figures cited in the text should be individually placed in numerical order, and placed after the tables. Do

not embed figures in the text. Each figure should contain a legend that provides sufficient description to enable the reader to understand the basic concepts of the figure without needing to refer to the text. Legends should be on a separate page from the figure. All figures and drawings should be of high quality (hand-drawn illustrations and lettering should be professionally done). Images are to be a minimum resolution of 300 dpi at 100% size. Patterns, not shading, should be used to distinguish areas within graphs or other figures. Unacceptable illustrations will result in rejection of the manuscript. Authors are also strongly encouraged to submit an electronic version (.cdr, .cpt, .gif, .jpg, and .tif formats) of all figures in individual files that are separate from the electronic file containing the text and tables.

Special Sections

Letters to the Editor:

Submission of letters regarding topics relevant to the Society or creation science is encouraged. Submission of letters commenting upon articles published in the *Quarterly* will be published two issues after the article’s original publication date. Authors will be given an opportunity for a concurrent response. No further letters referring to a specific *Quarterly* article will be published. Following this period, individuals who desire to write additional responses/comments (particularly critical comments) regarding a specific *Quarterly* article are encouraged to submit their own articles to the *Quarterly* for review and publication.

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Occasionally, the editor will invite individuals to submit differing opinions on specific topics relevant to the *Quarterly*. Each author will have opportunity to present a position paper (2000 words), and one response (1000 words) to the differing position paper. In all matters, the editor will have final and complete editorial control. Topics for these forums will be solely at the editor’s discretion, but suggestions of topics are welcome.

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All book reviews should be submitted to the book review editor, who will determine the acceptability of each submitted review. Book reviews should be limited to 1000 words. Following the style of reviews printed in this issue, all book reviews should contain the following information: book title, author, publisher, publication date, number of pages, and retail cost. Reviews should endeavor to present the salient points of the book that are relevant to the issues of creation/evolution. Typically, such points are accompanied by the reviewer’s analysis of the book’s content, clarity, and relevance to the creation issue.

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All members (categories 1–5 above) must subscribe to the Statement of Belief as defined on the next page.

Please complete the lower portion of this form and mail it with payment to CRS Membership Secretary, P.O. Box 8263, St. Joseph, MO 64508-8263, or fax for credit card payment to (816) 279-2312. Applications may also be completed online at creationresearch.org.

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† **New PAPERLESS option:** You may now opt out of receiving paper copies of the CRS periodicals (*CRS Quarterly* and *Creation Matters*). By choosing this option you may register for access to the Premium Area of the website, where you may view or download electronic (PDF) versions of these publications. Of course, regular members and subscribers may also have access to the Premium Area. Only members, however, will access to the Members Exclusive Area of the website.

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Creation Research Society

History—The Creation Research Society was organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (graduate degrees in science) and about 1000 non-voting members. The *Creation Research Society Quarterly* is a peer-reviewed technical journal. It has been gradually enlarged and modified, and is currently recognized as one of the outstanding publications in the field. In 1996 the CRSQ was joined by the newsletter *Creation Matters* as a source of information of interest to creationists.

Activities—The Society is a research and publication society, and also engages in various meetings and promotional activities. There is no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund and research center are maintained to assist in such projects. Contributions to the research

fund for these purposes are tax deductible. As part of its vigorous research and field study programs, the Society operates The Van Andel Creation Research Center in Chino Valley, Arizona.

Membership—Voting membership is limited to scientists who have at least an earned graduate degree in a natural or applied science and subscribe to the Statement of Belief. Sustaining membership is available for those who do not meet the academic criterion for voting membership, but do subscribe to the Statement of Belief.

Statement of Belief—Members of the Creation Research Society, which include research scientists representing various fields of scientific inquiry, are committed to full belief in the Biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution) both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. *All members of the Society subscribe to the following statement of belief:*

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.
2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.
3. The Great Flood described in Genesis, commonly referred to as the Noachian Flood, was a historical event worldwide in its extent and effect.
4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Savior. The act of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation can come only through accepting Jesus Christ as our Savior.

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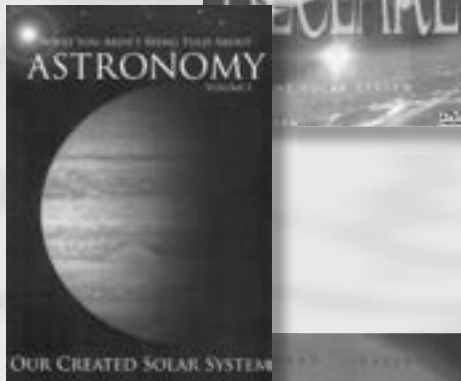


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