

CREATION RESEARCH SOCIETY



QUARTERLY

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EXEGETICAL AND GEOLOGICAL NOTES ON GENESIS 7**
- **THE HEART MOUNTAIN CONUNDRUM, PART 1:  
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**Haec Credimus**

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

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# God Floods Earth, yet Preserves Ark-Borne Humans and Animals: Exegetical and Geological Notes on Genesis Chapter 7

James J.S. Johnson and Timothy L. Clarey\*

## Abstract

This multidisciplinary research paper examines Genesis Chapter 7, which reports a critical timeframe during the global Flood. This study includes a verse-by-verse expository commentary on the original Hebrew text, in conjunction with integrating geological insights, gleaned from a newly compiled multi-continental database of stratigraphic columns. The analytical result is a data-based Genesis Flood model that connects the sedimentary rock record to historical highlights in Genesis Chapter 7's Flood narrative, with special attention to Flood Days 1, 40, and 150. We conclude that the Flood initiated on Day 1 with the bursting of the fountains of the great deep. The Flood-water continued to rise thereafter until it reached the Ark on Day 40, causing it to float freely. Between days 40 and 150, the water progressively rose until it reached its zenith, covering the highest hills by 15 cubits, where Chapter 7 ends.

**Key Words:** Zuni megasequence, Absaroka megasequence, Flood, Stratigraphic, Flood Day 1, Flood Day 40, Flood Day 150, Fountains of the great deep, Male-female unit, Windows of the heavens, Increased, Prevailed

## Introduction

Genesis Chapter 7 continues the preparation—by God and His servant, Noah—for the global Flood, followed by the Flood overwhelming the planet with its highwater climax. The Flood's catastrophic cataclysm was forewarned of (and preliminarily prepared for) in Chapter 6. The Flood's continuance

(from highwater climax at Day 150, followed by drainage) and aftermath are reported as narrative history (i.e., not “Hebrew poetry”) in Chapters 8 and 9 of Genesis, chronicling God's role—during the year-plus timeframe of the global Flood—as the divine Owner and Judge of Earth and of all its inhabitants (Johnson, 2011a; Johnson,

2019a). Because Genesis Chapter 7 is chronology-sensitive narrative prose, its literary structure frequently includes serial sentences, featuring *waw* consecutive-prefixed verbs (Johnson, 2011a; Johnson, 2019a).

Genesis 7 also gives us insight into the water levels and flooding of the continents at key moments in the Flood, such as Flood Days 1, 40, and 150. Other scholars have made attempts to merge the sedimentary rock record with data from the Biblical text (Whitcomb and Morris, 1961; Coffin, 1983; Brand, 1997;

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Barrick and Sigler, 2003; Barrick, 2008; Snelling, 2009; Walker, 2011; and Boyd and Snelling, 2014). Unfortunately, many of these earlier attempts relied heavily on secular geological data sets and/or were limited in scope and geographic range. In contrast, this study integrates the details found in the text of Genesis Chapter 7 with a multi-continental data set of stratigraphic columns that are relatively unrestricted by secular biases. Our petroleum-industry-based geological data come from over 1500 compiled stratigraphic columns across three continents, showing the actual rocks in place at each location (Clarey, 2020). Accordingly, we connected key dates (Days 1, 40, and 150) in the Flood account directly to the progression of the rising waters.

The chronological importance of Flood Day 150, and what it reveals about the pre-Flood calendar (Cooper, 2009), is also briefly highlighted hereinbelow.

## Exegetical Observations and Geological Commentary

### Genesis 7:1

Contextually, this verse begins with the *waw*-consecutive-prefixed verb “and He [i.e., the LORD] said” (*vayyōmer*), to show this is the continuation of God’s speaking activity (which began in Genesis 6:13) of telling Noah how to prepare for the soon-coming Flood, which includes a specific set of instructions on Ark construction and animals to be boarded therein. YHWH spoke unto Noah, telling Noah to “go!” (qal imperative singular masculine of *bō*), “you-yourself and your house[hold]” (*’atāh wekāl-bētekā*), unto “the Ark” (*ha-tēbāh*).

But why did God single out Noah (and his family) for this unique assignment?

God tells why: “because” (*kī*) Noah is singularly “seen” by God (literally “before My face”) as “righteous” (*šadīq*)

within Noah’s generation (*ba-dôr ha-zeh* = “in this generation”). Regarding how God saw Noah, YHWH uses *râ’itti*, the qal perfect 1<sup>st</sup> person form of the verb *râ’âh* (“to see”), to indicate that God’s observations of Noah were/are a completed action. (Grammatically speaking, any exceptions to this generalization needs to be specifically justified—with the “burden of proof” borne by whoever alleges the generalization as not being applicable to a specific passage.) Because, theologically speaking, we know that God is omnisciently foreknowing, God’s action of observing Noah’s life is truly a “perfect” action (*pardon the pun*). When addressing Noah (in 7:1b), the 2<sup>nd</sup> person singular *’attāh* (“you-yourself”) is used by YHWH, indicating that the “you” [KJV “thou”] refers to Noah individually, as opposed to using a plural for Noah’s family.

### Genesis 7:2

Noah is instructed to “take unto yourself” (*tiqah-lekâ*), i.e., onto the Ark, from “every” clean animal, “seven-seven, male and his female” (*šibe’âhh—šibe’âh ’iš we’istô*), i.e., seven pairs of each such animal category (Fruchtenbaum, 2009, p. 167). Noah is further instructed to take, from the animal which is not clean, “two, male and his female” (*šenayim ’iš we’istô*). If Genesis 7:2 said “two-two, male and his female” (which it does not say), that would more clearly indicate 2 pairs of every kind of unclean animal—however, the dual noun “two” is used only once, so the word “two” may mean the “pair”—with “pair” being composed of one male and his female, as the term “two” appears to be used earlier in Genesis 6:19–20 (Fruchtenbaum, 2009, p. 167).

However, it might alternatively be that here the number “two” means *two pairs* of each unclean animal “kind,” since one complete “animal” unit (if “animal” is defined by a created breedable “kind”) might be properly defined collectively (as a *male-female unit*,

as with mankind in Genesis 1:27). In other words, to have a true “unit” of mankind you must have both man and woman, to equal one mankind couple. The possibility of two pairs per kind is (arguably) supported, later, by Genesis 7:9 (“two-two”).

The animal categories are breedable “kinds,” according to how animal categories are defined earlier in Genesis (e.g., 1:11; 1:12 [2x]; 1:21; 1:24 [2x]; 1:25 [3x]; 6:20 [3x] with 6:19), buttressed by God’s purpose for such animals boarding the Ark—to preserve life during the Flood, so animal kinds can repopulate Earth after the Flood (6:19–20).

### Genesis 7:3

Noah is further instructed on the birds, who are treated differently, since they are to board the Ark at the rate of seven pairs per kind, regardless of whether they are “clean” or “unclean.” Specifically, Noah is to take birds (“from the fowl of the heavens”) “seven-seven, male and female” (*šibe’âh—šibe’âh zākâr ûneqēbâh*), i.e., seven pairs of each bird “kind” category (Fruchtenbaum, 2009, p. 167). This phrase is similar to how seven pairs of “clean” non-fowl animals were described in 7:2, except the respective nouns used for the phrase “male and his female” differ. As in 6:19–20, God repeats mention of His providential purpose of preservation—“to continue living seed [*zera*] upon the face of all the earth”—which matches God’s original mandate that life-forms be fruitful and multiply in their respective parts of the Earth. Perhaps that difference emphasizes a distinction between bird couples and non-bird animal pairs, or maybe that is a “distinction without a difference.”

### Genesis 7:4

Noah is told God’s deadline, “seven days” (literally “unto days yet seven”)—then the punishing Floodwaters will hit the Earth, because then God will “cause raining” (here “rain” is a *hiphîl* participle verb form of *mâtar*) to pound down

upon the Earth, non-stop, for 40 days and 40 nights (literally “40 of day, and 40 of night”), as it soon did (see Genesis 7:12). The result of this rainfall will be unprecedented and huge destruction: “and I will blot out” (God’s coming action, which will have continuing aspects to it, is represented by *ûmâhîti*, the *waw*-consecutive-prefixed *qal* perfect 1<sup>st</sup> person singular form of *mâhâh*) “every life-form” (*yaqûm* = that which grows up, from root verb *qûm*). The doomed creatures of “the ground” (*ha’adâmâh*) will be blanketed and blotted out by the soon-coming rained-down waters of the prophesied Flood.

### Genesis 7:5

This verse resembles Genesis 6:22, where Moses reports that Noah did as God commanded. Both verses use forms of the verb *šâwâh* (“to command,” “to decree”) to refer to God’s commands; likewise, both verses use forms of the verb *’âsâh* (“to do,” “to work”) to refer to Noah doing as instructed. As a matter of exegetical context, one immediate question is whether the actions that God commanded in Chapter 6, which Noah did (as summarized in 6:22), are identical to the actions that YHWH commanded in Chapter 7, which Noah did (as summarized in 7:5). The timeframe context, for Noah’s actions reported in Chapter 6 actions, seems to begin when Noah is 500 years old (compare Genesis 5:32 with Genesis 6:10), and we learn (from Genesis 7:6) that God sent the Flood when Noah was 600 years old. Thus, Noah had 100 years to prepare the Ark according to God’s architectural-outline instructions (which dominate Chapter 6), and Chapter 6 only alludes to animals boarding the Ark by “pairs” (6:19–20)—no mention is made in Chapter 6 of “clean” animals to board the Ark “seven-seven, male and his female” (*šibe’âhh—šibe’âh ’iš we’îštô*), i.e., seven pairs of each “clean” animal kind, as specified in Genesis 7:2.

Likewise, no mention is made in Chapter 6 of bird kinds to board the Ark “seven-seven, male and female” (*šibe’âh—šibe’âh zâkâr ûneqēbâh*), i.e., seven pairs of each bird “kind,” as specified in Genesis 7:3. That difference in specification may indicate that Noah did not need the animal details until the Ark itself was well under construction—since Noah appears to have had 100 years for this building project. So, perhaps decades later—as the diluvian doomsday loomed near—God provided greater specificity to Noah, about boarding animals (and thus those details are reported in Chapter 7). If so, Noah’s faithful obedience reported in Chapter 6 (at 6:22) may focus mostly on Ark construction, whereas Noah’s faithful obedience reported in Chapter 7 (at 7:5) may focus more on Noah’s oversight of the selected animals and boarding process, to achieve the biodiversity formula that God chose.

Another possibility should be considered: God may have originally set aside room in the Ark to preserve a minimum of land-dependent animal kinds, with much more of the Ark’s room preliminarily reserved for humans—many more than just eight. Noah preached to his generation (2<sup>nd</sup> Peter 2:5; Hebrews 11:7), during the 100 years before the Flood, but none responded with enough belief to board Noah’s Ark, except Noah’s own family members (2<sup>nd</sup> Peter 2:5), so whatever Ark space *that could have housed more humans*—by the dozens or scores or hundreds—would be “wasted” (unoccupied) during the Flood, unless God later modified His earlier command to Noah, regarding animal pairs, to increase *sevenfold* the pairs of clean beast kinds and also the bird kind pairs. It does seem that the timeframe for God’s specific instructions to Noah (that included some animal pairs to board by sevens), as reported in Chapter 7 (at 7:4), were given very near to “curtain-time,” i.e., seven days (*leyamîm ’ôd šibe’âh* = “for days yet seven”) before the Flood was to

hit the earth. If so, it might be that it was then obvious (after a century of Noah’s preaching) that no more humans would board, so God allocated that extra space to rescue more animal pairs.

### Genesis 7:6

This verse (7:6) reports when the global Flood began—it struck the Earth when Noah was 600 years old, which is 100 years after Noah became the father of Shem, Ham, and Japheth (see *wayyôled*, the *waw*-consecutive-prefixed *hiphîl* imperfect form of *yâlad* in Genesis 5:32, denoting the begetting of Noah’s sons as occurring when Noah was 500 years old).

If the perspicuity of Scripture is assumed, which it should be, Genesis 5:32 indicates that all three sons were begotten when Noah was 500 years old, i.e., they were born as triplets. (Multiple births are very important in Scripture, as twins Jacob and Esau illustrate; it also appears that Cain and Abel were twins.) Some have been misled by the KJV translation of Genesis 10:21, which says “Japheth the elder”—but the noun translated “elder” is *gâdôl* (meaning “great” in size or importance, similar to how the “tower” [*migdâl*] of Babel was not “ancient” in age, rather it was quantitatively tall [“great”] in size), not *zâqên* (meaning “old” or “older” in age). Noah’s three sons are always mentioned in birth order—Shem, Ham, and Japheth (Young, 1874, p. 698)—so Japheth is technically the youngest of the three sons, not “elder” (Johnson, 2002, pp. 8–10). The relevance of this chronology detail is to show that some have confused chronology details that Moses provided, in Genesis, such as those details that Moses provided within Genesis Chapter 7.

The word *hamabbûl* (i.e., *ha + mabbûl*) is routinely translated “the flood” in English translations (e.g., 13x in KJV), perhaps being etymologically related to *mabbû’* (translated “fountain” or “spring”), with the New Testament Greek equivalent being *κατακλυσμός*

(see Matthew 24:38–39; Luke 17:27; 2<sup>nd</sup> Peter 2:5). In Genesis the Hebrew noun *mabbûl* (“flood”) always refers to the worldwide Flood (see Genesis 6:17; 7:6–7; 6:10; 6:17; 9:11; 9:15; 9:28; 10:1; 10:32; 11:10), and the only other usage of *mabbûl* is in Psalm 29:10, which likewise appears to refer to the global Flood of Noah’s generation (Wigram, 1874, p. 660).

### Genesis 7:7

When the Flood violently hit Earth, as noted in 7:6, Noah summarily “went” (*wayyâbô* = *waw*-consecutive-prefixed *qal* imperfect 3<sup>rd</sup> person singular form of *bô*) unto the Ark (*ha-tēbâh*), plus his sons (and + *bânâyw*), and his wife (and + *’ištô*), and the wives of his sons (and + *nešê-bânâyw*), away from the presence of the accumulating Floodwaters (*mê hammabûl* = “waters of the flood”). This was a completed action by Noah and his household—they were literally leaving behind the soon-to-perish antediluvian world (which previously was the only world that they knew), as God commenced to destroy it (2<sup>nd</sup> Peter 3:6).

### Genesis 7:8

The animals boarding the Ark are described in this verse (7:8), continuing into the next, “from” the “clean” beast (singular noun used as collective representing the group), and “from” the unclean beast (singular noun used as collective representing the group), and “from” the fowl (singular noun used as collective representing the group), plus “each which is creeping upon ground” (*kôl ’aşer rômês ’al ha-’adâmâh*). Animal kinds were preserved by representative male-plus-female survivor pairs, selected “from” the entire group of every air-breathing terrestrial animal “kind,” so that each such kind could reproduce after the Flood (see Genesis 6:19–20).

### Genesis 7:9

The animal pairs boarded “two-two” (*šenayîm šenayîm*) ... “male and female

(*zâqâr ûnqēbâh*), either meaning “pair [after] pair” (of different animal kinds) or meaning “[by] two pairs” (if unclean animal kinds were represented by two pairs of survivors, as opposed to only one pair), just as God had “commanded” (*šiwwâh* = *piel* perfect 3<sup>rd</sup> person masculine singular form of *šâwâh*) Noah. (See analysis of “pairs,” hereinabove, in the earlier discussion of Genesis 7:2–3.) This boarding of animals by pairs, with some animal “kinds” being boarded as seven pairs, is relevant to both reproductive biology and biodiversity studies.

### Genesis 7:10

As foretold in Genesis 7:4, after “seven of days” (*šibe’at hayyâmîm*) the Floodwaters (*mê hammabûl* = “waters of the Flood”) were upon (*’al*) the Earth (*hâ-âreš*). As Genesis 7:20 indicates, this would be global. The word “days” (*yâmîm* = plural of *yôm*) is the same word for “days” that Moses used previously in Genesis (1:14; 3:14; 3:17; etc.), as well as later, when alluding to the events of Creation Week (see Exodus 20:11)—i.e., these are ordinary (solar) “days” as we know them. Throughout Genesis, Moses is careful to say “day” when referring to a single/notable day, and to say “days” when a timeframe involves more than one literal (i.e., solar) day. Likewise, the Lord Jesus referred to the “days” (not “day”) of Noah and of Lot (Matthew 24:37; Luke 17:26–28)—unlike the sloppy phrase “back in the day [sic]” that we all-too-often hear nowadays.

### Genesis 7:11

The recording of the exact date of the Flood’s beginning (literally, “in year six-of-hundred of the life of Noah, in month the second, in seventeen of day unto the month, in that day”), as given in 7:11, emphasizes how this account of the global Flood is narrative history (Johnson, 2011a) capable of being calendared in “real time”—the Genesis Flood account is obviously not some sort of “Hebrew poetry” that can be treated

allegorically or as some kind of mythical folk-tale.

In fact, the calendar information in Genesis—starting with this verse (i.e., Genesis 7:11)—suggests that Earth’s lunar and solar periodicities were slightly different before the Flood. This has been succinctly analyzed by the late Dr. Bill Cooper (ICR’s highly esteemed Master Faculty, who also served the Creation Science Movement of Great Britain), whose analysis is now quoted (for the convenience of *CRSQ* readers):

The moon orbits the earth every 29.5 days or so, and the year is (roughly) 365.25 days in length. It is an untidy arrangement that makes alignment of the lunar and solar calendars virtually impossible. [Even when we try, the arrangement is never perfect. The lunar month divides into the solar year roughly 12.4 times (being about, but never exactly, 11 days short of the present solar year.) It doesn’t get any better when we compare solar and lunar time with sidereal time, in which the fixed stars appear to go round the earth not once every 24 hours like the sun, but every 23 hours 56 minutes and 4 seconds, a slippage of nearly 4 minutes a day!] How much simpler it would have been had God, at the creation, decreed that the year should be 360 days and the lunar month 30 days in length. Evidence shows that God so ordained it at the beginning. The lunar year consisted of 12 months of 30 days’ duration, equaling exactly the solar year of 360 days. Only after the Flood did the two calendars drop out of line with each other, necessitating numerous calendar reforms which even today have not resolved the problem.

But how can one possibly know that the pre-Flood year consisted of 12 equal months of 30 days?

Today’s lunar calendar doesn’t consist of 12 equal months. Nor does the solar calendar. Today’s

lunar months are alternately 29 and 30 days, making the lunar year one of just 354 days, 11 days (or more) short of the present solar year. Is there evidence that the pre-Flood lunar calendar did not contain this aberration? The evidence is found in the book of Genesis. The writer notes two specific calendar events: the exact day on which the fountains of the deep were broken up and the windows of heaven were opened (Genesis 7:11), and the exact day on which the waters abated (Genesis 8:3–4). The importance of this information is this: The Flood began on the 17th day of the 2nd month (Genesis 7:11), and was over by the 17th day of the 7th month (Genesis 8:4). That makes 5 months of 30 days duration each, which Genesis stresses by adding the day-count of 150. Five months in the “modern” (actually ancient) Jewish calendar would have been either of 147 or 148 days’ duration, depending on whether the 5-month period began on a 29-day or a 30-day month.

The fact that Genesis uses here a *pre*-intercalationary calendar is a most important indication of its antiquity. Had Genesis been written during or after the Jewish exile in Babylon or Persia (6th–5th centuries BC), as modernists claim, it would have used the intercalationary calendar of Babylon and Persia, which, like the Jewish calendar, would certainly not have measured five months as 150 days. Besides, the post-exilic Jews always named the months after the Babylonian fashion and would have used those names in any “edited” account. Genesis doesn’t. It merely numbers the months in accordance with *pre*-Babylonian usage. Illustrated above [*photograph in original article*] is an Assyrian lunar calendar (which names the months) from

circa 1800 BC. It still works, but measures the post-Flood lunar year as 354 days. The Flood account in Genesis pre-dates its manufacture. In other words, this part of Genesis was written before the effects of the Flood—the sudden slippage between lunar and solar time and so on—began to be observed and measured. [“With the fountains of the great deep relocating a huge volume of liquid, moving continents, possible asteroid bombardment, etc., shifting the location of much mass, the length of the day, the length of the year, and the tilt of the axis could have all changed.” Morris, John D. 2005. In the Early Earth, Were All the Months Exactly Thirty Days Long? *Acts & Facts*, 34(12).] Thus, the calendar portrayed in its first chapters is a further evidence of the antiquity of Genesis.

This analysis (Cooper, 2009, quoted above) is further detailed with archaeological data within Chapter 9 of Dr. Cooper’s classic, *The Authenticity of the Book of Genesis* (Cooper, 2011), at pages 64–68. So, Earth’s chronometry was cataclysmically changed!

This cataclysmic change, which soon convulsed Earth globally, began with catastrophic volcanism. Arnold Fruchtenbaum translated the volcanic action (in Genesis 7:11) as follows: “On the same day were all the fountains of the great deep broken up” (Fruchtenbaum, 2009, p. 169).

What follows is a description of how the worldwide Flood initially erupted and then increased flooding: (a) starting with “great deep”-sourced floodwaters being “burst/ruptured” out (*nibqe’û* = *niphal* perfect 3<sup>rd</sup> person plural form of the verb *bâqa’*), meaning “to burst”—like an egg hatching, in Isaiah 34:15, or like a bottle-like vessel breaking apart, in Job 32:19, or like the miraculous earth-splitting reported in Numbers 16:31 (Wigram, 1874, pp. 264–265; Barrick, 2008, pp. 261–262, especially footnote

62)—followed by the “windows of the heavens” being “opened” (*nip̄tâhû* is the *niphal* perfect 3<sup>rd</sup> person plural form of the verb *pâtaḥ*, meaning “to open”). Thus, the worldwide Flood began with two unprecedented and powerful actions (both of which are reported by **perfect** verbs, denoting event-like actions that were soon completed), with both of those actions providing floodwaters that would eventually cover the globe: (a) “all the fountains/wellsprings of great-deep” were “burst” by God; and (b) “windows of the heavens” were “opened” by God, so waters came geysering and gushing up from below—“great deep” places (perhaps from below the oceans and/or far below the Earth’s land surfaces)—as well as from the atmosphere, due to “windows” in the sky being “opened.” Since these two disruptive geological/meteorological activities are linked as causing the Flood’s beginning, it is noteworthy that volcanic aerosols can help to trigger atmospheric precipitation, such as rainfall (Hebert, 2020).

Exactly what the “fountains” entailed is unclear from a geologic standpoint. Here, we agree with Austin et al. (1994), who also believed that the bursting of the “fountains of the great deep” were the initiation of the tectonic plates. Today’s volcanoes (including sub-oceanic volcanoes and ocean ridges) produce a tremendous amount of gases, like water and carbon dioxide, along with molten lava. It seems likely that the “fountains of the great deep” produced a lot of water/steam as they changed into a melt. There would have been a lot of pressure released as the magma rose upward in the Earth, but exactly how high this water/steam shot up into the atmosphere is unclear (Austin et al., 1994). One thing is clear, a tremendous volume of water still appears to be trapped in mantle minerals like wadsleyite and ringwoodite, which can produce vast amounts of water when they melt. In fact, amazingly, recent discoveries indicate that the mantle

transition zone (410–660 km deep) still contains as much trapped water as do the oceans (Fei et al., 2017)!

The initiation of vast rifts both on land and beneath the oceans (the fountains) may be the primary geological event that occurred during the first 10 or so days of the Flood (Clarey, 2020). Earth is unique in our solar system, appearing to be the only planet that has tectonic plates. As far as we know, Earth is the only planet in the universe to possess such features.

There is a lot of geological evidence for the simultaneous development of multiple rift zones across the globe, including several along the edges of North America and possibly the Midcontinent Rift in the continental interior (Reed, 2000; Clarey, 2020, pp. 182–186). These elongate rifts may be the “fountains” as described in Genesis 7:11.

Several discoveries have suggested that conditions were vastly different at this time, just prior to the deposition of the Sauk Megasequence (Cambrian through Lower Ordovician System rocks) (Figure 1).

German scientists found evidence suggesting the Earth’s mantle was up to 300 degrees Fahrenheit (about 150 degrees Celsius) *hotter* during the initial, formative stages of the Atlantic Ocean—when the continents began to violently pull apart to create it—compared to today (Brandl et al., 2013). These scientists studied the composition of oceanic crust using deep-sea drilling core samples and found a systematic change in chemistry from the edge of the continents to that of the middle of the ocean. Shifts in chemistry were linked to changes in the temperature of the underlying mantle that generated the oceanic crust. These findings suggest that the initiation of the great Flood may have begun with an anomalously high-temperature mantle beneath the pre-Flood crust. As the tectonic plates rifted apart, molten mantle filled the ever-widening gap, making new ocean

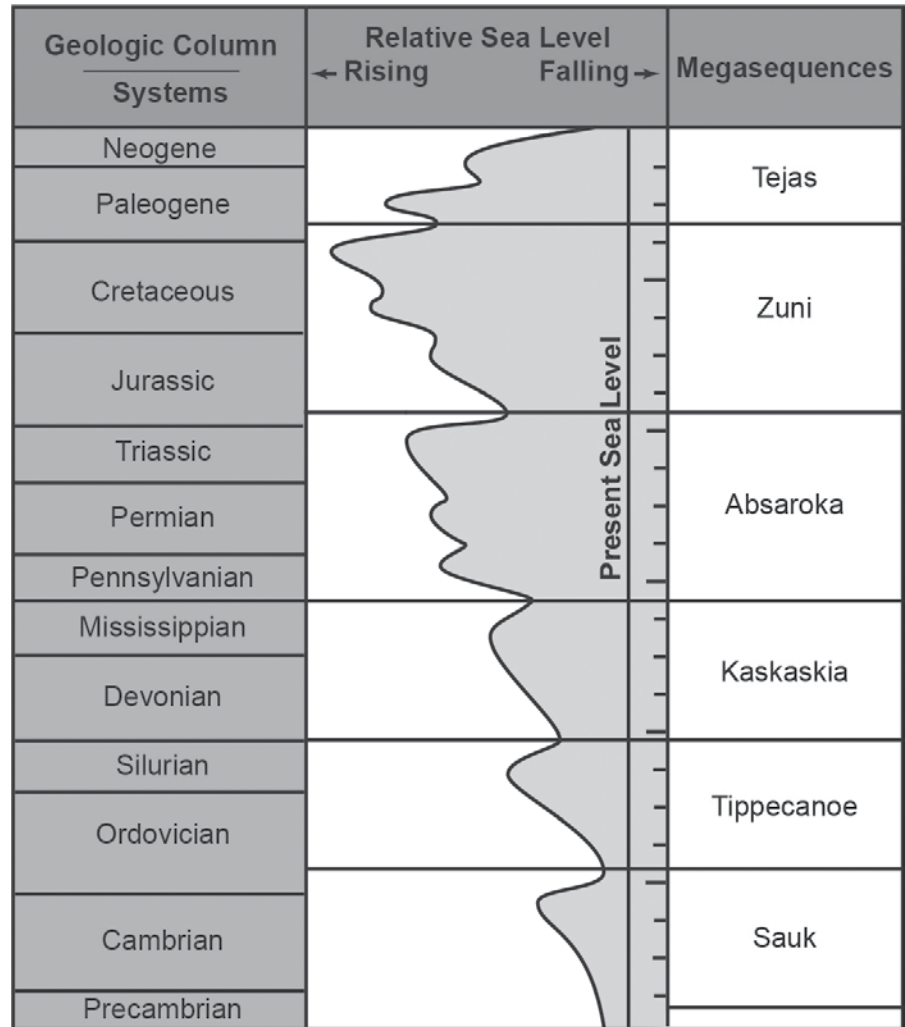


Figure 1. Diagrammatic global sea level curve showing the megasequences and geologic systems (Clarey, 2020, p. 474).

crust and supporting the concept of catastrophic plate tectonics.

The German scientists also noted that the average ocean ridge today resides at a depth of 2.9 km (1.8 miles) below sea level. In contrast, they calculated that the ridges above the hotter mantle in the past would have only been about 1 km (0.6 miles) below sea level—well over a mile higher (Brandl et al., 2013). What effect would this have had? Shallower ridges from higher heat flow would have raised global sea

levels, at least partially accounting for the inundation of the continents during the Flood event. Later, as the mantle progressively cooled, the ocean ridges would have sunk, dramatically dropping sea level and draining the water off the continents to end the Flood.

Two recent discoveries may provide important validations of the “fountains of the great deep” that started the deluge (Brune et al., 2017; Paulsen et al., 2017). A spike in volcanic activity and the rapid release of massive amounts of

carbon dioxide seems to have occurred just prior to the deposition of Cambrian rock layers (Paulsen et al., 2017).

Cambrian rocks are considered by many creation geologists to represent the first extensive Flood deposits (Whitcomb and Morris, 1961; Coffin, 1983; Austin et al., 1994; Brand, 1997; Snelling, 2009). Cambrian sediments are the bottom-most layer in the Sauk Megasequence and contain fossils of the so-called Cambrian Explosion—the first sediments with prolific numbers of hard-shelled organisms (Clarey, 2015a). However, in some limited locations, the beginning of the Flood rock record may have begun a bit lower in the rock record, in what is called the Neoproterozoic (Austin and Wise, 1994; Snelling, 2009) and possibly as far back as the end of the Mesoproterozoic (Reed, 2000; Clarey, 2020, pp. 182–186). Paulsen et al. (2017) concluded there is strong evidence of a massive outpouring of carbon dioxide and associated volcanic activity just prior to the deposition of the Sauk Megasequence in a system called the Ediacaran. The Ediacaran is what secular scientists call the latest Precambrian (latest Neoproterozoic).

The Bible offers a clear explanation for this newly identified spike (in volcanic activity and the rapid release of massive amounts of carbon dioxide): **volcanism**, i.e., sub-oceanic volcanoes denoted in Genesis 7:11 (*ma'yenōth tehôm rabâh* = “fountains of the great deep”) and in Genesis 8:2 (*ma'yenōth tehôm rabâh* = “fountains of the deep”) [I could not find *rabâh* or *rab* (“great”) in Genesis 8:2]. The breaking up of the fountains of the great deep may be a description of the great rifting that took place at the ocean-floor ridges, along the continental margins and even within the continents. Today, we merely see the remnants of this activity in the ridges of our modern oceans. No longer are they spewing out tremendous volumes of molten lava and massive amounts of

CO<sub>2</sub>. The Flood was a one-time event like no other.

### Genesis 7:12

The initial downpour of rainfall, that continued relentlessly, was “40 days and 40 nights”—this is historical narrative, so the quantification is literally true as history.

The fact that the number 40 is used repeatedly, in Scripture, for timeframes of *testing* (e.g., 40 years of wandering in the wilderness after the Exodus, as well as the Lord Jesus Christ being tested in the wilderness for 40 days, etc.), does **not** negate the historical facts as reported. Examples include the initial non-stop downpour of rain at the Flood’s beginning (Genesis 7:4; 7:12; 7:17; 8:6), Moses’ time on Mount Sinai (Exodus 24:18 & 34:28), Israel’s wilderness wanderings after the Exodus (Numbers 14:33; Deuteronomy 2:7; Amos 2:10; Acts 7:42), the Lord Jesus Christ being tested in the wilderness (Matthew 4:2; Mark 1:13; Luke 4:2); and the Lord Jesus Christ testing Jews, with the witness of “infallible proofs,” by appearing to them after His resurrection (Acts 1:3). Rather, that topical consistency (i.e., of the number 40 being associated with “testing” or “trials”) illustrates how God **controls** the flow of Providential history, sometimes emphasizing the topic of testing by delineating the timeframe by some count involving the number 40.

The first 40 days of the Flood likely included the start of plate motion as the originally-created cold and dense oceanic lithosphere began to subduct into the newly formed rifts. This subduction process may have begun as early as Days 10–20 of the Flood year (Clarey, 2020, pp. 194–215).

We interpret the pre-Flood world as looking something like the supercontinent Pangaea with a narrow, 300–500 km wide, pre-Atlantic Ocean between North America and Europe and Africa (Clarey and Werner, 2018; Clarey and Werner, 2020; Clarey, 2020). This is

supported by the discovery of shallow P and S wave anomalies beneath the Appalachian Mountains that indicate only about 300 km of subduction occurred during destruction of this pre-Atlantic Ocean (Schmandt and Lin, 2014), providing a limit to its width. A modified Pangaea-like supercontinent has the most observable geological evidence to support it, including the fit of the continents, and significantly reduces the amount of plate motion required by not having to transform Rodinia into Pangaea, as has been suggested by Snelling (2009). Recently, Clarey and Werner (2020) showed that the fit of Precambrian salt deposits across the Middle East, Pakistan, and India—based upon available geological data—best fit this Pangaea-like configuration, completely contradicting a Rodinia-like interpretation/model of the pre-Flood world.

The first consequence of sudden plate movement would have been the generation of massive numbers of tsunami-like waves. Geologically, this coincided with the onset of the deposition of the Sauk Megasequence as the tsunami-like waves moved across the shallow seas on the continental crust (Clarey, 2020, pp. 143–145). The waves spread blanket sands across the shallow seas on the edges of the continents. Many shallow marine organisms were inundated, creating the Cambrian Explosion as layers of sand, mud and lime were spread across vast regions of North America and the other continents also.

Although several previous researchers have suggested that the Flood rose, flooded the whole Earth, and/or reached a peak about Day 40 or shortly thereafter (Whitcomb and Morris, 1961; Barrick and Sigler, 2003; Snelling, 2009; Dickens and Snelling, 2015), we strongly disagree. We especially disagree with the interpretation that all vertebrate fossils were somehow dissolved by acidic waters released by the bursting of the fountains of the great deep as proposed by Dickens and Snelling (2015). If this were correct,

there should be prolific deposits of partially dissolved vertebrates globally. And acidic waters would have also destroyed the invertebrates. Instead, we observe prolific volumes of almost exclusively marine invertebrates in the earliest three megasequences and predominantly only marine vertebrates, especially fossils like fish (Figure 1). There are few, if any, partially dissolved fossils of any kind in these early megasequences as would be expected if the fountains of the great deep did in fact cause significant dissolution.

Clarey and Werner (2017) demonstrated quite conclusively that the early flooding was minimal across many continents, showing only limited areal extent during the Sauk Megasequence. The subsequent Tippecanoe and Kaskaskia Megasequences, likewise showed limited extent across the continents also (Clarey and Werner, 2017; Clarey, 2020).

The likelihood that erosion could have destroyed the true extent of the early megasequences is refuted by the overlapping and coincident extent of the early megasequences, especially across North Africa and South America (Clarey and Werner, 2017). Significant erosion of these early megasequences should have left more random patterns and little consistency (Clarey and Werner, 2017), contrary to what is observed.

Figure 1 shows the megasequences, the geologic systems, and a diagrammatic global sea level curve as interpreted by Clarey (2020, p. 474) from his global stratigraphic column research. Minimal flooding is reflected in the sea level curve in the earliest megasequences (Sauk and Tippecanoe). This curve is partially based on Table 1 and the extent and thickness maps as shown by Clarey (2020, pp. 470–471).

Possibly during Days 20–30 the tsunami-like waves of the Sauk Megasequence subsided and a new pulse of waves were generated from continued rapid plate motion, initiating the Tippe-

**Table 1. Surface area, sediment volume, and average thicknesses for North America, South America, and Africa for each of the six megasequences (Clarey, 2020, p. 473).**

Surface Area (km <sup>2</sup> )	North America	South America	Africa	Total
Sauk	12,157,200	1,448,100	8,989,300	22,594,600
Tippecanoe	10,250,400	4,270,600	9,167,200	23,688,200
Kaskaskia	11,035,000	4,392,600	7,417,500	22,845,100
Absaroka	11,540,300	6,169,000	17,859,900	35,569,200
Zuni	16,012,900	14,221,900	26,626,900	56,861,700
Tejas	14,827,400	15,815,200	24,375,100	55,017,700
Volume (km <sup>3</sup> )	North America	South America	Africa	Total
Sauk	3,347,690	1,017,910	6,070,490	10,436,090
Tippecanoe	4,273,080	1,834,940	6,114,910	12,222,930
Kaskaskia	5,482,040	3,154,390	3,725,900	12,362,330
Absaroka	6,312,620	6,073,710	21,075,040	33,461,370
Zuni	16,446,210	23,198,970	57,729,600	97,374,780
Tejas	17,758,530	32,908,080	28,855,530	79,522,140
Average Thickness (km)	North America	South America	Africa	Total
Sauk	0.275	0.703	0.675	0.462
Tippecanoe	0.417	0.430	0.667	0.516
Kaskaskia	0.497	0.718	0.502	0.541
Absaroka	0.547	0.985	1.180	0.941
Zuni	1.027	1.631	2.168	1.712
Tejas	1.198	2.081	1.184	1.445

canoe Megasequence and the deposition of the Middle Ordovician through Silurian strata (Clarey, 2020, pp. 216–233). This megasequence also buried millions of shallow marine organisms, reaching a slightly higher level, especially in South America, as new ocean lithosphere continued to form at the ridges. The Tippecanoe was also mostly confined to the pre-Flood shallow seas on the edges of the continents. It was during this time that the pre-Atlantic narrow ocean likely began to close as ocean lithosphere was subducted into the mantle, bringing Africa closer to North America (Clarey and Werner, 2018). The geologic record indicates the initial collision occurred along the northern boundary between those two continents.

Possibly during Days 30–40 the tsunami-like waves of the Tippecanoe

receded and another series of waves advanced across the continents depositing the Devonian and Mississippian rocks of the Kaskaskia Megasequence (Clarey, 2020, pp. 234–255). These deposits again covered primarily shallow seas, leaving a massive blanket-like limestone across a large portion of North America that included the Redwall Limestone in Grand Canyon.

The postulated pre-Flood narrow sea (300 km width) between North America and Africa and Europe was completely closed at this point in the Flood (Clarey, 2020). This caused deformation of earlier Flood sediments and created the Appalachian and Caledonian Mountains. Similarly, other early Flood mountains formed elsewhere, such as the Urals. The fossils buried in the sediments were much the same for

all three of the earliest megasequences. Shallow marine organisms continued to dominate the fauna.

Genesis 7:12 and Genesis 7:17 tell us about the initial 40 days of intense rain. Why are the initial 40 days described as predominantly rainfall? It is possible that up until Day 40 the Flood-waters still had not affected significant portions of the pre-Flood dry land (Clarey and Werner, 2017; Clarey, 2020).

The Sauk, Tippecanoe and Kaskaskia Megasequences contain nearly 100% marine fossils (Clarey, 2020, p. 243). Very few land animals, or plants for that matter, were trapped by these three megasequence cycles. Apparently, the intense rain was the major factor affecting the “dry” land portions of the continents up to this point in the Flood. Humans on the Ark, like Noah, who lived through the Flood would have known the first 40 days as a time of intense rainfall, without significant flooding of the dry land. The Bible suggests in Genesis 7:17 that it wasn’t until after these first 40 days that the Ark began to float, thereby verifying that the flooding of the land had commenced (Barrick and Sigler, 2003; Clarey, 2020, p. 246).

### Genesis 7:13

This verse (7:13) returns to action reported in 7:7. Again, emphasizing the literal historicity of this account, 7:13 reports that Noah, with his three sons (who this time are named: “Shem and Ham and Japheth”—listed in birth order, as always), plus Noah’s wife, plus the wives of Noah’s sons, all “entered” (here the verb *bô’* is a qal perfect, denoting a completed entry) the Ark.

### Genesis 7:14

Using the qualifying term “unto its kind” (*lemînâh*), 7:14 emphasizes God’s purpose for the Ark, besides preserving Noah’s family, is to preserve biogenetic (i.e., interbreedable) “kinds” of air-breathing terrestrial animals. See Genesis 6:19–20; the same preposition-

prefixed noun (*lemînâh*) is used in 6:20. Genesis 7:14–15 recounts activities reported in Genesis 7:8–9.

### Genesis 7:15

Recounting 7:9, the animal pairs boarded “two-two” (*šenayîm šenayîm*), either meaning “pair [after] pair” (of different animal kinds) or meaning “[by] two pairs” (if unclean animal kinds were represented by two pairs of survivors, as opposed to only one pair). This verse (7:15) emphasizes that the Ark-preserved land-based animals are animals that **must breathe air** (“from all flesh which [has] in it [the] breath of life”). Animals, not plants, are such “life”-forms.

### Genesis 7:16

This verse (7:16) recounts activity reported in Genesis 7:9, repeating mention of Noah’s faithful obedience to what God (*’elôhîm*) had commanded (*šiwâh* is piel perfect 3<sup>rd</sup> person singular masculine form of the verb *šiwâh*, “to command”)—yet Genesis 7:16 adds the very important fact that YHWH Himself “shut in” Noah (*wayyisgôr* is the *waw*-consecutive-prefixed qal perfect 3<sup>rd</sup> person masculine singular form of the verb *sâgar*, meaning “to shut” or “to seal /keep closed”). This intensive verb indicates that it was God’s emphatic action, when He (completely) shut the Ark door, to protect Noah and all who embarked on the Ark with him. The Genesis Flood is obviously God’s sovereign operation. The verb *sâgar* is also used of God’s action in keeping a womb closed (1<sup>st</sup> Samuel 1:5–6). The same verb is also used, elsewhere, of doors and gates being shut (Genesis 19:6; Joshua 2:7; Nehemiah 6:10; Ezekiel 44:2), of overlaying an object with gold (1<sup>st</sup> Kings 6:20–21 & 10:21), of being shut up in prison (Isaiah 24:22), etc.

### Genesis 7:17

This verse (Genesis 7:17) reports how the Ark encountered enough Flood-waters, as the oceans surged and over-

whelmingly transgressed the shorelands, with an ever-rising water level: the Floodwaters “increased” (*wayyîrbû* = *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person masculine plural of *râbâh*), and they “bore up” (*wayyîšē’û* = *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person masculine plural of *nâšâ’*) the Ark, so that the Ark “arose” (*wattârâm* = *waw*-prefixed qal imperfect 3<sup>rd</sup> person feminine singular of *rûm*) “from above the earth” (*mē’al ha-’areš*). As the Flood-waters continually encroach into the continental landmasses, the Floodwater level rises all over the Earth—eventually to cover the entire globe and then some (i.e., with 15 cubits above even the highest montane summits).

Since Genesis 7:17 tells us that the Ark began to float after 40 days, we can assume that pre-Flood dry land began flooding at this point also. Runaway subduction and plate motion were (likely) now occurring on a global scale, especially around the Pacific Rim (Clarey, 2020).

Meanwhile, the entire pre-Flood ocean floor continued to be consumed and a new ocean surface was forming through the process of catastrophic plate tectonics (Austin et al., 1994). This hotter ocean floor rose and pushed the ocean water and the tsunami waves higher and higher (Clarey, 2020, pp. 256–281). The deposition of the Absaroka Megasequence marks a critical juncture in the Flood account when things went from bad to worse. These Upper Carboniferous through Lower Jurassic strata were possibly deposited during Days 40–90 of the Flood year (Figure 1). After the initial 40 days of intense rain and tsunamis crashing across the shallow seas on the edges of the continents, the seas begin to rise higher and flood some of the land, including lifting up the Ark.

By the earliest part of the Absaroka Megasequence cycle, the major continents of the world had completely formed the supercontinent Pangaea by

completely closing up the pre-Atlantic Ocean. This resulted in renewed deformation along the Appalachian Mountains (including many overthrusts) and the intense folding within the Hercynian mobile belt across Western Europe. These deformational events folded and faulted many of the earliest deposits of the Flood. Before this, the continents were in a slightly different pre-Flood supercontinent configuration, referred to as ‘modified’ Pangaea (Clarey, 2020, pp. 152–171).

Later in the Absaroka Megasequence cycle, subduction along the USA West Coast commenced and the various plates of the Pacific Ocean began their rapid development. The supercontinent of Pangaea was wrenched apart, beginning with rifting that separated North America from West Africa, creating the new seafloor of the North Atlantic Ocean.

The Absaroka Megasequence introduces a lot of “firsts” to the geologic record (Clarey, 2020, pp. 271–275). It is not just a coincidence that so much occurs at the same time at this point in the Flood. These events had a common cause. Sea level was pushed upward dramatically in the Absaroka as more ocean lithosphere formed, resulting in the first areas of dry land becoming inundated across the globe. This began to change everything in the rock record.

The first extensive coal beds are found at this level, formed by the destruction of lycopod forests fringing the land masses. These were the so-called Carboniferous coals. The Absaroka also saw the first and sudden appearance of massive numbers of terrestrial animal fossils. Amphibians show up near the base of the Absaroka, followed by reptiles in the layers above. Even dinosaurs and mammals make sudden appearances before the Absaroka is over (Triassic System). Most of these terrestrial fossils were mixed with marine fossils (Clarey, 2015b).

Large marine reptiles also make their first appearance in the Triassic System

of the Absaroka Megasequence. Ichthyosaurs were common fossils in the Lower Triassic and are found in rocks as high as the later Cretaceous System of the Zuni Megasequence.

Finally, the so-called Permian extinction occurs in the early portion of the Absaroka. This has been hailed by secular scientists as the largest ‘extinction’ of all geologic time, or at least exhibiting the most abrupt changes in fossil species. Many of the fossils found above and below this horizon are, in fact, vastly different.

However, most creation geologists explain ‘extinction events’ as the last occurrence of organisms in the Flood record. Specifically, we explain them as a result of rapid changes in water level that buried completely new types of organisms from new biozones. In this view, the so-called ‘extinctions’ are merely a record of abrupt disappearances of many organisms at the same spot in the fossil record. The Permian-Triassic event may correlate with the highest water level of the Absaroka, or possibly one of the highest water levels (Clarey, 2020, p. 273) (Figure 1).

### Genesis 7:18

As Chapter 7 continues Moses’ report, the Hebrew verbs continue to show the progress and power of the global Flood: the Floodwaters “prevailed” (*wayyigberû* = *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person masculine plural of *gâbar*). Also, the rising Floodwaters “increased greatly” (*wayyirbû* = *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person masculine plural of *râbâh*), qualified with extra emphasis by adverb *me’ôd*) upon the Earth, with water levels rising up so high that the Ark launched—i.e., floated—and began moving with the Floodwater currents (*wattêlek* = *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person feminine singular of *hâlak* = “walked,” “journeyed,” “traveled”) upon the surface (“face”) of the waters. The Floodwater increase is

occurring in stages, such that the “very-increased” Floodwater level (described by the *waw*-consecutive-“converted” qal imperfect verb, in 7:18) is deemed a completed action

### Genesis 7:19

In 7:19 the Earth’s flooding intensifies further: the waters “prevailed” (*gâbrû*) “mightily”—upgrading from “very much increased” to “very, very much increased” (qal perfect 3<sup>rd</sup> person masculine plural of *râbâh*, qualified with extra-extra emphasis by the doubled adverb *me’ôd-me’ôd*). As in the previous verse, the Floodwater increase is occurring in stages, such that the “very-increased” Floodwater level (denoted by the perfect action of *gâbrû*, in 7:19) is deemed a completed action.

This particular stage of inundation included covering the highest topographical height of the pre-Flood world, such that all the then-existing mountain/high-hill summits were passively covered with Floodwaters: “and were covered” (*wayekûssû* = *waw*-consecutive-prefixed pual imperfect 3<sup>rd</sup> person plural of verb *kâsâh* [“to cover”], indicating the action of covering was completed) “all of the high mountains” (*kôl he-hârîm ha-gebôhîm*) of the entire world (Wigram, 1874, pp. 607–608). No earthly mountain range is spared the universality of Genesis 7:19’s coverage—“all” of the mountaintops which were then “under all the heavens” (*taht kôl ha-šâmâyîm*) were covered with Floodwaters. This is a truly global Flood, not a regional or “local” flood. Moreover, the overall context of (and activities reported in) Genesis Chapters 6–9 likewise indicates a genuinely worldwide cataclysm, because if the punitive flooding was only “local” (or regional) there would have been no need for the Ark to house and preserve representative pairs of terrestrial animal kinds, because sufficient migrations could achieve biodiversity preservation during the 100 years between God’s initial warning and the Flood’s eruption.

During the deposition of the Absaroka and the subsequent Zuni Megasequence, the entire ocean floor continued to be created anew (Clarey, 2020, pp. 268–270). Runaway subduction was now happening all over the globe on a massive scale.

As Pangaea (which would have been called “earth” or “the dry land” back then) began to further break apart, the Pacific Ocean plates began to subduct along the edges and simultaneously create the beginnings of an entirely new global seafloor at the ocean ridges. In fact, the oldest ocean crust in the world only goes back to the Absaroka Megasequence (Clarey, 2020). It is likely the creation of this new seafloor, led primarily by the activity in the Pacific region, that ultimately drove the water high enough to Flood the entire globe.

In Genesis 7:18–19, which continues to report the progress of the Flood, the Ark was now free-flowing and the geology also reflects this higher water level. The deposition of the vast Zuni Megasequence may have been deposited during Days 90–150 of the Flood year (Clarey, 2020, pp. 282–311). It was by far the most extensive and voluminous megasequence.

Most secular geologists—inexcusably—do not admit that the entire world was completely flooded (see 2<sup>nd</sup> Peter 3:1–7), at least not during the Phanerozoic Eon (Paleozoic, Mesozoic, and Cenozoic). But sedimentary rocks tell us a different story. Thus far, geologic and paleontological data have revealed Earth’s geologic history as including an ever-increasing global Flood event.

### Genesis 7:20

This verse (7:20) adds detail to the overwhelming Floodwater coverage reported in 7:19, because not only were the highest mountaintops (of the pre-Flood world) covered with Floodwaters, the highest mountaintops were covered by at least fifteen cubits (literally, “15 of cubit”) deep in Floodwaters. To add

emphasis, Moses repeats that the Floodwaters “prevailed” (*gâbrû* = *qal* perfect 3<sup>rd</sup> person plural of *gâbar*, indicating the action of **prevailing** was completed), and “the mountains” (*he-hârîm*) were passively “covered” (*wayekûssû* = *waw*-consecutive-prefixed *pual* imperfect 3<sup>rd</sup> person plural of verb *kâsâh*, indicating the action of **covering** was completed).

Did the Zuni Megasequence completely flood all of the continents by Day 150? I believe the geologic evidence is there to answer, yes! Do we see Zuni deposits everywhere today? The answer to that question is, no. However, the Bible tells us that the highest water level rose only 15 cubits over (i.e., above) the highest mountains. Fifteen cubits is about 6.9–9.1 m (22.5–30 feet), depending on the length of a cubit. (Because a “cubit” is defined as the length of a man’s forearm, if Noah’s forearm was longer than 18 inches, his standard “cubit” would be longer than 18 inches.) So, with only 7.6 m (25 feet) of water column we shouldn’t expect to find a lot of sediment covering the pre-Flood uplands. We think post-Flood erosion removed a lot of these thinner deposits, and left vast areas with little or no Zuni. However, there are still some erosional remnants, which we call a “bathtub ring,” indicating there was more extensive, and likely global coverage, of all continents at this point as described in the Bible (Clarey, 2020, pp. 283–295).

The Zuni may have been deposited from about Day 90 of the Flood to Day 150 of the Flood. The exact timing of when the Absaroka ended and the Zuni began is rather subjective. The Bible gives us no clues of any changes between Day 40 and Day 150 other than the water was prevailing higher and higher. However, the sedimentary record indicates that the end of the Zuni Megasequence (end Cretaceous/earliest Paleogene) was the highest point of the Flood, which we believe was at or near Day 150 (Clarey, 2020, p. 308) (Table 1). However, some earlier researchers have

disagreed, instead claiming the Flood reached a peak on Day 40 (Whitcomb and Morris, 1961) or reached a peak soon after Day 40 and stayed high or slightly higher until Day 150 (Barrick and Sigler, 2003; Barrick, 2008). Like us, Austin et al. (1994), Coffin (1983), Snelling (2009), and Walker (2011) all interpret the highest water point as Day 150 of the Flood. From Table 1, it is quite evident that the Zuni records the highest sea level of all the megasequences and was most likely reached on Day 150 (Snelling, 2009; Clarey, 2020). It is not a coincidence that the Zuni exhibits the maximum surface area coverage, the highest volume and the greatest average thickness across the continents (Table 1, Figure 1). The Zuni was the culmination of a fairly continuous rise in global sea level that began in the Sauk. By this point in the Flood, Pangaea had completely separated. The massive runaway subduction that began in the Absaroka continued unimpeded.

### Genesis 7:21

This verse (7:21) reports the fatal consequences to air-breathing terrestrial creatures, as a result of the “over-the-tops” global inundation: death. However, the usual verb for dying, *mût* (“to die”), is not here used, although it is used in Genesis 7:22. Rather, 7:21 begins with a form of the verb *gâwa* (“to be/become a body,” often in a context of death, i.e., being/becoming a corpse, as an etymologically related noun, *gaw*, illustrates in Isaiah 50:6 & 51:23). At this stage of the Flood, with all of its unimaginable mega-tsunami-blasted devastation, rotting human corpses (as well as terrestrial animal corpses) would be floating in ocean-waters, many serving as food for carnivorous marine animals, as well as detritivores and planktonic decomposers. The global death toll covers all humans (except Noah’s Ark-borne family) and terrestrial animals: birds, domesticated and wild beasts of the fields, creatures that swarm on land, and mankind.

Fossils from the Zuni Megasequence include most of the dinosaur graveyards across the American West and other locations globally. The majority of these layers also contain prolific numbers of marine organisms (Clarey, 2020, pp. 301–304). Such strata, indicating a mixing of land and marine environments, is ubiquitous for both the Absaroka and Zuni Megasequences globally (Clarey, 2015b).

### Genesis 7:22

This verse (7:22) continues the death toll—of ocean-floating corpses—reported in 7:21, with emphasis that Floodwater-drowning doomed these once-breathing creatures, this time using (as the final word in the sentence) the usual verb for dying, *mût* (*mētû* = qal perfect 3<sup>rd</sup> person plural of *mût*, indicating that the death occurrences were completed actions). Literally translated, 7:22 says: “Everything which [had] breathing-wind-of-life (*nišmat rūâh hayyîm*) in his/her/its nostrils (*be’apâyw*), from all which [was] on dry-land, died.” Most humans were likely still alive for much of the Zuni Megasequence (Clarey, 2020). But by the end, they had all perished. In between these moments, humanity must have experienced horrendous conditions.

Massive earthquakes would have been ongoing. Rain was still falling. The advancing tsunami waves would have been pushing tremendous amounts of debris and destroying everything in their paths. Trees, sediment and dead animals would have all been mixed together in the powerful and destructive forces of the advancing waves of Floodwaters. After the Flood, as Earth’s wild weather settled down, so that ecosystems stabilized and rebounded, it would take a while for forests of well-populated (and well-rooted) trees to return (Johnson, 2019b; 2020).

Adding to the geologic chaos were massive volcanic eruptions, spewing tremendous volumes of ash and debris,

choking the air and making it difficult to breathe. These ash-rich volcanic eruptions were caused by the massive amounts of runaway subduction that was occurring during the deposition of the Absaroka and Zuni Megasequences.

As the Zuni progressed and the time drew closer to Day 150, the tsunami-like waves would have reached progressively higher and higher as more seafloor was created, pushing up water levels even further. This would have forced the remaining animals and humans to rapidly migrate toward the highest elevations.

The last vestiges of dry land would have been getting smaller each day with each tsunami wave. This is the point—in the rock record—where the fossil remains of 10,000 *Maiasaura* (duck-billed dinosaurs) are found all buried together (Clarey, 2020, pp. 307–308). These animals, and many just like them, were stampeding to avoid the advancing Floodwaters. Humans, then well-known for their violence, were also likely fiercely competing for the last remnants of dry land. It was a life-or-death situation for every air-breathing animal and human. Violence against one another was likely rationalized by the desperate desire to survive another day of the ever-increasing cataclysmic conditions. But each day, the waves just kept rising higher, with no relief.

### Genesis 7:23

Moses continues to report and emphasize the unprecedentedly devastating consequences of the global Flood, using the verb *mâhâh* (“blot out”) twice in 7:23.

The first usage of *mâhâh* is *wayyîmah* (a *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person masculine singular of *mâhâh*), indicating that God’s *direct* action of blotting out pre-Flood lives (of both mankind and beast, save those aboard the Ark) was a completed action.

The second usage of *mâhâh* is *wayyîmahû* (a *waw*-consecutive-prefixed *niphal* imperfect 3<sup>rd</sup> person masculine

plural of *mâhâh*), indicating that God’s actions, that resulted in blotted-out pre-Flood lives (of both mankind and beast, save those aboard the Ark), produced the completed fate (i.e., the fate of *being blotted-out*) for those doomed creatures.

The same categories of destroyed terrestrial lives are recounted, from mankind to beasts and creeping things and flying birds. What then remained, i.e., what was left/spared (*wayyîšâ’er* = *waw*-consecutive-prefixed *niphal* 3<sup>rd</sup> person masculine singular of *šâ’ar*) was only Noah’s household/menagerie, i.e., those surviving with him “in the Ark” (*ba-têbâh*). The active action of *šâ’ar* is “to remain;” the passive action of *is* “to leave remaining,” “to let remain,” i.e., to leave as a remainder (Wigram, 1874, pp. 1222–1223).

At this point, the highest hills were likely stripped down to the barren crust by the fast-moving waves that went over the top of the highest hills (Clarey and Werner, 2018; Clarey, 2020, pp. 322–324). Any semblance of human activity or evidence of their pre-Flood civilization was blotted out as well.

These geographic areas are the so-called “shield” areas today, areas of exposed granitic crust, such as the Canadian Shield or the West African Shield. All air-breathing land animals and all humans not on the Ark were drowned by this point. Remnants of Zuni Megasequence sediments are found near Hudson Bay, Canada and in Michigan and Illinois, marking the high water point of the Flood in North America. We can also see remnants of Zuni across the other continents (Clarey, 2020, pp. 470–471).

### Genesis 7:24

The ocean-blanketed Earth remained covered with prevailing Floodwaters for 150 days. The verb “prevailed” (*wayyîberû*) is the *waw*-consecutive-prefixed qal imperfect 3<sup>rd</sup> person masculine plural form of *gâbar*, indicating completed action, i.e., this 150-days timeframe

completed the highwater stage. This was anything but a “tranquil flood” (Johnson, 2011b)!

**Concluding Comments**

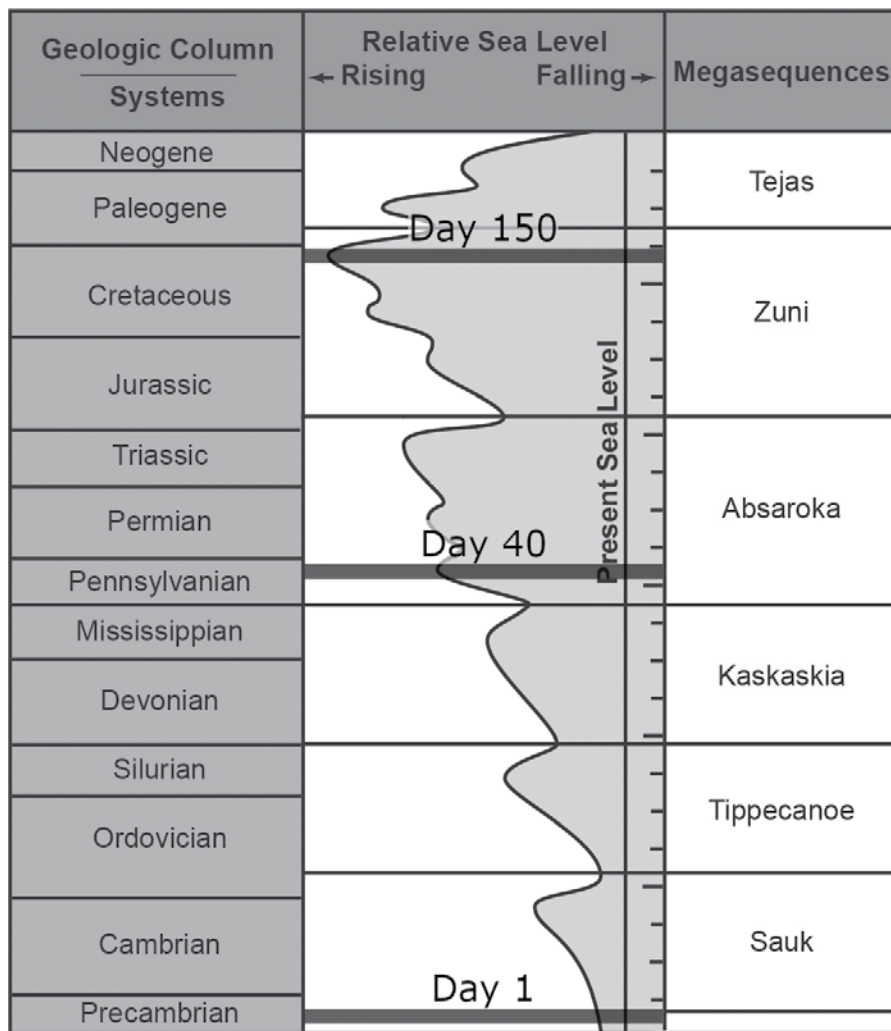
These exegetical observations and geologic commentary are presented here as preliminary “research notes,” to give CRSQ readers information and insights for Genesis Chapter 7. Recognizing the holiness of God’s Word, we have sincerely tried to hold true to the Biblical text in all our interpretations.

The geologic interpretations (analyzed above) were derived from over 1500 stratigraphic columns that were compiled across three continental regions, North America, South America, Africa and the Middle East (Clarey, 2020).

The bursting of the fountains of the great deep on Day 1 of the Flood is marked by prolific volcanic activity across the globe, including voluminous outpourings of lava in the Midcontinent Rift of North America. This is also the day that the tectonic plates most likely originated. Sediments associated with these early rift events are part of what has been called the pre-Sauk Megasequence (Clarey, 2020, pp. 172–193) (Figure 2).

Days 1–40 of the Flood are most likely the period when the three earliest megasequences were deposited (Sauk, Tippecanoe, Kaskaskia). As these layers contain almost exclusively marine fossils, it seems evident that the Floodwaters, although increasing in each megasequence, did not significantly impact the dry land portions of the continents until Day 40 (Figure 2).

The Biblical text tells us the Ark began to float on Day 40 so we assume that the dry land was now being inundated at this point. In support of this interpretation, the Absaroka Megasequence (beginning at the Upper Carboniferous level) shows a dramatic increase in both coverage and thickness across the continents (Table 1). And the Absaroka strata contain the first appearances of



**Figure 2. Diagrammatic global sea level curve showing the megasequences and geologic systems with Days 1, 40, and 150 superimposed (Clarey, 2020, p. 474). Day 1 is the initiation of the Flood in the pre-Sauk (Late Precambrian). Day 40 is near the boundary of the Kaskaskia-Absaroka when the Ark became free-floating. Day 150 is interpreted as the sea level peak near the end of the Cretaceous System and near the end of the Zuni Megasequence.**

prolific numbers of land plants and land animals, further supporting the inundation of major portions of pre-Flood land surfaces.

Somewhere after Day 40 and before Day 150, the Absaroka ended and the Zuni Megasequence began. The Zuni shows the maximum extent, maximum volume and maximum average thickness, supporting the conclusion that

this as the high point of the Flood, likely marking Day 150 of the Flood year (Table 1).

This is the first time a global stratigraphic data base has been amalgamated with an exegesis of Genesis Chapter 7 in detail. Our results show perfect agreement with the account of the Flood and provide key insights for Days 1, 40, and 150 of the Flood year (Figure 2).

What follows, in Genesis Chapter 8, is the Flood's cataclysmic back-and-forth drainage (Genesis 8:3) and its drainage-deposited aftermath (Morris and Johnson, 2012).

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# Origin of the Physical Laws of Nature

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## Abstract

The ultimate origin of the physical laws of nature are seldom discussed in science circles. Yet, the regularity of these laws is assumed and depended upon in every scientific endeavor. Some have attempted to explain a spontaneous origin for physical laws; six approaches are described and shown to be deficient. In contrast, Biblical creation provides a refreshing and credible alternative to secular thinking. The laws of nature are closely connected with mathematics, the language of creation. As an example of this physical symbiosis, the insights of German mathematical genius Amalie Emmy Noether (1832–1935) are described.

**Key Words:** Physical laws, Noether's Theorem, Multiple universes, Postmodernism, Conservation laws

## Introduction

The basic physical laws, distinct from man-made laws, cannot be modified or broken. We have no choice but to obey them. These laws are patterns that nature follows without exception, other than divine miracles. Physical laws or rules give certainty and stability to the behavior of the universe, and the science world entirely depends on this regularity. Many such laws have been discovered, and several follow from the discipline of physics:

Ampère's circuital law  
Avogadro's law  
Bernoulli's principle  
Boyle's law

Charles' law  
Conservation laws  
Coulomb's law  
Gauss' law  
Gay-Lussac's law  
Hooke's law  
Kepler's laws of planetary motion  
Law of gravity  
Laws of thermodynamics  
Lenz's law  
Newton's laws of motion  
Ohm's law  
Pascal's principle  
Stefan's law  
Weber's law  
Wien's displacement law

Other fields of science inquiry likewise have alternate sets of laws ranging from the law of biogenesis in biology to the laws of superposition in geology.

This article considers the ultimate origin or source of the laws of nature. That is, where do they come from? Two related topics are not covered here. One is the philosophical discussion of these laws including their application, limitations and logic. Science philosophy is a fascinating topic; however, not everyone agrees. With apologies to philosophical readers, physicist Richard Feynman (1918–1988) is credited with the statement, "Philosophy of science is about as useful to scientists as ornithology is to birds" (Munafo and Smith, 2018, p. 1).

A second area not addressed is the historical discovery and development of physical laws. Much of this pioneer groundwork was accomplished by godly men and women as they "searched out the secrets" of their Creator. As shown

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elsewhere, the entire foundation of modern science follows from the research of pioneer scientists who held strong faith and confidence in a consistent, planned universe including its physical laws.

## Views on the Origin of Physical Laws

Throughout my physics career, very little was heard or read concerning the origin of physical laws. This lack of discussion includes the content of university courses, conferences, textbooks, and research programs.

In the spirit of full disclosure, the conclusion of this article is that every physical law carries the clear fingerprint of the Creator. However, many science scholars choose other paths of understanding. Six naturalistic approaches to the origin of laws are identified here along with some representative quotes. These approaches are followed by a brief outline of Biblical creation.

### 1. Dodging the issue

The laws of nature along with a multitude of physical constants appear to be precisely chosen for our survival and well-being. This is called the Anthropic Principle which refers to the “user-friendly” details of the universe. Examples range from the exact mass of the proton which provides for its stability, to the Earth’s orbital location in the habitable zone of the Sun which allows water to exist in liquid form.

To avoid the obvious hint of intelligent design, multiple universes are often proposed. These countless hypothetical universes are assumed to exhibit a great variety of physical laws. In this view, the laws of nature familiar to us are just one possible subset of an infinite variety existing elsewhere. Advocates envision a “vast patchwork quilt of universes, each with its own distinctive set of bylaws, so it is no surprise that we find ourselves in a Goldilocks universe—one that is just right for life” (Davies, 2007). Otherwise

life could not begin and we simply would not be here.

A related quote states, “So if we picture our own universe as a bubble, it is sitting in a network of bubble universes of space. What’s interesting about this theory is the other universes could have very different laws of physics than our own, since they are not linked” (Howell, 2018). This metaphysical speculation still does not explain the ultimate origin of such laws and it greatly complicates the issue with countless additional sets of laws. A further weakness of this position is the complete lack of supporting evidence for alternate universes.

### 2. Evolving laws

Canadian physicist Lee Smolin also assumes the multi-universe model and suggests that parent universes somehow spin off descendant “baby universes” with different sets of physical laws. That is, laws vary or evolve from one universe to the next: “Nothing transcends time, not even the laws of nature. Laws are not timeless. Like everything else, they are features of the present, and they can evolve over time” (Smolin, 2014, Preface).

In spite of the lack of any type of mutation-natural selection mechanism, the history of physical laws is said to parallel biological evolution. An immediate problem arises: Similar to the secular mystery of life’s origin, how did the first physical laws arise? Notice the analogy here: Both biological evolution and natural science are based on missing foundations.

By extension of Smolin’s thinking, it might be suggested that laws should also change or evolve over time within our known universe. However, decades of high-precision measurements of laws and constants show no variation whatsoever.

### 3. Pure math

MIT cosmologist Max Tegmark gives a novel interpretation of physical laws and

reality. He suggests that all matter is part of a mathematical structure, including ourselves: “I argue that...our universe isn’t just described by math, but that it is math in the sense that we’re all parts of a giant mathematical object, which in turn is part of a multiverse so huge that it makes the other multiverses debated in recent years seem puny in comparison” (Tegmark, 2014). One can readily agree that mathematics is the language of creation. However it is offensive to imply that a person is nothing more than a complex mathematical function. This artificial interpretation of reality reminds one of science fiction films such as *The Matrix* (1999).

### 4. Postmodernism

This movement was popularized in recent decades. It includes a general skepticism and rejection of traditional laws, truths and values: Objective knowledge simply does not exist. The questioning extends even to mathematics and science. In the extreme, postmodernists conclude that math functions and science laws are arbitrary “social constructs” based largely on Euro-American influence. That is, the established laws of nature are arbitrary, biased inventions. Typical quotes illustrate postmodernism:

Science can be viewed as “a man-made edifice that is historical, not timeless, one of many alternative ways of carving up the world” (Johnson, 1996).

“...no stone tablet has ever been found upon which laws were either naturally or supernaturally inscribed. On the contrary, the laws of physics are human inventions” (Stenger, 2004).

The dangers of this reinterpretation of science history are expressed: “Postmodernist thought is being used to attack the scientific worldview and undermine scientific truths; a disturbing trend that has gone largely unnoticed by a majority of scientists” (Kuntz, 2012, Abstract). The Wikipedia website includes the topic “Science wars” which discusses

this conflict in depth. Fortunately, the postmodern attack on objective truth has diminished in recent years, largely due to its extremism.

### 5. Randomness

The writings of physicist John Wheeler (1911–2008) suggest that the laws of nature spontaneously appeared at the time of the alleged Big Bang event along with space and time. In Wheeler's words, the laws emerged "higgledy-piggledy" from chaos, perhaps from quantum fluctuations, a notion comically described as "it from bit" (Overbye, 2007). In this view the laws of nature are accidental, or contingent. Lee Smolin puts it this way, "...God is nothing but the power of the universe to organize itself" (Smolin, 2014). Such thinking must assume that the laws governing quantum fluctuations are already in place to control particle fluctuations and initiate new physical laws.

### 6. Secular faith

In this popular view, such questions as the origin of physical laws are declared to be simply beyond our understanding. This position gives the laws of nature an independence from anything other than themselves. They "just are" and we have no choice but to obey them. Paul Davies is a theoretical physicist and cosmologist at Arizona State University who uncovers the religious implication of this viewpoint: "Science can proceed only if the scientist adopts an essentially theological worldview. ...even the most atheistic scientist accepts as an act of faith the existence of a law-like order in nature that is at least in part comprehensible to us" (Davies, 1995). It should be noted that Paul Davies himself pictures God as an impersonal, abstract idea, somewhat similar to that of Einstein's view (Davies, 2016).

Davies gives additional insight into the current state of secular science. He suggests that a common theistic faith in early science was finally extinguished



**Figure 1.** A California wind farm (Wikipedia Commons). Energy exists in many forms including wind, fossil fuel, and nuclear. In every transfer process, some energy becomes unavailable; however, the total amount of energy is always conserved or constant.

by the "God is Dead" movement first promoted by German philosopher Friedrich Nietzsche (1844–1900). That is, the very idea of the Creator God was deleted from science inquiry. As a result, ever since, natural laws freely float in the science world with no source. There seems to be an "I don't know and I don't care" attitude toward the ultimate origin of physical laws and constants.

### Physical Laws and Biblical Creation

There is a common shortcoming in all six of the preceding discussions: None follow through with a credible explanation for the ultimate origin of the laws which control the operation of the physical universe. In contrast, Biblical creation provides a refreshing alternative with several origins details provided.

Details are given in the form of questions and answers:

#### 1. Are the laws of nature eternal or do they have an origin?

All details of nature including its laws have a supernatural beginning. As Colossians 1:16 explains, "For by him [Christ] all things were created: things in heaven and on earth, visible and invisible...all things were created by him and for him." The verse is clear that there is an intelligently planned starting point for nature and the physical laws of nature, and also the spirit world.

#### 2. When were physical laws established?

Possible answers include during or at the completion of the Creation Week. As the week takes place, material objects are spoken into existence (Psalm 8:3).

In this supernatural process, physical energy is added to the universe from God's infinite reserves. This implies that the law of conservation of energy, and perhaps other laws, are not yet established across the cosmos until the work of Creation is complete.

### 3. Are physical laws self-sustaining?

Colossians 1:17 explains that Christ is before all things, and in him all things hold together or consist. This verse describes a direct interface between the physical and spirit worlds. The Greek verb for consist ( $\sigma\upsilon\nu\iota\sigma\tau\acute{\alpha}\omega$ , *sunistaō*) means to cohere or preserve. Extra-Biblical Greek use of this word pictures a container holding water within itself. The word use in Colossians is in the perfect tense which normally implies a continuing state arising from a completed past action.

A second reference, Hebrews 1:3, declares that Christ upholds or sustains the universe by his Word. Uphold ( $\phi\epsilon\acute{\rho}\omega$ , *pherō*) describes the maintaining of all things including physical laws.

To consider just one implication, suppose the Creator turned his back on the universe for one moment of time. Physical laws would be unenforced, and instant chaos surely would follow. Thankfully this does not happen because the Creator faithfully upholds the laws He established.

### 3. Do physical laws change by either decaying or evolving?

Physical laws are constant, or immutable, at least in the present age, other than divine miracles: "...you established your faithfulness in heaven itself" (Psalm 89:2). The permanent physical laws continually are displayed by the change of seasons, the exact occurrences of solar eclipses and steady sunshine.

### 4. Are physical laws understandable?

Not entirely. Job was asked by his Creator, "Do you know the laws of

the heavens? Can you set up God's dominion over the earth?" Job 38:33. This rhetorical question has an obvious negative answer.

Much is known of physical laws yet there remain deep mysteries. Consider the familiar law of gravity with its precise inverse-square formula. The current interpretation is that massive objects somehow curve or warp nearby space-time. However, why does gravity exist in the first place? And why is it always attractive, never repulsive, and how does it give curvature to space? Credible scientific answers are lacking.

The science world searches for a "Theory of Everything" (TOE) which ties together all the distinct natural laws of the universe into one expression. Steven Hawking (1942–2018) remarked, "...if we do discover a complete theory... it would be the ultimate triumph of human reason—for then we would know the mind of God" (Hawking, 1988). The quest for a final theory is futile because the mind of the Creator God, far beyond Hawking's impersonal interpretation, is infinitely above our capacity for full understanding (Isaiah 55:8–9).

## Conservation Laws

There is a special set of physical laws which merits further discussion. Perhaps the most familiar law of nature is the conservation of energy, also called the First Law of Thermodynam-

ics. Energy becomes unavailable over time as described by the Second Law of Thermodynamics; however, total energy amounts cannot be created or destroyed. This energy law supersedes the earlier idea of mass conservation from Isaac Newton's era. This follows because energy ( $E$ ) and mass ( $m$ ) are interchangeable by the relationship  $E = mc^2$  where  $c$  is the speed of light in a vacuum. Mass is popularly described as "frozen energy."

Table I summarizes four conserved physical quantities and their related mathematical symmetries, illustrating Noether's Theorem (1918).

Energy belongs to the special category of physical laws where quantities do not change over time in a closed system, that is, in the absence of outside forces or influence. Four major conservation laws are listed in the Table and there are additional lesser-known conservation laws. The quantities originally could have been described in a negative way as not changing. However, the term conservation, or constant, gives a positive expression to these fundamental laws. Note that this use of the word conservation is distinct from the environmental term of saving or conserving energy.

## Noether's Theorem

Amalie Emmy Noether (NUR-ter, 1882–1935) was a talented German mathematician and a pioneer feminine

Table I. Four conserved physical quantities and their related mathematical symmetries, illustrating Noether's Theorem (1918).

Conservation Law	Mathematical Invariance
Energy	Time translation
Linear momentum	Space translation
Angular momentum	Space rotation
Electric charge	Schrödinger equation (Complex wave phase changes)

scholar. Because her family was Jewish, the rise of Nazism led to her dismissal from an academic position in 1933. Emmy was welcomed in the U.S. where she joined the faculty at Bryn Mawr College in Philadelphia, also lecturing on mathematics at Princeton University. Unfortunately, Emma passed away from health issues just two years later at age 53. I can find no information or quotes on the personal faith of Emmy, apparently a life totally dedicated to the pursuit of mathematics (Rowe and Koreuber, 2020).

Emmy Noether was gifted with deep insights connecting mathematics and physics. She showed in 1918 that physical quantities described by symmetric mathematical equations lead to physical conservation laws. This is called Noether's Theorem and links the two important concepts, math and physics. In technical terms, every differentiable symmetry of the action of a physical system leads to a corresponding conservation law. The symmetries are not geometric as in a visible mirror image but instead involve math functions (Collins, 2006).

As an example, the equations of motion do not depend on a particular location or coordinate system. That is, the laws of motion are valid everywhere and in any direction in space. This translational symmetry is described as spatial invariance (another word for symmetry) and leads to the law of conservation of linear momentum. As a second example, time invariance means that the same physical laws apply in the past, present, and future, leading to the law of conservation of energy.

The proof of Noether's Theorem is not trivial and includes the Lagrangian function along with abstract algebra, which Emmy also pioneered. Proofs of the theorem are discussed on many internet sites. For interested readers, an Appendix at the end of this article shows how time invariance for a particle leads to conservation of energy.



**Figure 2. A 1910 photograph of Emmy Noether at age 28 (Wikimedia Commons). She excelled in abstract algebra and theoretical physics. The Noether Theorem (1918) connects mathematical symmetries with physical conservation laws.**

The Table [see above] lists four mathematical symmetries and their related conserved quantities. Noether's Theorem has been called the "most beautiful idea in physics." Beyond classical physics, it has proved valuable in relating symmetries and conservation laws in high energy particle physics. The theorem further contributes to the understanding of quantum theory, supersymmetry, broken symmetries, superstring theory and other ideas in modern physics.

## Conclusion

This paper explores the origin of the fundamental laws of nature. These laws describe the behavior of matter and energy across the universe. They provide the foundation for all fields of

science, yet their emergence remains a mystery, at least apart from a divine cause. Noether's Theorem further shows the close relationship between several physical laws and mathematics. Whether considering the behavior of electrons or galaxies, all physical laws proclaim the handiwork of the Creator.

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## Appendix

This section shows how time symmetry, or invariance, leads to energy conservation for a simplified system. Alternate approaches appear in many texts. We use the Lagrangian expression 'L' for the state of the system in classical mechanics, defined as

$$L = KE - PE$$

where KE and PE are kinetic and potential energies. Consider a single free particle with mass m, position q and velocity q' at time t.

$$L = L(q, q', t)$$

By the chain rule,

$$\frac{dL}{dt} = \left[ \frac{\partial L}{\partial q} q' + \frac{\partial L}{\partial q'} q'' + \frac{\partial L}{\partial t} \right]$$

If the Lagrangian is time independent, a condition for Noether's Theorem, the last term is zero. Next we apply the Lagrange-Euler equation, a useful tool proved elsewhere,

$$\frac{d}{dt} \left[ \frac{\partial L}{\partial q'} \right] - \frac{\partial L}{\partial q} = 0$$

Combining terms,

$$\frac{dL}{dt} = \frac{d}{dt} \left[ \frac{\partial L}{\partial q'} \right] q' + \frac{\partial L}{\partial q'} q''$$

$$= \frac{d}{dt} \left[ \frac{\partial L}{\partial q'} q' \right]$$

Rewriting the expression,

$$\frac{d}{dt} \left[ \frac{\partial L}{\partial q'} q' - L \right] = 0$$

Therefore,

$$\left[ \frac{\partial L}{\partial q'} q' - L \right] = \text{constant}$$

As before,

$$L = KE - PE$$

We will assume

$$\frac{\partial PE}{\partial q'} = 0$$

that is, the potential energy does not depend on the particle velocity.

Now since

$$KE = \frac{1}{2} m q'^2$$

Then

$$\left[ \frac{\partial KE}{\partial q'} \right] = m q' = 2KE / q'$$

Evaluating the previous constant,

$$2KE - KE + PE = \text{constant}$$

Therefore

$$KE + PE = \text{constant}$$

The conclusion: Total energy for the particle is conserved as long as the listed conditions are met.

# The Heart Mountain Conundrum, Part 1: Models of Low-Friction Sliding Have Major Problems

John Matthews\*

## Abstract

**H**earth Mountain, Wyoming, USA, is a geological puzzle. Paleozoic carbonates overlie much younger Lower Cenozoic rock. So, either several mountain-sized blocks broke apart and slid up to 45 km from where they were originally deposited onto the younger rock or the way the relative ages of the base layer and the blocks are assessed is wrong. This paper, with its partner, examines the issues and problems explaining this proposed event. Part 1 examines three (uniformitarian) models of a low-angle slide on a low-friction cushion. In Part 2, another six essential issues, including how the movement started and was sustained over uneven terrain, are examined. The joint conclusion is that present models are seriously inadequate.

**Key Words:** Heart Mountain, Décollement, Detachment, Slide, Uniformitarianism, Low-friction sliding, Geologic column, Flood models

## Introduction

Heart Mountain, Wyoming, USA, has been recognized as a geological puzzle for over 100 years (Hauge, 1993). Paleozoic carbonates overlie much younger Lower Cenozoic rock. Either numerous mountain-sized blocks broke apart, with or without the involvement of volcanic rocks, and slid up to 45 km onto the

younger rock, or the way the relative ages of this sequence are assessed is wrong. Many studies of the area have focused on trying to explain how several portions detached from a “mother area,” broke apart, and moved up to 45 km. No uniformitarians have questioned the stratigraphic assumptions underlying the dating.

Whitcomb and Morris (1961) challenged the uniformitarian geologic column because of what the authors saw as anomalies and its intimate association with evolution. They had used the sequence at Heart Mountain as an example of the failings of the column because they saw no physical evidence of an overthrust. Other creationists (e.g., Garner, 2011; Clarey, 2013) accept the uniformitarian claim that this detachment and sub-aerial sliding (typically abbreviated to HMD) took place and that it does not compromise the chronostratigraphic column, although they do not accept its geochronologic timescale.

This series examines the issues surrounding the HMD. Part 1 examines the three latest uniformitarian models

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that attempt to explain how the HMD block moved down a slight slope on a low-friction cushion. Part 2 examines six key issues, including how the supposed movement started (the break-away fault), how the break-up occurred, and how movement was sustained over uneven terrain. The conclusion of both is that all three models are inadequate and that they reveal major problems regarding the understanding of the chemistry, geology, petrology, physics, and rock mechanics of the event.

These three models are uniformitarian. Currently, there is only one creationist model that attempts to explain the HMD movement (Oard, 2011). It is also reviewed in Part 2. Other creationist low-friction models might be developed (Sydow, 2020), but until such time, Whitcomb and Morris' (1961) view that the "Paleozoic" rocks of Heart Mountain are younger than the "Cenozoic" rocks they rest on remains a distinct possibility, implying that 60 stages of the geological column are suspect.

The hope is that these two papers will encourage further discussion on Heart Mountain (including newer ideas on how the slide might have happened) and a willingness to reconsider the geological column if no new ideas are forthcoming. It is disappointing that a carefully laid-out discussion with new data has not taken place since 2006 (Reed and Oard, 2006), since it is crucial for modeling the Flood and challenging evolution.

## The Heart Mountain Conundrum

The sequence of rocks at Heart Mountain, Wyoming, USA, has puzzled geologists for over 100 years. Uniformitarians have proposed that the older rocks, "Ordovician and Mississippian" carbonates, detached from a larger "mother mass," broke off, and slid in separate groups, or in a volcanic/carbonate coherent mass, up to 45 km into their present positions atop "Eocene" rock (Pierce,

1957; Hauge, 1990). Thus, based on the order in the geological column, older rocks overlie younger rocks. If the order at the HMD is a result of a catastrophic décollement, then the mechanism for detachment and motion must be addressed.

Some claim that there is separate petrological evidence for the slide. For example, certain layering is interpreted as "microbreccia" suggesting a period of sliding. But there are stratigraphic features within the complex that show a "sedimentary character that appear[s] to record deposition from suspension rather than friction" (Beutner and Gerbi, 2005, p. 724). So, this evidence is equivocal. There are four other points offered by uniformitarians, and one by creationists, also largely equivocal, which are addressed in detail in Part 2.

A simple cross-section is shown in Figure 1 (NW to SE, left to right) based on Beutner and Gerbi (2005) and other references. Note that the cross-section is not a perfect straight line, see Figure 2 of Aharanov and Anders (2006).

## Review of Uniformitarian Explanations

The literature on Heart Mountain is extensive. Beutner and Gerbi (2005) reviewed much of it and offered their own uniformitarian model, proposing that high-pressure carbon dioxide could have formed a low-friction cushion for the HMD block to slide on down the low-angle slope. They noted that similar ideas had been proposed previously, but none were robust models since they failed to address the question of how any cushion(s), gaseous or liquid, was/were sustained over long distance. They therefore suggested a continuously self-generated layer of CO<sub>2</sub>. Since then, two other models of a low-friction cushion have been proposed, including a water-layer (Aharanov and Anders, 2006), and a melt-layer (Craddock et al., 2009). In view of this recent interest in a low-

friction cushion, this paper evaluates these three models.

Beutner and Gerbi (2005) also recognize that there is more to explaining HMD than a low-friction slide. They identify six key questions addressed in Part 2. Uniformitarian answers are vague or not scientifically robust. It is not possible, in a journal article, to provide all the detail (chemical, geological, mathematical, and physical) of this assessment for rejecting HMD as a detachment and slide. That material is available in an unpublished document of 40 pages from the author (Matthews, 2019). This series is its summary.

## Gaps in the Slide-Explanations

Seven questions listed by Beutner and Gerbi (2005, p. 724) were circulating years earlier in prototype form (Prostka, 1978).

1. What allowed or caused a mass of rock more than 1,100 km in area and several km in thickness to detach approximately along a bedding plane and slide on a slope of  $<2^\circ$  while spreading to cover more than three times its original area?
2. What force, or forces, initiated movement?
3. What caused the detachment to form near the base of the Ordovician Big-horn Dolomite rather than in weaker underlying rocks?
4. What was the rate of displacement?
5. What process or processes reduced friction on the sliding surface sufficiently to allow sliding on such a low slope?
6. What role did contemporaneous volcanism play?
7. Why is rock immediately below the slide surface so commonly undeformed?

The authors continue (p. 724):

...during the last century numerous geologists [they list six] attempted to answer these questions. None

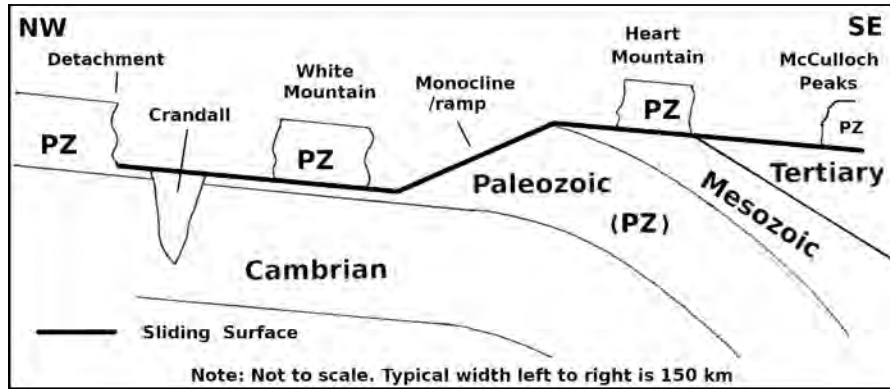


Figure 1. Simplified cross-section of Heart Mountain, Wyoming, USA.

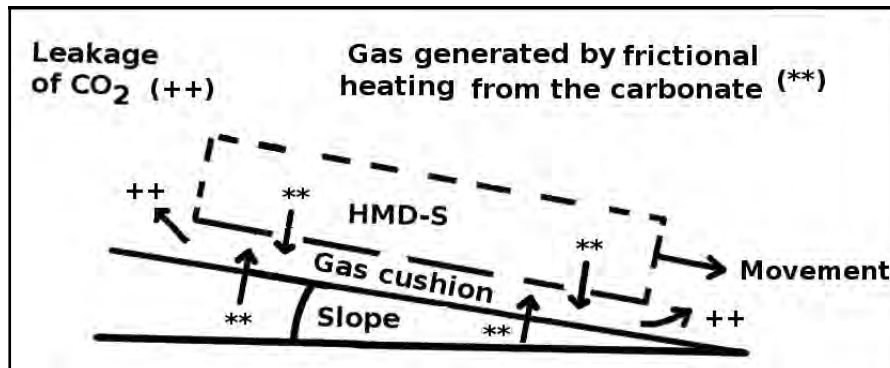


Figure 2. Heart Mountain sliding on a gas cushion.

of the resulting hypotheses [they list eleven] attracted a quorum of supporters because evidence was not offered that unequivocally accorded with one hypothesis and negated others.

Since there are no obvious reasons to reject Beutner and Gerbi's (2005) conclusion that these earlier ideas are inadequate, only these three later models need to be studied.

One of the more recent papers on the HMD, (Craddock et al., 2009), admits that the absence of significant breccia across the assumed sliding surface is a serious challenge. This was Whitcomb

and Morris' (1961, p. 181) original point. To that extent, the focus of those anxious to explain HMD is on Question 5, and all propose a low-friction regime which could explain the absence of breccia. In reality, the seven questions contain multiple and indirect questions; some overlap. It is therefore essential to relate the questions to the proposed full models for HMD.

Oard (2006) noted the questions set out by Beutner and Gerbi (2005) and offered tentative answers, explaining HMD as a subaqueous detachment and slide during the Flood. The model does not specifically rely on a low-friction

cushion. It is more appropriate therefore to discuss that model in Part 2.

### The Low-Friction Models

Leaving aside six of the questions, we focus first on Question 5, namely: what provided the low-friction cushion? The reason for going straight to Question 5 is that recent uniformitarian models follow this approach. The models assessed include: 1) the Carbon Dioxide Cushion, 2) the High-Pressure Water Cushion, and 3) the Molten Calcite Model. These can be critiqued in detail, whereas many of the issues surrounding the other six questions cannot. Obviously, answers to all seven questions must be internally consistent with any proposed low-friction cushion.

### The Carbon Dioxide Cushion

Since there is little evidence of rock-to-rock contact during the supposed movement, Beutner and Gerbi (2005, p. 732) claim that carbon dioxide could have been released during movement thus providing a low-friction cushion. Their model is not described in detail nor in a systematic manner, but three statements reveal their weak points.

First:

In order to maintain this system, motion along the detachment is interpreted to have been rapid, [emphasis mine] with displacement taking place in no more than a few tens of minutes. [p. 734]

Obviously, unless the movement was rapid, the CO<sub>2</sub> cushion would have quickly escaped, and so they offer a velocity of many tens of kilometers per hour (kph), but without supporting calculations. They also remind readers that one authority suggested 150 kph (~40 m/s) but with "tongue in cheek." But a focus on velocity prior to confirming motion is tantamount to forcing the desired answer and avoiding conflict with the geological column. By focusing on

the low-friction aspect, the authors are trapped in circular reasoning.

Second:

The kinetics of dissociation by frictional heating *clearly need further study* [emphasis mine]. How much calcareous dolomite [i.e., the Paleozoic carbonates] would have to dissociate in order to float the Heart Mountain allochthon remains an important question.... a simple calculation using the ideal gas law suggests that several centimeters of dolomite would have to dissociate to generate an ~10-cm-thick cushion of CO<sub>2</sub>.... Our model *requires explanation* [emphasis mine] of the nature and source of the gas-like fluid present along the fault during movement. We *suggest* [emphasis mine] that CO<sub>2</sub> released by dissociation of carbonate as a result of frictional heating is a likely candidate for the fluid phase along the slide surfaces of the Heart Mountain.... [p. 734]

Their triple equivocations are clear.

Third:

A detailed thermodynamic and kinetic study *remains to be done* [emphasis mine] for the Heart Mountain structure. [p. 734]

So, in three respects, they admit that their model is tentative. Only by taking their model to the next level of detail could it be validated. The following are reasons for rejecting it completely.

A robust model needs to show that, if the block is moving steadily down the slope as shown in Figure 2, the change in potential energy during movement could balance the frictional heating necessary to sustain the generation of a 10-cm gas cushion, leaking continuously at the edges (*which the authors failed to mention*). Using the quoted parameters in Beutner and Gerbi (2005) relating to temperatures, heat capacities, ideal gas law, etc., and favorable parameters where they were silent, we calculate that a velocity of ~25 m/s meets these conditions for the dolomite (Matthews, 2019).

While this velocity is consistent with their range of 10–40 m/s, there are five major problems with their explanation. Any of them separately rule out a low-friction gas cushion slide and prompt several additional questions.

First, why a 10-cm gap? The irregularities on the fault plane could reach 5 m, judging by the maps of the area, and unevenness created by the Crandall Intrusive Complex and the Blacktail Thrust. A gap of only 10 cm would result in the huge block dragging on the substrate because of vibration, swaying during movement, and this natural unevenness. Rock-to-rock contact would rapidly increase friction, which would halt motion. But a larger gap would result in faster escape of the gas from beneath the rock mass. To balance gas generation with leakage from a larger gap with continued motion would require a velocity of Mach 3 (Matthews, 2019). At that velocity, the air resistance would severely interfere with the gas cushion in such an extensive gap.

Second, why did the HMD travel southeast rather than southwest? The slope to the SE is <2°, while the slope to the SW is 10° (Prostka, 1978). This dramatic difference in gradient is one reason Prostka (1978) ruled out a gravity slide. Thus, the block should have ended up many kms to the SW if a low-friction cushion allowed free movement. In a simple detachment and sliding, the “mountain” would have moved SW (solid line track, Figure 3). If an initial velocity of 25 m/s had somehow been achieved moving SE, then a curved track would have resulted (long dashes) due to gravitational acceleration to the SW on the moving block offsetting the initial SE motion. There is no reason for it to have moved as proposed.

Third, how did it *continue* to slide up a monocline of Paleozoic and Mesozoic rocks before ending up on the Lower Cenozoic? Sliding across this monocline would require a higher velocity, ~40 m/s, because extra heat is needed to liberate

sufficient gas (Matthews, 2019), even with Beutner and Gerbi’s (2005) 10-cm gap, which was probably not sufficient to avoid grinding contact. So, the block would have had to encounter the top of the monocline moving at a velocity of around 40 m/s.

This leads to the fourth question—how did it climb the monocline? The Mesozoic and Cenozoic could have been between 300 and 500 meters higher than the Paleozoic ‘fault plane’ at the time of movement (see Part 2 discussion of rock mechanics associated with the initial detachment and fracturing). If the block arrived at the *base* of the monocline at 25 m/s, it would come to a halt on the monocline *even with* a low-friction cushion because the kinetic energy would have been absorbed by the increase in potential energy. The monocline/ramp may have been different at the time of movement; it could have *higher* or *lower*, hindering or helping the model. Beutner and Gerbi (2005) mention but do not explore this point, and so I will leave it here. Given all of the problems noted, the original state of the ramp does not affect my basic conclusion that their model cannot account for the outcome.

Furthermore, if the block needed to cross the Mesozoic and Cenozoic strata at 40 m/s, it must have been moving between 90 and 110 m/s when it reached the monocline (unless there is some mechanism for injecting more kinetic energy into the block). Otherwise, the model is not robust. But that higher velocity across the Paleozoic strata could not have been sustained since the gap generated would no longer be in equilibrium with the heating rate. Summarizing, the CO<sub>2</sub> model would have required three phases of movement (across the Paleozoic, up the monocline, across the Mesozoic and then across the Lower Cenozoic of the Bighorn Basin), but uniformitarians insist it was a single-pulse event. More detail on the issue of kinetic energy is addressed in Part 2.

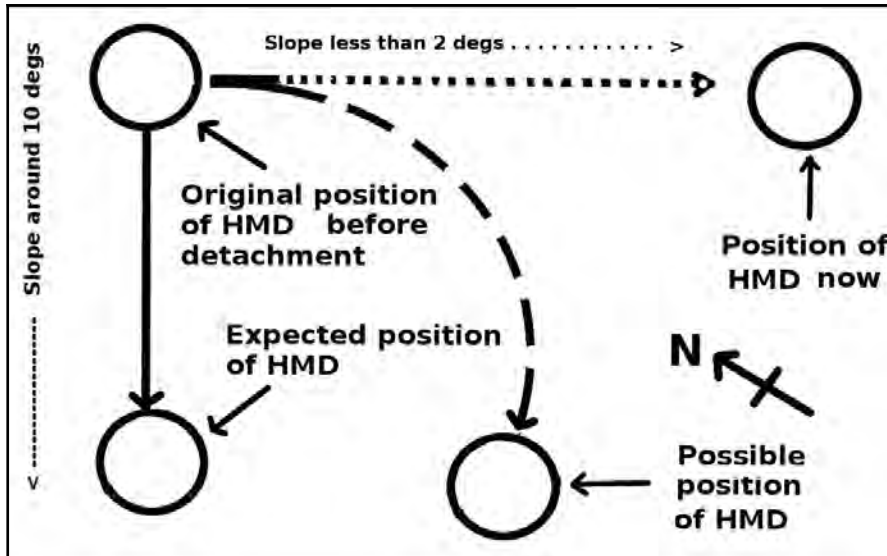


Figure 3. Trackway reconstruction of Heart Mountain, Wyoming, USA.

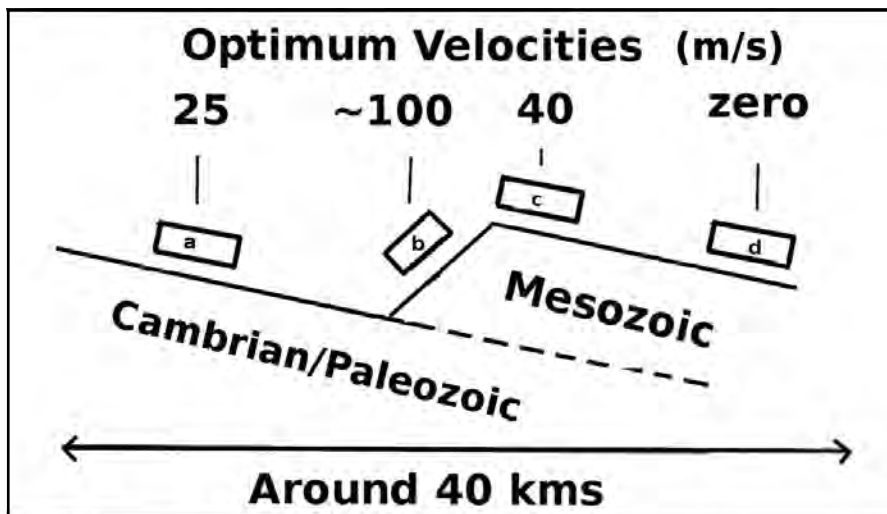


Figure 4. The velocity dilemma

There are other problems with the monocline. As the block reached the base of the monocline, it would have had to shift from moving 2 degrees downslope to as much as 30 degrees *upslope*. A huge gap between its base and the substrate would have opened, allowing more rapid CO<sub>2</sub> escape along-

side substantial physical damage.

How did the changes in velocities needed by the different portions of movement occur? Figure 4 (not to scale) shows the stark reality of the problem. It emphasizes that there are at least three different portions of movement at different velocities (positions a, b,

and c) where changes in velocity *must* have occurred. In reality, there are four, because we must include the location where Heart Mountain came to a halt (d). What is so special about that position? Why did the CO<sub>2</sub> cushion fail at that specific point when it had been so successful for 40 km? Why could the carbonate pieces found at McCulloch Peaks pass that point and not Heart Mountain? Without answers, we do not have a robust model.

Fifth, as the dolomite releases CO<sub>2</sub>, it turns to lime in this model. That lime would be expelled from beneath the block by escaping gas, creating a depressed trackway on the fault plane and levees at the edge (Figure 5). There is no evidence for these. Beutner and Gerbi (2005) suggest that the lime could have turned back to carbonate by interaction with air-borne and other local sources of CO<sub>2</sub>. But the argument is one from a lack of evidence, and therefore ad hoc. Also, since dolomite includes magnesium, magnesium minerals, sparse in CO<sub>2</sub>, would also have been deposited in the levees. These are neither soluble nor react back to their original state. Beutner and Gerbi (2005) admit that they are not there.

Commenting on this CO<sub>2</sub> self-generated cushion, several creationists accept that HMD was a real, sub-areal slide. For example:

Beutner and Gerbi have ... made a strong case for catastrophic movement of HMD (involving supercritical CO<sub>2</sub> as the suspending medium.) (Clarey, 2013, p. 5)

In light of the hidden and unreasonable assumptions identified in Beutner and Gerbi's work herein, if HMD moved it was not by CO<sub>2</sub>.

### The High-Pressure Water Cushion

Aharonov and Anders (2006) address the friction problem with a high-pressure water cushion. They suggest that dikes

rose from depth at high pressure along what would become the fault plane. Water from those dikes could explain how the slide started on a near-zero-friction surface of high-pressure water. Their calculations using rock mechanics and overpressures show that, given certain assumptions, the pressure of the interstitial water could have been raised by the Skempton effect to the lithostatic load. The block could then start to move down the small slope without the need for an arbitrary injection of kinetic energy (which Beutner and Gerbi require). With a slope of  $<2^\circ$  it would have moved slowly. Meanwhile, the high-pressure water would have escaped along the glide plane. Thus, their key problem would be maintaining the slide. The block would have moved away from the high-pressure water source and onto an unpressurized surface. The high-pressure water should have rapidly escaped as the block accelerated, resulting in abrupt rock-rock friction, and termination of the motion. This is why Beutner and Gerbi (2005) rejected earlier models of low-friction sliding. Another major problem for Aharanov and Anders' (2006) model is that HMD should have slid SW (Figure 3) since gravity provided the energy for their slide.

Other problems include not assessing the viscous drag from the water gap even if movement could have started. Also, high-pressure water along a fault plane creates other problems (see Part 2). The paper references Beutner and Gerbi's (2005) idea on this point without comment. The fact that it is a very different idea is an implicit criticism of Beutner and Gerbi's  $\text{CO}_2$  gas cushion, but it fares no better than theirs.

### The Molten Calcite Model

The paper by Craddock et al. (2009) is primarily about White Mountain (about 30 km "upstream" of Heart Mountain). Since it is also judged to have experi-

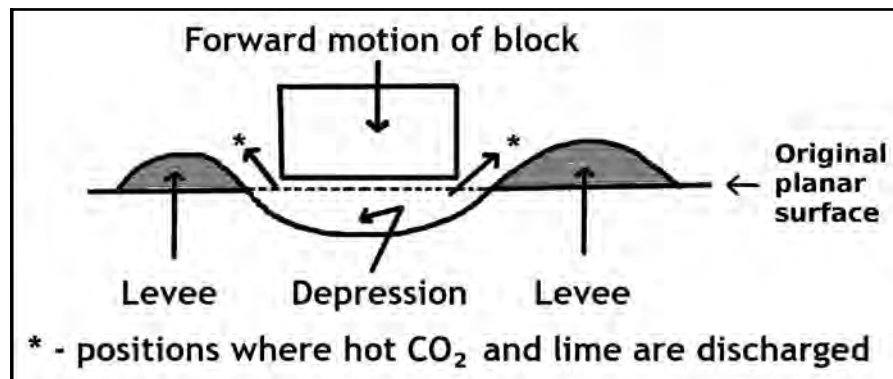


Figure 5. The formation of levees and depressions

enced catastrophic movement, their model could resolve the problems understanding HMD.

Like the others, this model starts with the assumption that the detachment occurred. The moving block has an unknown velocity that can be calculated by assuming that the slide took place over a low-friction layer of molten carbonate. A value of  $\sim 0.06$  is quoted compared with a normal rock-to-rock value around 0.6 (Jaeger et al., 2007). The heat is generated by the friction of sliding. Of the seven questions listed by Beutner and Gerbi (2005), Questions 1 to 3 are ignored, and Question 4 is answered by assuming that the slide took place (*circular reasoning*). Question 5 is answered by a less-than-sophisticated heat transfer calculation, and Questions 6 and 7 are ignored.

Furthermore, in their heat-transfer calculations, there is an assumption that the heat required to melt the rock is *fully available* at the beginning, but it would not be until the end that there would be sufficient heat to melt the calcite. There are also *numerical inconsistencies* (see Matthews, 2019). There are too many assumptions to call this a viable model. Like Beutner and Gerbi (2005), the focus was on a petrological examination of the rocks, with too little thought on

the physical mechanisms needed for the large-scale process.

This model cannot help explain how Heart Mountain traversed the Paleozoic, climbed the monocline, or traversed the Mesozoic and part of the Cenozoic.

### Summary, Conclusions, and Recommendations

Geologists have been baffled by the HMD for over 100 years (Hauge, 1993). They claim that it detached from its "mother mass," sliding up to 45 km to the east-southeast. Recent uniformitarian studies reveal seven questions that need answering before a viable explanation can be made. But the focus has solely been on only one—namely the nature of the low-friction cushion needed to explain the lack of breccia from the supposed movement.

Three very different recent models of low-friction sliding have been examined herein. They include cushions formed by carbon dioxide, high-pressure water, or melted calcite. Numerous problems exist with these, including the lack of consistency *between* the three distinctive ideas. Therefore, this leads to two obvious questions: Did Heart Mountain really move? And, if so, how did it move?

Leaving aside these fundamental questions for the moment, the key conclusions and recommendations from this study are:

1. In spite of intense effort to explain HMD as a low-friction slide, current models are woefully inadequate. They fail fundamental tests of physics and chemistry. All three assume movement, then try to justify it with ad hoc mechanisms.
2. While there is always opportunity for new perspectives on HMD that might answer the seven questions, it grows less likely in view of the effort so far and the lack of consistency between different researchers. There has been no major work in the last 10 years.
3. Creationists, especially those who consider the geological column to be a robust model of Earth's history (though without its uniformitarian timescale), should be wary of using or endorsing any of these low-friction models and need to note the *a priori* and often unstated assumptions in them.
4. Since Whitcomb and Morris (1961) seem to have had a valid point, creationists should revisit the geologic column, perhaps in a forum like Reed and Oard (2006), for two reasons. First, if the column is not robust, evolution is more readily challenged. Second, establishing whether the column is or is not robust affects how Flood models are constructed.

## Personal Note

This paper has been many years in the making. During that time, I have had extensive discussions with those having an interest in the subject and those I have pressured to check my physics. I am

grateful for the time they have spent with me clarifying things and alerting me to factors I had not previously noted. Some support the column; some do not; others (two physicists) have no independent view. I am also grateful to the formal reviewers helping me clarify my ideas and being sensitive to those who hold alternative views on the column.

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# A Little Flood Geology

## Part IV: The Nature of Flood Geology

Peter Klevberg\*

### Abstract

**F**loods are a key category of geologic processes, as presented in Part I. Examples of flood-related projects the author has worked on were presented in Part II. Part III showed that geologic paradigms can have negative effects on field work, sometimes causing evolutionists to miss or ignore evidence for relatively recent, catastrophic, regional-to-global processes. Creationists can become so enamoured with “Flood models” that they can likewise miss evidence of small-scale, slow geologic processes (Part III). Both positions present a false dilemma since both current processes and very different past processes contributed to modern landscapes. In this paper, evidence for megafloods is presented along with peculiarities of scale, evidence for equifinality of disparate processes, and some of the limitations of extrapolating from local floods to megafloods and from regional megafloods to the Deluge. While good analogues are essential, it is also essential to recognize their limitations, especially effects of scale.

**Key Words:** Flood geology, Megaflood, Equifinality, Evorsion, Landform, Analogue, Scale effects

### Introduction

As documented in Part I (Klevberg, 2019), floods are a key geologic process and the largest category of natural disasters. Even small floods can do a great deal of geologic work, as documented in Part II (Klevberg, 2020a) in examples from Central Montana (Figure 1 and Table I). These often combined with mass wasting and ground water phe-

nomena, some very difficult to explain. Part III (Klevberg, 2020b) provided examples of processes acting gradually or stochastically. While these are incapable of explaining larger features of the rock record and landscapes (i.e., uniformitarianism is discredited), they are important on a local scale. Similarly, abundant evidence for mega-flooding should not be ignored by secular geolo-

gists. To pit one set of evidence against the other is a false dilemma; the real tension is between geologic paradigms, not science. Flood analogues can be a bridge between geology and natural history. In this part, the knowledge gained from the Montana floods of 2011 is extended to megafloods.

### Flood Geology as a Bridge to Natural History

A great deal can be learned from floods, though mysteries remain, even with relatively small floods. This is evident in the difficulties of flood prediction, and

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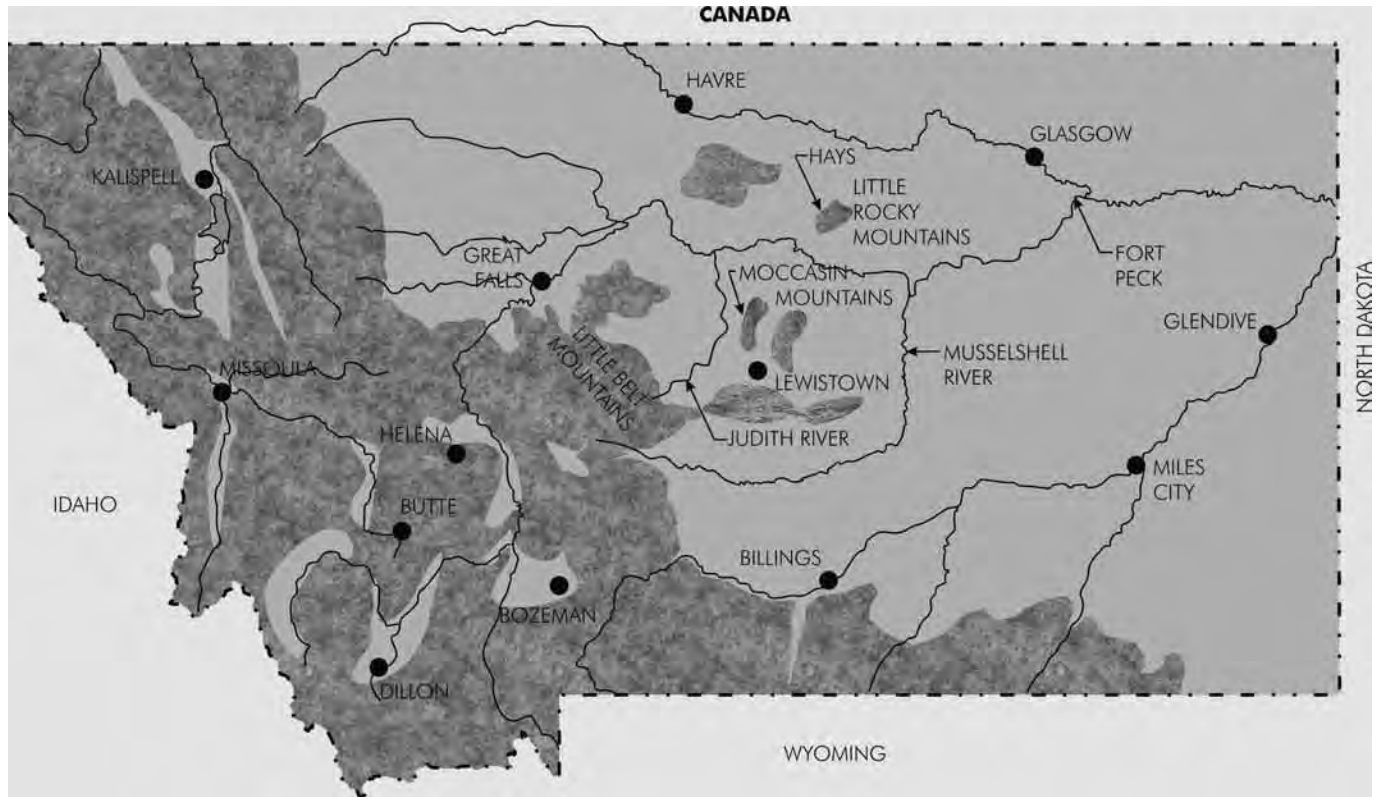


Figure 1. Map of Montana showing major rivers and mountainous areas.

in estimating scour and back calculating flood parameters. To what extent can we extrapolate our knowledge from today’s floods to past “megafloods”?

In fluid dynamics, complex phenomena are modeled in wind tunnels and flumes by controlling important ratios (dimensionless parameters) such as Mach number, Froude number, or Reynolds number. This allows a large-scale process to be modeled at laboratory scale under controlled conditions. In geology, processes are observed at small scales, but to what extent can they be validly *extrapolated* to larger scales?

This difficulty is exacerbated when elements of natural *history* are introduced. None of the megafloods listed in Table II (the first five floods in the list) were observed; all of them are inferences from geologic features. They are unique, unrepeatable, historic events, not scientific experiments. It is not possible

Table I. Selected Peak Discharges from 2011 in Central Montana

Gauging Location	Peak Discharge	
	m <sup>3</sup> /s	cfs
Musselshell River at Martinsdale	136	4,800
Musselshell River at Harlowton	153	5,400
Musselshell River at Roundup	425	15,000
Musselshell River at Mosby	736	26,000
Judith River at Utica	140	4,960
Judith River at Central Montana Rail bridge	283	10,000
Judith River at mouth	433	15,300
Missouri River downstream of Fort Peck	1,866	65,900

\*Data from U.S. Geological Survey

to turn on a flume and run trials under controlled conditions, or even watch a re-run. This is the essence of why natural history is a “mixed question”

(Adler, 1965), and why the level of certainty is less than with direct scientific observation and measurement (Reed and Klevberg, 2018).



Figure 2. View southwest from near west-northwest end of Judith River bridge. Note that slope instability indicates the valley was formed by processes considerably larger (more catastrophic) than those operating today. Modern processes subdue the topography through mass wasting, which also encroaches on the relict planation surface (bench).

## Scale

Some of the problems of scale have been noted relative to prediction of scour (Holnbeck and Parrett, 1997). Many of the physical relationships used in scour analysis were derived from flume experiments. These experiments have proven invaluable, but as the Judith River (Klevberg, 2019, 2020a) showed, the actual scour was significantly more than the initial estimate (prediction), the river being more complex than the laboratory flume. Similarly, megafloods may exhibit much greater complexity.

## Geomorphic features

At least four distinct scales are evident in the Judith Basin where Central Montana Rail crosses the Judith River and Arrow Creek (Figures 2–4). The smallest scale (1) is within the stream channel of the Judith River. Based on HEC-RAS

computer modeling, the river's 100-year flood plain (2) occupies approximately half of the valley bottom. The edge of the valley (3) is incised into a vast planation surface, or "bench," capped by gravel. The bench edge is marked by a decisively incised slope, with large amounts of mass-wasting products at its base. The bench is approximately 45 m (150 ft.) above the level of the valley and exhibits a scale (4) approximately 150 times larger than the valley bottom. The broad expanse of the Judith Basin consists of a series of closely spaced benches that ramp into each other, with a few higher surfaces remaining as buttes or isolated bench remnants (at the horizon in Figures 2 and 3). These differences in scale are noted in Figure 2.

Both the magnitudes and characteristics of these features show contrasts. The modern Judith River occupies only a portion of the valley floor and is much more sinuous than the oversized

valley. This indicates that larger flows eroded this valley. Other than size and the relatively straight form of the valley, its dendritic pattern is typical of streams. The valley is minuscule in comparison to the Judith Basin. The Judith Basin consists of planation surfaces dissected by similar stream courses. As previously noted (Oard and Klevberg, 1998; 2008; Oard, 2008; 2011; 2013), these vast, nearly-level planation surfaces are not *formed* by extant processes; they are being *destroyed* (Crickmay, 1974). The lateral extent of similar surfaces in this region, such as the higher Cypress Hills and Flaxville erosion surfaces, clearly demands extreme processes and energy levels, like those of the Noahic Flood (Oard and Klevberg, 1998). These are extreme processes, unlike the diminutive processes currently in operation, even in the flood of 2011. Table I shows measurements from several Central Montana gauging stations for the 2011



Figure 3. View toward Danvers from west-northwest end of Indian Creek viaduct. Danvers grain elevator provides scale. Mass wasting events of various ages and scales are evident on west side of valley. Extant erosional processes are gradually destroying the gravel-capped planation surface (bench). Such erosion surfaces are not observed forming on earth today (Oard, 2008, 2011, 2013).

flood peak flows. These flows are between one and five orders of magnitude smaller than the megafloods in Table II. Features of the type seen in the Judith Basin do not show evidence of gradual accretion from localized floods, and in scale they defy recognized megafloods. The megafloods themselves are larger than even major floods for which we have contemporary data.

### Drainage Basins and Flood Magnitudes

O'Connor and Costa (2003) present data showing an inverse relationship

between size of drainage basin and magnitude of flooding events. Cloudbursts dump larger quantities of rain over smaller areas producing more destructive, but localized, flooding (O'Connor et al., 2002). For example, the ghost town of Bannack, Montana's first territorial capital, was severely damaged by a flash flood in 2013, though it escaped such destructive flooding in 2011 and for the 149 years prior. The Bannack flood was localized. The great flood of 1964 ("The Flood" to some locals) in Central Montana remains a vivid memory partly because it overtopped Gibson Dam, initiated the failure of

Swift Dam, and resulted in the loss of thirty lives (Department of Military Affairs, 2010), with widespread lowland flooding (Rowell, 2014). However, it was *more* localized in terms of the Missouri Basin than the flooding of 2011 (Alexander et al., 2013). The largest floods in Montana have been a *combination* of factors, typically rain on snow, sometimes ice jams or snowmelt on frozen ground, rather than immediate precipitation (Department of Military Affairs, 2010). In general, 24-hour rainfall amounts in the Musselshell and Judith Basins in 2011 only rated as 10- to 25-year events (Green, 2011).

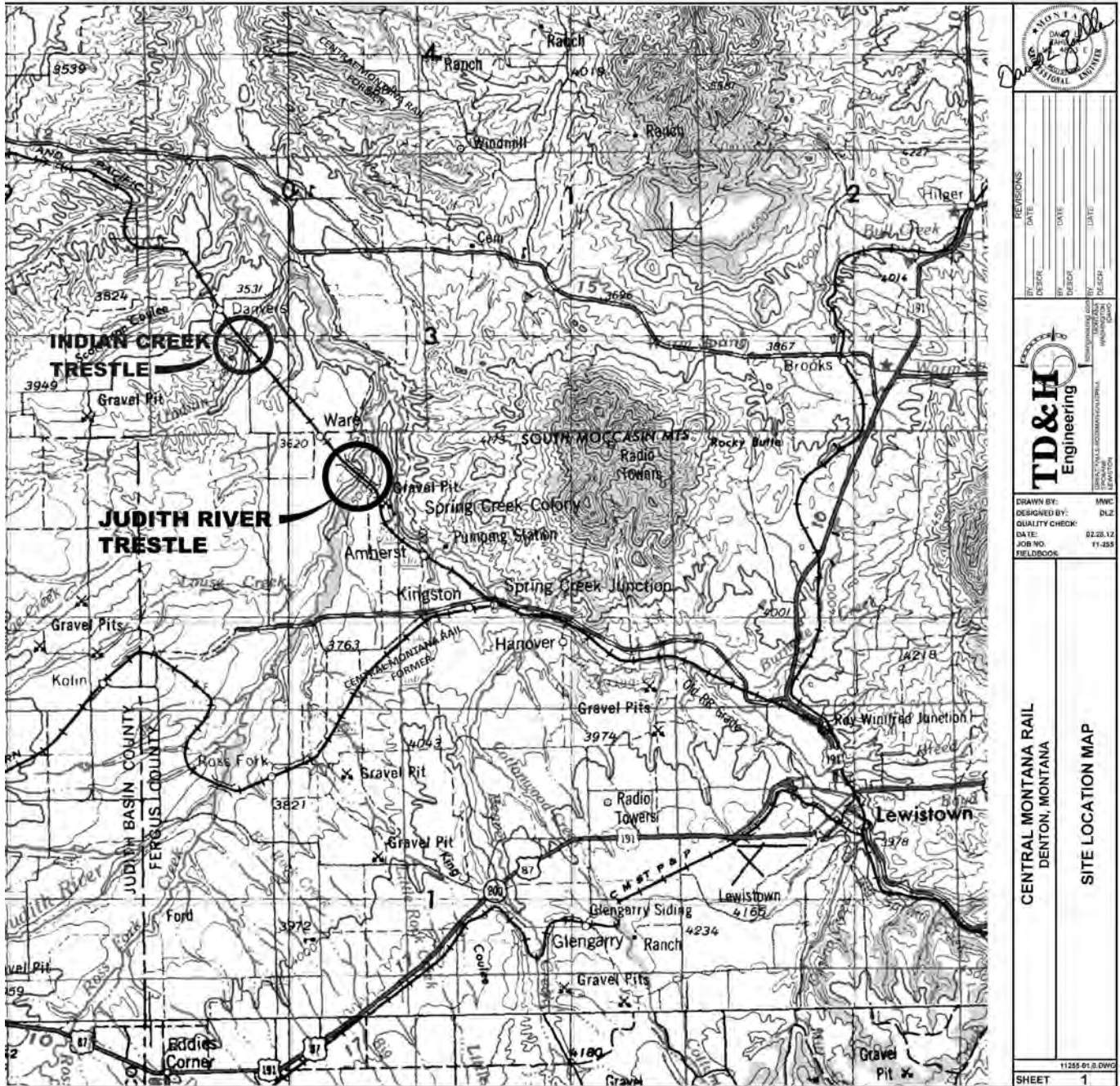


Figure 4. Map showing location of Judith River and Indian Creek bridges northwest of Lewistown, Montana. Figure courtesy of TD&H Engineering.

**Extrapolating to Megafloods**

To what extent can a flood that does not even inundate a valley bottom be an analogue for a megaflood? To what extent can even “The Flood” of 1964

or the Russell Fjord Flood of 1986 ( $Q_{peak} = 105,000 \text{ m}^3/\text{s}$  or  $3.7 \cdot 10^6 \text{ cfs}$ ) be an effective analogue? While these events clearly demonstrate the episodic nature of the most important geologic

processes (Baker, 2002; Benito, 1997; Clayton and Knox, 2007), can they provide quantitative or semi-quantitative means of inferring geologic work?

Table II. Selected Major Floods of the World

Flood	Year	Peak Discharge		Apparent Mode of Initiation	References
		m <sup>3</sup> /s	cfs		
Kuray, Altai, Eastern Russia	unknown	1.80E+07	6.36E+08	Ice-dam failure	Rudoy, 2002*
Missoula, Northwestern U.S.A.	unknown	1.70E+07	6.00E+08	Ice-dam failure	O'Connor and Baker, 1992
Darkhat Lakes, Mongolia	unknown	4.00E+06	1.41E+08	Ice-dam failure	Rudoy, 1998
Lake Agassiz, Alberta, Canada	unknown	1.20E+06	4.24E+07	Pro-glacial lake overflow	Smith and Fisher, 1993
Lake Bonneville, Northwestern U.S.A.	unknown	1.00E+06	3.53E+07	Lake-basin overflow	O'Connor, 1993
Indus River, Pakistan	1841	5.40E+05	1.91E+07	Landslide-dam failure	Shroder et al., 1991
Katlahlaup, Katla, Southern Iceland	1918	3.00E+05	1.06E+07	Jökulhlaup	O'Connor and Costa, 2004
Amazon River, Obidos, Northeastern Brazil	1963	2.50E+05	8.83E+06	Rainfall	Rodier and Roche, 1984
Lena River, Kasur, Russia	1967	1.90E+05	6.71E+06	Ice jam and snowmelt	Rodier and Roche, 1984
Yangtze River, China	1870	1.10E+05	3.88E+06	Rainfall	Rodier and Roche, 1984
Russell Fiord, Alaska, U.S.A.	1986	1.05E+05	3.71E+06	Ice-dam failure	U.S. Geological Survey*
Skeiðarársandur, Southeastern Iceland	1996	4.50E+04	1.59E+06	Jökulhlaup	World Data Centre, 1996
Fraser River, British Columbia, Canada	1972	1.40E+04	4.94E+05	Rain and snowmelt	Clayton and Knox, 2007*
Upper Missouri River, North Dakota, U.S.A.	1952	1.40E+04	4.94E+05	Ice-dam failure	O'Connor and Costa, 2004
Glacial Lake George, Alaska, U.S.A.	1958	1.00E+04	3.53E+05	Jökulhlaup	Clayton and Knox, 2007*
Upper Missouri River, Montana, U.S.A.	2011	1.87E+03	6.59E+04	Rain and snowmelt	U.S. Geological Survey*
Upper Missouri River, Montana, U.S.A.	1946	1.44E+03	5.10E+04	Rain and snowmelt	U.S. Geological Survey*
Upper Missouri River, Montana, U.S.A.	1964	4.25E+02	1.50E+04	Rain and snowmelt	U.S. Geological Survey*
Upper Missouri River, Montana, U.S.A.	2014	2.60E+02	9.20E+03	Rain and snowmelt	U.S. Geological Survey*

\*Except for these marked sources, information in this table, including sources, is from O'Connor and Costa, 2004.

Missouri River measurements in Montana are from downstream of Fort Peck.

Thankfully, the laws of physics apply at all scales. But is geology just a specialized application of physics (Kravitz, 2013)? Geologists rely on physical analogues, but extrapolation is only valid if the scale does not affect the process. Scale effects include velocity distributions and relative bed roughness. Boundary layer thickness becomes a smaller proportion of flow with deeper water. While the water surface must slope downgradient, the bottom may be quite irregular. The Bernoulli equation still applies. If, however, irregularities of the bottom extend to the surface, flow may be restricted, and a new local base level created. In these cases, an analogy may break down. The most consistent principle is energy: processes will be driven toward lower energy states regardless of scale.

### Peculiarities of Megafloods

Megafloods and jökulhlaups (glacial outburst floods) show effects not seen in “ordinary” floods like the 2011 floods. Benito (1997) found a relation between landforms and inferred flow depth for the Missoula Flood (Figure 5). Some of the effects of megafloods not typical of normal flooding are:

- Giant current ripples or antidunes (Thiel, 1932; Carling et al., 2009; Klevberg and Oard, 2016), boulder deltas (Elfström, 1987), giant gravel bars (Benito, 1997; Carling et al., 2009), and large or outsized ramparts and terraces—often errantly called “river terraces” (Rudoy, 2002);
- Deposition of poorly rounded clasts, apparently from suspension (Baker, 2002; Rudoy, 2002);
- Streamlined hills (Benito, 1997) and erosional drumlins (Shaw, 2010);
- Hummocky terrain, diamict(on), and fluting (Shaw, 2010);
- Potholes and closed depressions, butte-and-basin topography (Benito, 1997);

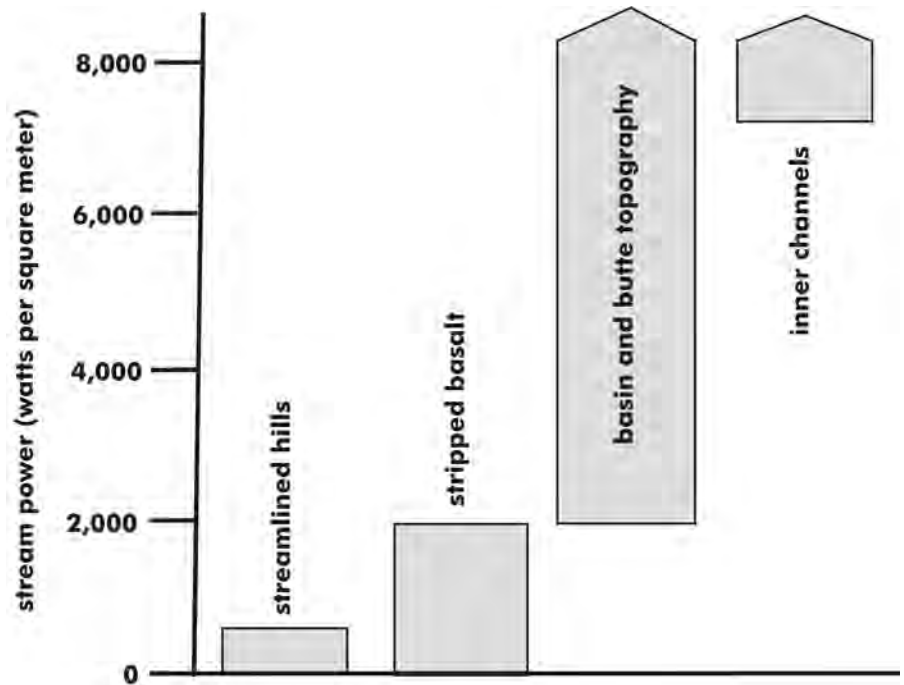


Figure 5. Relation between inferred unit stream power and observed geologic features in the Channeled Scablands along the Columbia River in Washington and Oregon. Figure modified from Benito (1997).

- Grooves and anastomosing (braided) channels (Benito, 1997);
- Oversized valleys and large-scale channels (Kozłowski et al., 2005; Shaw, 2010);
- Giant and erratic boulders (Baker, 2002; Birkeland, 1968; Carling, 2013; Clayton and Knox, 2007; Elfström, 1987; Kershaw et al., 2005).

Each of these could be a fertile area of research, but a few examples are provided here for large boulders. Peculiarly large boulders have been transported in recent history, strengthening the hypothesis that turbulent conditions in the deeper waters of megafloods could move larger clasts than simple application of stream power relations would suggest (Benito, 1997; Kershaw et al., 2005). Boulders a few meters in diameter were moved hundreds of meters by a dam breach flood in British Columbia in 1997 (Kershaw et al.,

2005). Boulders up to 5 m (16½ feet) in diameter in Sweden are rounded to subrounded and appear to have been transported 2 to 3 km (1.2 to 1.8 miles) on a low-gradient slope. They have scour marks around them indicative of fluvial transport, probably in a jökulhlaup or high-density flow (Elfström, 1987). A boulder 9 feet long, 5 feet wide, and 4 feet tall (2.7x1.5x1.2 m) was inferred to have been transported in a flood 10 feet (3.3 m) deep in the channel of the Truckee River at about 15 to 18 feet per second (4.5 to 5.5 m/s), and the largest boulder in this study had dimensions of 36 feet by 20 feet by 20 feet (10.9x6.1x6.1 m) where exposed (Birkeland, 1968). The 1928 failure of the St. Francis Dam in California produced a flood with a maximum depth of 125 feet (38 m) and a velocity of 26.4 feet per second (8 m/s); this flood transported a piece of concrete 63 feet by 54 feet by 30 feet

(19.1x16.4x9.1 m) one-half mile (one km) from the dam (Birkeland, 1968). Modern examples of surprisingly large boulders transported over low-gradient slopes are also to be found from various flash floods, though these are dwarfed by the megaflood examples.

Differences between geologic features attributed to megafloods and features from “ordinary” floods can be attributed to processes not found in shallower or lower power floods. Ordinary processes can operate at larger scales. These include *deposition*, where giant current ripples or antidunes, boulder deltas, oversized ramparts and terraces form; *erosion*, forming oversized valleys and large-scale channels, sometimes crossing drainage divides (Clayton and Knox, 2007); and *evorsion* or the formation of potholes by vortices, sometimes at much larger scale than the small potholes found in active streams (Rudoy, 2002). In addition, megafloods and jökulhlaups can produce greater unit stream power or deeper flows with fluid mechanisms unlike normal flood processes, including *cavitation*, where relatively shallow, very rapid flow can produce intense physical erosion of solid rock (Holroyd, 1990; Benito, 1997; Baker, 2002). They also can transport large clasts by suspension in deep, turbulent flow. This may produce coarse, sometimes poorly sorted deposits, and relatively little rounding of clasts (Baker, 2002; Rudoy, 2002; Carling, 2013). In addition, we see evidence of high viscosity or hyperconcentrated flows that may have transported large boulders and produced glacial-like features (Elfström, 1987; Klevberg and Oard, 1998; Shaw, 2010). Finally, we see high unit flow power currents—moderate and deep, energetic currents, could quickly produce scabland and butte-and-basin topography, streamlined hills, and similar features (Benito, 1997; Rudoy, 2002).

All the megafloods in Table II (floods with estimated peak discharges of one million m<sup>3</sup> or more) are “prehistoric.”

They must be inferred from geologic evidence and are more limited in their usefulness than recent floods that were observed or measured with instruments. The preponderance of these megafloods is believed to have been generated by Ice Age processes quite unlike modern ones (Oard, 1990).

Many unique features of megafloods are simply scale rather than type. For scales common today, many of these are termed “bedforms” and are indicative of the extrapolated flow regimes. Carling et al. (2009, p. 34) recommend distinguishing terminology for these larger, relict features:

... the term ‘landform’ is to be preferred as this latter term has neither spatial nor genetic association with a particular portion of a channel way. In a similar sense the adjective ‘diluvial’ may be a useful precursor to the term ‘depositional landform’ in as much as the term may be used to signify an association with exceptionally large floods. However, some scientists object to the biblical connotations that the word ‘diluvial’ carries.

Might there be a little bit of prejudice in the scientific community? Are some features being overlooked because of it?

### **Flood Prediction**

The U.S. Army Corps of Engineers recommends use of megaflood inferences in flood frequency estimation and risk analysis (Fenske, 2003), which assumes uniformitarian history. Megafloods are believed to recur at various times, with an increasing regularity given enough time (O’Connor et al., 2002). This assumption is likewise made in stratigraphy and other branches of geology (Miall, 2013). The consequences of this prejudice should be obvious. Logically, megafloods could have resulted from unusual conditions (e.g., ice age) or could recur in an unpredictable man-

ner. While diluvialists accept a relatively short history for Earth, replete with radical shifts in climate, only recent social pressure from “climate alarmists” might persuade uniformitarians to consider that megafloods may be unpredictable. Even predicting the frequency of modern floods is difficult.

### **Difficulties with Extrapolation**

While extrapolating ordinary stream rates over millions of years per Lyell has been effectively discredited, diluvialists need to be careful as well. As noted by Morris (1976) and others, the Hebrew word for the Deluge is *mabbul* (or *mabbuwl*); not the ordinary word for a flood. One important difference is that many diluvial processes are those of *marine geology*, not *flood geology*. This characteristic of “megafloods” or diluvial processes has been pointed out by several researchers, both diluvialists and uniformitarians. The Altai and Missoula megafloods “... achieved peak discharges ... comparable to the volume of water moved by many ocean currents” (Baker, 2002, p. 2380). Carling (2013) points out the abundance of laterally extensive, planar bedded and often coarse-grained sediments, some with outsized clasts, and sometimes exhibiting a Bouma sequence. He states (p. 104), “This analogy between flood deposits and turbidites is very important as it implies distinctive transport and depositional processes could be at work within megafloods which are akin to density driven processes most commonly seen in the marine environment.” While open channel flows are generally applicable by treating the “channel” as having infinite width (Klevberg and Oard, 1998), actual flow during the *mabbul* differed from our understanding of steady, uniform flow and is difficult to estimate. Baker (2002) and Benito (1997) pointed this out regarding the Missoula Flood. As the smaller “megafloods” differ from “ordinary” floods, so a “super-megaflood”

or *mabbul* could be expected to differ from “typical” megafloods.

The same difficulty in extrapolation applies to sedimentation in general (cf., Carling, 2013). If we keep these important differences in mind, we can appropriately use knowledge from flood hydrology, flood geology, and marine geology to test natural history speculations. As Kravitz (2013, p. 21) noted, the past cannot be observed: “To state this more exactly, by assuming the uniformity principle, the past becomes dependent on the geologist’s thinking, and in this sense, he can be said to construct it rather than discover it.” While diluvialists have the advantage of a written historical account, natural history speculations are still natural history speculations.

## Conclusions

Accrued knowledge of flood geology from local floods (mostly of rivers) has been extrapolated to megafloods. Observations and inferences include:

1. Most important geologic processes apparently have been (and continue to be) episodic, and floods are an example of such processes, especially megafloods.
2. Most geologic modeling is based on analogues with only limited ability to control conditions using dimensionless parameters (e.g., flume experiments). Field analogues, such as “ordinary” floods, must be *extrapolated* to megaflood scale. Extrapolation is only valid if *scale* does not affect the process.
3. Megafloods ( $>10^6$  m<sup>3</sup>/s) have not been observed but are inferred from geologic features that resemble what one would expect. Evidence of megafloods has been observed in many places.
4. Extrapolating from flume-scale controlled conditions to river-scale uncontrolled conditions is valuable but incomplete, since “real world” conditions can be much more com-

plex. This has been illustrated by difficulties in accurately predicting scour.

5. Megafloods produce many of the same features and landforms as “ordinary” floods, though often at much larger scales. These include giant current ripples or antidunes, boulder deltas, and oversized ramparts and terraces.
6. Megafloods also produced landforms and features not commonly observed today, including deposits of poorly-rounded clasts, streamlined hills and erosional drumlins, hummocky terrain, diamict(on), fluting, potholes, butte-and-basin topography, and large erratic boulders. Some of these features are common with glacial processes (i.e., equifinality).
7. Geologic formations and landforms observed in the Judith Basin of Montana do not show evidence of gradual accretion from local floods. The scale of the main valleys suggests megafloods, and the basin’s planation surfaces defy gradual processes in scale.
8. Care must be exercised in extrapolating modern flood processes. As megaflood effects appear to be more varied than features and deposits of “ordinary” floods, the Deluge would produce more varied features and deposits than later megafloods. In many cases, megaflood (and particularly diluvial) processes may be more accurately thought of as *marine* geology rather than *flood* geology.
9. While historical geology is a “mixed question” that properly belongs in the category of natural history, it has long been viewed as natural science by uniformitarians. Geology as a science has contributed much to our understanding of erosion and deposition, especially through flood studies, and it has discredited uniformitarian philosophy. Nonetheless, uniformitarian thinking still dominates the geologic community.

10. Common flood prediction methods are based on commitment to belief in traditional “deep time.” This paradigm may produce false confidence in our ability to predict the magnitude and frequency of floods. Climate change may further complicate this and limit our ability to predict flood events.

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# Doxological Biodiversity in Job, Chapter 39:

## God’s Wisdom and Providence as the Caring Creator, Exhibited in the Creation Ecology of Wildlife Pairs

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### Abstract

The Old Testament book of Job contains a “nature sermon,” directly delivered by God Himself, unto Job, in answer to Job’s questions about how Job’s peaceful life was suddenly interrupted by agonizing afflictions and disasters. God’s answers provide a creationist theology of God’s goodness, might, wisdom, and providence. In this “nature sermon,” reported in Job 38–41, God highlights His control over the physical cosmos, then He describes His control over the world of living creatures. Beginning in Job 38:39, God emphasizes how He has carefully planned for and carefully fitted resources for critical needs of His animal creatures, including reproductive success, dietary necessities, resources to facilitate terrestrial and aerial mobility, etc. Accordingly, (a) Job should recognize God’s kind providence as it is wonderfully applied to God’s lesser creatures; (b) Job should recognize that his own humanity is more valuable to God than the lives of wild animals; and (c) Job should patiently depend upon God to work out good outcomes for his life, here and hereafter. To teach these truths (which are later summarized in 1 Peter 4:19) unto Job, God provides these paired illustrations of various animal’s needs and activities: (1) lion and raven; (2) wild mountain goat and cervid doe; (3) wild donkey and rhinoceros; (4) ostrich and horse; (5) hawk and eagle; (6) Behemoth and Leviathan.

**Key Words:** Providence, lion, raven, wild mountain goat, cervid, wild donkey, rhinoceros, ostrich, horse, hawk, eagle

### Introduction

The Book of Job has a literary structure that does not fit an “either-or” categorization of prose-versus-poetry, because

Job’s book begins with a historical prose prologue (Chapters 1 & 2), and concludes with a historical narrative epilogue (42:7–17)—yet the interven-

ing text (3:1–42:6) primarily provides powerful and poignant discourses (both monologues and dialogues) that are presented in the parallelism-framed format of Hebrew poetry (Johnson, 2011).

Job 39 is part of the lengthy serial-questions-based “nature sermon” (Job, Chapters 38–41) that God gave unto Job, with each creation exhibit (including all

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animal “creature features”) proving God’s infinite wisdom and providence, as the Creator of the heavens, the Earth, animal life (especially wildlife), and mankind—including Job himself (Johnson, 2014).

Specifically, God’s nature sermon (Job 38–41) begins with God’s rhetorical questions about the heavens and Earth’s geophysical environment (38:1–38), follows with God’s questions about selected land-based beasts of the earth (38:39–39:30), and ends with two monstrous beasts of water-dominated habitats—Behemoth (chapter 40, inhabiting freshwater wetland habitats) and Leviathan (chapter 41, inhabiting “deep” saltwater habitats).

Thus, within the overall context (of Job 38–41), the flow (of Chapter 39’s wildlife lessons) actually begins at Job 38:39, which begins a theme-connected series of “creature feature” pairs, starting with the hunger of lions and ravens. It would be more thematically convenient if chapters 38 and 39 broke at Job 38:38 / 38:39—because the series of animal-based inquiries begins with the question of how lions get food (at 38:39–40), which is paired to the question of how ravens get food (Job 38:41).

Job 38–41 is structured as Hebrew poetry, so parallelism is the key to exegeting Job 38–41. The first “creature feature” animal pair is the “lion” (38:39–40) and “raven” (38:41), whose hunger God satisfies. That pair is followed by four more land-based animal pairs (chapter 39), concluding with a wet-habitat monster pair, Behemoth (chapter 40), and Leviathan (chapter 41).

Thus, Chapter 39 continues this series of animal pairs with child-bearing “wild goat of the rock” and the child-bearing “hind” (39:1–4); followed by the free-ranging, untamed “wild ass” (39:5–8) and free-ranging, untamed “unicorn” (39:9–12), which is the archaic name for rhinoceros (Johnson 2018a); followed by the fearless, reckless “ostrich” (39:13–18) and fearless, reckless “horse” (introduced in verse 18, discussed in

39:19–25); followed by the wind-borne, soaring “hawk” (39:26) and wind-borne, soaring “eagle” (39:27–30).

[U]sing a “nature sermon” ... God pointed to how He takes care of earthly creatures through His providential timing. Lion and raven babies hunger first, then they eat. Wild goats and deer have designed timeframes for gestation, then birth occurs. Hawks and eagles fly with purposeful timing, synching their flights to thermal air currents ... Sequential timing is vital for the important things in this life, even the basics of being born, metabolizing food, and daily movements. Timing contextualizes all of the temporal adversities in human life, too. But eventually, all temporal afflictions end. God was testing Job’s moral character. We know this now because we have [Job’s] book and know the entire ordeal, including the happy ending. But if God had told Job about the test in advance, including how God was proving that Satan was an impudent liar, it would have ruined the legitimacy of Job’s own trial of faith. What Job learned through his agonizing ordeal was synched to sequenced timing—God’s timing—so that Job’s sufferings ultimately ended and counted for good ... as Paul would later [in Romans 8:28] say, “all things work together for good” (quoting from Johnson, 2016).

The main lesson for Job—which fits the overall context of his book—is that God is providentially caring, all-wise, and all-powerful, so He can and should be trusted with all of Job’s life.

## Exegetical Observations and Lexical Analysis

### Verses 1–4

As before (such as in 38:39, with God’s question about lions), God’s

interrogation (of Job) begins with the interrogatory particle prefix (*ha-*), indicating a question. In these verses Job is asked about gestation and child-bearing, as illustrated in the life cycles of the *ya’elê-sâla’* (KJV: “wild goats of the rock”) and *’ayyâlôth* (KJV: “hinds”). Both of these are wild mammals that illustrate the need for successful reproduction. God’s inquiry begins with the rhetorical question “do you know [*ha-yâda’tâ* – qal perfect 2<sup>nd</sup> person masculine singular of *yâda’*] ...?”—emphasizing God’s perfect and infinite knowledge of creation, in contrast to Job’s imperfect and finite knowledge.

These two animals exhibit the suffering (affliction, pain, discomfort, etc.) of pregnancy and childbirth that leads to a good outcome, eventually. These paired animals, as well as the other wildlife pairs, illustratively fit the overall “Creator-cares-for-His-struggling-creation” theme of Job’s book; this theme is well summarized by 1<sup>st</sup> Peter 4:19.

There are two infinitive constructs in 39:1, the qal *ledeth* (“bring forth,” i.e., to procreatively generate or “beget”/“give birth,” from *yâlad*) and the pôlêl *hólêl* (“do calve,” i.e., to procreatively struggle in pain/discomfort to give birth, from *hûl*, as in Isaiah 26:17 & 54:1). For both of these mammal mothers, the *timing* of their pregnancy and childbirths is providential: God knows “when” [‘ê] the ibexes bring forth, as well as when cervid “hinds” (deer roe) calve. God’s question (in Job 39:1b) implies that Job neither observes nor provides watch-care (qal imperfect form of root verb *šamar* = to watch, keep, safeguard, preserve.) over these critical wildlife events, once again demonstrating Job’s limited knowledge of how God comprehensively cares for the world and its multifarious creatures’ life cycles.

As 39:2 indicates, these birthing events are always observed (and providentially cared for) by God; unlike Job the mortal human, God can and does “number [qal imperfect form of *sâphar*]

the months they fulfill [piel imperfect form of *māla*]” and He knows “the time [‘ēt] when they bring forth [qal infinitive construct form of *yālad*, with 3<sup>rd</sup> person feminine plural suffix].”

These animal childbirth processes involve struggle, as 39:3 indicates: these mammal mothers “bow themselves” [qal imperfect form of *kāra*], to “bring forth” [piel imperfect form of *pālah*] their begotten-ones (i.e., their newborn babies); thus they forcibly “cast out” [piel imperfect form of *šālah*] their sorrows.

Yet this progeny-generating struggle achieves a good outcome: “their young ones” (*benêhem* = “their children”) grow up in the open field (*bar*); they issue forth and don’t return unto their parents. Notice that the last two verbs in Job 39:4, *yašē’û* (they “go forth”) and *šābû* (they “return”) and both qal perfect forms (of *yāšā’* and *šûb*, respectively), indicating a description of activity as completed.

Although the multi-generational process continues, with each new generation of ibexes leaving their mothers after weaning, God is emphasizing (to Job) that He completes the child-rearing process so that the filial generation become independent of parental care and does not return to the earlier state of childish dependence. This shows that the Hebrew perfect verb is not identical to an English grammar’s “past” tense, because the completed action (of leaving maternal care for a new life of independence) is chronologically future as to future generations.

The rocky cliff-dwelling *ya’alāh* (introduced in Job 39:1a) is not a domesticated goat (‘ēz). The root verb for this noun is “ascend” (‘*alah*), and that is what these high-elevation quadrupeds are famous for doing. The first-named animal is a type of wild mountain goat, most likely what today is called the Nubian ibex, which is similar to the Alpine ibex, a/k/a Steinbok (Cansdale, 1976). Specifically, zoölogist Cansdale observes: “The incident in I Samuel 24:2 ff. gives useful confirmation by

describing David and his men as being ‘on the rocks of the wild goats.’ This was at En Gedi, the oasis just above the west side of the Dead Sea. The name itself was significant—the Fountain [i.e., freshwater well/spring] of the Kid—and the ibex themselves are still there today, in a Wildlife Sanctuary made specially to protect them among the barren hills where they have always lived. In Job 39:1 the [Nubian] ibex is associated with [i.e., compared to] the hind (deer) in a way suggesting that they belong to the same class [or comparable category] of animals.” (Quoting Cansdale 1976, page 88.)

This rocky cliff-dwelling *ya’alāh*, in singular feminine noun form (*ya’alāh*), also appears in Proverbs 5:19. Furthermore, the masculine plural noun form (*ye’ēlīm*) appears also in 1<sup>st</sup> Samuel 24:2 (1<sup>st</sup> Samuel 24:3 in the Hebrew Bible), associated with rocks, and again in Psalm 104:18, associated with high elevations.

The cervid doe (introduced in 39:1b), i.e., the mother deer (“hind” in KJV, the Hebrew feminine plural is ‘*ayyālōth*), is the second-named baby-bearing (and birthing) mammal. This feminine noun appears elsewhere, such as in Genesis 49:21, 2<sup>nd</sup> Samuel 22:34, Habakkuk 3:19, etc.—with Psalm 29:9 specifically noting that it is the LORD Who shakes loose (i.e., causes calving) the cervid hind’s newborn, at birth, using a wordplay with the same verb [*hûl*] in Psalm 29:8. The male deer (“hart” in KJV) is *ayyāl* in Hebrew (as in Psalm 42:1(2), Isaiah 35:6, etc.

### Verses 5–12

The next wild mammal pair begins with the “wild ass” (*perē*), also called ‘*ârôr* in 39:5b), followed by the “unicorn” (*re’ēm*), described in Job 39:9–12, which is a wild animal that today is called rhinoceros (Johnson, 2018a). The common theme for this pair is their unharnessed, free-ranging, vigorous independence (linking to the independence allusion in 39:4).

The “wild ass” (Job 39:6), according to zoölogist George Cansdale, is most likely the steppe-dwelling Asian equid variety called the Onager, which is the same untamed “wild ass” mentioned in Jeremiah 2:24, and metaphorically likened to Ishmael’s progeny in the prophecy of Genesis 16:12) (Cansdale, 1976, pages 94–95; see also Job 24:5; Jeremiah 2:24; Psalm 104:11). The wild ass lives apart from mankind (39:7), so a lifetime of domesticated service, such as bearing burdens for a “driver,” or hearing the noises of city activities—is not the lifestyle of the wild ass. Yet mankind is not needed, for the wild ass to survive (and thrive) in the wildernesses or arid deserts and semi-arid steppes (39:8), because the onager ass is providentially equipped to search out needed food (“every green thing” = *kāl-yârôq*) from vegetation growing in “mountains” (*hârīm* = highlands, i.e., mountains or hills). In effect, to the wild ass, “his pasture” (*mirē’ēhû*) is what humans call a wild wasteland. Onagers are resilient, no thanks to humans—again showing God’s providence.

The next animal is what the King James Version calls “unicorn”—which was the usual English word used, during A.D.1611 and for centuries thereafter (Webster, 1828; Johnson, 2018a), to denote a one-horned rhinoceros (today called *Rhinoceros unicornis*). As shown elsewhere, the usages of the Hebrew noun *re’ēm* suggest that this Hebrew noun was not limited to the one-horned rhinoceros, as is shown by Deuteronomy 33:17 (which refers to the *re’ēm* having more than one horn). In fact, one-horned rhinoceroses (Indian and Javan varieties) once ranged in northern India, in Indochina, and in Indonesia; whereas two-horned rhinos (White and Black varieties) once dwelt over most in Africa—including not far from the Nile River (and thus near the Mideast), as well as one variety (Sumatran variety) in Indochina and in Indonesia (Dinerstein, 2003). Since Job lived in “the land of

Uz” (1:1), which (according to Lamentations 4:21) was later associated with the Edomites, the historic ranges of the two-horned rhinoceros was geographically closer to where Job is assumed to have lived, which better matches the *re’ēm* of Deuteronomy 33:17.

Unsurprisingly, humans do not domesticate rhinos; the rhinoceros is neither service-harnessed (for ploughing agricultural fields) nor housed in a cattle-crib, as 39:9–10 indicates. Rhinoceros might is unquestioned, but that power will not be useful to human farmers (39:11). God uses rhetorical questions to guide Job’s thinking, with interrogative particles (*ha-*) prefixed to the “unicorn” questions in Verses 9, 10, 11, and 12.

Job himself was a master of agriculture, owning oxen and asses (as noted in Job 1:3), so God mentions grain crops being planted (39:10–11) and harvested (39:12)—and God then notes that the rhino is no help to crop-growing farmers who need beasts of burden like mules or oxen.

### Verses 13–25

The next pair of animals are described (in 39:13–25) with some vocabulary that has puzzled (and often confused) many translators, to say the least. Identifying the second animal (of the pair) is easy: the horse (*sūs*), which is the only animal in this series that is bridled for mankind’s service. It is the first-named creature of the pair, the birds called *renânîm* (plural noun, based upon the root verb *rânan* = “to call/sing/shout/scream/cry loudly”), and its described traits, that baffle many exegetes. As shown below, the most likely identification of this wild flightless bird is the ostrich (or perhaps an ostrich “cousin,” such as now-extinct ratites like the moa or elephant bird). Of course, much of what is noted here would be applicable to ratites in general, such as the Casowary of Australia (Smith, 2015, pages 17–21).

The common theme in 39:13–25 is the fearless (even reckless) disposition of both the powerful ostrich and powerful war-horse. Job is experiencing what seems like an out-of-control world, so he can relate to what looks like crazy recklessness (e.g., 39:15–16 & 39:20–22) and crazy commotion (39:18 & 39:20–25) that attends the fast-lane lifestyles of ostrich and war-horse.

The ostrich wing (*kenaph-renânîm* in 39:13) is not designed for flying.

Notice that (in Job 39:13) “wing” is in singular feminine construct, “ostriches” is in plural masculine absolute; since the wings are symmetrical, the God-designed anatomy and utility of one wing applies to both wings.

However, that does not mean those wings (like the wings of other ratite birds) are useless, because flapping wings are useful to the ostrich: they are used for courtship displays, they conserve body heat (including coverage of upper leg skin) during cold nights, and they can radiate excess body heat during hot days. Moreover, the ostrich uses his or her wings like an aerodynamic “rudder,” for quick change-of-direction steering while running at high speeds. These unusual wings—and the ostrich’s unusual speed—are traits that God emphasizes to Job, as God explains how He balances creaturely limitations with providential traits, so that the overall outcome is a success story (Cansdale, 1976, pages 190–193; see also Johnson, 2017).

The ostrich is relatively careless about parenting, exposing ground-laid eggs (Cansdale, 1976, page 191) to injury (Job 39:14–15), yet the resilient toughness and speed of the ostrich compensates, as a counter-balancing advantage that suits this fearless bird for its rough habitats (39:16–18). Ostrich ranges were previously larger, including southwest Asia, in Israel and the Arab regions, and in Africa (Cansdale, 1976, page 191). The ostrich is the largest bird alive nowadays, so it is not surprising that it is a confident, noisy bird—ac-

ordingly, the ostrich has virtually no predators for it to be habitually fearful of. As a noisy bird—its Hebrew name is related to the verb that is often translated “sing” (*rânan*), usually in contexts of rejoicing (e.g., Psalms 51:14 & 81:1; Isaiah 35:6 & 65:14; Jeremiah 31:7; etc.). In fact, there may be a wordplay linking the joyful singing connotation (of the ostrich’s Hebrew name) with the action verb in Job 39:13, ‘âlas—the action of rejoicing (i.e., the verb “rejoice” in Job 20:18).

The feminine singular noun “wing” (*kenaph*, as construct form in 39:13) somehow matches three other feminine singular words in that same sentence: ‘*ebrâh* (“wing”/“pinion” = power, i.e., powering the wings for flight), *ḥasîdâh* (“faithful” or “stork”), and *nōṣâh* (plumage/feather). The connotation of *kenaph* is the wing’s action of overspreading, collecting, and fencing in the air, for airlift (see Daniel 9:27; see also the equivalent Aramaic verb *kenaph* in Daniel 3:2–3 & 3:27). Further complicating the sentence, the pivotal conjunction ‘*im* (immediately preceding ‘*ebrâh* in 39:13) serves as an interrogative or hypothetical particle, often implying a contrast or negative (see Jeremiah 33:25–26). How does that conjunction (‘*im*) connect the feminine singular noun “wing” (*kenaph*, as a construct form in 39:13) with the three subsequent feminine singular nouns (and/or adjectives, i.e., ‘*ebrâh* (“wing”/power, as in Psalm 55:6(7), Isaiah 40:31, Ezekiel 17:3), *ḥasîdâh* (“faithful”/“stork,” as in Jeremiah 8:7), and *nōṣâh* (plumage/feather, as in Ezekiel 17:3 & 17:7)?

Although many translate *ḥasîdâh* (in 39:13) as a feminine **adjective** (meaning “loving-kind” or “faithful”), it could be the same-spelled feminine **noun**, meaning “stork.” Israel’s white stork (*ḥasîdâh*) is famous for its dependability, faithfully returning from its migration—as such a role-model of faithfulness that the prophet Jeremiah, in Jeremiah 8:7, contrasted the stork’s faithful return to the failure

of God's covenant people (i.e., Israel) to "return" to Him (Johnson, 2008).

Also, the wings of the stork are notable for their size and airlift (see Zechariah 5:9), greatly contrasting with flightless ostrich wings.

Another puzzle piece is the Hebrew etymology of *nōṣāh*—is that derived from the verb *nāṣāh*, meaning "to fly over"/"oversee" (as in ), or from the same-spelled *nāṣāh*, meaning "to struggle"/"to overcome"/"to overpower"/"to contend," etc., as in Exodus 2:13 & 21:22; Leviticus 24:10; 2<sup>nd</sup> Samuel 14:6; Jeremiah 4:7; Isaiah 37:26; Numbers 26:9, etc.).

Maybe the pivotal conjunction *'im* introduces a contrast, i.e., that the flightless wings of the ostrich are designed in contrast to the flight-powering wings of the stork? Perhaps this sentence may be more literally translated: "[The] wing of ostriches is joy-waved, but [is it] wing-power [of] stork and/or plumage?" If so, the rhetorical question necessarily implies that the ostrich has wings that are unlike those of the stork, because God's purpose for the ostrich's **terrestrial** (running) mobility is very different from God's purpose for the stork's **airborne** (flying) mobility.

Like the boisterous ostrich, the horse (*sūs*)—especially the horse trained for warfare—is powerful, fearless, and thrive amidst commotion (39:19–25). When the surrounding circumstances are in danger and tumult (as was then the case, with Job's personal life, during Job's dialogue with God), both the ostrich and the war-horse, in effect, laugh with confidence (39:18 & 39:25). In particular, God informs Job (in 39:19–25, especially in 39:20) that the war-horse is not intimidated by humans like Job, so the horse will not jump skittishly before him, like a grasshopper might. Some translate *'arbeh* (in 39:20) as "locust" but locusts are actually a condition-adapted form of grasshopper, so the Hebrew noun *'arbeh* properly applies to both of

what we call "grasshopper" and "locust" (Johnson, 2020).

### Verses 26–30

Before God speaks to Job about the monstrous creatures of wet habitats—Behemoth (in chapter 40) and Leviathan (in chapter 41)—God refers to one more pair of land-based creatures, both of them raptor birds, the "hawk" (*nēṣ*) and the "eagle" (*nāṣer*, which some would apply to certain vultures, but those "vultures" are misnamed and should be labeled "eagles"), in 39:26–30.

These predatory birds are large-bodied, and thus heavy, so launching from the earth, into the skies, requires efficiently overcoming gravity. Yet it is God Who has solved (in advance) the gravity problem, just as God solves all of the important problems in life (including Job's problems).

Some who read Job 39:26—which alludes to a hawk stretching out its wings "toward the south"—assume that hawk migration is the question's topic (Cansdale, 1976, page 147).

But the poetic parallelism-based context suggests otherwise, because the hawk's aerial behavior is compared to eagle flight. Both raptor birds require special aerodynamics to lift their heavy bodies up into the air successfully. In fact, God has designed such raptors to utilize weather-powered "elevators" for ascending upward into air currents (see Isaiah 40:31; Obadiah 1:4; Proverbs 30:19; see also Harrison & Loxton, 1993, page 49).

As Luke 12:55 indicates, hot air currents routinely come from south of Israel, so hawks can "catch a [thermal] ride" simply by stretching out their wings southward, catching the powerful air current, just as a boat's sail catches wind-power to blow the boat across a sea. This harnessing of wind-power matches the Hebrew vocabulary used (in Job 39:26), as is shown by the same Hebrew verb [*pâraś*] used to describe hawk wing-

spread (in 39:26) being used in Isaiah 33:23, to refer to boat-sails being spread out, to catch the wind's power (Alerstan 1993, pages 252–253; Stokes & Stokes 1989, pages 98, 110, 139, & 156.).

Likewise (in 39:27), the "eagle" (*nāṣer*) "mounts up" (a hiphil imperfect form of *gābah*) upon God's command, and is thus enabled to frequent high places (as Obadiah 1:14 indicates) where it "makes high its nest" (*yârîm qinnô*).

Thus, the continuing focus of this series of "creature feature" pair questions is emphasized in 39:26, when God's question confronts Job:

**"Is it from your wisdom ... [that these animals can do what they do, successfully] ...?"**

All these animals are able to survive—and even thrive—amidst the rough-and-tough vicissitudes of life on a fallen planet, because God providentially applies His infinite wisdom (*bînâh*) to the multifarious life challenges facing all these wild creatures—including their need for food (38:39–41), their need for successful reproduction (39:1–4), their need for a home range (39:5–12), their need for mobility on land (39:25) or mobility in the skies (39:26–30).

The necessarily implied lesson for Job (and for us, today), while suffering continues, is that Job (and we, today) can trust God to do the same—and more (1<sup>st</sup> Peter 4:19; Ephesians 3:20).

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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.*

### True Creation Model Must Be Metaphysical

Jerry Bergman's letter on the "Creation Model Controversy" (CRSQ Vol. 57, Fall 2020, p.153–154) raises again the point I have attempted to express in previous letters to this *Quarterly*. That is, that the attempt to model scientifically such supernatural acts as Creation and the Flood must ultimately find ways to represent theoretically the modes of divine causality that affected them. This means creation scientists getting serious about metaphysics, about divine ideas actualized by divine will into cre-

ated forms and beings and interactions between them, and about ways of representing divine causality in theoretical formalisms. On the one hand, we don't want to be invoking the Almighty to fill in any and every gap in theory, but on the other, when Scripture says "God created," or "God said . . . I will bring a flood of waters upon the earth," how can our theories fail to include representations of divine action? Absent this dimension we end up with what Bergman describes: "The development of creation

models often amounts to attempting to remove the supernatural element from creation." Only traditional (premodern) metaphysics can restore the supernatural element to the theoretical modeling of Creation and the Flood.

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## A Response to “Thoughts on the Creation Model Controversy”

In 2017, I authored a short article in *Creation Matters* titled “The CRS Mission Is Model Building” (Hill, 2017a). I thought the article was uncontroversial. I was surprised that Jerry Bergman wrote a letter to the editor opposing my article (Bergman, 2017). My response was published in the same issue (Hill, 2017b).

I read “Thoughts on the Creation Model Controversy” (Bergman, 2020) and had the feeling of *déjà vu*. Bergman wrote many of the same things he did regarding our exchange in 2017 in the pages of *Creation Matters*.

I will focus on the primary claim in his latest discourse against creation models. He wrote:

“I became involved in the CRS (Creation Research Society) shortly after the organization was founded 1964. Since then, I have seen several major changes in the focus of the Creation Movement. One of the most radical is the shift from responding to evolution to pushing to develop creation models” (Bergman, 2020).

The last sentence deserves scrutiny. If this statement is false, the rest of his arguments are irrelevant. I claim that it is false. The rest of this letter will demonstrate that it is false. I will focus on evidence from the *CRSQ*.

In 1964, Walter Lammerts wrote about building the creation model. A few quotes from the first issue of the *Creation Research Society Quarterly* by the first president of the society Walter Lammerts show that the mission of the Creation Research Society was building from the creation model from the very beginning.

“We propose to re-evaluate science from this viewpoint. Beginning in 1964, we are publishing an annual yearbook of articles by various members of the Society and thereafter a quarterly review of scientific

literature. Our eventual goal is the realignment of science based on theistic creation concepts and the publication of textbooks for high school and college use.” (Lammerts 1964, p. 1).

“The tasks involved in reorganizing the many fields of science in line with this concept are many. Creationists have too long been merely negative in their thrust, indicating the weaknesses of the evolution concepts, but offering little in its place.” (Lammerts 1964, p. 2).

Lammerts makes it clear that creationists should not be only negative. We need to be positive by developing the creation model. I used these quotes from Lammerts in my 2017 article (Hill, 2017a). These quotes are not unusual. Variations of them appeared in future issues of the *Creation Research Society Quarterly*.

In 1967, George Howe wrote about building the creation model. George Howe, the first chair of the Research Committee for the Creation Research Society wrote:

“Among the many purposes of the founders of the Creation Research Society were two goals: (1) establishment of a creationist journal, and (2) stimulation of research projects that support the creationist model of origins” (Howe, 1967).

He was announcing the beginning of the grant program for the Creation Research Society. One goal of the founders for the Creation Research Society was supporting the creationist model of origins through research.

In 1969, George Howe wrote about the creation model. *The Genesis Flood* by Whitcomb and Morris is considered by many people to be the book that launched the modern creation movement. Here is what George Howe wrote about the legacy of this book.

“Some of us (the present editor included) owe a lasting debt of gratitude to Drs. Whitcomb and Morris for having boldly, yet skillfully, presented Bible Catastrophism as a viable (yet, superior) alternative to uniformitarian theory” (Howe, 1969).

Howe praised the work of Whitcomb and Morris for presenting a viable alternative to uniformitarian theory. How did not praise them for attacking uniformitarian theory. He praised them for presenting an alternative to uniformitarian theory. Whitcomb and Morris provided a model that was an alternative to uniformitarian theory. Whitcomb and Morris did model building. They were building a creation model of origins.

In 1972, Henry Morris referred to the Creation Model when he was president of the Creation Research Society.

“Members of the Creation Research Society are consciously and vigorously using the Creation Model in their studies and are continually finding it to be a most powerful and satisfying framework for correlating and predicting data” (Morris, 1972).

Morris wrote of a Creation Model and claimed it had predictive power.

In 1975, Duane Gish wrote:

“This Society was established primarily for research in all fields of science designed to demonstrate that the scientific evidence related to origins can be correlated and explained much more satisfactorily by the concepts of special creation and a universal catastrophic flood than the concepts of evolution and uniformitarian geology” (Gish, 1975).

Later in the same article he wrote:

“Yet, considerable research needs to be done to support the specific Biblical creation model and to re-establish Flood geology as an alternative to evolutionary geology. Thus,

most of the research performed by creationist geologists has been directed at the goal of interpretation of geological data within the concept of catastrophism in contrast to the actualism of evolutionary geologists” (Gish, 1975).

Gish writes about doing research from a biblical worldview that will produce the creation model. Gish did not focus on attacking evolution or uniformitarianism. He focused on building the creation model.

In 1984, Emmett Williams wrote about the creation model when commenting on the work of Henry Morris. Williams was editor of the *Creation Research Society Quarterly* at the time. He wrote:

“This issue is dedicated to Dr. Henry M. Morris, one of the brilliant creationists of our time. His work on the creation model of science is known throughout the world and it is a pleasure to honor him” (Williams, 1984).

Williams referred to the work on Morris building the creation model. I could add more quotes from the leaders of the Creation Research Society, but

this set should be adequate for the task at hand. The leaders of the Creation Research Society have consistently referred to model building and its importance to our mission.

In this letter, Dr. Bergman claimed that the emphasis on building the creation model is a new and radical shift from the original goals and purpose of the Society. However, Lammerts, Howe, Morris, Gish, and Williams say the exact opposite. The people I have quoted were early editors of the *Quarterly* or Presidents of the Creation Research Society. Therefore, they represent the thinking and objectives of the early years of CRS. Thus, Dr. Bergman’s initial claim has been falsified.

This is the second time Dr. Bergman has written against the emphasis of the Creation Research Society on building the creation model. I am uncertain why Dr. Bergman remains so insistent that model building is not a major part of the CRS mission or why it is not a necessary part of promoting creation.

**Robert Hill**  
South Carolina

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## Reply to “Thoughts on the Creation Model Controversy”

In the Fall 2020 edition of *Creation Research Society Quarterly*, Jerry Bergman wrote a letter to the editor titled, “Thoughts on the Creation Model Controversy.” I was curious because I didn’t know there was a controversy in the sense that he seemed to be implying. I joined CRS because I am a scientist and because I believe in the veracity of scripture. Going through secular schools and working in a secular environment, I never once found arguing against evolutionary claims to be helpful in redemptive conversations. Understanding evolution and questioning its assumptions often led to those types of conversations, but even then, unless a suitable explanation of the data from a biblical perspective is presented, the conversation came to a halt.

The scripture informs us of historical reality (God created the universe by the word of His power in six literal days) and creation models help us make sense of scientific data within that reality. I’ve tried to work on a model to help my students understand the diversity of life from the Flood to the present (by redeeming concepts like genetic drift, natural selection, gene flow, and bottlenecks).<sup>1</sup> It really helps my understanding of the data. Creation models that make sense of the data in light of scripture help keep my students from being thwarted in graduate school when given the evolutionary model of the diversity of life from the first cell to the present. With creation models, my students are equipped to have conversations with evolutionists that don’t offend (that is

evolution bashing), but provide a means for redemptive conversations that offend with the very thing that Jesus said should offend—the gospel.

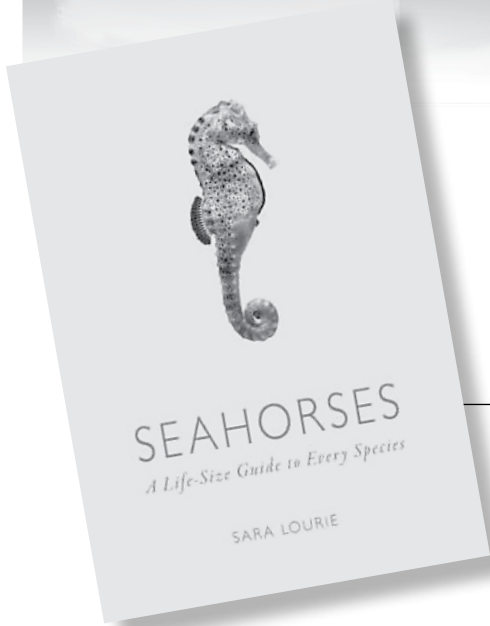
I hope that Dr. Bergman will join the ranks of those who are trying to promote the reality of creation by posing testable models instead of focusing solely on demoting evolution. He has a wealth of knowledge and expertise that could do all of us much good.

**David W. Boyd, Jr.**  
**Professor and Head**  
**Department of Biology**  
**Bob Jones University**

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<sup>1</sup> <https://answersingenesis.org/birds/bird-speciation-flood-present/>

# Media Reviews



## *Seahorses: A Life-Size Guide to Every Species*

by Sara Lourie

The University of Chicago Press, Chicago, 2016, 160 pages, \$30.00

This handsome book extols the wonders of one of God's creatures. These amazing fish have a number of features which showcase His handiwork. Seahorses are often strikingly beautiful and can be found in tropical, subtropical, and temperate oceans and estuaries worldwide. Author Sara Lourie is a research associate with the global Project Seahorse. She has identified multiple new seahorse species and is the author of several books and articles on seahorse taxonomy. Lourie describes their morphology, behavior, distribution, fossil record, supposed evolution, their place in commerce, and efforts to conserve them. The greater part of the book features a page on each of the forty-two species with full-color photographs. The book is well written and accessible to the general reader. When Lourie uses technical terms, she gives clear definitions. The book has an index and references to additional resources on the topic.

Seahorses swim vertically, lack scales, have prehensile tails, and independently moving eyes. However, the most remarkable characteristic of these strange fish is that the males give birth to the young. Two major divisions are those that "brood their eggs on the front of their trunk region... and those that brood them on the underside of their tail..." (p. 9). How could all the physical and behavioral traits enabling males to give birth come about by chance? In all other kinds, it is the male that transfers sperm and the female that receives it. The seahorse demonstrates that it doesn't have to be that way. If this whole process were the result of chance, one would expect that, in the animal world, either all would be the same way because the alternative is impossible, or if both ways are possible, that we would see a 50/50 ratio of the two kinds of reproduction. If it's all the result of chance, why are there not many more examples of males giving birth in nature?

In regard to their morphology, "It is a non-trivial evolutionary change to have gone from a 'normal' horizontal-swimming fish (like most pipefishes) to a vertical seahorse, and one that neces-

sitates all kinds of anatomical modifications" (p.13). Lourie goes into some detail describing the suite of modifications that had to have been made if evolution was their source. I find it difficult to accept that chance incremental changes are sufficient to account for such an integrated, highly "non-trivial" change, especially when the final product functions so efficiently. Even their method of eating involves a "specialized technique" in which "they are experts" (p.13). But this feeding technique would be useless without their "very acute vision, allowing them to locate and successfully strike at small, fast-moving crustaceans" (p.14).

Seahorse's scaleless skin is "...being actively researched to help inspire novel synthetic materials where stiffness, superior strength, and flexibility are all required" (p.15). As in so many other areas of research, we see human engineers endeavoring to learn to produce better products by studying the marvels of the Master Engineer, called biomimicry. Another feature of seahorse skin is its ability to change colors to enable it to blend in with the environment (p.23).

"The grasping (prehensile) tail of the seahorse is a marvel of engineering"

(p.16). I agree, but how could blind chance perform such a marvel? Though it is encased by bony plates, it is “incredibly flexible” and can bend forward, backward, and sideways. It has two different kinds of muscles which is unique to seahorses. Some other fish also have prehensile tails, but their differences prompt Lourie to exclaim, “surprisingly, however, the trait seems to have evolved independently at least twice” (p.17). Such convergent evolution is indeed a surprise—something that would not be predicted to result from the action of mindless processes.

Seahorse fins are positioned in an arrangement that is different from all other fish. They move at more than 40 beats per second, too fast for the human eye to detect! Though seahorses cannot swim very fast, their “... mode of propulsion is supremely well suited for high maneuverability in complex habitats (such as coral reefs and seagrass beds)” (p.17). Who would expect evolution to suit a trait “supremely well”?

Embryonic seahorses develop in a pouch on the male’s body. The female deposits her eggs into the pouch where they “...become embedded in small cups in the pouch wall, where they are bathed in a liquid that initially has a chemical make-up resembling internal body fluids. Over the course of the pregnancy, its composition gradually changes to become similar to seawater” (p.19). “That this can be considered a real pregnancy is attested to by the fact that the pouch is a physiologically complex organ in which the young have all their needs met” (p.20). Eventually, “... the male undergoes strong contractions,

initiated (as in humans) by the hormone oxytocin, and jack-knives his tail against his pouch, in order to expel the young” (p.34). All the regulated processes, with each step taking place at just the right time, loudly proclaim a superior intelligence to be responsible.

Before the female deposits her eggs in the male’s pouch, the two display wonderfully coordinated behavior:

An endearing feature of seahorses is the way they form faithful pair bonds, which is relatively unusual in nature. Most seahorse species that have been studied in the wild show elaborate social interactions that create and maintain these partnerships. Every day, at least during the breeding season, paired male and female seahorses come together for a few minutes to greet one another. During this greeting they shed their typical concern for hiding and camouflage and visibly brighten in color, twirl in a complex dance around one another, and often entwine tails and swim in synchrony. When the time comes for the seahorses to mate, their daily greeting is essentially prolonged into a full courtship display (p. 30).

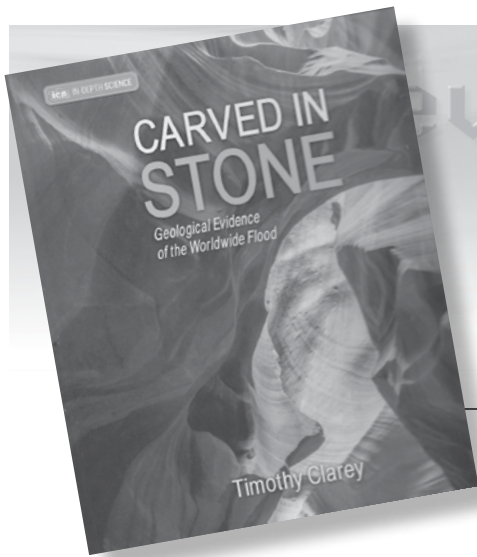
How did seahorses achieve a cosmopolitan distribution? Their swimming ability is relatively weak. Their larval stage is more conducive to distribution by currents, but it only lasts about two to four weeks. Lourie tells us that “it is believed that rafting may have played an important role in this” (p.40). Many creationists favor rafting as a mechanism for the distribution of terrestrial life, and it was likely significant in the spreading of this fish, as well. After the Flood there

would have likely been much floating plant life, providing conditions favorable for rafting.

Fossil seahorses have been found, the oldest supposedly 12.5 million years old. But Lourie presents no evidence for the existence of fossils of transitional forms between vertically oriented seahorses and their supposedly horizontally oriented ancestors. Evolution would predict such creatures having existed since, “One of the main evolutionary innovations of seahorses was the adoption of their upright posture. This new arrangement necessitated some significant morphological changes, particularly in the spine, in order to keep the head horizontal” (p.42).

Lourie and her associates have done much for the conservation of these wonderful creatures, for which they should be applauded. Seahorse populations are declining, a major factor being their use in traditional Chinese medicine. Also, in Brazil they are used as medicine, for good luck, or even worshipped alive (p.49). The total volume of the trade is estimated to be 15 to 20 million seahorses per year (p.52). For more information on seahorse conservation and how to get involved go to [www.iseahorse.org](http://www.iseahorse.org).

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Reviews

## Carved in Stone

by Timothy Clarey

Institute for Creation Research,  
Dallas, 2020, 492 pages, \$40.00

Author  
Clarey provides a comprehensive analysis of geological data from outcrops, oil wells and seismic studies of the North American, South American and African/Middle East continents. The study is sponsored by the ICR under the name *Column Project*.

“This book Presents a new and novel model that is based on analysis of rock columns across multiple continents, developing a framework to which future studies can be linked. It builds on the [Catastrophic Plate Tectonics] CPT conceptual model but then takes it a step further by explaining the rock record in greater detail” (p. 24). Clarey develops a correlation between the geologic column as represented by six megasequences (Sauk, Tippecane, Kaskaskia, Absaroks, Zuni and Tejas) and the flood description provided in Genesis chapters 7–8. The goal is to “Take a fresh look at all available geologic data and create a global flood model that isn’t based on merely tweaking secular ideas but is instead a new conceptual model based on tangible geologic data” (p. 25).

This is an important and watershed point in Creation Science. Many non-

geologist creationists have difficulty accepting the geologic column. For many, the difficulty is the lack of a biblical correlation and a perceived evolutionary bias. While Clarey does not specifically differentiate between the standard geologic column (Precambrian, Cambrian, ...) and the megasequence geologic column (Sauk, Tippecanoe, ... Zuni, Tejas), such a distinction needs to be made. This is because Dr. Clarey lays out a cogent case for biblical acceptance of the megasequence geologic column but not for the standard geologic column. To this point, Dr. Clarey comments, “Instead of being critical of the geologic column, creationists should embrace it as robust evidence of the global flood. ... The true global nature of the geologic column is one of the strongest evidences we have of a worldwide flood. It confirms exactly what the Bible tells us” (p. 396). His work seems to validate this for the megasequence geologic column but not necessarily for the standard geologic column.

Another important outcome of this study is a review of sea level curves. “Evolutionary geologists have compiled a global sea level curve from the Cambrian system to the present using

paleo-environmental interpretations and then deep time. ... We have now compiled stratigraphic data from over 1,500 columns across North America and South America, Africa, and the Middle East. If we ignore paleo-environmental speculation and uniformitarian dogma and look only at extent and volume of the rocks across these continents we see a completely different story from that of the accepted secular sea level curve” (p. 474). It is the new, data driven, sea level curve that is correlated to the global flood events described in Genesis.

This biblically-based approach to science is a model for the rest of us. It starts with identifying scriptural statements and principles, then comparing the data to the scriptures. Did Dr. Clarey answer all the questions? No. However, his work lays a biblically-based foundation for continued research.

**Richard Overman**  
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# Instructions to Authors

## Submission

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

All submitted manuscripts will be reviewed by two or more technical referees. However, each section editor of the *Quarterly* has final authority regarding the acceptance of a manuscript for publication. While some manuscripts may be accepted with little or no modification, typically editors will seek specific revisions of the manuscript before acceptance. Authors will then be asked to submit revisions based upon comments made by the referees. In these instances, authors are encouraged to submit a detailed letter explaining changes made in the revision, and, if necessary, give reasons for not incorporating specific changes suggested by the editor or reviewer. If an author believes the rejection of a manuscript was not justified, an appeal may be made to the *Quarterly* editor (details of appeal process at the Society's web site, [www.creationresearch.org](http://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](mailto:CRSQeditor@creationresearch.org)) prior to submitting any previously published material. In addition, manuscripts submitted to the *Quarterly* should not be concurrently submitted to another journal. Violation of this will result in immediate rejection of the submitted manuscript. Also, if an author uses copyrighted photographs or other material, a release from the copyright holder should be submitted.

## Appearance

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

Submitted manuscripts should have the following organizational format:

- 1. Title page.** This page should contain the title of the manuscript, the author's name, and all relevant contact information (including mailing address, telephone number, fax number, and e-mail address). If the manuscript is submitted by multiple authors, one author should serve as the corresponding author, and this should be noted on the title page.
- 2. Abstract page.** This is page 1 of the manuscript, and should contain the article title at the top, followed by the abstract for the article. Abstracts should be between 100 and 250 words in length and present an overview of the material discussed in the article, including all major conclusions. Use of abbreviations and references in the abstract should be avoided. This page should also contain at least five key words appropriate for identifying this article via a computer search.
- 3. Introduction.** The introduction should provide sufficient background information to allow the reader to understand the relevance and significance of the article for creation science.
- 4. Body of the text.** Two types of headings are typically used by the *CRSQ*. A major heading consists of a large font bold print that is centered in column, and is used for each major change of focus or topic. A minor heading consists of a regular font bold print that is flush to the left margin, and is used following a major heading and helps to organize points within each major topic. Do not split words with hyphens, or use all capital letters for any words. Also, do not use bold type, except for headings (italics can be occasionally used to draw distinction to specific words). Italics should not be used for foreign words in common usage, e.g., "et al.," "ibid.," "ca." and "ad infinitum." Previously published literature should be cited using the author's last name(s) and the year of publication (ex. Smith, 2003; Smith and Jones, 2003). If the citation has more than two authors, only the first author's name should appear (ex. Smith et al., 2003). Contributing authors should examine this issue of the *CRSQ* or consult the Society's web site for specific examples as well as a more detailed explanation of manuscript preparation. Frequently-used terms can be abbrevi-

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

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

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

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

Lipman, E.A., B. Schuler, O. Bakajin, and W.A. Eaton. 2003. Single-molecule measurement of protein folding kinetics. *Science* 301:1233–1235.

Margulis, L. 1971a. The origin of plant and animal cells. *American Scientific* 59:230–235.

Margulis, L. 1971b. *Origin of Eukaryotic Cells*. Yale University Press, New Haven, CT.

Hitchcock, A.S. 1971. *Manual of Grasses of the United States*. Dover Publications, New York, NY.

Walker, T.B. 1994. A biblical geologic model. In Walsh, R.E. (editor), *Proceedings of the Third International Conference on Creationism* (technical symposium sessions), pp. 581–592. Creation Science Fellowship, Pittsburgh, PA.

**7. Tables.** All tables cited in the text should be individually placed in numerical order following the reference section, and not embedded in the text. Each table should have a header statement that serves as a title for that table (see a current issue of the *Quarterly* for specific examples). Use tabs, rather than multiple spaces, in aligning columns within a table. Tables should be composed with *14-point type* to insure proper appearance in the columns of the *CRSQ*.

**8. Figures.** All figures cited in the text should be individually placed in numerical order, and placed after the tables. Do

not embed figures in the text. Each figure should contain a legend that provides sufficient description to enable the reader to understand the basic concepts of the figure without needing to refer to the text. Legends should be on a separate page from the figure. All figures and drawings should be of high quality (hand-drawn illustrations and lettering should be professionally done). Images are to be a minimum resolution of 300 dpi at 100% size. Patterns, not shading, should be used to distinguish areas within graphs or other figures. Unacceptable illustrations will result in rejection of the manuscript. Authors are also strongly encouraged to submit an electronic version (.cdr, .cpt, .gif, .jpg, and .tif formats) of all figures in individual files that are separate from the electronic file containing the text and tables.

## Special Sections

### Letters to the Editor:

Submission of letters regarding topics relevant to the Society or creation science is encouraged. Submission of letters commenting upon articles published in the *Quarterly* will be published two issues after the article’s original publication date. Authors will be given an opportunity for a concurrent response. No further letters referring to a specific *Quarterly* article will be published. Following this period, individuals who desire to write additional responses/comments (particularly critical comments) regarding a specific *Quarterly* article are encouraged to submit their own articles to the *Quarterly* for review and publication.

### Editor’s Forum:

Occasionally, the editor will invite individuals to submit differing opinions on specific topics relevant to the *Quarterly*. Each author will have opportunity to present a position paper (2000 words), and one response (1000 words) to the differing position paper. In all matters, the editor will have final and complete editorial control. Topics for these forums will be solely at the editor’s discretion, but suggestions of topics are welcome.

### Book Reviews:

All book reviews should be submitted to the book review editor, who will determine the acceptability of each submitted review. Book reviews should be limited to 1000 words. Following the style of reviews printed in this issue, all book reviews should contain the following information: book title, author, publisher, publication date, number of pages, and retail cost. Reviews should endeavor to present the salient points of the book that are relevant to the issues of creation/evolution. Typically, such points are accompanied by the reviewer’s analysis of the book’s content, clarity, and relevance to the creation issue.

# Creation Research Society Membership/Subscription Application and Renewal Form

The membership/subscription categories are defined below:

1. **Voting Member** ..... Those having at least an earned master's degree in a recognized area of science.
2. **Sustaining Member** ..... Those without an advanced degree in science, but who are interested in and support the work of the Society.
3. **Student Member** ..... Those who are enrolled full time in high schools, undergraduate colleges, or postgraduate science programs (e.g., MS, PhD, MD, and DVM). Those holding post-doctoral positions are not eligible. A graduate student with a MS degree may request voting member status while enrolled as a student member.
4. **Senior Member** ..... Voting or sustaining members who are age 65 or older.
5. **Life Member** ..... A special category for voting and sustaining members, entitling them to a lifetime membership in the Society.
6. **Subscriber** ..... Libraries, churches, schools, etc., and individuals who do not subscribe to the Statement of Belief.

All members (categories 1–5 above) must subscribe to the Statement of Belief as defined on the next page.

Please complete the lower portion of this form and mail it with payment to CRS Membership Secretary, 1 W. Firestorm Way #145, Glendale, AZ 85306, or fax for credit card payment to (928) 636-1153. Applications may also be completed online at [creationresearch.org](http://creationresearch.org).

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This is a  new  renewal application for the subscription year beginning Summer  2021  \_\_\_\_\_. (Please type or print legibly.)

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<input type="checkbox"/> Student* [per year]	<input type="checkbox"/> \$38	<input type="checkbox"/> \$58	<input type="checkbox"/> \$75	<input type="checkbox"/> \$28
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\* Student members are required to complete the bottom portion of this form.  
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24	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	36	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	48	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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29	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	41	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	53	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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**Mail to: Creation Research Society, 1 W. Firestorm Way #145, Glendale, AZ 85306, USA**

## Creation Research Society

**History**—The Creation Research Society was organized in 1963, with Dr. Walter E. Lammerts as first president and editor of a quarterly publication. Initially started as an informal committee of 10 scientists, it has grown rapidly, evidently filling a need for an association devoted to research and publication in the field of scientific creation, with a current membership of over 600 voting members (graduate degrees in science) and about 1000 non-voting members. The *Creation Research Society Quarterly* is a peer-reviewed technical journal. It has been gradually enlarged and modified, and is currently recognized as one of the outstanding publications in the field. In 1996 the CRSQ was joined by the newsletter *Creation Matters* as a source of information of interest to creationists.

**Activities**—The Society is a research and publication society, and also engages in various meetings and promotional activities. There is no affiliation with any other scientific or religious organizations. Its members conduct research on problems related to its purposes, and a research fund and research center are maintained to assist in such projects. Contributions to the research

fund for these purposes are tax deductible. As part of its vigorous research and field study programs, the Society operates The Van Andel Creation Research Center in Chino Valley, Arizona.

**Membership**—Voting membership is limited to scientists who have at least an earned graduate degree in a natural or applied science and subscribe to the Statement of Belief. Sustaining membership is available for those who do not meet the academic criterion for voting membership, but do subscribe to the Statement of Belief.

**Statement of Belief**—Members of the Creation Research Society, which include research scientists representing various fields of scientific inquiry, are committed to full belief in the biblical record of creation and early history, and thus to a concept of dynamic special creation (as opposed to evolution) both of the universe and the earth with its complexity of living forms. We propose to re-evaluate science from this viewpoint, and since 1964 have published a quarterly of research articles in this field. *All members of the Society subscribe to the following statement of belief:*

1. The Bible is the written Word of God, and because it is inspired throughout, all its assertions are historically and scientifically true in all the original autographs. To the student of nature this means that the account of origins in Genesis is a factual presentation of simple historical truths.

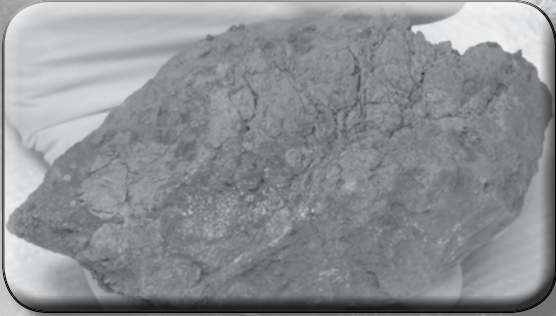
2. All basic types of living things, including humans, were made by direct creative acts of God during the Creation Week described in Genesis. Whatever biological changes have occurred since Creation Week have accomplished only changes within the original created kinds.

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

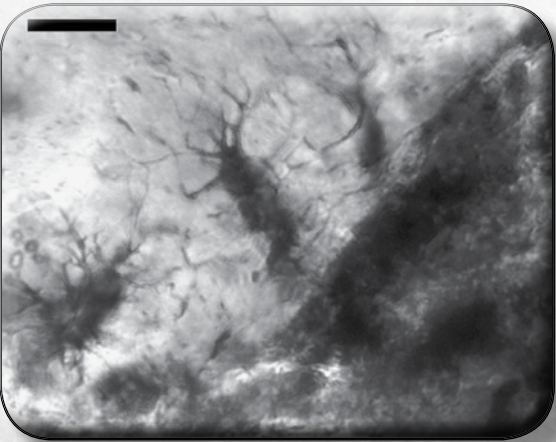
4. We are an organization of Christian men and women of science who accept Jesus Christ as our Lord and Savior. The act of the special creation of Adam and Eve as one man and woman and their subsequent fall into sin is the basis for our belief in the necessity of a Savior for all people. Therefore, salvation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

# iDINO II

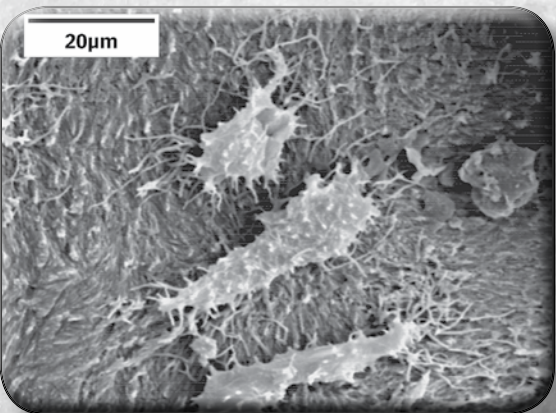
## Investigation of Dinosaur Intact Natural Osteo-tissue



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



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



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

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

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

**How can this fragile biological material survive for so long?**

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

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

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

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

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

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



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