The Bible Trumps Everything—Even Creation Science: This article explains the danger of clinging too tightly to models arising from Creation science. It examines some early Creation science models that have given way over the years and discusses the strengths and weaknesses of current models describing the flood.

Flood! This article briefly surveys some of the numerous flood accounts in ancient civilizations.

Noah’s Flood: the Gilgamesh Epic and Genesis: Some scholars argue Genesis borrowed its flood account from the Akkadian Epic of Gilgamesh. This article challenges that assertion and provides an alternate view.

Living for 900 Years: Today few people reach the age of 120 years. We’re understanding more … but, with new research, can we live longer? Fascinating new information about how and why we age casts fresh light on the long lifespans of pre-flood people.

Decreased Lifespans: Have we been looking in the right place? This article looks at some possible reasons for the decrease in longevity after the flood.

Meeting the Ancestors: This article shares a fascinating observation about the patriarchal lists of early Genesis.

Extreme Aging: Tragically, some children age at tremendous rates, resulting in an average lifespan of thirteen years.

SESSION TWO: THE ARK

Thinking Outside the Box: This webpage takes an in depth look at the ark and how it safely brought Noah, his family, and all those animals through the Flood’s devastation.

Where does the Lutheran Church—Missouri Synod stand on Genesis 1? This page contains the Lutheran Church—Missouri Synod’s official doctrinal position. (Look for #5 “Of Creation”).

Hibernation, Migration, and the Ark: This article discusses attempts to find natural processes to explain how the animals came to the ark and how Noah cared for them there.
Were Dinosaurs on Noah’s Ark? This Creation Ministries International article searches the Bible for possible clues.

Depicting the Ark This article traces the different ways artists have rendered Noah’s ark over the centuries.

Can the Usher Chronology be Trusted? Examines how Archbishop James Ussher calculated his chronology dating events from Creation to the Fall of Jerusalem.

Is there a Link between Noah’s Flood and the Tower of Babel? The famous Jewish historian Josephus offered a link between the flood and the Tower of Babel in his book *Jewish Antiquities*.

Safety Investigation of Noah’s Ark in a Seaway. In this detailed article a Korean firm studied the seaworthiness of the ark.

Ancients’ Couldn’t Have Built a Wooden Ship that Large, Could They? This article discusses large ships built in antiquity to prove Noah could have built that large a ship.

Could Noah’s Ark Float without Problems?

Are Wooden Ships Reliable?

Was Noah’s Ark Seaworthy, or is that Impossible?

Has the Ark been Found? In 1960 articles came out reporting a pilot sighting a boat-like shape on Lesser Mount Ararat. Was it the ark?

SESSION THREE: THE FLOOD

The Black Sea Flood This article investigates claims from some scientists that a local Black Sea flood was Noah’s flood in the Bible.

Was Noah’s Flood Local or Global? This article poses some problems with the view that the Flood was local.

Flood Models: The Need for an Integrated Approach This article discusses various models that explain the source of the flood waters, the pattern of sentiment deposition and dinosaur tracks.
**Drowned from Below** The Genesis account of the Flood says “all the fountains of the great deep burst forth” (Genesis 7:11). Now scientists believe there is far more water beneath the Earth's crust than in the oceans.

**Fountains of the Great Deep on Mars?** Scientists have long thought water was responsible for the surface features of Mars. Some even think there were vast stores of water underground—and there still may be.

**Did Meteors Trigger Noah’s Flood?** In this article Dr. Andrew Snelling considers the possibility that massive meteor strikes shattered the Earth’s crust into tectonic plates and triggered the fountains of the great deep to burst forth.

**Probing the Earth’s Deep Places** Creation Magazine interviews plate tectonics expert Dr. John Baumgardner about evidence for rapid plate tectonics.

**What Geologic Processes were Operating during the Flood?** This article describes the fountains of the great deep, the motion of tectonic plates, and the effects of all that water on the earth.

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**SESSION FOUR: THE AFTERMATH**

**Genesis and Catastrophe** this article discusses how the Genesis Flood could have been the main mechanism for laying down the fossil record.

**New Evidence of Noah’s Flood** An international research team puzzled over a dinosaur find in Mexico.

**Is Hawaii an Aftermath of the Flood?** Geologist Dr. Andrew Snelling considers how plate tectonics connected to the Flood could have formed the Hawaiian Island chain.

**Dinosaur Footprints** Huge dinosaurs flee rising waters of Noah’s flood in Australia.

**Dinosaur Herd buried in Noah’s Flood?** Geologist Dr. Tas Walker discusses a herd of more than twenty-five juvenile dinosaurs that became trapped in mud and buried in sentiment in Inner Mongolia, China.

**The Mystery of Coal** Geologist Dr. Steve Austin discusses some mysteries in the formation of coal that challenge conventional notions.

**Did Natural Gas take Millions of Years to Form?** This article describes experiments which show the production of natural gas and oil occurs very swiftly.

**Warped Earth** In this article geophysicist Dr. David Allen discusses how rocks could be folded without fracturing.
A Receding Flood Scenario for the origin of the Grand Canyon  Many creation scientists think a breach of lakes left after the Flood formed the Grand Canyon from east to west. This article proposes an alternate origin.

The Yellowstone Petrified Forests—Evidence of Catastrophe?  This article discusses evolutionist and creationist views of the formation of the Yellowstone petrified forests with insight from Mount St. Helens.

“I Got Excited at Mount St. Helens!” Ken Ham describes his tour of Mount St. Helens, and the many geological effects catastrophic events can cause in a short period of time.

Mount St. Helens—Explosive Evidence for Creation  In this 26:30 YouTube video episode of the show “Origins,” Dr. Steve Austin discusses findings at Mount St. Helens. *

After Devastation … The Recovery  After the devastating 1980 explosion of Mt. St. Helens, scientists lamented that over 200 square miles of land would be desolate throughout their lifetimes. The rapid recovery tells us something about the world’s recovery after the flood. *

How did Animals get from the Ark to Places such as Australia?  This article explores possible answers to this challenging question. *

Natural Rafts carried Animals around the Globe  Fishermen have logged instances of animals floating to new lands on natural rafts. Could this be part of the answer to animals repopulating the earth after the flood? *

* These articles include extra-Biblical hypotheses or conclusions that may or may not be true. Please consider them food for thought and the current best guess of creation scientists.
Biblical creationists by definition believe in a globe-covering flood. But how this occurred has been a matter of intense debate within the creationist geologist community. Some general observations can be made from a theological, philosophic and scientific perspective.

The Bible, as God’s written word, should be non-negotiable. Its teachings are propositional truth, and must be the foundation for all our teachings, including about the Flood. This applies not only to explicit statements, but to anything logically deducible from these
But where the Bible is genuinely silent, we are free to use science to help build models to help elucidate the clear teachings of Scripture. But these models are just man-made—they must never be given the same authority as Scripture. In any case, science is always changing, so being married to a model today will probably result in being widowed tomorrow. Worse, if the Bible is too tied up with a model later discarded, many will think that the Bible itself was refuted (cf. the church’s adoption of Aristotelian cosmology v Galileo\textsuperscript{2,3}).

\textit{Model-building should be an example of the ministerial use of science.}

Model-building should be an example of the \textit{ministerial} use of science. In contrast, the \textit{magisterial} use of science, practised by all compromisers on Genesis, overrules the clear teaching of the Bible to come up with a meaning inconsistent with sound hermeneutics. Instead of the Reformation principle of\textit{Sola Scriptura} (Scripture alone), this is \textit{Scriptura sub scientia} (Scripture below science).\textsuperscript{4} With these principles, some popular ideas can be examined.

\textbf{Pre-Flood paradise?}

Many creationist works from a few decades ago portrayed the antediluvian world as a paradise, which was horribly spoiled at the Flood. But this is not taught in Scripture. Furthermore, it obscures the teaching that the big spoiling of paradise occurred at the \textit{Fall}.	extsuperscript{5} This was the time that death, childbirth pain, and thorns and thistles were introduced, when Adam and Eve were tossed out of the Edenic paradise, and when the whole creation started groaning in pain.\textsuperscript{6}

The only genuinely biblical evidence adduced for a pre-Flood paradise is that people before the Flood lived for over 900 years, while lifespans dropped exponentially after that. Yet Noah’s lifespan wasn’t shortened despite spending the last third of his life in the alleged ruined environment. Rather, in the 1990s, it was proposed that the decline in lifespans had \textit{genetic} causes.\textsuperscript{7} Recent advanced computer programs vindicate this proposal, showing
that an exponential decline of lifespans fits well with accumulating mutations after the catastrophic population bottleneck at the Flood.8–11

Figure 2. In the catastrophic plate tectonics model, runaway subduction into the earth’s mantle of the oceanic plates drives the motion of the rigid lithosphere at metres per second. The only remaining support for an environmental cause of the decreasing lifespan is Shem, born before the Flood bottleneck, but living only \( \frac{3}{4} \) as long as most of his ancestors. But here there is also a plausible genetic explanation: he was born when his father was 502,12 i.e. over half-way through his lifespan. His ancestors were much younger when they begot their named sons.

It has long been known that children born to aged mothers have a higher risk of developing non-hereditary genetic disorders such as Down’s Syndrome, and it is plausible that Mrs Noah was about the same age as Noah. But even if she were much younger, more recent research points to aged fathers as a major source of genetic disorders. This should not be surprising since men keep producing sperm throughout their lives, and older men have more mutations.13

So it is not surprising that Shem, while very fit by today’s standards, would have been considerably less fit than his parents, and carried extra heritable mutations.

No rain before Flood?

Many older creationist models asserted that there was no rain or rainbow before the Flood, based on Genesis 2:5, “for the Lord God had not caused it to rain on the land”, and the Noahic Covenant in Genesis 9:13. This is supposed to result in a warmer and more even climate in the antediluvian world.
Yet the first passage is describing the situation before Man was created; it is silent on whether there was subsequent rain in the 1656 years before the Flood (Genesis 5). And there are plenty of examples in Scripture where God took pre-existing objects or actions and bestowed a new covenantal meaning on them. For example, bread and wine obviously pre-dated the Lord’s Supper.

Furthermore, the Bible gives no indication that the ‘laws of nature’ (really God’s regular ways of upholding His creation\textsuperscript{14}) were any different before the Flood from what they are now. Yet they would have to be if there were no evaporation, precipitation and differential refraction before the Flood.

Higher atmospheric or oxygen partial pressure

One idea for the pre-Flood world, derived partly from the fallacious pre-Flood paradise assumption, is that oxygen concentration\textsuperscript{15} or atmospheric pressure was higher than today. This would supposedly have beneficial effects duplicated in today’s hyperbaric chambers. These increase the oxygen partial pressure\textsuperscript{16} as per Dalton’s Law.\textsuperscript{17} Yet would they be as beneficial as claimed, given the known health benefits of anti-oxidants? To be fair, evolutionists have also proposed higher oxygen concentration or higher atmospheric pressure in the past, for some of the reasons below.\textsuperscript{18} This is supported by some scientific evidence, yet this does not hold up:\textsuperscript{19}

\textit{Higher oxygen levels in amber air bubbles:} yet they are not a closed system—gases diffuse in and out. Furthermore, contraction under solidification would shrink bubbles, thus raising pressure according to the law named after the creationist ‘father of modern chemistry’, Sir Robert Boyle (1627–1691), that gas pressure is inversely proportional to volume. Also, even the formation of bubbles in itself must increase pressure, to counteract the resistance of surface tension to producing the new surface area of the inside of the bubble. This excess \textit{Laplace pressure} is given by the equation:

$$\Delta P = \frac{2\gamma}{r}$$

where $\Delta P$ is excess pressure, or difference between inside and outside; $\gamma$ = surface tension; $r$ is bubble radius. This extra pressure is considerable in tiny bubbles, so the partial pressures would also be increased, according to Dalton’s Law.
Pterosaurs need high pressure to generate enough lift to fly: but previous models of pterosaur flight overlooked the function of the tiny pteroid bone, that would have supported a controllable flap. This would greatly increase lift in both takeoff and landing.\textsuperscript{20,21}

Gigantic insects could not have gained enough oxygen under normal pressure. The fossil record shows huge insects such as Meganeura, a dragonfly with a wingspan of 71 cm. For a long time, scientists thought that insects didn’t breathe, and oxygen diffused passively through holes (spiracles) through tiny tubes in the abdomen (tracheae). Since this could work only over very short distances, how could such a creature survive without extra oxygen?\textsuperscript{22} Yet recent synchrotron X-ray microscopy shows that insects really do ‘breathe’ by squeezing the tracheae, such that half the gas is exchanged every second.\textsuperscript{23,24}

This doesn’t disprove a higher oxygen concentration and air pressure, but it shows that they were not \textit{needed} scientifically. They are definitely not needed on biblical grounds.

**Meteorite impact**

In the Bible, the first cause for the Flood was “all the fountains of the great deep burst forth” and the second was “the windows of the heavens were opened” (Genesis 7:11). Keil and Delitzsch comment:

“The same day were all the fountains of the great deep (תָּהוּם tê hôm the unfathomable ocean) broken up, and the sluices (windows, lattices) of heaven opened, and there was (happened, came) pouring rain (םָשֶׁג geshem) in distinction from מָתָר (mātār) upon the earth 40 days and 40 nights.’ Thus the flood was produced by the bursting forth of fountains hidden within the earth, which drove seas and rivers above their banks, and by rain which continued incessantly for 40 days and 40 nights.”\textsuperscript{25}

Thus the Flood began with fountains in the sea and other deep parts of the earth, and only secondarily from the rain. However, some Flood models involve a meteorite \textit{initiating} the Flood. But this could never be derived from the biblical text, and is instead driven by ‘science’. But could it be acceptable anyway?

Certainly, there is strong evidence of large numbers of impacts on the earth and other solar system bodies. Further, the evidence from lunar craters—their location mainly in one
quadrant and the ‘ghost’ craters\textsuperscript{26,27}—suggests that the main source of bombardment was a narrow meteoroid swarm that passed by before the moon had moved very far in a single orbit.\textsuperscript{28} A likely time for this swarm was in the Flood year. Indeed, multiple impacts would provide sufficient energy to \textit{maintain} the Flood, including causing much water (liquid and vapour) to shoot into the sky and return as rain. The Bible is genuinely silent on this, so such a model is biblically acceptable; whether it can solve all the geological problems is an ongoing question.\textsuperscript{29}

But a meteorite as an \textit{initiator} of the Flood seems unacceptable. This contradicts the clear teaching that the Flood began deep within the ocean and underground, not the sky. Furthermore, this is not an argument from silence, but an argument from \textit{conspicuous absence}. If a meteorite really were the primary cause, then why does Genesis not mention such a dramatic event? Elsewhere in Scripture, we have the description of “stars falling from heaven”,\textsuperscript{30} and in both Hebrew and Greek, any bright heavenly object was called a ‘star’, including a ‘shooting star’. So one would expect Genesis 7:11 to read “a star fell from heaven, and all the fountains of the great deep burst forth … ”, or even “God cast a star down from heaven …”.

In formal logical terms, an argument from conspicuous absence is a valid argument called \textit{denying the consequent} (or \textit{modus tollens}): if something as dramatic as a meteorite caused the Flood, then the Bible would have mentioned it. The Bible doesn’t mention it, therefore a meteorite didn’t cause the Flood. Conversely, an argument from silence is a logical fallacy called \textit{denying the antecedent}: if the Bible had mentioned that Noah used nails to build the Ark, then Noah used nails; the Bible doesn’t mention nails, therefore Noah didn’t use them.\textsuperscript{31}

One defence is that Noah didn’t see the meteorite, but only the resulting tsunamis, so the Bible recorded only the latter. But by the same token, would Noah have seen the happenings in the deep central ocean either? Even more serious, this is identical \textit{in principle} to a major argument of local flood compromisers: the world was flooded as far as Noah could see, but it was still only regional. In any case, the Genesis Flood account was clearly a God’s-eye view, hence the revelation of the global character of the Flood by its \textit{repeated} use of “all” (Hebrew \textit{כָּל} kol), including the ‘double kol’ in Genesis 7:19.\textsuperscript{32}
Canopy theory

The canopy theory, as a model for the beginning of the Flood, aligns strongly with this ‘antediluvian paradise’ idea. This asserts that the ‘waters above’ referred to a canopy of water vapour, which condensed and collapsed to provide the rain for the Flood (figure 1). A few decades ago, this was very popular—for good reason, since it seemed to explain many things about rain, rainbows and longevity. Now it is rejected by most informed creationists.

However, the real problem was that some creationists gave the impression that it was a direct teaching of Scripture; CMI cautioned against such dogmatism back in 1989 when the model was still very popular among many creationist writers.³³ After all, for most of church history, no one had seen a canopy in the actual text of Scripture, yet God specifically wrote Scripture to teach, i.e. to be understandable (2 Timothy 3:15–17). Furthermore, it seems to contradict Scripture, since Psalm 148:4 says: “Praise him, you highest heavens, and you waters above the heavens!” Clearly these waters could not have been a canopy that collapsed during the Flood, since they were still present during the time of the Psalmist over a thousand years later.

Many of the arguments for the canopy were faulty on scientific grounds. For example, one argument is that the canopy would protect us from damaging radiation, and explain the extremely long lifespans. But water vapour is not a great shield for UV—you can be sunburned on a cloudy day and while swimming. When it comes to cosmic radiation, there is no evidence that this is involved in longevity, and as stated above, the cause of decreasing lifespans was genetic rather than environmental.

What water absorbs very well is infrared, as any vibrational spectroscopist knows.³⁴ It is actually a far more important ‘greenhouse gas’ than CO₂, accounting for about 66% of the atmospheric ‘greenhouse effect’ on Earth, or maybe even as much as 95%.³⁵ This leads to the major scientific problem with the canopy theory—a water vapour canopy thick enough to provide more than about a metre’s worth of floodwater would cook the earth.³⁶

Catastrophic plate tectonics

This is probably the most popular model among informed creationists today.³⁷ This accepts much of the evidence adduced to support uniformitarian plate tectonics, but solves a
number of problems. The CPT model begins with a pre-Flood super-continent (possibly indicated by Genesis 1:9). While uniformitarian models assume that the ocean plates have always had the temperature profile they display today, the CPT model starts with some additional cold rock in regions just offshore surrounding the supercontinent. Since this rock was colder, it was denser than the mantle below. At the start of the Flood year, this began to sink (figure 2).

One problem with this created instability is that it would be a ticking time bomb. This is not necessarily an insuperable difficulty, though, since it is akin to the issue of (and answer to) “why are some features designed to hurt other things, if God created a world without death and suffering?” While some things can be explained as an adaptation from plant-eating structures, such as some teeth, other things cannot. A good example is jellyfish’s stinging cells with a catapult mechanism. Here, it is not adequate to claim that they once stung plants. Rather, since God foreknew the Fall, He programmed latent genetic information that would be switched on at the Fall.38

![Figure 3. In the hydroplate model rupture of the crust allows steam and sediment to be ejected as a fountain into the atmosphere, returning to the earth as rain (from Brown, ref. 62).](image)

But how can it sink more rapidly than ocean plate subducts today? The answer lies in laboratory experiments that show that the silicate minerals that make up the mantle can weaken dramatically, by factors of a billion or more, at mantle temperatures and stresses. If a cold blob of rock is sufficiently large, it can enter a regime in which the stresses in the envelope surrounding it become large enough to weaken the rock in that envelope, which allows the blob to sink faster, resulting in the stresses becoming a bit larger still, and
causing the rock inside the surrounding envelope to weaken even more. Moreover, as the blob sinks ever faster, the volume of the envelope of weakened rock grows ever larger. Rather quickly the sinking velocity of the blob of dense rock can reach values of several km/hour, on the order of a billion times faster than is happening today. This is called *runaway subduction*.

The sinking ocean floor would drag the rest of the ocean floor along, in conveyor belt fashion, and would displace mantle material, starting large-scale movement throughout the entire mantle. However, as the ocean floor sank and rapidly subducted adjacent to the pre-Flood super-continent’s margins, elsewhere the earth’s crust would be under such tensional stress that it would be torn apart (rifted), breaking up both the pre-Flood super-continent and the ocean floor.

Thus, ocean plates separated along some 60,000 km where seafloor spreading was occurring. Within these spreading zones hot mantle material was rising to the surface to fill the gap caused by the rapidly separating plates. Being at the ocean bottom, this hot mantle material vapourized copious amounts of ocean water, producing a linear chain of superheated steam jets along the whole length of the spreading ridge system. This is consistent with the biblical description of the ‘fountains of the great deep’ (*Genesis* 7:11; 8:2). This steam would disperse, condensing in the atmosphere to fall as intense global rain ("and the flood-gates of heaven were opened", *Genesis* 7:11). This could account for the rain persisting for 40 days and 40 nights (*Genesis* 7:12).

Not only is CPT backed up by supercomputer modelling that even impresses uniformitaritians, but it has also provided further fruitful research avenues for creationists, including a mechanism for Earth’s rapid magnetic field reversals and hydrothermal solutions to carve huge caves. All the same, weather experts have been modelling the weather for decades, yet there are still many flaws; some argue that we should not place too much faith in modelling for plate tectonics either. Defenders argue that there are fewer unknowns in a confined solid state modelling of CPT than in the fluid (liquid and gas) dynamics and variable solar activity modelled in weather simulations.

Thus I think it is still the most promising theory, explaining the data supporting uniformitarian plate tectonics, and solving a number of its problems. That is why I have
promoted it in my two largest books, *Refuting Compromise* (2004) and *The Greatest Hoax on Earth?* (2010). Its strong points include explaining high-pressure minerals and simultaneous uplift of all of today’s high mountains. Furthermore, under Uniformitarian PT, plates are moving too slowly to penetrate past the upper layers of the mantle; rather, they should blend in long before they reach the lower mantle. Yet studies show that the subducted plates have penetrated much further, and are still relatively cool. This is consistent with the subduction being fast enough to penetrate the mantle, and recently enough so they haven’t had time to heat up.

But CPT is not a direct teaching of Scripture, so it is legitimate for creationists to question or reject it as a model, and a number of knowledgeable creationist geologists do.\textsuperscript{42,43} Opponents argue that it concedes too much to uniformitarianism, and that it doesn’t explain the whole of the Flood, but only the last half.

Another problem that seems unsolved is getting rid of the excess heat. It is hardly satisfactory to suggest that God miraculously removed the heat. If one is going to resort to “God of the Gaps” reasoning\textsuperscript{44} for a tiny part of the model, then why not just be done with a search for a mechanism and say, “God caused the Flood supernaturally”? After all, the Flood was a major disjunction in biblical history, and clearly a time of special intervention by God. Biblical creationists need not be closed to miraculous causes for such one-off, special events, rather than worry about ‘scientific’ rigour or ‘economy of miracles’. After all, we don’t need to find a quasi-naturalistic explanation for the Resurrection or feeding the 5,000. This is different from ordinary repeatable ‘operational’ science, where “God did it” is not acceptable.\textsuperscript{45} Since models like CPT are trying to make an operational-science cause of the Flood, an *ad hoc* appeal to the miraculous is likewise unacceptable, unlike saying that the whole thing was miraculous.

**Hydroplate**

This model of Dr Walter Brown\textsuperscript{46} has many passionate supporters. Brown explains: “Before the global flood, considerable water was under the earth’s crust. Pressure increases in this subterranean water ruptured that crust, breaking it into plates. The escaping water flooded the earth. Because hydro means water, those crustal plates will be called hydroplates.”
Furthermore, water and rocks were hurled at speeds exceeding escape velocity, so this explains the origin of comets, asteroids and meteorites (figure 3).

The origin of the Flood under the ocean is a biblical strength of the model. Furthermore, ‘the Flood caused meteors’ lacks the biblical weakness of ‘meteor caused the Flood’. Yet it has failed to attract the support of many creationist geologists and geophysicists, many of whom have no reason to reject a successful flood model.

Furthermore, few creationist astronomers would accept an Earth origin for comets, meteors and asteroids. The Bible doesn’t require it and it is scientifically suspect—reaching Earth’s escape velocity of 11.2 km/s would be hard enough, and such objects would burn in the atmosphere. Note that our spacecrafts are launched in stages: first, they are taken up to a low earth orbit, where the speed is about 8 km/s. Then another stage accelerates the craft to escape velocity, which is a little lower as it is further from Earth’s gravity—about 10.9 km/s. But to launch comets into orbits reaching beyond Pluto would require speeds just a little less than the escape velocity with respect to the sun’s gravity at the earth’s orbit, or 42.1 km/s—and that’s after overcoming atmospheric resistance. Note that the Voyager space probes were able to move past Pluto only by using “gravitational slingshots” of handily aligned planets to augment their speeds.

The *Journal of Creation* has published an article about various Flood models, including the hydroplate, which was treated neutrally. But for the creationist community to take it further, Dr Brown should publish it in a journal such as this, and respond to criticisms from creationist experts in geology, e.g. that there is more water still inside the mantle than in the oceans. A forum similar to a previous one on CPT would be most instructive.

‘Vanishing Flood’ models

The Bible doesn’t directly teach anything about the pre-Flood and post-Flood boundaries. It doesn’t even directly teach that fossils and rocks are the result of the Flood. Yet 2 Peter 3:3–6 is an important passage:

“Scoffers will … deliberately ignore this fact, … the world that then existed was deluged with water and perished.”

This strongly implies that the Flood must have left some dramatic evidence, otherwise why would scoffers be held culpable for “deliberately ignoring” the fact of the Flood if there is no
evidence? By similar reasoning, Romans 1:18–22 is a good argument against theistic evolution. Verse 20 says:

“Ever since the creation of the world his invisible nature, namely, his eternal power and deity, has been clearly perceived in the things that have been made. So they are without excuse.”

This passage clearly teaches that unbelievers won’t have the slightest excuse for unbelief, because God’s power and deity can be “clearly seen” from nature. This seems to be a strong support for the argument from design. However, according to Gould, one of Darwin’s main motivations was to counteract the argument from design. So if evolution were true, or that there was “gobs of evidence” for it as one professing creationist recently asserted, then where is the clear evidence for God’s power from what has been made? Far from being evidence for a divine hand, evolution, according to Gould, gives ‘evidence’ that “there’s nothing else going on out there—just organisms struggling to pass their genes on to the next generation. That’s it.” So once again, if evolution were true, there is no evidence for a God from what has been made, but evidence only for ruthless struggle for existence. So why would unbelievers be “without excuse” if evolution were true?

The same applies to the uniformitarianism of Flood scoffers, such as Darwin’s mentor Charles Lyell who tried to “free the science [of geology] from Moses”. Widespread fossils of soft-bodied creatures and huge animals, as well as wide and flat sedimentary layers certainly fit the bill. Thus this passage rules out certain extreme versions of the ‘Anglo-European’ or ‘Recolonization’ Flood Model, which become ‘vanishing Flood’ models, where most of the geology of the earth formed after the Flood. And of course, this would rule out the view of certain ‘progressive creationists’ such as Hugh Ross that the Flood was local and left no traces.
Figure 4. The Biblical Geologic Model is a geologic classification scheme based on the biblical record of Earth history. The model is useful for classifying geologic data, understanding geologic processes and guiding geologic research. It is a powerful tool for communicating biblical geologic concepts.

So, given that the Flood left behind considerable evidence, as this passage teaches, what can be predicted? Walker has proposed a geological framework (although not an explanation of the Flood per se) by which to understand rock layers and fossils, not just for the Flood year, but for all of Earth history—from the Creation Week to the present time (figure 4). He did this by using the clear descriptions of Scripture, as well as more loosely holding inferences from what we think we know about sedimentology and hydrology.

Since the Bible clearly teaches that the waters rose to cover the whole earth, then retreated, Walker proposes two main stages of the Flood ‘year’ (really 370 days): ‘inundatory’ and ‘recessive’. There might be some minor deviations, since variations in topography, floodwater and chemistry, mean that the results of Flood processes might not be strictly synchronous, even though the rocks produced might be the same.

The former is subdivided further: the earliest is the ‘eruptive phase’, derived from the explosive implications of the “fountains of the great deep bursting forth”; second, ‘ascending phase’, derived from the waters “increasing” upon the Earth (Genesis 7:17–18); third, the ‘zenithic’, from the biblical teaching of the Flood waters “prevailing” for so long.
with the mountains all covered, as well as the common-sense observation that the waters must have peaked some time.

The latter (‘recessive’) stage is subdivided not according to Scripture per se, but according to hydrological observations (which is why it is called a model). First, large amounts of water moving off a surface that was wholly submerged would first start to flow in huge sheets. This phase is called ‘abative’. Then, as the water level dropped and land emerged, the flow would be divided into large channels, hence the ‘dispersive’ phase.

Where the Bible is truly silent, one is free to invoke known phenomena, but models involving these should be held loosely.

This makes good sense of many geological features hard to explain under uniformitarian models, of which I will mention two. First, planation surfaces, which look like someone had taken a giant plane over the surface and shaved it flat, regardless of orientation or hardness. This is just what a giant sheet of water would do in the abative phase. Second, water gaps: instead of rivers following the path of least resistance around mountains, many go through gaps in them. This is consistent with violent channelized flow of huge volumes of water overtopping perpendicular barriers and carving channels straight through them. Since water gaps were formed after much erosion had occurred, they are consistent with having been formed in a later stage of the recessive stage.

Verified predictions are a strength of a model, but they cannot logically be considered a proof—that would be a logical fallacy called affirming the consequent. Conclusion

The biblical global Flood is a vital teaching of Scripture, and essential for understanding Earth history. Yet we were not there, so trying to understand it has a number of difficulties. So it is not surprising that there are a number of different creationist proposals, and a few errors in some.

The starting point must be the explicit statements of Scripture, and propositions that logically follow from them. Since the Flood was a historical event, then our description of its details is at heart historical.
For finding out the details, science is useful as a forensic tool, but is not the driving discipline. This can show how known processes in hydrology and sedimentology would work under the constraints of the biblically-derived propositions. Where the Bible is truly silent, one is free to invoke known phenomena, but models involving these should be held loosely.

With so many unknowns, it is not surprising that there are a number of different models. But multiple models are a good thing in science, especially when it comes to trying to understand what happened in the unobservable past. What ultimately matters is what is true, not what fits a particular scientific model.

References

5. Much the same error is made by illustrations or animatronics of Adam and Eve’s children playing with baby carnivorous dinosaurs. The Fall predated any children (cf. the murderer Cain, the first child ever born, and clearly fallen (Genesis 4)), and the Fall also marks the beginning of animals eating each other—tooth marks in dinosaur bones and coprolites with dinosaur remains show that carnivory was well established by the Flood. In any case, it would be dangerous to have kids with some herbivorous animals as well, e.g. elephants.
12. Noah was 500 when his first son (Japheth) was born (Genesis 5:32), and 600 when the Flood came. Shem had Arphaxad 2 years after the Flood, when he was 100 (Genesis 11:10), therefore Shem was only 98 when the Flood came.
15. That is, its volume fraction in a mixture, i.e. relative proportion.
16. The partial pressure of a gas is the pressure it would exert if it occupied the whole volume. The ability of oxygen to diffuse across lung membranes and dissolve in water, and its reactivity, depend on partial pressure, not concentration. But for a given total pressure, partial pressure is proportional to the concentration.
17. The sum of partial pressures of all gases in a mixture equals the total pressure of the gas mixture—at least for ideal gases (1801).


26. The problem is that huge ancient meteorite impacts would both obliterate previous craters and smash open the crust and release lava. This leaves a very narrow time window for new impact craters to form, then be partially buried by the lava, leaving 'ghosts'. Walker, T. and Catchpoole, D., Ghost craters are young too, *Creation* 31(3):18, 2009; Samec, R.G., On the origin of lunar maria, *J. Creation* 22(3):101–108, 2008; creation.com/lunar-maria.

27. Faulkner, D., A biblically-based cratering theory, *J. Creation* 13(1):100–104, 1999; creation.com/creating; Spencer, W.R., Response to Faulkner's 'biblically-based cratering theory', *J. Creation* 14(1):46–49, 2000; creation.com/crateringresponse. They propose that a brief, narrow swarm of space objects impacted the moon producing the distinctive, dark, basaltic maria ("seas"). This explains why the maria are almost exclusively confined to one quadrant—the swarm passed before the moon had time to turn on its axis (it is tidally locked) and expose the other side.


29. Even if some of the references are apocalyptic, this would be deduced from the literary genre of the passages as a whole, not merely because they mention stars falling. See explanation of valid implications vs. logical fallacies in Sarfati, J., ref. 1.


31. See Wieland, C., Hanging loose, *Creation* 11(2):4, 1989; creation.com/hanging_loose. Also, a number of creationists had criticized the model in CRSQ in the 1970s and 1980s.


33. A molecular vibration absorbs infrared radiation only if it is changes the molecule's dipole moment. CO is a highly symmetric linear molecule O=O=O, and a symmetric stretch of the C=O bonds (i.e. in phase) cancels out the dipole change, so this vibration doesn't absorb, while the other ones do. Water (H2O) is a bent polar molecule, and all its vibrational modes strongly absorb infrared.


50. Wood, T.C., The truth about evolution; toddcwood.blogspot.com/2009/09/truth-about-evolution.html, 30 September; a confused fideistic tirade that a number of atheopathic evolutionists adored.


54. Sarfati, ref. 2, pp. 264–5.


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“When mankind were overwhelmed with the deluge, none were preserved but a man named Coxcox ... and a woman called Xochiquetzal, who saved themselves in a little bark, and having afterwards got to land upon a mountain called by them Colhuacan, had there a great many children; ... these children were all born dumb, until a dove from a lofty tree imparted to them languages, but differing so much that they could not understand one another.”

A garbled version of the biblical accounts of Noah and Babel? Perhaps. This story comes from the Aztecs of Mexico—one of many such tales, from geographically remote and widely divergent cultures, that speak of a cataclysmic flood.

A wealth of deluge legends

Mesopotamia

Tablets excavated from Iraq recount the myths of ancient Mesopotamia. They speak of a vanished culture in Sumer and of a king called Gilgamesh. He was renowned for his great
wisdom and knowledge. Gilgamesh related the story of a worldwide flood. This was told to him by Utnapishtim, a king of a pre-flood civilisation and a survivor of the catastrophe.

The story relates that Ea, lord of the waters and man’s guardian, warned Utnapishtim of the deluge by which the gods planned to exterminate mankind. Ea told Utnapishtim to “tear down your house and build a boat” and to “take up into the boat the seed of all living creatures. … [E]ach side of the deck measured one hundred and twenty cubits, making a square”. There were seven decks in all. The flood itself was frightening and full of fury. Utnapishtim recounted that ‘the god of the storm turned daylight to darkness, when he smashed the land like a cup’. Once the tempest had subsided, Utnapishtim ‘looked at the face of the world and there was silence, all mankind was returned to clay. The surface of the sea stretched flat as a rooftop … on every side was the waste of water’. Utnapishtim loosed a dove who returned finding no resting place, and then a swallow with the same result. Finally, a loosed raven did not return. The boat came to ground on a mountaintop and Utnapishtim offered a sacrifice.²

North American Indians

The North American Indians have several flood stories. One from the Choctaw tribe tells how, long ago, men became so corrupt that the Great Spirit destroyed them in a flood. Only one man was saved—a prophet whose warnings the people disregarded, and whom the Great Spirit then directed to build a raft from sassafras logs. After many weeks, a small bird guided the prophet to an island where the Great Spirit changed the bird into a beautiful woman who became the wife of the prophet. Their children then repopulated the world.³

Australian Aboriginal flood stories

Likewise, there are several Australian Aboriginal flood stories. One tells how, long ago, there was a flood that covered the mountains so that many of the Nurrumbunguttias, or spirit men and women, were drowned. Others, including Pund-jil, were caught up by a whirlwind into the sky. When the waters receded, and the mountains appeared again, and the sea went back into its own place, the son and daughter of Pund-jil ‘went back to earth and became the first of the true men and women who live in the world today’.⁴

Ancient Chinese

Early Jesuit scholars were the first Europeans to gain access to the Chinese ‘book of all knowledge’ from ancient times. This 4,320-volume collection told of the repercussions of
mankind’s rebellion against the gods: “The Earth was shaken to its foundations. The sky sank lower towards the north. The sun, moon, and stars changed their motions. The Earth fell to pieces and the waters in its bosom rushed upwards with violence and overflowed the Earth.”

Another story, in the folklore of the Bahnars, a primitive tribe of Cochin, China, tells of how the rivers swelled “till the waters reached the sky, and all living beings perished except two, a brother and a sister, who were saved in a huge chest. They took with them into the chest a pair of every sort of animal ...”.

**Egypt**

Flood stories from the continent of Africa are rare, but one from Egypt tells of an ancient creation god, Tem, who “was responsible for the primeval flood, which covered the entire earth and destroyed all of mankind except those in Tem's boat”.

**Peru**

The Incas of Peru also had a tradition of a deluge. “They said that the water rose above the highest mountains in the world, so that all people and all created things perished. No living thing escaped except a man and a woman, who floated in a box on the face of the waters and so were saved.”

**Scandinavia**

The stories of the Teutonic tribes of Scandinavia are vivid and describe terrifying events. The imagery of these legends emphasizes the size of the cataclysm. One such tale portrays the chaos of the world when the mighty wolf Fenrir shook himself and “made the whole world tremble. The aged ash tree Yggdrasil [envisaged as the axis of the earth] was shaken from its roots to its topmost branches. Mountains crumbled or split from top to bottom ...”. Men “were driven from their hearths and the human race was swept from the surface of the earth. The earth itself was beginning to lose its shape. Already the stars were coming adrift from the sky and falling into the gaping void. ... Flames spurted from fissures in the rocks; everywhere there was the hissing of steam. All living things, all plant life, were blotted out. ... And now all the rivers, all the seas rose and overflowed. From every side waves lashed against waves. They swelled and boiled and slowly covered all things. The earth sank beneath the sea ...”. Then slowly “the earth emerged from the waves. Mountains rose anew
... Men also reappeared. ... Enclosed in the wood itself of the ash tree Yggdrasil ... the ancestors of a future race of men had escaped death."

Uncanny coherence to Noah’s account

There are at least 500 legends of a worldwide deluge. Many of these show remarkable similarities, with many aspects similar to the details about Noah’s Flood in the Bible (see aside below).

We are left with a few options. Perhaps all the peoples of these remote civilisations had different flood experiences that, by chance, had all these features in common, on which they based their stories. However, the more reasonable alternative is that these legends all find their root in the same one global Flood experience that Genesis records.

So why do sceptics reject the story today? The Bible says that people willingly close their minds about the Flood: “For this is hidden from them by their willing it, that the heavens were of old, and the earth out of the water, and through water, being held together by the word of God, through which the world that then was, being flooded by water, perished” (2 Peter 3:5-6).

The Bible also proclaims that this world is being reserved for another cataclysm: “But the day of the Lord will come as a thief in the night, in which the heavens will pass away with a rushing noise, and the elements will melt with fervent heat. And the earth and the works in it will be burned up” (2 Peter 3:10).
All too often we rest in the surety of yet another benevolent sunrise. We rely too smugly upon the delicate balance that makes life on our planet possible. The ancient prophecies and legends, corruptions though they are of the original true account, help to remind us of our vulnerability before God. We should humbly bow the knee and get in step with His purposes. They are the only purposes that really count.

**Australian Aboriginals relate legend of world-destroying flood**

One of the more striking Flood accounts, summarized here, was discovered by anthropologists among a remote Aboriginal tribe in Western Australia, before any contact with missionaries.

“It came about that the earliest-time children tormented and ill-treated the Winking Owl, Dumbi. Ngadja, the Supreme One, was inwardly grieved and felt deep sorrow for him. He instructed Gajara, ‘If you want to live, take your wife, your sons and your sons’ wives and get a double raft. Because of the Dumbi affair, I intend to drown everyone. I am about to send rain and a sea flood,’ he told them. ‘Put on the raft long-lasting foods that may be stored, foods such as gumi, banimba, and ngalindaja, all these ground foods.’
“So Gajara stored all these foods. He also gathered birds of the air such as the cuckoo, the mistletoe-eater, the rainbow bird, the helmeted friar bird and finches; these he took on the raft, and also a female kangaroo. Gajara gathered his sons as the crew, and his own wife and his sons’ wives together.

“Then Ngadja sent the rainclouds down, shutting the clouds in upon them. The sea-flood came in from the north-north-east and the people were closed in by the salt-water flood and the tidal waters of the sea. Ngadja whirled the flood waters and the earth opened, drowning and flattening them all. He finished them at Dumbey. Meanwhile, the flood carried all those who were on the raft with Gajara along on the current far away to Dulugun.

“At last, the floodwaters brought Gajara back in this direction. He sent some birds out from the raft, first the cuckoo. The cuckoo found the land and did not return to him. Gradually the waters were going down. Later on, the other birds returned to Gajara and he sent them out again the following day. The land was already drying the waters up and the living creatures found a home and food. They killed a kangaroo after landing, and Gajara’s wife, Galgalbiri, put it in the earth oven and cooked it with other foods. The smoke rose slowly until it reached through into the sky. Ngadja, the Supreme Being, could smell the steam and smoke rising from the female kangaroo as it was cooking and he was pleased.

“Ngadja, the Supreme Being, put the rainbow in the sky to keep the rain-clouds back. The rainbow protects us so that the rainfall does not rise too high. Our people understand the significance of it. When we see the rainbow we say, ‘There will not be any abnormally heavy rain.’”
Funk and Wagnall’s 1950 *Dictionary of Folklore, Mythology and Legend* stated under the heading ‘Deluge or Flood’: “A world cataclysm during which the earth was inundated or submerged by water: a concept found in almost every mythology in the world. The exceptions are Egypt and Japan …” [But see Egyptian myth mentioned above (Ref. 7).] It goes on to describe the ‘bare bones of the usual deluge story’ as follows: “The gods (or a god) decide to send a deluge on the world, usually as punishment for some act, broken tabu, the killing of an animal, etc. (in a Tsimshian myth the deluge comes because the people have mistreated a trout), but sometimes for no reason. Certain human beings are warned, or it comes without warning. If warned, the people construct some kind of vessel (raft, ark, ship, Big Canoe, or the like), or find other means of escape (climbing a mountain or tree, growing tree, floating island, calabash or coconut shell, a turtle’s back, crab’s cave, etc.). Sometimes they also save certain things essential to a way of life, such as food, rarely domestic animals. The deluge comes (rain, huge wave, a container broken or opened, a monster’s belly punctured, etc.). Bird or rodent scouts are often sent out, but this is not universal. When the deluge is over the survivors find themselves on a mountain or an island; sometimes they offer a sacrifice (not universal), and then repeople the earth, recreate animals, etc., by some miraculous means.”

If there were no near-universal distribution of world-destroying flood legends, sceptics would no doubt attack the Bible's credibility on this basis, questioning how the memory of such an awesome account could be lost in so many cultures.
The dictionary quoted from here seemed to feel the need to reassure its readers with, "The fact [of a world Flood] itself finds no place in the geological history of the earth ...." But arguing against a global Flood on the basis of the earth’s ‘geological history’ of ‘long ages’ is only sound if that long-age history is a correct reading of the rocks, and the long-age reading is only true if there was no global Flood. This is known as the logical fallacy of 'begging the question'—assuming that which you are trying to prove. The cultural memories of a world-destroying Flood, obviously altered by centuries of telling and retelling, are powerful, worldwide evidence consistent with the veracity of Genesis. They are an exciting reminder of the way in which the true history of the Bible connects with the real world of today.

References

6. Ref. 1, p. 82.
10. For full version see: Coates, H., The Flood, Creation 4(3):9-12, 1981Funk & Wagnalls, Standard Dictionary of Folklore, Mythology and Legend, 1950. In 1795, before examining the evidence, Hutton, ‘the father of modern geology’, proclaimed that ‘the past history of our globe must be explained by what can be seen to be happening now ... No powers are to be employed that are not natural to the globe, no action to be admitted except those of which we know the principle' (emphasis added). This automatically ruled out the globe-covering Flood the Bible records. Hutton, J., Theory of the Earth with Proof and Illustrations; cited in Holmes, A., Principles of Physical Geology, 2nd edition, pp. 43-44, 1965.

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Hardly anything in the Bible has been attacked as much as God’s cataclysmic judgment of Noah’s Flood. This started with a Scottish physician called James Hutton (1726–97), who decreed in 1785, *before examining the evidence*:

> the past history of our globe *must be explained* by what can be seen to be happening now ... No powers are to be employed that are not natural to the globe, *no action to be admitted* except those of which we know the principle’ (emphasis added).¹

This was not a refutation of biblical teaching of Creation and the Flood, but a dogmatic refusal to consider them as even possible explanations—just like the scoffers Peter predicted in 2 Peter 3.
However, disbelief in the Flood has become so entrenched that even many ostensibly Christian colleges don’t teach it. However, Jesus taught the Flood was real history, as real as His future second coming:

‘Just as it was in the days of Noah, so also will it be in the days of the Son of Man. People were eating, drinking, marrying and being given in marriage up to the day Noah entered the Ark. Then the Flood came and destroyed them all.’ (Luke 17:26–27)

In this passage, Jesus straightforwardly talks about Noah as a real person (who was His ancestor—Luke 3:36), the Ark as a real vessel, and the Flood as a real event. So those of a broadly conservative theological disposition will not deny the Flood completely, but will claim that it was merely a local event, usually in Mesopotamia (ancient Iraq). However, the liberals, who care nothing for Jesus’s words, go even further. A very common view is that the biblical story of Noah’s Flood was not historical at all, and was borrowed from flood legends in Mesopotamia.

**The Gilgamesh Epic**

In 1853, the archaeologist Austen Henry Layard and his team were excavating the palace library of the ancient Assyrian capital Nineveh. Among their finds were a series of 12 tablets of a great epic. The tablets dated from about 650 BC, but the poem was much older. The hero, Gilgamesh, according to the Sumerian King List, was a king of the first dynasty of Uruk who reigned for 126 years. However, in the legend, Gilgamesh is 2/3 divine and 1/3 mortal. He has enormous intelligence and strength, but oppresses his people. The people call upon the gods, and the sky-god Anu, the chief god of the city, makes a wild man called Enkidu with enough strength to match Gilgamesh. Eventually the two fight, but neither can win. Their enmity becomes mutual respect then devoted friendship.

The two new friends set off on adventures together, but eventually the gods kill Enkidu. Gilgamesh grievously mourns his friend, and realises that he too must eventually die. However, he learns of one who became immortal—Utnapishtim, the survivor of a global Flood. Gilgamesh travels across the sea to find Utnapishtim, who tells of his remarkable life.
The Gilgamesh Flood

In reality, it was Utnapishtim’s flood, told in the 11th tablet. The council of the gods decided to flood the whole earth to destroy mankind. But Ea, the god who made man, warned Utnapishtim, from Shuruppak, a city on the banks of the Euphrates, and told him to build an enormous boat:

'O man of Shuruppak, son of Ubartutu: Tear down the house and build a boat! Abandon wealth and seek living beings! Spurn possessions and keep alive living beings! Make all living beings go up into the boat. The boat which you are to build, its dimensions must measure equal to each other: its length must correspond to its width.'

Utnapishtim obeyed:

'One (whole) acre was her floor space, (660’ X 660’) Ten dozen cubits the height of each of her walls, Ten dozen cubits each edge of the square deck. I laid out the shape of her sides and joined her together. I provided her with six decks, Dividing her (thus) into seven parts.’ ... Utnapishtim sealed his ark with pitch, took all the kinds of vertebrate animals, and his family members, plus some other humans. Shamash the sun god showered down loaves of bread and rained down wheat. Then the flood came, so fierce that:

'The gods were frightened by the flood, and retreated, ascending to the heaven of Anu. The gods were cowering like dogs, crouching by the outer wall. Ishtar shrieked like a woman in childbirth, the sweet-voiced Mistress of the Gods wailed: “The olden days have alas turned to clay, because I said evil things in the Assembly of the Gods! How could I say evil things in the Assembly of the Gods, ordering a catastrophe to destroy my people!! No sooner have I given birth to my dear people than they fill the sea like so many fish!” The gods—those of the Anunnaki—were weeping with her, the gods humbly sat weeping, sobbing with grief(?), their lips burning, parched with thirst.'
However, the flood was relatively short:

‘Six days and seven nights came the wind and flood, the storm flattening the land. When the seventh day arrived, the storm was pounding, the flood was a war—struggling with itself like a woman writhing (in labor).’

Then the ark lodged on Mt Nisir (or Nimush), almost 500 km (300 miles) from Mt Ararat. Utnapishtim sent out a dove then a swallow, but neither could find land, so returned. Then he sent out a raven, which didn’t return. So he released the animals and sacrificed a sheep. This was not too soon, because the poor gods were starving:

‘The gods smelled the savor, the gods smelled the sweet savor, and collected like flies over a (sheep) sacrifice.’

Then Enlil saw the ark and was enraged that some humans had survived. But Ea sternly rebuked Enlil for overkill in bringing the flood. Whereupon Enlil granted immortality to Utnapishtim and his wife, and sent them to live far away, at the Mouth of the Rivers.

Here is where Gilgamesh found him, and heard the remarkable story. First Utnapishtim tested Gilgamesh’s worthiness for immortality by challenging him to stay awake for 7 nights. But Gilgamesh was too exhausted and quickly fell asleep. Utnapishtim asked his wife to bake a loaf of bread and place it by Gilgamesh every day he slept. When Gilgamesh awoke, he thought he had just been asleep for a moment. But Utnapishtim showed Gilgamesh the loaves at different stages of aging, showing that he had been asleep for days.

Gilgamesh once more lamented about his inevitable death, and Utnapishtim took pity on him. So he revealed where he could find a plant of immortality. This was a thorny plant in the domain of Apsu, the god of the subterranean sweet water. Gilgamesh opened a conduit to the Apsu, tied heavy stones to his ankle, sunk deep down, and grabbed the plant. Although the plant pricked him, he cut off the stones, and rose.

Unfortunately, on the return journey, Gilgamesh stopped at a cool spring to bathe, and a snake carried off the plant. Gilgamesh wept bitterly, because he could not return to the underground waters.
<table>
<thead>
<tr>
<th></th>
<th>Genesis</th>
<th>Gilgamesh</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent of flood</td>
<td>Global</td>
<td>Global</td>
</tr>
<tr>
<td>Cause</td>
<td>Man’s wickedness</td>
<td>Man’s sins</td>
</tr>
<tr>
<td>Intended for whom?</td>
<td>All mankind</td>
<td>One city &amp; all mankind</td>
</tr>
<tr>
<td>Sender</td>
<td>Yahweh</td>
<td>Assembly of “gods”</td>
</tr>
<tr>
<td>Name of hero</td>
<td>Noah</td>
<td>Utnapishtim</td>
</tr>
<tr>
<td>Hero’s character</td>
<td>Righteous</td>
<td>Righteous</td>
</tr>
<tr>
<td>Means of announcement</td>
<td>Direct from God</td>
<td>In a dream</td>
</tr>
<tr>
<td>Ordered to build boat?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Did hero complain?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Height of boat</td>
<td>Three stories</td>
<td>Seven stories</td>
</tr>
<tr>
<td>Compartments inside?</td>
<td>Many</td>
<td>Many</td>
</tr>
<tr>
<td>Doors</td>
<td>One</td>
<td>One</td>
</tr>
<tr>
<td>Windows</td>
<td>At least one</td>
<td>At least one</td>
</tr>
<tr>
<td>Outside coating</td>
<td>Pitch</td>
<td>Pitch</td>
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<td>-----------------</td>
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</tr>
<tr>
<td><strong>Shape of boat</strong></td>
<td>Oblong box</td>
<td>Cube</td>
</tr>
<tr>
<td><strong>Human passengers</strong></td>
<td>Family members only</td>
<td>Family and few others</td>
</tr>
<tr>
<td><strong>Other passengers</strong></td>
<td>All kinds of land animals (vertebrates)</td>
<td>All kinds of land animals</td>
</tr>
<tr>
<td><strong>Means of flood</strong></td>
<td>Underground water &amp; heavy rain</td>
<td>Heavy rain</td>
</tr>
<tr>
<td><strong>Duration of flood</strong></td>
<td>Long (40 days &amp; nights plus)</td>
<td>Short (6 days &amp; nights)</td>
</tr>
<tr>
<td><strong>Test to find land</strong></td>
<td>Release of birds</td>
<td>Release of birds</td>
</tr>
<tr>
<td><strong>Types of birds</strong></td>
<td>Raven &amp; three doves</td>
<td>Dove, swallow, raven</td>
</tr>
<tr>
<td><strong>Ark landing spot</strong></td>
<td>Mountains—of Ararat</td>
<td>Mountains—Mt Nisir</td>
</tr>
<tr>
<td><strong>Sacrificed after flood?</strong></td>
<td>Yes, by Noah</td>
<td>Yes, by Utnapishtim</td>
</tr>
<tr>
<td><strong>Blessed after flood?</strong></td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Which came first?**

We can see from the table that there are many similarities, which point to a common source. But there are also significant differences. Even the order of sending out birds is logical in Noah’s account. He realized that the non-return of a carrion feeder like a raven proved nothing, while Utnapishtim sent the raven out last. But Noah realized that a dove was more logical—when the dove returned with a freshly picked olive branch, Noah knew the water had abated. And its non-return a week later showed that the dove found a good place to settle.
Enemies of biblical Christianity assert that the biblical account borrowed from the Gilgamesh epic. Followers of Christ cannot agree. So in line with the Apostle Paul’s teaching in 2 Corinthians 10:5, it’s important to demolish this liberal theory.

**Genesis is older**

It makes more sense that Genesis was the original and the pagan myths arose as distortions of that original account. While Moses lived long after the event, he probably acted as the editor of far older sources.⁹ For example, Genesis 10:19 gives matter-of-fact directions, ‘as you go toward Sodom and Gomorrah and Admah and Zeboiim’. These were the cities of the plain God destroyed for their extreme wickedness 500 years before Moses. Yet Genesis gives directions at a time when they were well-known landmarks, not buried under the Dead Sea.

It is common to make legends out of historical events, but not history from legends. The liberals also commonly assert that monotheism is a late evolutionary religious development. The Bible teaches that mankind was originally monotheistic. Archaeological evidence suggests the same, indicating that only later did mankind degenerate into idolatrous pantheism.¹⁰

For instance, in Genesis, God’s judgment is just, he is patient with mankind for 120 years (Genesis 6:3), shows mercy to Noah, and is sovereign. Conversely, the gods in the Gilgamesh Epic are capricious and squabbling, cower at the Flood and are famished without humans to feed them sacrifices. That is, the human writers of the Gilgamesh Epic rewrote the true account, and made their gods in their own image.

The whole Gilgamesh-derivation theory is based on the discredited Documentary Hypothesis.⁹ This assumes that the Pentateuch was compiled by priests during the Babylonian Exile in the 6th century BC. But the internal evidence shows no sign of this, and every sign of being written for people who had just come out of Egypt. The Eurocentric inventors of the Documentary Hypothesis, such as Julius Wellhausen, thought that writing hadn’t been invented by Moses’ time. But many archaeological discoveries of ancient writing show that this is ludicrous.
All people groups remember a global Flood

Liberals often claim that the Gilgamesh epic was embellished from a severe river flood, i.e. a local flood. This might work if there were similar flood legends only around the ancient near east. But there are thousands of such flood legends all around the world—see the chart below for some examples.¹¹

Even the Australian Aborigines have legends of a massive flood, as do people living in the deep jungles near the Amazon River in South America. Dr Alexandra Aikhenvald, a world expert on the languages of that region, said:

‘... without their language and its structure, people are rootless. In recording it you are also getting down the stories and folklore. If those are lost a huge part of a people’s history goes. These stories often have a common root that speaks of a real event, not just a myth. For example, every Amazonian society ever studied has a legend about a great flood.’¹²

This makes perfect sense if there were a real global Flood as Genesis teaches, and all people groups came from survivors who kept memories of this cataclysm.
Ark shape

The Ark was built to be tremendously stable. God told Noah to make it 300x50x30 cubits (Genesis 6:15) which is about 140x23x13.5 metres or 459x75x44 feet, so its volume was 43,500 m$^3$ (cubic metres) or 1.54 million cubic feet. This is just right to keep the boat from capsizing and to smooth the ride. There are three main types of rotation in ships (and planes), about three perpendicular axes:

1. **Yawing**, rotation about a vertical axis, i.e. the bow and stern move alternately left to right.

2. **Pitching**, rotation about a lateral axis, an imaginary line left to right, i.e. the bow and stern move alternately up and down.

3. **Rolling** (or heeling), rotating about the longitudinal axis, an imaginary line from bow to stern, tending to tip the boat on its side.

Click on picture for high resolution (30 kb).

Yawing is not dangerous, in that it won’t capsize a boat, but it would make the ride uncomfortable. Pitching is also an unlikely way to capsize a boat. In any case, the enormous length of the boat would make it align parallel to the wave direction, so these disturbances would be minimal.
Diagram showing how resistant the Ark was to capsizing. After Henry Morris, *The Biblical basis for modern science*.

Rolling is by far the greatest danger, and the Ark solves that by being much wider than it is high. It would be almost impossible to tip over—even if the Ark were somehow tipped over 60°, it could still right itself, as shown in the diagram (above).

But it would be almost impossible to tip the Ark over even a fraction of this. David Collins, who worked as a naval architect, showed that even a 210-knot wind (three times hurricane force) could not overcome the Ark’s righting moment, which would have stopped the Ark tilting much beyond 3°. ¹³

Furthermore, Korean naval architects have confirmed that a barge with the Ark’s dimensions would have optimal stability. They concluded that if the wood were only 30 cm thick, it could have navigated sea conditions with waves higher than 30 m. ¹⁴ Compare this with a tsunami (‘tidal wave’), which is typically only about 10 m high. Note also that there is even less danger from tsunamis, because they are dangerous only near the shore—out at sea, they are hardly noticeable.
Dr Werner Gitt showed that the Ark had ideal dimensions to optimize both stability and economy of material—see his DVD from the 2004 Supercamp, How Well Designed was Noah’s Ark (http://usstore.creation.com/catalog/well-designed-noahrsquos-p-1076.html?osCsid=aj3aibdmq0jc5jb6achkqa7cv0).

Contrast that with Utnapishtim’s ark—this was a huge cube! It is harder to think of a more ridiculous design for a ship—it would roll over in all directions at even the slightest disturbance. However, the story is easy to explain if they distorted Genesis, and found that one dimension is easier to remember than three, ‘its dimensions must measure equal to each other’, and it seems a much nicer shape. The pagan human authors didn’t realize why the real Ark’s dimensions had to be what they were. But the reverse is inconceivable: that Jewish scribes, hardly known for naval architectural skills, took the mythical cubic Ark and turned it into the most stable wooden vessel possible!

**Genesis is the original**

The Gilgamesh Epic has close parallels with the account of Noah’s Flood. Its close similarities are due to its closeness to the real event. However, there are major differences as well. Everything in the Epic, from the gross polytheism to the absurd cubical ark, as well as the worldwide flood legends, shows that the Genesis account is the original, while the Gilgamesh Epic is a distortion.

**Update:** see Nozomi Osanai, *A comparative study of the flood accounts in the Gilgamesh Epic and Genesis*, MA Thesis, Wesley Biblical Seminary, USA, 2004, which was completed independently of this article, and provides more detail. She graciously allowed us to publish her thesis on our site—<www.creation.com/gilg>.
References


2. For refutations of the local flood compromise, see Anon., Noah’s Flood covered the whole earth, Creation 21(3):49, June–August 1999.


7. At least for the real Ark of Noah, this pitch would have been made by boiling pine resin and charcoal. Indeed, the major pitchmaking industries of Europe made pitch this way for centuries. See Walker, T., The Pitch for Noah’s Ark, Creation 7(1):20, 1984.


11. From Monty White.


14. Hong, S.W. et al., Safety investigation of Noah’s Ark in a seaway, Journal of Creation 8(1):26–36, 1994. All the co-authors are on the staff of the Korea Research Institute of Ships and Ocean Engineering, in Daejeon. They also analyzed other possible threats to the Ark, such as deckwetting frequency, acceleration at various points and slamming frequency.

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A few people reach around 120 years. We’re understanding more … but, with new research, can we live longer? Fascinating new information about how and why we age casts fresh light on the long lifespans of pre-Flood people.

In the book of Genesis, the Bible routinely records human lifespans which seem outrageously different from our experience today. Adam lived to 930 years; Noah even longer, to 950 years (see graph below). These long lifespans are not haphazardly distributed; they are systematically greater before the Flood of Noah, and decline sharply afterwards.

These great ages are not presented in the Bible as if they are in any way extraordinary for their times, let alone miraculous.

Many people are quick to scoff at such ages, claiming they are ‘biologically impossible’. Today, even if they avoid all fatal diseases, humans will generally die of old age before they reach much past 100. Even the very exceptional cases don’t make it much past 120 years.
However, a look at the evidence related to aging suggests that the apparent upper limit on today’s average lifespans is not something that is ‘biologically inevitable’ as such for humans or other multi-celled creatures.

Disease, diet, ‘wear and tear’ and other environmental factors undoubtedly play a part in how long we live. However, it now appears that underlying all these are factors somehow written into our genetic code, which determine what our ‘upper limit’ is. This is not really surprising; most of us know of families in which nearly everyone lives to a ripe old age—and the opposite, of course.

And although an average ‘upper limit’ seems to be ‘programmed’ into each species, breeding experiments have shown that this limit can be altered, even dramatically. Experiments with fruitflies and worms have shown that extra longevity can be bred into and out of these populations. So you can have two populations of the same fly, with one group living many times longer than the other, on average. Even a genetic ‘switch’ involved in longevity has been identified in one species of worm.

**Why do we wear out?**

Why is it that multi-celled creatures (like people) all eventually wear out and die? It is not enough to simply say that there are physical laws which dictate that all fixed structures will eventually wear out. This is true, but biological machinery has built-in ‘intelligence’ (programmed into the DNA) which gives it the ability to repair itself.

That’s why single-celled creatures like bacteria don’t die of old age—they just divide into two new copies, each of which divides into two more, and so on. [Note added in May 2009: Actually, there is now abundant evidence that even single-celled creatures can suffer senescence—i.e., aging and death.] Beings like us have organs (e.g., liver, kidneys and so on) which are made up of lots of individual cells. Why don’t these cells keep on dividing, repairing and renewing the organ forever? If this were to happen, with worn-out cells replaced by newly manufactured ones, then none of your ‘parts’ would wear out. Which of course means that you would never wear out. You might be killed by a falling tree, or die of some infection, but you would never die of old age.
Of course, this isn’t so. Our individual organs do wear out. The cells within them can multiply for a while, but not forever. After a certain number of times, they simply stop dividing. It is known that ordinary human cells will only divide some 80–90 times, then no more.

It appears that there is, on the tips of each of our chromosomes, a structure called a telomere. Think of it as a counting device, with a number of beads on the end. Every time the cell divides, it is as if a bead is snipped off, shortening the telomere (see section below). Once all of the beads have gone, cell division can no longer take place. From then on, as each cell ‘runs down’, it is not replaced by any new ones. So even if you avoid any sort of fatal accident or disease, you will eventually succumb to failure of one or more organs.

The machinery by which cells divide is controlled by the instructions written on the DNA, the genetic code. So it looks as if some pre-programmed genetic limit, while not all there is to aging, could well be a big part of the story. In short, there is no known biological reason why lifespans of 900 years or more would be impossible if that genetic limit were set at a different point.

And there is reason to think that there could indeed be great variation in this genetic ‘upper limit’. We have already seen that simply reshuffling gene frequencies through breeding selection in fruitflies can drastically increase their lifespan.

The real question then becomes not, ‘How could they possibly live for so long?’, but rather, ‘Why don’t we live that long any more?’
Noah’s new environment

Looking at the drop in lifespans after the Flood, it is natural to think that it must be related to the world having changed so drastically. Evidence from the fossil record does suggest that carbon dioxide (also possibly oxygen) levels were higher in the pre-Flood world. Many have suggested that an atmospheric canopy of water vapour sheltered the pre-Flood world from cosmic radiation. However, whether this is so or not, there is little evidence that aging is substantially influenced by any of these factors.

The idea that the environment became so much more ‘toxic’ after the Flood as to slash our lifespans by nearly eight centuries, to one-ninth of what they were, stumbles at one important point. Noah was already over 600 years old when he stepped out of the Ark. But this allegedly much more hostile environment did not cause him to rapidly wither and die in a few decades. Instead, he lived for another 350 years, outstripping the age of even his ancestor Adam.

We don’t know whether environmental factors perhaps only cause problems in the developmental phase of human life. However, one simple explanation of why Noah still lived for so long is that Noah’s genetic make-up was what gave him the potential to live so long. And that perhaps most, if not all, people before the Flood were programmed for much longer lifespans than we are programmed for today.

So what happened? Remember that the whole population shrank to just a handful. There are well known ways in which forms of genes (known as alleles), which could include any...
coding for longer lifespans, can be eliminated from a population that has gone through such a ‘bottleneck’—down to eight people (see chromosome box below).

**Other factors**

If such genetic loss were the reason for the decline in lifespans, it may not be the only one. Harmful mutations accumulating at higher rates may have played a part. Some of these mutations may have caused a loss of the length of the telomere, for instance. After the Flood, the variety of plants available for food was drastically reduced, perhaps one reason why God permitted man to eat meat at that point. However, not even the most avid enthusiast for healthy eating would suggest that, by simply changing our diet, we could live for 950 years today. Perhaps some of these other factors are the reason for the continuing decline, lasting for centuries. Isaac lived to 180, Moses 120, King David only 71 years. Interestingly, we are seeing an increase in lifespans today due to environmental factors. However, I think it is likely that to live anywhere near as long as our ancestor Noah, we would need some of his genetic factors.

Of course, the ultimate reason for all aging and death is the Curse on all creation recorded in Genesis chapter 3. Adam was told that if he disobeyed God, ‘dying, you shall die’ [lit. Hebrew]. Adam immediately died spiritually, and began to die physically on the very same day, just as we are all dying today.

Modern genetic research shows that we all inherit the inevitability of aging and death. When we look at our encroaching wrinkles in the mirror, it should remind us of the awfulness of sin in the sight of a holy God. And it should cause us immense thankfulness that God has provided a way of escape from His own righteous judgement on sin, through His Son, the Lord Jesus Christ.

**Living beyond your means**

Some 30 years ago, a middle-aged lawyer in France struck a deal with a lady client in her 90s, as follows. He gained ownership of her apartment, in return for a handsome monthly stipend. She could live in it rent-free all her life. It seemed an obvious win-win; because of her advanced age, he would surely end up with a very cheap purchase, and she would live
out her meagre allotment of remaining years with a high income.

To the lawyer’s great misfortune, his client, Jeanne Calment, was destined to become the longest living person in modern history. She died in 1997 (with all faculties intact) at the age of 122 years, 164 days. Her lawyer died of old age long before she did. He (and his estate) ended up paying her the price of her apartment many times over.

Two French researchers have recently traced Calment’s genealogy back five generations on both sides. Each of her ancestors had lived a remarkable 10.5 years longer, on average, than the mean age at death of people in the same region. They concluded that how she lived or what she ate was not the main factor in her great age, but that a rare constellation of longevity genes must have come together in one individual. Obviously, she also happened to avoid any misfortune which might have caused earlier death.

This is consistent with our thesis here there are genetic longevity factors. The availability of a great array of these in our pre-Flood ancestors might well explain their long lifespans, while loss of some could explain the subsequent drop.

Possible genetic combinations inherited by offspring.

Genetic loss after the Flood—a cause for dropping lifespans?

There is a well-known and simple phenomenon called ‘genetic drift’, through which varying forms (alleles) of genes (stretches of DNA coding for various characteristics) can become lost in small populations.

Genes come in pairs; you inherit one from your mother and one from your father. In the example shown above diagrammatically, the ‘G’ form of the gene is present in father and
not in mother. Each of their children only has a 50–50 chance of inheriting the ‘G’ version of that particular gene, as shown. Therefore the possibility that none of the offspring will inherit this gene is not at all a remote one. (If they only have three children, the chance is 1 in 8). In a situation in which the entire human race was reduced down to Noah, his three sons and their wives, it is entirely feasible that some forms of the genes present in Noah were not passed on. Since it now appears that much of aging is under genetic control, loss of some of the genes for longevity may be the reason for the drop post-Flood. Perhaps subsequent population bottlenecks (at Babel) contributed further to this genetic elimination.²

The ‘capping’ at the end of each chromosome (called a telomere, from Greek τέλος telos = ‘end’ and μέρος meros ‘part’) is, like the capped tips of shoelaces, necessary to prevent the ends fraying. The telomere shortens with each cell division—once the limit is reached, the cells can no longer divide. This is probably only one way in which our limited lifespans are ‘programmed’ into us. There is no biological reason at all why people could not live much longer than they do at present, if they had the appropriate genetic makeup.

It has long been known that there are human cells that can keep on dividing forever—cancer cells. These appear not to have the built-in ‘switch’ which tells cells to stop dividing, so they keep on making copies of themselves. This is why medical labs, which need to use human cell lines in their work, can be continually supplied with cells which are all the ‘offspring’ of one unfortunate person’s cancer. (Called HeLa cells, after Henrietta Lacks, the lady whose cancer it was). The HeLa cell line is effectively ‘immortal’ (unless existing HeLa cells were to all be physically destroyed).
Recently, laboratory results based on an enzyme\(^3\) that is involved with the replication of the telomere, have caused much excitement. Modified human cell lines have divided many times past their limit. Some speculate that such manipulations could cause people to live to much longer ages, providing they do not succumb to disease or accident in the meantime. Aging is certain to be much more complex than these simplified discussions, based on preliminary findings, might lead us to think. However, the evidence so far strongly suggests that genetics plays a major part.

**Bibliography/further reading**


**References and notes**

1. Simplified for brevity—there is a fluctuation in length, with a net shortening. In our brain cells, the telomere does not shorten.
2. This assumes that there was probably considerable variation in lifespans in the pre-Flood world, with some only programmed to live a maximum of say, 400 to 500 years. This may be why Noah’s sons failed to match his great age.
3. This enzyme, called telomerase, was discovered in 1980 by the winner of the 1998 Australia Prize, Prof. Elizabeth Blackburn. Without telomerase, cells cannot copy their ‘caps’. Prof. Blackburn, along with Carol Greider and Jack Szostak, were awarded the 2009 Nobel Prize in Physiology or Medicine “for the discovery of ‘how chromosomes are protected by telomeres and the enzyme telomerase.’”

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Digging Deeper Links for


Decreased lifespans

http://creation.com/decreased-lifespans-have-we-been-looking-in-the-right-place

Decreased lifespans: Have we been looking in the right place?

by Carl Wieland

For all our days are passed away in thy wrath: we spend our years as a tale that is told. The
days of our years are three score years and ten; and if by reason of strength they be four
score years, yet is their strength labour and sorrow; for it is soon cut off, and we fly
away. Psalm 90:9–10

The Bible is not the only place to record that people lived for many hundreds of years in
ancient times, but it does so in exquisite, documentary detail. Adam lived to 930 years of
age; Methuselah to 969; Noah to 950. This is of course in marked contrast to the modern
situation.

By not discounting infant mortality, the data on average lifespans in cultures and times
without the benefit of modern public health measures have been skewed downward
drastically. I recall in my youth hearing figures being thrown around about an average
lifespan for an ancient Roman of around 30 years, which made it seem to the casual
observer that it would have been rare to see middle-aged or old men in Rome.

This was not the case; a more realistic picture of longevity is gained by looking at the
average age at death (excluding war) of adults. That is, recording only the average age at
death of all who have passed the hazards of firstly childbirth, and secondly disease in
infancy and childhood, which is where truly great advances in survival have occurred in
modern culture.

It is likely that on such a basis, the last few centuries have seen little improvement in
lifespan over the situation prevailing at the time of David’s lament at the beginning of this
piece. Politicians worry about the fact that our present Western populations are getting a
larger proportion of aged which is set to increase over the next few years. However, it is often forgotten that this is only marginally due to medical advances keeping people alive longer. The real reason why far-sighted governments wonder where all the future age-pension moneys will come from is because there is a population ‘hump’ moving through— quite simply, the post-war baby-boomers are getting older. In time, therefore, the proportion of aged can again decline.

Today, though there are occasional rare reports (usually with absent or dubious birth certification) of people living somewhat longer, it seems that there are no well-documented cases of anyone living for more than 120 years, and these are in any case very exceptional. David’s ‘three score and ten’ (a description of a situation, not a biblical promise or proscription) is still near the mark today on average.

A casual scan of the biblical ages at death seems to show them hovering around those large figures up till the time of the Flood, with a fairly steep decline thereafter.

**Causes**

Creationist explanations (of this drop in lifespans) to which I have been exposed (and have often put forward as possible answers) all seem to, not surprisingly, focus on environmental factors. A global Flood would obviously be accompanied by massive environmental effects—so a universal change in human lifespans at around the same time would naturally appear to be related.

These attempts mostly focus on the water vapour canopy theory. For example, it is suggested that this canopy shielded the earth from harmful ionizing (cosmic) radiation to which, in its absence, we are now all exposed. The same would have been true of the stronger magnetic field in the past, observed to be still weakening today. However, the canopy is usually foremost in such explanations.

It has also been proposed that the greater partial pressures of oxygen and/or carbon dioxide under such a canopy may have contributed to greater lifespans.

However, one needs to ask whether there is any evidence that such environmental factors really do have a major effect on human senescence and lifespan. These explanations also presume that there was such a canopy, which is a matter being argued out elsewhere.
Increasingly, the consensus among the current generation of creationists at the cutting edge is (on the basis of exegetical and scientific arguments) pointing away from the necessity for—or even the likelihood that there was—such a canopy (for more information, see Where did the water come from? chapter 12 in the The Creation Answers Book).

Ionizing radiation may cause (non-inheritable) mutations in somatic (body) cells. If this is to be the cause of us now living only 70-odd (compared to 900 or so) years, the effect would have to be rather drastic. There is no biblical evidence that the patriarchs were senescent after the first hundred years or so of their lives, so the pre-Flood 100 year old was certainly in much better condition than today’s 100 year old. (Noah in fact had his children at 500, whereas Abraham [who still lived to 175 years] seems surprised at the idea of a 100 year old becoming a father.)

If background radiation has such a powerful ‘aging effect’, then in principle this should easily show up experimentally. One would expect differences, for example, in populations naturally shielded from or exposed to differing degrees of such radiation, whether among humans or animals. It should be relatively easy to raise mice in a completely radiation-free environment and see a massive increase in lifespans.

Proponents of the ‘different gas pressure’ models have an even more difficult time explaining how this could affect longevity. I propose an experiment involving raising successive generations of mice in a hyperbaric atmosphere to attempt to test many of the speculative ideas about the effects of such an atmosphere on both longevity and ‘giantism’.

All positions which attempt to explain the ‘lifespan drop’ in environmental terms have another bit of data to explain, and that is the temporary persistence of longevity after the Flood. Noah was 600 at the time of the Flood, but lived another 350 years afterwards, in the post-flood atmosphere! Even in pre-Flood terms, Noah was already of moderately advanced age. One would presume that, if the post-Flood atmosphere/environment has such devastating effects on us now, then because Noah would have been instantly exposed to these same effects, it should have cut his life short much more rapidly. Actually, only Methuselah and Jared lived longer than Noah.

Remember that these environmental effects are supposed to age us eight or nine times as quickly as we would normally. Also, with the canopy gone, for example, why would the
reduction in lifespans not appear in one single swoop, in the very next generation? A quick glance at Table 1 going down the generations, all born after the Flood, shows that such a one-step drop seems hardly to have been the case.

<table>
<thead>
<tr>
<th>Name</th>
<th>Age At Death (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arphaxad</td>
<td>438</td>
</tr>
<tr>
<td>Salah</td>
<td>433</td>
</tr>
<tr>
<td>Eber</td>
<td>464</td>
</tr>
<tr>
<td>Peleg</td>
<td>239</td>
</tr>
<tr>
<td>Reu</td>
<td>239</td>
</tr>
<tr>
<td>Serug</td>
<td>230</td>
</tr>
<tr>
<td>Nahor</td>
<td>148</td>
</tr>
<tr>
<td>Terah</td>
<td>205</td>
</tr>
<tr>
<td>Abraham</td>
<td>175 (Sarah died at 127)</td>
</tr>
<tr>
<td>Isaac</td>
<td>180 (Ishmael 137)</td>
</tr>
<tr>
<td>Jacob</td>
<td>&gt; 130</td>
</tr>
<tr>
<td>Joseph</td>
<td>110</td>
</tr>
<tr>
<td>Moses</td>
<td>120 (recorded as in good condition)</td>
</tr>
</tbody>
</table>
Even though the post-Flood decline is obvious, we see that eight generations after the Flood, people are still living more than twice as long as is common today.

It would seem much easier to explain the situation if the change occurred within the makeup of humans, rather than external to them. If our longevity is genetically pre-programmed, then that can explain why Noah still lived for a considerable time after the Flood, regardless of any change in radiation or atmospheric pressure. In other words, he was fulfilling his genetic potential as far as lifespan was concerned (in the absence of accidental death or disease).

**Biological Aging and Death**

Barring accidental death, one-celled organisms are potentially ‘immortal’. A bacterial cell reproduces by dividing into two where there was one, those two then become four, and so on. Why then do multi-celled organisms die? Individual human cells in tissue culture divide some 50 times and then stop -some sort of pre-programmed genetic limit is reached. Human tumour cells, on the other hand, can be propagated indefinitely by division -the DNA mechanism for preprogrammed cessation of division appears to be lacking or damaged in such cancer cells.

In multicellular organisms, once damaged and worn cells can no longer replace themselves, death is only a matter of time as the function of whole organ systems deteriorates. So even without accidents or disease, there is a programmed ‘upper limit’ on our age, which appears to be 120 years or so as previously stated.

I suggest that our ancestors simply possessed genes for greater longevity which caused this ‘genetic limit’ to human ages to be set at a higher level in the past.

Suggestive evidence in support of this is the fact that in some other organisms (for example, fruitflies), it has been shown that changes in average lifespans can be bred into or out of populations. Most of us also know of individual family lines in which many successive generations all seem to live to very ripe old ages, with apparently delayed senescence relative to the norm. Reports of entire populations (for example, the Hunzas) living to 100+...
far more frequently than is the case in our society (in spite of indulgence in tobacco and 
alcohol) has caused many to hunt for their dietary secrets. However, genetics would seem 
to provide an obvious answer.

If this suggestion has merit as the major (if not the sole) cause of greater pre-Flood ages, 
then the obvious question is how some of these longevity genes were lost. The human 
population went through a severe genetic bottleneck at the time of the Flood—only eight 
individuals. The phenomenon of ‘genetic drift’ is well-known to be able to account for 
‘random’ selectively neutral changes in gene frequencies (including the loss or ‘extinction’ of 
genes from a population) which may be quite rapid. Also, loss of genes is far more likely in 
a small population.

An extreme example would be a population reduced to two, having only one offspring. At 
any particular gene locus, if mother and father carried four alleles (A, B, C, D) then it is 
inevitable that two of these genes will be lost in that time, with each gene having only a 
50% chance of surviving into the next generation. If there are two offspring (the minimum 
needed for continuation of the population) then all four alleles might possibly survive, but it 
is far more likely that one or more will be lost. No matter how large the subsequent 
population numbers become, the loss is irreversible.

This brief essay is meant solely as a stimulus to further thought, not as a precise model of 
events. However, it would seem that an explanation along these lines would be feasible, 
especially if several genes contributed to such longevity. For this scenario to work Noah’s 
sons and their wives would have to have significant heterozygosity at the relevant gene loci. 
That this could well have been so is suggested by the age of Shem at death -600, 
considerably less than that of his father.

‘Short-lived’ alleles of the relevant genes may always have been present, which would mean 
that in the pre-Flood world, there would have always been some individuals (homozygous 
for such alleles) living drastically less than the ages recorded for the patriarchs. It may be 
that these individuals would not have been as short-lived as today, since they might still 
have had other longevity factors which were subsequently lost, by drift, entirely from the 
world population, in the first generation after the Flood. Such a loss may account for the
major drop in the descendants of the Flood survivors, from the 600+ range to the 400s in one swoop.

The second-stage drop to the 200s may be the result of a second such loss. It should also not be forgotten that the dispersion at Babel in effect caused a number of bottlenecks once again, although we have no definite indication just how tight these were.

It is also likely (if not more so) that genes coding for lesser longevity arose by mutational degeneration, with their frequency of possession rising as time passed. At the moment, too little is known of the exact mechanics of the way in which cells are programmed to die in order to offer more specific suggestions.

The information on lifespans given in Scripture does not cover all the world’s peoples then living, but concentrates on one line of descent. The nation of Israel effectively starts from one man (Abraham) and his (closely related) wife, so this is another genetic bottleneck. The course of changing longevity may have been quite different in other population groups.

It has been suggested that maybe increased environmental radiation (if such was indeed the case) increased the mutation rate in the germ cells (egg and sperm), accounting for the progressive decline over generations. Even if so, this needs to be clearly distinguished from the usual way in which the ‘radiation’ explanation is used—that is, in this suggestion the radiation causes mutational losses/ damage which affects longevity, but the radiation as such is not being blamed for aging people. This is in effect an admission that aging is dramatically dependent on genetic factors, which is the point of this article. However, I would resist the suggestion that the recorded decline is merely due to the ongoing accumulation of a myriad of miscellaneous defects, mainly because of the way in which the decline had already plateaued by the time of David. The accumulation of genetic errors in the human line has continued since David’s time, of course. Each mistake in gene copying will usually only be eliminated totally if it is lethal in the heterozygous condition. We all carry hundreds of such accumulated mistakes, which are not usually obvious in the heterozygous state.
Morphological Correlates?

Some post-Flood humans may in fact have carried the ‘longevity’ genes to greater or lesser degree over many generations. These genes may have become extinct as the populations did. I suggest that Neanderthal and *Homo erectus*, for example, give us evidence of genetically distinct humans existing post-Flood. These no longer exist today as discrete populations, although some of the genes coding for some of their distinctive bony anatomy were apparently passed on to some of today’s populations. For instance, some Europeans carry the distinctive Neanderthal bony ridge over the trigeminal nerve opening in the jaw.

Some of these lesser ‘longevity’ genes may have survived in some such populations, say in Neanderthals. Since these would, especially during the rigours of the post-Flood Ice Age, have tended to be small and isolated, drift may again have played a major role in the eventual ‘extinction’ of some of the Neanderthal genes coding for the unique aspects of their very human anatomy (for example, robusticity, large braincase), as well as possibly being responsible for the loss of their longevity, if indeed they had such. Beasley\(^2\) has suggested that some of the morphological features of such post-Flood humans may in fact be due to greater longevity, which he very reasonably links to delayed maturation.

If this is so, then in this picture the differences in morphology, between say Neanderthals and Cro-Magnon, are in any case genetic—whether primarily or secondarily linked to variations in longevity. With the existence of intense selection pressure operating on such small groups, especially during the post-Babel dispersion/migration, the rapid splitting off of racial variation is no surprise, in this case expressed via bony features. (It appears that Neanderthal, *erectus*, and *sapiens* [for example, Cro-Magnon] were genetically distinct but contemporaneous populations of undoubted people.)

The extinction of human lines with more robust morphology (Neanderthal, *erectus*) may correlate with extinction of longevity. The robusticity may be the result of genetic longevity/delayed maturation or the same populations may have had [possibly linked] genes for longevity and robusticity.
Conclusion

Further exploration of this area, particularly as knowledge of the relationship of genetics to human aging and lifespan increases, seems to be worthwhile. This is relevant to the question of declining post-Flood lifespans as well as to understanding the anatomical variation in early post-Flood humans.

References

1. Note that modern creationist modelling or the declining magnetic field incorporates reversals. Creationist physicist Russ Humphreys actually predicted in print the subsequent discovery or indisputable evidence for rapid reversals—in weeks, rather than thousands or years. See:


Can you imagine Lamech, the father of Noah, talking to Adam and saying, ‘Tell me again what it was like to talk with God in the Garden of Eden, before you ate the forbidden fruit’? A fictitious conversation? Yes, but it could have taken place, because, according to the genealogies recorded in Genesis, Adam did not die until Lamech was 56 years old. See table.

What about Abraham saying to Shem, ‘Tell me again how you and your brothers, Ham and Japheth, and your father, Noah, built the Ark, and what it was like to live on it for a year during the Flood, with all the animals God sent you.’ A fictitious conversation, yes, but another which could have taken place, because, according to the genealogies recorded in Genesis, Shem was alive in Abraham’s day!

The Bible is meticulous in recording the ages of the patriarchs from Adam to Abraham. It states how old each was when his first child, or the child in the Messianic/covenant line, was born, how long each lived after that, and/or how old each was when he died. Hence, by
simple arithmetic, the Year of the World (in Latin *Anno Mundi*, so usually abbreviated to ‘AM’) that each patriarch was born, lived and died can be easily and accurately reckoned, and any possibility of a ‘gap’ is thereby eliminated from these Genesis lists.

*The genealogical details of the early patriarchs are given three times in the Bible—a fact which shows the importance that God places on these details.*

Thus Adam, who was created on the sixth day of the first year, and died AM 930, could have talked with his descendants all the way down to Noah’s father, Lamech, who was born AM 874. And Noah’s son, Shem, born AM 1558 and died AM 2158, could have talked with his descendants all the way down to and including Abraham (born AM 2008).³

Similarly, the date of the Flood after Creation can also be accurately stated. Genesis 7:6 says: ‘And Noah was six hundred years old when the flood of water was upon the earth.’ From the table we see that Noah was born AM 1056, and so the Flood occurred 600 years later, i.e. AM 1656, which was 352 years before Abraham was born.

Notice that Shem (died AM 2158) and Eber (died AM 2187) both outlived all their descendants down to Abraham. In the patriarchal society that then was, it is no wonder that the Israelites were also known as ‘Semitic’ (after Shem) or ‘Hebrews’ (after Eber).

Are there any gaps?

Some well-meaning Christians have said that there are gaps in these genealogies. The reason they say this is to try and stretch the Biblical timeframe to partly accommodate secular geology and archaeology. However, as shown above, there are no gaps in the Genesis genealogies—they were written to be water-tight!

Are the records accurate?

*Most of the events of Creation Week in Genesis 1 occurred before Adam was created, so must have been revealed by God, probably to Adam.*

There are 11 verses in Genesis which read, ‘These are the generations [Hebrew *toledoth* = ‘origins,’ ‘history,’ or ‘family history’] of …’.⁷ These statements all come after the events they describe, and the events recorded in each division all took place *before* rather than after the death of the individuals named, so they may very well be subscripts or closing
signatures, i.e. colophons, rather than superscripts or headings. If this is so, the most likely explanation of them is that Adam, Noah, Shem, and the others each wrote down on clay tablets an account of the events which occurred during their lifetime, and handed them down from father to son via the line of Adam, Seth ..., Noah, Shem ..., Abraham, Isaac, Jacob, etc. Moses, under the guidance of the Holy Spirit, selected, compiled and edited these, along with his own comments, into the book we now know as Genesis.

Such written records would have helped keep accurate any oral accounts of the happenings, as would the fact of the huge ancestral overlap. *Thus, between Adam and Abraham there needed to have been only two intermediaries, e.g. Methuselah (or perhaps Lamech), and then Shem.*

The genealogical details of the early patriarchs are given three times in the Bible—in Genesis chapters 5 and 11, 1 Chronicles 1, and Luke 3—a fact which shows the importance that God places on these details. Jude 14 specifically refers to Enoch as being *‘the seventh from Adam,’* thereby reinforcing the fact that these genealogies are a tight record of history and that we are meant to take them literally, as did the New Testament writers.
Those long lifespans

Many have suggested that the long lifespans of the patriarchs in early Genesis were not historical. However:

1) There is nothing in the text to suggest that they were not intended to be historical.

2) Their order of magnitude is supported by Sumerian records.¹

3) The Hebrew way of writing numbers (in words) would make it very difficult to introduce copying errors.

4) The suggestion has been put that each ‘year’ was actually meant to be a month. Thus Methuselah, for example, would be 80 years at death. But in addition to being an ad hoc assumption with no textual support, it makes no sense, as some of the patriarchs would be fathers in their early childhood.

5) There are several internal consistencies. From the ages given at death, it can be calculated that Methuselah died exactly in the year of the Flood.² Whereas if one used the (fallible) Septuagint, his death would be 14 years after the Flood, yet he was not on board the Ark—an internal contradiction. Dramatic lifespan decline (only) kicks in just after the
Flood, consistent with its catastrophic effect on the world and on populations.

6) There is no biological barrier to long lifespans, and there are convincing genetic explanations (in addition to any environmental factors) for the subsequent decline.³

References and notes

1. The ages of their pre-Flood kings seem astronomical. However, when one realizes that the Sumerians used a number base of sixty (not ten), presumably when transcribing from historical pre-Flood records, the ages come into good alignment with the patriarchal lifespans of Genesis. See López, R., The antediluvian patriarchs and the Sumerian King List, Journal of Creation 12 (3):347–357, 1998.

2. Some commentators argue that the name Methuselah comes from the roots muth (= death) and shalach (= bring or send forth), thus his name means ‘his death shall bring’—a prophetic reference to the Flood judgment. If so, then it is fitting that he was the longest-lived person in the Bible, a symbol of God’s immense patience and longsuffering.


References and notes

1. Not to be confused with another Lamech, son of Methusael and descendant of Cain (Genesis 4:17–18).


3. Abram, mentioned first in Genesis 11:26, was the most important of the three sons born to Terah; he might or might not have been the first born, cf. Shem, Note 6. Abram left Haran at the age of 75 (Genesis 12:4), after the death of Terah (Acts 7:4) who died at age 205 (Genesis 11:32). This would mean that Abram was born when Terah was 130, i.e. in AM 2008.

4. Abram’s name, which means ‘exalted father,’ was changed by God to Abraham, meaning ‘father of many,’ when Abram was 99 years old (Genesis 17:1,5).

5. E.g. Genesis 5:3–6: ‘And Adam lived a hundred and thirty years, and begat a son in his own likeness, after his image; and called his name Seth: And the days of Adam after he had begotten Seth were eight hundred years: and he begat sons and daughters: And all the days that Adam lived were nine hundred and thirty years: and he died. And Seth lived a hundred and five years and begat Enos …’

6. Of Noah’s three sons, born after Noah turned 500 (Genesis 5:32), although Shem (the son in the covenant line) is mentioned first, Japeth is described as the elder (Genesis 10:21), so presumably Japeth was born when Noah was 500; Ham is called the younger (Genesis 9:24). Genesis 11:10 says, ‘Shem was one hundred years old, and begat Arphaxad two years after the flood’; i.e. Shem was 100 in AM 1658, and so would have been born AM 1558, when Noah was 502.


8. Most of the events of Creation Week in Genesis 1 occurred before Adam was created, so must have been revealed by God, probably to Adam.
9. The Lord Jesus Himself and the Gospel writers said that the Law was given by Moses (Mark 10:3; Luke 24:27; John 1:17), and the uniform tradition of the Jewish scribes and early Christian fathers, and the conclusion of conservative scholars to the present day, is that Moses wrote Genesis. See Grigg, R., Did Moses really write Genesis? Creation 20(4):43–46, 1998.


12. For a discussion on how many people there were pre- and post-Flood, see Batten, D., Where are all the people? Creation 23(3):52–55, 2001.

13. The key to understanding any portion of the Bible is to ascertain the purpose of the writer of that part. A straightforward reading of these three records indicates that the writers intended to give a complete genealogical record from Adam to Abram/Abraham (and on to the kings of Judah in 1 Chronicles, and on to the Lord Jesus Christ in Luke 3).

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Hutchinson-Gilford Progeria Syndrome ("Progeria", or "HGPS") is a rare, fatal genetic condition characterized by an appearance of accelerated aging in children. Its name is derived from the Greek and means "prematurely old." While there are different forms of Progeria*, the classic type is Hutchinson-Gilford Progeria Syndrome, which was named after the doctors who first described it in England; in 1886 by Dr. Jonathan Hutchinson and in 1897 by Dr. Hastings Gilford.

HGPS is caused by a mutation in the gene called LMNA (pronounced, lamin - a). The LMNA gene produces the Lamin A protein, which is the structural scaffolding that holds the nucleus of a cell together. Researchers now believe that the defective Lamin A protein makes the nucleus unstable. That cellular instability appears to lead to the process of premature aging in Progeria.

Although they are born looking healthy, children with Progeria begin to display many characteristics of accelerated aging at around 18-24 months of age. Progeria signs include growth failure, loss of body fat and hair, aged-looking skin, stiffness of joints, hip dislocation, generalized atherosclerosis, cardiovascular (heart) disease and stroke. The children have a remarkably similar appearance, despite differing ethnic backgrounds. **Children with Progeria die of atherosclerosis (heart disease) at an average age of thirteen years.**
* Other progeroid syndromes include Werner's syndrome, also known as "adult progeria" which does not have an onset until the late teen years, with a life span into the 40's and 50's.

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Thinking Outside the Box
by Tim Lovett
March 19, 2007

While the Bible gives us essential details on many things, including the size and proportions of Noah’s Ark, it does not necessarily specify the precise shape of this vessel. It is important to understand, however, that this lack of physical description is consistent with other historical accounts in Scripture.¹ So how should we illustrate what the Ark looked like? The two main options include a default rectangular shape reflecting the lack of specific detail, and a more fleshed-out design that incorporates principles of ship design from maritime science, while remaining consistent with the Bible’s size and proportions.

Genesis describes the Ark in three verses, which require careful examination:

6:14—"Make yourself an ark [tebah] of gopher wood; make rooms [qinniym] in the ark, and cover it inside and outside with pitch [kofer]."

6:15—"And this is how you shall make it: The length of the ark shall be three hundred cubits, its width fifty cubits, and its height thirty cubits.

6:16—"You shall make a window [tsohar] for the ark, and you shall finish it to a cubit from above; and set the door of the ark in its side. You shall make it with lower, second, and third decks” (NKJV).

Most Bibles make some unusual translation choices for certain key words. Elsewhere in the Bible the Hebrew word translated here as “rooms” is usually rendered “nests”; “pitch” would normally be called “covering”; and “window” would be “noon light.” Using these more typical meanings, the Ark would be something like this:

The tebah (Ark) was made from gopher wood, it had nests inside, and it was covered with a pitch-like substance inside and out. It was 300 cubits long, 50 cubits wide, and 30 cubits high. It had a noon light that ended a cubit upward and above, it had a door in the side, and there were three decks. (For the meaning of “upward and above,” see point #2 on the diagram below.)

As divine specifications go, Moses offered more elaborate details about the construction of the Tabernacle, which suggests this might be the abridged version of Noah’s complete directions. On the other hand, consider how wise Noah must have been after having lived several centuries. The instructions that we have recorded in Genesis may be all he needed to be told. But in any case, 300 cubits is a big ship, not some whimsical houseboat with giraffe necks sticking out the top.
Scripture gives no clue about the shape of Noah’s Ark beyond its proportions—length, breadth, and depth. Ships have long been described like this without ever implying a block-shaped hull.

The scale of the Ark is huge yet remarkably realistic when compared to the largest wooden ships in history. The proportions are even more amazing—they are just like a modern cargo ship. In fact, a 1993 Korean study was unable to find fault with the specifications (see sidebar “Scientific Study Endorses Seaworthiness of Ark” below).

All this makes nonsense of the claim that Genesis was written only a few centuries before Christ, as a mere retelling of earlier Babylonian flood legends such as the *Epic of Gilgamesh*. The *Epic of Gilgamesh* story describes a cube-shaped ark, which would have given a dangerously rough ride. This is neither accurate nor scientific. Noah’s Ark is the original, while the Gilgamesh Epic is a later distortion.

**What about the Shape?**

For many years biblical creationists have simply depicted the Ark as a rectangular box. This helped emphasize its size. It was easy to explain capacity and illustrate how easily the Ark could have handled the payload. With the rectangular shape, the Ark’s stability against rolling could even be demonstrated by simple calculations.

Yet the Bible does not say the Ark must be a rectangular box. In fact, Scripture does not elaborate about the shape of Noah’s Ark beyond those superb, overall proportions—length, breadth, and depth. Ships have long been described like this without implying a block-shaped hull.

**Scientific Study Endorses Seaworthiness of Ark**

Noah’s Ark was the focus of a major 1993 scientific study headed by Dr. Seon Hong at the world-class ship research center KRISO, based in Daejeon, South Korea. Dr. Hong’s team compared twelve hulls of different proportions to discover which design was most practical. No hull shape was found to significantly outperform the 4,300-year-old biblical design. In fact, the Ark’s careful balance is easily lost if the proportions are modified, rendering the vessel either unstable, prone to fracture, or dangerously uncomfortable.

The research team found that the proportions of Noah’s Ark carefully balanced the conflicting demands of stability (resistance to capsizing), comfort (“seakeeping”), and strength. In fact, the Ark has the same proportions as a modern cargo ship.
The study also confirmed that the Ark could handle waves as high as 100 ft (30 m). Dr. Hong is now director general of the facility and claims "life came from the sea," obviously not the words of a creationist on a mission to promote the worldwide Flood. Endorsing the seaworthiness of Noah’s Ark obviously did not damage Dr. Hong’s credibility.

Source: worldwideflood.com/ark/hull_form/hull_optimization.htm

Dr. Seon Won Hong was principal research scientist when he headed up the Noah’s Ark investigation. In May 2005 Dr. Hong was appointed director general of MOERI (formerly KRISO). Dr. Hong earned a B.S. degree in naval architecture from Seoul National University and a Ph.D. degree in applied mechanics from the University of Michigan, Ann Arbor.

In Hebrew "Ark" is the obscure term tebah, a word that appears only one other time when it describes the basket that carried baby Moses (Exodus 2:3). One was a huge, wooden ship and the other a tiny, wicker basket. Both floated, both preserved life, and both were covered; but the similarity ends there. If the word implied anything about shape, it would be “an Egyptian basket-like shape,” typically rounded. More likely, however, tebah means something else, like “lifeboat.”

The Bible leaves the details regarding the shape of the Ark wide open—anything from a rectangular box with hard right angles and no curvature at all, to a shiplike form. Box-like has the largest carrying capacity, but a ship-like design would be safer and more comfortable in heavy seas. Such discussion is irrelevant if God intended to sustain the Ark no matter how well designed and executed.

### Clues from the Bible

Some question whether the Ark was actually built to handle rough seas, but the Bible gives some clues about the sea conditions during the Flood:

- The Ark had the proportions of a seagoing vessel built for waves (Genesis 6:15).
- Logically, a mountain-covering, global flood would not be dead calm (Genesis 7:19).
- The Ark moved about on the surface of the waters (Genesis 7:18).
- God made a wind to pass over the earth (Genesis 8:1).
- The Hebrew word for the Flood (mabbul) could imply being carried along.

The 1993 Korean study showed that some shorter hulls slightly outperformed the Ark model with biblical proportions (see sidebar “Scientific Study Endorses Seaworthiness of Ark” above). The study assumed waves came from every direction, favoring shorter hulls like that of a modern lifeboat. So why was Noah’s Ark so long if it didn’t need to be streamlined for moving through the water?

The answer lies in ride comfort (seakeeping). This requires a longer hull, at the cost of strength and stability, not to mention more wood. The Ark’s high priority for comfort suggests that the anticipated waves must have been substantial.
1. Something to catch the wind
Wind-driven waves would cause a drifting vessel to turn dangerously side-on to the weather. However, such waves could be safely navigated by making the Ark steer itself with a wind-catching obstruction on the bow. To be effective, this obstruction must be large enough to overcome the turning effect of the waves. While many designs could work, the possibility shown here reflects the high stems which were a hallmark of ancient ships.

2. A cubit upward and above
Any opening on the deck of a ship needs a wall (combing) to prevent water from flowing in, especially when the ship rolls. In this illustration, the window “ends a cubit upward and above,” as described in Genesis 6:16. The central position of the skylight is chosen to reflect
the idea of a “noon light.” This also means that the window does not need to be exactly one cubit. Perhaps the skylight had a transparent roof (even more a “noon light”), or the skylight roof could be opened (which might correspond to when “Noah removed the covering of the Ark”). While variations are possible, a window without combing is not the most logical solution.

3. Mortise and tenon planking

Ancient shipbuilders usually began with a shell of planks (strakes) and then built internal framing (ribs) to fit inside. This is the complete reverse of the familiar European method where planking was added to the frame. In shell-first construction, the planks must be attached to each other somehow. Some used overlapping (clinker) planks that were dowelled or nailed, others used rope to sew the planks together. The ancient Greeks used a sophisticated system where the planks were interlocked with thousands of precise mortise and tenon joints. The resulting hull was strong enough to ram another ship, yet light enough to be hauled onto a beach by the crew. If this is what the Greeks could do centuries before Christ, what could Noah do centuries after Tubal-Cain invented forged metal tools?

4. Ramps
Ramps help to get animals and heavy loads between decks. Running them across the hull avoids cutting through important deck beams, and this location is away from the middle of the hull where bending stresses are highest. (This placement also better utilizes the irregular space at bow and stern.)

5. Something to catch the water
To assist in turning the Ark to point with the wind, the stern should resist being pushed sideways. This is the same as a fixed rudder or skeg that provides directional control. There are many ways this could be done, but here we are reflecting the “mysterious” stern extensions seen on the earliest large ships of the Mediterranean.

Scripture gives no clue about the shape of Noah’s Ark beyond its proportions that are given in Genesis 6:15, which reads: “And this is how you shall make it: The length of the ark shall be three hundred cubits, its width fifty cubits, and its height thirty cubits” (NKJV).
**Designed for Tsunamis?**

Was the Ark designed for tsunamis? Not really. Tsunamis devastate coastlines, but when a tsunami travels in deep water, it is almost imperceptible to a ship. During the Flood, the water was probably very deep—there is enough water in today’s oceans to cover a relatively flat earth to a consistent depth of over 2 miles (3.2 km). The Bible states that the Ark rose “high above the earth” (Genesis 7:17) and was stranded early (Genesis 8:4), before mountaintops were seen. If the launch was a mirror of the landing—the Ark being the last thing to float—it would have been a deep-water voyage from start to finish.

The worst waves may have been caused by wind, just like today. After several months at sea, God made a wind to pass over the earth. This suggests a large-scale weather pattern likely to produce waves with a dominant direction. It is an established fact that such waves would cause any drifting vessel to be driven sideways (broaching). A long vessel like the Ark would remain locked in this sideways position, an uncomfortable and even dangerous situation in heavy weather.

However, broaching can be avoided if the vessel catches the wind at one end and is “rooted” in the water at the other—turning like a weather vane into the wind. Once the Ark points into the waves, the long proportions create a more comfortable and controlled voyage. It had no need for speed, but the Ark did “move about on the surface of the waters.”

The box-like Ark is not entirely disqualified as a safe option, but sharp edges are more vulnerable to damage during launch and landing. Blunt ends would also produce a rougher ride and allow the vessel to be more easily thrown around (but, of course, God could have miraculously kept the ship’s precious cargo safe, regardless of the comfort factor). Since the Bible gives proportions consistent with those of a true cargo ship, it makes sense that it should look and act like a ship, too.

Coincidentally, certain aspects of this design appear in some of the earliest large ships depicted in pottery from Mesopotamia, which is not long after the Flood. It makes sense that shipwrights, who are conservative as a rule, would continue to include elements of the only ship to survive the global Flood—Noah’s Ark.

Scripture does not record direction-keeping features attached to the Ark. They might have been obvious to a 500-year-old, or perhaps they were common among ships in Noah’s day as they were afterwards. At the same time, the brief specifications in Genesis make no mention of other important details, such as storage of drinking water, disposal of excrement, or the way to get out of the Ark. Obviously Noah needed to know how many animals were coming, but this is not recorded either.

The Bible gives clear instruction for the construction of a number of things, but it does not specify many aspects of the Ark’s construction. Nothing in this newly depicted Ark (as seen on the cover) contradicts Scripture, even though it may be different from more accepted designs. But this design, in fact, shows us just how reasonable Scripture is as it depicts a stable, comfortable, and seaworthy vessel that was capable of fulfilling all the requirements stated in Scripture.

**Was Noah’s Ark the Biggest Ship Ever Built?**

Few wooden ships have ever come close to the size of Noah’s Ark. One possible challenge comes from the Chinese treasure ships of Yung He in the 1400s. An older contender is the ancient Greek trireme *Tessarakonteres.*
At first historians dismissed ancient Greek claims that the *Tessarakonteres* was 425 feet (130 m) long. But as more information was learned, the reputation of these early shipbuilders grew markedly. One of the greatest challenges to the construction of large wooden ships is finding a way to lay planks around the outside in a way that will ensure little or no leaking, which is caused when there is too much movement between the planks. Apparently, the Greeks had access to an extraordinary method of planking that was lost for centuries, and only recently brought to light by marine archaeology.

It is not known when or where this technique originated. Perhaps they used a method that began with the Ark. After all, if the Greeks could do it, why not Noah?

The Ark is near the maximum size that is known to be possible for a wooden vessel.

*How Big Was the Ark?*

It depends on your cubit size! To get the 510 ft (155 m) given here, we used a cubit of 20.4 in (51.8 cm).

This diagram shows how Noah’s Ark compares to other large ships.

Tim Lovett earned his degree in mechanical engineering from Sydney University (Australia) and was an instructor for 12 years in technical college engineering courses. Tim has studied the Flood and the Ark for nearly three decades and is widely recognized for his cutting-edge research on the design and structure of Noah’s Ark.
Digging Deeper Links for


Where does the Lutheran Church—Missouri Synod stand on Genesis 1?

http://www.lcms.org/doctrine/doctrinalposition#creation

A Brief Statement of the Doctrinal Position of the Missouri Synod

(adopted 1932 (St. Louis: Concordia Publishing House, N.D.)

OF CREATION

5. We teach that God has created heaven and earth, and that in the manner and in the space of time recorded in the Holy Scriptures, especially Gen. 1 and 2, namely, by His almighty creative word, and in six days. We reject every doctrine which denies or limits the work of creation as taught in Scripture. In our days it is denied or limited by those who assert, ostensibly in deference to science, that the world came into existence through a process of evolution; that is, that it has, in immense periods of time, developed more or less of itself. Since no man was present when it pleased God to create the world, we must look for a reliable account of creation to God’s own record, found in God’s own book, the Bible. We accept God’s own record with full confidence and confess with Luther’s Catechism: “I believe that God has made me and all creatures.”

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A recent [November 2007] news item caused a flurry of interest among creationists. It was based on an article in the German journal *Naturwissenschaften* (Natural Sciences), about a marsupial able to hibernate for more than a year. Several people wrote in alerting us to the report. They were presumably keen for us to use it as evidence that ‘animals could have hibernated during the year of the Flood’.

It’s worth exploring just how this does or does not add to the apologetic arguments about the feasibility of the Flood account. First, some more detail on the report.
The discovery

The animal concerned was the pygmy possum, *Cercartetus nanus*, a marsupial. This is an ‘opportunistic non-seasonal hibernator’. In the right circumstances, it is able to put on substantial fat reserves which enable it to go into prolonged torpor. The research in this instance was directed to seeing whether the pygmy possum, given the right conditions, would be able to prolong its hibernation, existing only on its own body fat, well beyond winter.

The outcome was impressive—the prolonged hibernation lasted 310 days on average in various of the creatures, with one reaching 367 days.

How it might relate to the Flood account

On the surface, it seems somewhat obvious. Faced with the problem of caring for thousands of animals for a year, it would make things far simpler if the animals went into some sort of prolonged shutdown for most of the journey.

For one thing, it would dramatically reduce the amount of food and water required. For example, in the case of the pygmy possum mentioned above, the average energy expenditure during hibernation was reduced to about 2.5% of normal. This in turn drives the waste load way down, too.

*No animals have the built-in, natural instinct to migrate towards a man-made boat*

For another, one can imagine the fear and restlessness among all those animals, confined in dark quarters for months while the ship was subject to all manner of ‘boat-rocking’ external forces, despite the demonstrated high stability of its proportions. Not to mention the sound of driving rain for days on end—and presumably wind, waves, and thunder, too.

It’s not surprising, then, that as far back as the classic *The Genesis Flood*, creationist authors have been suggesting that the animals may have entered a state of prolonged hibernation. This suggestion is perfectly reasonable, and the possibility is not being questioned here. But to point to some present-day hibernation feat as evidence supporting the Flood account is not as simple and straightforward as a quick glance might suggest.

Note that even without hibernation of any sort, the Ark journey still ‘works’, despite being a lot more problematic for its inhabitants. This is reinforced by the detailed figures and rigorous arguments in Woodmorappe’s classic work, *Noah’s Ark: a feasibility study*. In short, raising the issue of hibernation for apologetic purposes is not so much a crucial necessity as it is a helpful nicety.

Reducing the need for miracles

In pointing to such things as present-day hibernation, in fact in all such ‘Ark feasibility’ studies, one is really trying to minimize the need for supernaturalism, to try to explain it...
naturally without the need for a miracle. This is an understandable goal, to want to avoid multiplying the number of miracles required in some arbitrary fashion.

That is not to be confused with bowing to naturalism and liberal theology in denying the miraculous in Scripture. The description of the Flood/Ark in Genesis reinforces what Henry Morris has called the ‘economy of miracle’ seen in the Bible in general. God could, for instance, easily have suspended all the animals and Noah’s family above the clouds during the year of the Flood. But He chose to use natural laws such as the principles of buoyancy involved in a floating ship. Even then, He could have materialized a readymade Ark of safety, but instead chose to give detailed instructions for its presumably long and laborious construction.

The absence of a flurry of capricious, ‘abracadabra-style’ miracles in the Bible (apocryphal gospels have an abundance of these) is actually one hallmark of its authenticity. It makes the rare, special-purpose miracle, like raising Lazarus from the dead, or feeding the five thousand, stand out all the more. This is in part why we feel more comfortable when we have a ‘naturalistic’ explanation for an Ark-feasibility problem, as per Woodmorappe’s book. Having to postulate miracle after miracle, especially ones the Bible does not mention, would seem awkward and would in practice make the Bible account less believable to sceptics.

Clearly, having the animals go to sleep makes the journey far less problematic. What is being discussed here is the appeal to existing ‘natural instincts’, as part of this drive to minimize the supernatural.

Migration—a parallel to hibernation

Creation apologists, dealing with the issue of the animals traveling to the Ark, have similarly sought naturalistic explanations where possible. They often point to ‘the migration instincts in various animals’, and/or their instinct to travel to safety if there is impending danger. But both here and in the case of hibernation, the appeal to existing instincts is problematic. As we will see, it cannot avoid the need for the miraculous, pure and simple—and in substantial doses, in fact.

First, present-day migration instincts are nowhere near universal among animals. So even if God may have used the existing instinct somehow in some species, that still leaves the
overwhelming majority of those that needed to be on board, which show little trace of a migration instinct. So if supernatural action is needed for that majority, why not the lot? How much, then, has the ‘instinct’ argument really helped the ‘explanation’?

Second, existing instincts do not direct animals towards a man-made boat.

We cannot escape from the raw fact that to put all those animals to ‘sleep’ for the year of the Flood would have involved a substantial dose of supernaturalism.

Third, even if all animals had a migratory instinct, and even if all were programmed to migrate towards large man-made vessels, why did only those particular ones from each type make the journey? Clearly, a mighty miracle was involved. We correctly talk of Noah taking the various creatures on board, but it should not be overlooked that these were ones which God sent (Genesis 6:20). Noah did not have to roam the world with lassoes and animal traps. In fact, the sight of pairs of animals migrating to the Ark would likely have been an awesome testimony to onlookers that the hand of the miracle-working creator God was here to be seen—notwithstanding the fact that hearts remained hard.

Often the argument is worded such that God could have ‘modified existing migratory instincts’ in certain creatures. OK, He could have done that, and we’re not told either way. But it’s clear from the earlier discussion that in any case, many animals would have needed to have such instincts specially created at the time. And those that already had them needed them extensively reprogrammed—and then only in those chosen for this journey. The degree of supernatural specificity is so extensive that bringing up the argument in this way seems, on analysis, to be of little help. Why not accept that God directly and supernaturally commanded the animals He wanted to travel to (and board) the Ark to do so? In short, pointing to some migratory instincts to attempt to make the account more feasible is not exactly an apologetic ‘coup’. It does not avoid or in any tangible way mitigate the need for supernaturalism, despite perhaps giving such an impression.

Back to hibernation

We similarly see creationists claim that God ‘could have used or modified existing hibernation instincts’. But here, too, we cannot escape from the raw fact that to put all those animals to ‘sleep’ for the year of the Flood would have involved a substantial dose of supernaturalism. Many mammals do hibernate each year, often for about six months at a time. (Even hibernating for half the journey would help, of course.) But many animals do not hibernate at all. So why should those on the Ark hibernate, and why at that particular time? Here, too, it is almost redundant to talk of ‘modifying existing instincts’, since it might have been just as much trouble for God to put the animals directly into a torpid state.

Then of course there is the issue of whether, even when put to sleep by God, most of the animals could have had sufficient fat reserves to last them for a year without further supernatural help. This is possibly why the observation concerning the pygmy possum stirred some interest. If some animals can be induced to hibernate for up to a year or more without running out of ‘body fuel’, then maybe this could be true for all? But the pygmy possum is already programmed to hibernate, and more importantly in this context, is
designed with the capacity to ‘fatten up’ adequately in anticipation of extended periods without food or drink. Presumably, those creatures which do not hibernate would once again require special intervention to ‘fatten up’ to the extent needed in anticipation of a year-long journey.

So here, again, one might ask, ‘Why not just go straight to the obvious? God did it supernaturally.’ We are not talking about any old ‘god’ here, but about the God of Genesis, who created a complex universe (including all of its contained migration and hibernation instincts) in six earth-rotation days in the first place. Though His normal operation in the world today is via what modern science describes as the physical laws, He is certainly not constrained by them. He has described instances in the Bible in which He has overridden (or perhaps better, added to) them, for special purposes at special times in history. And the Flood certainly was an incredibly special time.

Summary and conclusion

Some animals have extraordinary abilities and instincts to migrate. But how much does it help in defending the Flood account?

The Flood, almost by definition, would have required a mixture of natural and supernatural activity—both for its causes and particularly for the survival of the Ark and its crew. In the understandable tendency to seek ‘natural’ explanations wherever possible, one can easily overlook the fact that most animals would not normally and naturally either head off to and then board the Ark, or go to ‘sleep’ once there, let alone have already stored up enough fat for all or most of the journey. To talk of God ‘modifying’ certain instincts (whether migration or hibernation) overlooks/sidesteps the fact that not all animals have those instincts. And for those which do, the degree of specificity and complexity involved in the necessary ‘reprogramming’ would seem to make the existence of any previous instincts almost superfluous.
The appeal to existing instincts therefore falls somewhat short of a robust explanation. If one makes that appeal in a way that gives the impression that these mechanisms can be conveniently conscripted in a ‘naturalistic’ fashion, one risks using it largely as rhetorical window-dressing.

One needs to remember that the instincts in today’s creatures are in any case there as a result of supernatural programming during Creation Week. So, notwithstanding all the caveats in this article, it would still seem reasonable to point to these present-day instincts in a discussion on Flood issues. Provided, that is, that one does so as mere analogy to what was required during the Flood, rather than giving the impression that a naturalistic ‘blanket solution’ has been provided.

References


2. Used in the sense of defending the faith (specifically the trustworthiness of the Bible); from the Greek απολογία (apologia), as in 1 Peter 3:15.

3. Presumably not many would postulate that all animals around the world were sent to Noah for his selection; the most reasonable inference from the Genesis account by far is that only those intended for the journey were compelled to make the trip to the boat.

Return to Session Two List
Were dinosaurs even around then?

The story we have all heard from movies, television, newspapers, and most magazines and textbooks is that dinosaurs ‘ruled the Earth’ for 140 million years, died out 65 million years ago, and therefore weren’t around when Noah and company set sail on the Ark around 4300 years ago.

However, the Bible gives a completely different view of Earth (and therefore, dinosaur) history. As God’s written Word to us, we can trust it to tell the truth about the past. (For more information about the reliability of Scripture, see Q&A: Bible (http://creation.com/bible-questions-and-answers)).

Although the Bible does not tell us exactly how long ago it was that God made the world and its creatures, we can make a good estimate of the age of the universe by carefully studying the whole counsel of Scripture:

1. God made everything in six days, and rested on the seventh. (By the way, this is the basis for our seven day week—Exodus 20:8–11). Leading Hebrew scholars indicate that, based on the grammatical structure of Genesis 1, these ‘days’ were normal-length, and did not represent long periods of time (see Q&A: Genesis (http://creation.com/genesis-questions-and-answers)).

2. We are told God created the first man and woman—Adam and Eve—on Day Six, along with the land animals (which would have included dinosaurs).

3. The Bible records the genealogies from Adam to Christ. From the ages given in these lists (and accepting that Jesus Christ, the Son of God, came to Earth around 2000 years ago), we can conclude that the universe is only a few thousand years old (perhaps just 6000), and not millions of years old (see also The earth: how old does it look? (http://creation.com/the-earth-how-old-does-it-look), especially under Jesus and the age of the world (http://creation.com/the-earth-how-old-does-it-look#Jesus_Age)). Thus, dinosaurs lived within the past few thousand years.

So, were dinosaurs on the Ark?

In Genesis 6:19–20, the Bible says that two of every sort of land vertebrate (seven pairs of the ‘clean’ animals) were brought by God to the Ark. Therefore, dinosaurs (land vertebrates) were represented on the Ark.
3. How did those huge dinosaurs fit on the Ark?

Although there are about 668 names of dinosaurs, there are perhaps only 55 different ‘kinds’ of dinosaurs. Furthermore, not all dinosaurs were huge like the *Brachiosaurus*, and even those dinosaurs on the Ark were probably ‘teenagers’ or young adults. Indeed, dinosaurs were recently discovered to go through a growth spurt, so God could have brought dinosaurs of the right age to start this spurt as soon as they disembarked—see Dinosaur growth rates: Problem or solution for creationists? (http://creation.com/dinosaur-growth-rates-problem-or-solution-for-creationists)

Creationist researcher John Woodmorappe has calculated that Noah had on board with him representatives from about 8,000 animal genera (including some now-extinct animals), or around 16,000 individual animals. When you realize that horses, zebras, and donkeys are probably descended from the horse-like ‘kind’, Noah did not have to carry two sets of each such animal. Also, dogs, wolves, and coyotes are probably from a single canine ‘kind’, so hundreds of different dogs were not needed.

According to Genesis 6:15, the Ark measured 300 x 50 x 30 cubits, which is about 460 x 75 x 44 feet, with a volume of about 1.52 million cubic feet. Researchers have shown that this is the equivalent volume of 522 standard railroad stock cars (US), each of which can hold 240 sheep. By the way, only 11% of all land animals are larger than a sheep. Without getting into all the math, the 16,000-plus animals would have occupied much less than half the space in the Ark (even allowing them some moving-around space).

**Conclusion**

The Bible is reliable in all areas, including its account of the Ark (and the worldwide catastrophic Flood). A Christian doesn’t have to have a blind faith to believe that there really was an Ark. What the Bible says about the Ark can even be measured and tested today.

For answers to other objections about the Biblical account of Noah’s Flood and the Ark (e.g., Where did all the water come from?, How did Noah collect and then care for the animals?, etc.), see the books featured below. *The Creation Answers Book*—Chapters 12 (http://creation.com/images/pdfs/cabook/chapter12.pdf) and 13 (http://creation.com/images/pdfs/cabook/chapter13.pdf), in particular, cover these particular ‘problems’ related to Noah’s Flood, and *Noah’s Ark: A Feasibility Study* covers these and more in detail.

Noah’s Ark has been a popular subject for artists throughout the centuries. However, it is not easy to adequately depict this vessel because the description in Genesis 6 is very brief. To paint a complete picture, the artist must assume some important details.

As the invention of Gutenberg’s movable-type printing press in the 1400s made rapid and widespread distribution of the Holy Scriptures possible, Noah’s Ark quickly became the subject of lavish illustrations. Many designs were pictured, and some were more biblical than others. Often, artists distorted the biblical specifications to match the ships of the day. For instance, the picture shown in the sidebar (labeled 1493) has the hull of a caravel, which was similar to two of the small sailing vessels used by Christopher Columbus in 1492.
Athanasius Kircher was careful to follow the Bible’s instructions and used a rectilinear hull, based on the dimensions in Genesis 6:15, including three decks, a door in the side, and a window of one cubit.

Unlike most other artists, Athanasius Kircher (a Jesuit scientist, 1602–1680) was committed to accurately depicting the massive Ark specified in Genesis. He has been compared to Leonardo da Vinci for his inventiveness and his works’ breadth and depth. This early “creation scientist” calculated the number of animals that could fit in the Ark, allowing space for provisions and Noah’s family. His realistic designs (see sidebar, labeled 1600s) set the standard for generations of artists.

For the next two centuries, Bible artists stopped taking Noah’s Ark quite so seriously, and ignored the explicit biblical dimensions in their illustrations. These artists simply reflected the scholars of the day, who had rejected the Bible’s history of the world. Few Christians living in 1960 had ever seen a biblically based rendering of Noah’s Ark. Cute bathtub shapes and smiling cartoonish animals illustrated the pervasive belief that Noah’s Ark was nothing more than a tool for character-building through fictionalized storytelling.

Then in 1961 Dr. John Whitcomb and Dr. Henry Morris published The Genesis Flood, which made sense of a global cataclysm and a real, shiplike Noah’s Ark. This book thus began the modern creationist movement.

The primary focus in The Genesis Flood was the size of the Ark and its animal-carrying capacity. A block-shaped Ark was ideal for this, easily suggesting that the Ark had plenty of
volume. Later studies confirmed that a ship with a rectangular cross-section 50 cubits wide and 30 cubits high was stable. Images of a rectangular Ark strikingly similar to Kircher’s design rendered centuries earlier began to appear in publications (see sidebar, labeled 1970s–1980s).

The next few decades saw another popular phenomenon—the search for Noah’s Ark. Documentary movies and books claimed Noah’s Ark was hidden on Mt. Ararat, and prime-time television broadcast some mysterious photos of dark objects jutting out from the snow. George Hagopian was one of the first modern “eyewitnesses” who purported to have seen a box-shaped Ark. And so it happened—Noah’s Ark was illustrated worldwide as a box.

As history has shown, artists in each generation have defined Noah’s Ark according to the cultural setting and what they knew at the time. While we used to see variety in the shape of the Ark, more recent depictions have seemingly locked into the box shape. But new insights—in keeping with the biblical specifications of the Ark and conditions during the Flood—suggest that it’s time we start thinking “outside the box”.

Visit www.worldwideflood.com/general/ark_history.htm to see more pictures of how Noah’s Ark has been represented throughout history.

Tim Lovett earned his degree in mechanical engineering from Sydney University (Australia) and was an instructor for 12 years in technical college engineering courses. Tim has studied the Flood and the Ark for 13 years and is widely recognized for his cutting edge research on the design and structure of Noah’s Ark.
Can the Ussher Chronology Be Trusted?

by John D. Morris, Ph.D.

Up until fairly recently, nearly all printings of the King James Bible included dates in the marginal notes which helped place Biblical events in their chronological context. Using this as a guide we can see that "God created the heaven and the earth" in 4004 b.c.; the Flood covered the Earth in 2348 b.c.; the Exodus occurred in 1491 b.c.; David became King of Israel in 1056 b.c.; and the Nation of Judah was carried into captivity in 593 b.c. Obviously, the numbers are helpful in understanding the sequence and timing of events, but where did they come from, and are they reliable?

The chronology was derived by Archbishop James Ussher, and first published in a.d. 1650. Born in Ireland, he rose rapidly in the ranks of the Anglican Church, renowned for his scholarship, mastery of Semitic and classical languages, and voluminous knowledge of history. Widely published on many subjects, his most important work was "The Annals of the World," which covered and calendarized all important historical events, beginning at creation and extending to the destruction of Jerusalem in a.d. 70.

In compiling this history, Ussher made use of extensive collections of documents in England and throughout Europe. Some of these were first-hand accounts of events which were never widely circulated and have since disappeared.

His primary interest was Biblical history and how secular events impacted it, but his Annals included much information about early Romans, Greeks, Persians, and Egyptians, which was never published elsewhere. For centuries Annals was a primary source document. Part of his work was a chronology of historical events referenced to Biblical chronology, which he accepted as authoritative.

The Biblical text doesn't always use a linear time-line spanning all of its episodes, but it does give much chronological and sequential information linked to events which we can absolutely date from secular history. Ussher chose the known date of Nebuchadnezzar's death as his starting point, and worked forward and backward from there, using the Biblical data as his infallible guide.

The calculations are not as straightforward in the Bible as one might hope. Thankfully, the Bible gives several large time spans, which bridge the uncertainties.

Actually, the Biblical data are the only reliable data for the Patriarchal periods, as archeological finds are notoriously sparse and vague. On the other hand, adopting the Biblical time scale allows us to understand archaeological remains more completely.

While Ussher had access to documents we no longer have, numerous discoveries have come to light since Ussher, which enhance our understanding. But none of them change his conclusions to any great extent. There have been over 100 attempts to establish a chronology since Ussher, and each one is slightly different, but all are fairly close to his.

Bishop Ussher wrote his Annals in Latin, and a later English translation had numerous weaknesses. Recently ICR colleague Larry Pierce re-translated Ussher's 1600 page tome into modern form, including more recent discoveries as footnotes. Perhaps this new work will re-establish Ussher's chronology as a standard research tool, and for some, restore their confidence in the Biblical record.
Digging Deeper Links for

Is There a Link between Noah’s Flood and the Tower of Babel?


Chapter 4

Concerning The Tower Of Babylon, And The Confusion Of Tongues

1. Now the sons of Noah were three, -- Shem, Japhet, and Ham. Born one hundred years before the Deluge. These first of all descended from the mountains into the plains, and fixed their habitation there; and persuaded others who were greatly afraid of the lower grounds on account of the flood, and so were very loath to come down from the higher places, to venture to follow their examples. Now the plain in which they first dwelt was called Shinar. God also commanded them to send colonies abroad, for the thorough peopling of the earth, that they might not raise seditions among themselves, but might cultivate a great part of the earth, and enjoy its fruits after a plentiful manner. But there were so ill instructed that they did not obey God; for which reasons they fell into calamities, and were made sensible, by experience, of what sin they had been guilty: for when they flourished with a numerous youth, God admonished them again to send out colonies; but they, imagining the prosperity they enjoyed was not derived from the favor of God, but supposing that their own power was the proper cause of the plentiful condition they were in, did not obey him. Nay, they added to this their disobedience to the Divine will, the suspicion that they were therefore ordered to send out separate colonies, that, being divided asunder, they might the more easily be Oppressed.

2. Now it was Nimrod who excited them to such an affront and contempt of God. He was the grandson of Ham, the son of Noah, a bold man, and of great strength of hand. He persuaded them not to ascribe it to God, as if it was through his means they were happy, but to believe that it was their own courage which procured that happiness. He also gradually changed the government into tyranny, seeing no other way of turning men from the fear of God, but to bring them into a constant dependence on his power. He also said he would be revenged on God, if he should have a mind to drown the world
again; for that he would build a tower too high for the waters to be able to
reach! and that he would avenge himself on God for destroying their
forefathers!

3. Now the multitude were very ready to follow the determination of Nimrod,
and to esteem it a piece of cowardice to submit to God; and they built a tower,
neither sparing any pains, nor being in any degree negligent about the work:
and, by reason of the multitude of hands employed in it, it grew very high,
sooner than any one could expect; but the thickness of it was so great, and it
was so strongly built, that thereby its great height seemed, upon the view, to
be less than it really was. It was built of burnt brick, cemented together with
mortar, made of bitumen, that it might not be liable to admit water. When God
saw that they acted so madly, he did not resolve to destroy them utterly, since
they were not grown wiser by the destruction of the former sinners; but he
caused a tumult among them, by producing in them divers languages, and
causing that, through the multitude of those languages, they should not be
able to understand one another. The place wherein they built the tower is now
called Babylon, because of the confusion of that language which they readily
understood before; for the Hebrews mean by the word Babel, confusion. The
Sibyl also makes mention of this tower, and of the confusion of the language,
when she says thus: "When all men were of one language, some of them built
a high tower, as if they would thereby ascend up to heaven, but the gods sent
storms of wind and overthrew the tower, and gave every one his peculiar
language; and for this reason it was that the city was called Babylon." But as
to the plan of Shinar, in the country of Babylonia, Hestiaeus mentions it, when
he says thus: "Such of the priests as were saved, took the sacred vessels of
Jupiter Enyalius, and came to Shinar of Babylonia."

Return to Session Two List
Digging Deeper Links for


Safety Investigation of Noah’s Ark in a Seaway.


Safety investigation of Noah’s Ark in a seaway


Abstract

In this study, the safety of Noah’s Ark in the severe environments imposed by waves and winds during the Genesis Flood was investigated. Three major safety parameters—structural safety, overturning stability, and seakeeping quality—were evaluated altogether to assess the safety of the whole system.

The concept of ‘relative safety’, which is defined as the relative superiority in safety compared to other hull forms, was introduced and 12 different hull forms with the same displacement were generated for this purpose. Evaluation of these three safety parameters was performed using analytical tools. Model tests using 1/50 scaled models of a prototype were performed for three typical hull forms in order to validate the theoretical analysis.

Total safety index, defined as the weighted average of three relative safety performances, showed that the Ark had a superior level of safety in high winds and waves compared with the other hull forms studied. The voyage limit of the Ark, estimated on the basis of modern passenger ships, criteria, revealed that it could have navigated through waves higher than 30 metres.

Introduction

There has been continuing debate over the occurrence of the Genesis Flood and the existence of Noah’s Ark in human history. Even though many scientific researches on the occurrence of the Flood itself have been made by geologists and anthropologists, limited information is known about Noah’s Ark, and conclusive physical evidence about the remains of the Ark has not been discovered, despite many searches this century of sites such as the Ice Cave and Anderson sites. While little is known about the hull form and the structure of the Ark, the size and the material of the Ark given in the Bible\(^1\) themselves are enough to warrant the attention of naval architects and so enable investigations of the practicality of the Ark as a drifting ship in high winds and waves.

In this study, the safety of the Ark in the severe environments imposed by the waves and winds during the Genesis Flood was investigated.
In general, the safety of a ship in a seaway is related to three major safety parameters—structural safety, overturning stability, and seakeeping quality. Good structural safety ensures the hull against damage caused mainly by wave loads. Enough overturning stability is required to prevent the ship from capsizing due to the heeling moment caused by winds and waves. Good seakeeping quality is essential for the effectiveness and safety of the personnel and cargo on board.

Information about the hull is of course available from the existing references to Noah’s Ark, and from the reasonable (common sense) assumptions of naval engineers. In order to avoid any error due to the lack of complete hull information, we introduced the concept of ‘relative safety’, which was defined as the relative superiority in safety compared to other hull forms. For this purpose, 12 different hull forms with the same displacement were generated systemically by varying principal dimensions of the Ark. The concept of relative safety of a ship has been introduced by several researchers, such as Comstock and Keane,² Hosoka et al.,³ Bales⁴ and Hong et al.,⁵ to analyze the seakeeping quality. In this paper, we extend the relative safety concept for the seakeeping quality to the concept of total safety, including structural and overturning safety.

An index for structural safety was obtained by assessing the required thickness of the midship for each hull form to endure the vertical bending moment imposed by waves. An index for overturning stability was obtained by assessing the restoring moment of the ship up to the flooding angle. An index for seakeeping quality was obtained by assessing six degrees of freedom of ship motions and related accelerations due to wave motion. Finally the total safety index was defined as a weighted average of the three indices.

Ship motions and wave loads for the analysis were predicted by using a strip method developed by Salvesen, Tuck and Faltinsen.⁶ Model tests using 1/50 scaled models of a prototype were performed for three typical hull forms in the Korea Research Institute of Ships and Engineering’s (KRISO’s) large towing tank, with a wave generating system in order to validate the theoretical analysis.

Hull Form and its Characteristics

**Principle dimension**

According to the Bible (Genesis 6:15), the length of the Ark was 300 cubits, the breadth of it was 50 cubits, and the height of it was 30 cubits. A cubit is known to be the distance between a man’s elbow and finger-tip. To decide the actual size of the Ark, a cubit had to be defined in terms of a modern unit. Scott⁷ collected the existing data about cubits around the Middle East area, and we adopted the common cubit (1 cubit = 17.5 inches) to approximate the size of the Ark. In modern units, the Ark was approximately 135m long, 22.5m wide and 13.5m high.
Hull form

Figure 1. View of the proposed hull form of the Ark.

Little is known about the shape and form of the Ark’s hull. However, several explorers have each claimed that they have discovered the remains of the Ark at some sites on Mt. Ararat. Based on their arguments and references, we estimated the form of the Ark’s hull as that of a barge-type ship. In Figure 1, the shape of the Ark provided by KACR (Korea Association of Creation Research) is depicted, but it is slightly modified in the bilge radius, the dead rise, and the camber of the upper deck for the present investigation.

Draft and center of gravity

The draft of a ship, that is, the height of submergence, determines the displaced volume of the ship and the cargo capacity; No special mention about the draft is found in the Bible, but Genesis 7:20 reads, ‘The water prevailed 15 cubits higher; and the mountains were covered’, which implies that the draft could be assumed to have been half the depth of the Ark (30 cubits). With this assumed draft, the displaced tonnage of the Ark would have been

$$\Delta = 1.025L Bd$$

$$= 1.025 \times 135 \text{m} \times 22.5 \text{m} \times \frac{13.5}{2} \text{m}$$

$$= 21,016 \text{ tonnes}$$

where the density of the water displaced is taken to be that of sea water, namely, 1.025 (tonnes per cubic metre).

The centre of gravity was the most important parameter that determined the safety of the ship. The longitudinal centre of gravity was taken quite naturally to be located at the midship. The vertical centre of gravity $KG$ was determined by the way we distributed the cargo weight. Two possible loading distributions were considered. The first case assumed
the cargo was loaded equally over three decks, and the second case assumed the cargo was loaded according to the ratio of 2:2:1 from the lowest deck upwards. The cargo weight was determined by subtracting the lightweight from the displaced tonnage. The lightweight, the weight of the bare hull, was estimated under the assumption that the longitudinal strength members took 70% of the deadweight, and the thickness of them all was 30 cm. Assuming the specific gravity of the wood was 0.6 (tonnes per cubic metre) gave a lightweight (bare hull weight) estimate of about 4,000 tonnes, and the cargo weight then became 17,016 tonnes.

For each loading case, the vertical centre of gravity \( KG \) was estimated by calculating the mass centre. Thus we found that \( KG_1 = 4.93 \) m for the first case, and \( KG_2 = 4.21 \) m for the second case. By assuming the actual loading condition was in between these two cases, \( KG \) was decided to have been

\[
KG = \frac{D}{3}
\]

The mass moments of inertia played an important role in determining rotational motions. They were determined according to the weight distribution. Since there was no specific information about them, we adopted the widely used approximation for conventional ships.

**Comparative hull forms**

In order to apply the relative safety concept, 12 different hull forms of barge-type were generated by varying principal dimensions while keeping the displaced volume constant. Table 1 lists the principal dimensions of the comparative hull forms.

<table>
<thead>
<tr>
<th>Ship No.</th>
<th>Length (L)</th>
<th>Beam (B)</th>
<th>Depth (D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 (Ark)</td>
<td>( L_o = 135m )</td>
<td>( B_o = 22.5m )</td>
<td>( D_o = 13.5m )</td>
</tr>
<tr>
<td>1</td>
<td>( L_o )</td>
<td>( B_o/1.5 )</td>
<td>( 1.5D_o )</td>
</tr>
<tr>
<td>2</td>
<td>( L_o )</td>
<td>( B_o/1.2 )</td>
<td>( 1.2D_o )</td>
</tr>
<tr>
<td>3</td>
<td>( L_o )</td>
<td>( 1.2B_o )</td>
<td>( D_o/1.2 )</td>
</tr>
<tr>
<td>4</td>
<td>( L_o )</td>
<td>( 1.5B_o )</td>
<td>( D_o/1.5 )</td>
</tr>
<tr>
<td>5</td>
<td>( L_o/1.5 )</td>
<td>( B_o )</td>
<td>( 1.5D_o )</td>
</tr>
</tbody>
</table>
Seakeeping Performance

**Evaluation items and conditions**

Behavior of a ship in a seaway depends mainly on the wave height, wave direction and ship speed. The Ark was supposed to have drifted at a very low speed, implying the effect of speed was negligible.

To evaluate the seakeeping performance, the related items should be selected based on the type of ship. Since the Ark had a barge-type hull form and the speed was nearly zero, the following seakeeping items were investigated:

1. heave,
2. pitch,
3. roll,
4. vertical acceleration at FP (Forward Perpendicular, defined as the foremost location of the loading waterline near the bow), $a_{VFP}$,
5. deckwetting frequency at FP, $N_w$,
6. slamming frequency at ST 3/20 (Station Number, defined as the normalized distance FP by ship length; here the location is 3/20 of the ship length away from FP), $M_{VBM}$,
7. vertical acceleration at the bridge, $a_{VBR}$, and

**Table 1. Principal dimensions of comparative hull forms.**

<table>
<thead>
<tr>
<th>No.</th>
<th>L/1.2</th>
<th>B.</th>
<th>1.2D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>1.2L</td>
<td>B.</td>
<td>D./1.2</td>
</tr>
<tr>
<td>7</td>
<td>1.5L</td>
<td>B.</td>
<td>D./1.5</td>
</tr>
<tr>
<td>8</td>
<td>L/1.2</td>
<td>1.5B.</td>
<td>D.</td>
</tr>
<tr>
<td>9</td>
<td>1.2L</td>
<td>B./1.2</td>
<td>D.</td>
</tr>
<tr>
<td>10</td>
<td>1.5L</td>
<td>B./1.5</td>
<td>D.</td>
</tr>
</tbody>
</table>

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5. deckwetting frequency at FP, $N_w$,
6. slamming frequency at ST 3/20 (Station Number, defined as the normalized distance FP by ship length; here the location is 3/20 of the ship length away from FP), $M_{VBM}$,
7. vertical acceleration at the bridge, $a_{VBR}$, and
(8) lateral acceleration at the bridge, $a_{\text{HBR}}$.

Here the bridge was assumed to be located at midship and $D/4$ above the waterline.

**Method of evaluation**

A widely used strip method$^{10}$ for ship motion analysis in regular waves was applied to evaluate the seakeeping items. The response in an irregular seaway was estimated by linearly superposing the regular wave response under the assumption that the wave and ship response follow Rayleigh’s distribution.

When a ship advances with constant speed and constant heading angle in regular waves, the ship motion can be estimated in the form of the response amplitude operator $R_x(w)$ by a strip method which assumes small amplitude motion. Ship response in irregular waves for a given sea state is predicted by linearly superposing the regular wave response. The ship response energy spectrum in irregular waves $S_{xx}(w)$ is estimated by

$$S_{xx}(\omega) = \left[R_x(\omega)\right]^2 S(\omega) \quad (1)$$

where $S(w)$ is the wave energy spectrum.

By integrating $S_{xx}(w)$ for all frequency components, we obtain the rms (root mean square) ship response in irregular waves.

In order to estimate the frequency of deckwetting and slamming, relative vertical motions at FP and at ST 3/20 need to be calculated from heave, pitch and roll responses

$$X_R = X_3 + yX_4 - xX_4 - \zeta \quad (2)$$

Here $x$, $y$ are the longitudinal and transverse coordinates and $X_3$, $X_4$, $X_5$ are the heave, roll and pitch displacements respectively. Following Ochi’s$^{11}$ formula the number of deckwettings per hour $N_w$ and that of the slammings per hour $N_s$ are given as

$$N_w = \frac{3600}{T_{rz}} \exp\left(-\frac{d^2}{2m_{or}} - \frac{V_{cr}^2}{2m_{orv}}\right) \quad (3)$$

$$N_s = \frac{3600}{T_{rz}} \exp\left(-\frac{F^2}{2m_{or}}\right) \quad (4)$$

where $T_{rz}$ is the zero-upcrossing period of relative vertical motion, $F$ is the effective freeboard at the deck, $d$ is the effective draft, $m_{or}$ is the area of spectrum of relative vertical motion, $m_{orv}$ is the area of spectrum of relative vertical velocity, and $V_{cr}$ is the threshold velocity for slamming.
Responses for vertical and lateral accelerations ($a_v, a_H$) are calculated from the heave, roll, pitch and yaw responses, such that

$$a_v = X_3 + yX_4 - xX_5 \quad (5)$$

$$a_H = X_2 + xX_6 - zX_4 \quad (6)$$

On the other hand, model tests were performed to confirm the reliability of the analytical calculation of the behaviour of ships in waves for three typical hull forms (#0, #10 and #12). Good agreement was obtained for all motions except roll motion, which usually showed strong nonlinear behaviour due to viscous damping. This discrepancy in roll motion would not have created serious problems, since in this research we put stress on the relative safety concept.

**Seakeeping safety index**

The calculated ship responses in irregular seaways were arranged for each sea state (that is, wave height). For each evaluated item, a safety index was defined, such that it was 0 for the safest case and 1 for the most dangerous case, that is

$$S_{X_i}^j = \frac{(X_i^j - X_{\text{min}}^j)}{(X_{\text{max}}^j - X_{\text{min}}^j)} \quad (7)$$

where $S_{X_i}^j$ was the safety index for jth item of ship i. This safety index depended on the wave directions, as well as on the wave heights. Since the waves came from all directions with the same probability, we defined another safety index $S_i^j$, which was given by taking the average of the safety indices for each wave direction.

The total seakeeping safety index was defined then as the weighted average of eight safety indices as where $W_j$ were the weighting factors for each item. In this case, we took $W_j$ as 1/8, meaning that no weighting was considered.

In Table 2, the total seakeeping safety indices, together with each item’s index, are listed for the sea state with a wave height of 11 metres.

<table>
<thead>
<tr>
<th>Ship No.</th>
<th>$S_i$ (wave)</th>
<th>Heave</th>
<th>Roll</th>
<th>Pitch</th>
<th>$a_{\text{rep}}$</th>
<th>$a_{\text{max}}$</th>
<th>$N_w$</th>
<th>$M_{\text{max}}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0.36</td>
<td>0.49</td>
<td>0.68</td>
<td>0.45</td>
<td>0.38</td>
<td>0.01</td>
<td>0.42</td>
<td>0.33</td>
</tr>
<tr>
<td>1</td>
<td>0.41</td>
<td>0.69</td>
<td>0.00</td>
<td>0.87</td>
<td>1.00</td>
<td>0.01</td>
<td>0.21</td>
<td>0.48</td>
</tr>
<tr>
<td></td>
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<td></td>
<td></td>
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<td></td>
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<tr>
<td>---</td>
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<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>0.47</td>
<td>0.55</td>
<td>0.91</td>
<td>0.58</td>
<td>0.58</td>
<td>0.00</td>
<td>0.47</td>
<td>0.57</td>
</tr>
<tr>
<td>3</td>
<td>0.31</td>
<td>0.44</td>
<td>0.60</td>
<td>0.36</td>
<td>0.22</td>
<td>0.02</td>
<td>0.47</td>
<td>0.24</td>
</tr>
<tr>
<td>4</td>
<td>0.24</td>
<td>0.38</td>
<td>0.37</td>
<td>0.26</td>
<td>0.07</td>
<td>0.06</td>
<td>0.26</td>
<td>0.31</td>
</tr>
<tr>
<td>5</td>
<td>0.66</td>
<td>1.00</td>
<td>1.00</td>
<td>1.00</td>
<td>0.55</td>
<td>0.00</td>
<td>0.75</td>
<td>1.00</td>
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<tr>
<td>6</td>
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<td>0.72</td>
<td>0.95</td>
<td>0.72</td>
<td>0.54</td>
<td>0.00</td>
<td>0.74</td>
<td>0.68</td>
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<td>0.23</td>
<td>0.27</td>
<td>0.42</td>
<td>0.22</td>
<td>0.18</td>
<td>0.07</td>
<td>0.18</td>
<td>0.20</td>
</tr>
<tr>
<td>8</td>
<td>0.35</td>
<td>0.00</td>
<td>0.38</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
<td>0.25</td>
<td>0.13</td>
</tr>
<tr>
<td>9</td>
<td>0.45</td>
<td>0.67</td>
<td>0.81</td>
<td>0.56</td>
<td>0.11</td>
<td>0.00</td>
<td>1.00</td>
<td>0.45</td>
</tr>
<tr>
<td>10</td>
<td>0.45</td>
<td>0.63</td>
<td>0.79</td>
<td>0.55</td>
<td>0.32</td>
<td>0.00</td>
<td>0.78</td>
<td>0.49</td>
</tr>
<tr>
<td>11</td>
<td>0.30</td>
<td>0.30</td>
<td>0.77</td>
<td>0.29</td>
<td>0.31</td>
<td>0.02</td>
<td>0.32</td>
<td>0.21</td>
</tr>
<tr>
<td>12</td>
<td>0.16</td>
<td>0.05</td>
<td>0.39</td>
<td>0.07</td>
<td>0.19</td>
<td>0.09</td>
<td>0.00</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 2. Seakeeping safety indices for a wave height $H_{1/3} = 11$ metres (safest = 0, least safe = 1). See text for definitions of indices.

$S_{\text{wave}}$ is the total seakeeping safety index.

### Structural Safety

**General**

Since little information on the internal structures of the Ark are known, we made the following estimation from the viewpoint of modern shipbuilding technology, although we assume that the Ark was in fact built using relatively ancient technology.

At that time, trees might have grown taller than 10 metres, and their diameters may have been larger than 1 metre as a result of the presumed more favourable natural environment. A tree could have weighed about 5 tonnes. About 800 trees might thus have been required to build the Ark, if the wood weight of the Ark were about 4,000 tonnes.

The Ark may well have been constructed by joint structures of frames and plates. The frame structure of thick beams (50cm x 50cm) could have been installed in longitudinal, transverse and diagonal directions, and connected to each other at each end. The plate structure may have been attached to the frame structure to make the shell, deck and compartments using thick boards (30cm).
Taking into account these suggested details, structural designs only for the longitudinal members were carried out using the method of wave load analysis. Also, the suggested construction method was visualized with the aid of the pre-processor portion of the ANSYS programme. Finally, the structural safety index of the Ark was obtained by comparing the required wood volume for the 13 hull forms.

**The structural design of longitudinal members**

The longitudinal members are usually designed in accordance with the classification rules (of the IACS) or by the wave load analysis method, which we have adopted in this paper. The thickness of the longitudinal members was thus calculated in accordance with the hull section modulus, which can be obtained as follows:

\[
Z_a = \frac{M_w + M_v}{\sigma_a} \tag{9}
\]

where \(Z_a\) is the hull sectional modulus, \(M_w\) is the wave bending moment, and \(\sigma_a\) is the allowable stress.

**The structural analysis of the Ark**

The suggested construction method was visualized by using the ANSYS pre-processor (PREP7). The basic construction of the Ark was by use of frame and plate structures (see Figure 2). The frame structure was made longitudinal, the transverse and diagonal directions being fixed to each other. The plate structure was then attached to the frame structure.
The structural analysis of the Ark was carried out by using the ANSYS solver for the suggested structure. The frame structure was modelled to the truss elements and the plate structure was modelled to the membrane elements. The static load, the dynamic wave load and the cargo load were considered as the loading conditions.

The distribution of the equivalent stress obtained by the stress analysis is shown in Figure 3. Because the maximum stress was smaller than the allowable stress, the Ark could be said to have had safe structural performance.

Figure 3. The distribution of the equivalent stress of the Ark.

**Structural safety index**

The structural safety indices of the Ark were obtained by comparing the required wood volumes for the various hull forms. The structural safety index (SSI) was defined by normalizing the required wood volume, using the maximum and minimum required wood volume, using the maximum and minimum required wood volumes as follows:

\[
SSI = \frac{V - V_{\text{min}}}{V_{\text{max}} - V_{\text{min}}} \quad (11)
\]
where $V$ is the required wood volume for each hull form.

The structural indices for the severe condition (11 metre wave height and 180 entrance angle) are shown in Figure 4, which indicates that the structural safety indices were most sensitive to the variation of ship length and ship depth. The Ark’s index (OR) was small, so that it had high structural safety.

![Figure 4. Comparison of the structural safety indices for a wave height $H_{1/3} = 11$ metres (safest = 0, least safe = 1)](image)

**Overturning Stability**

**Restoring arm**

Overturning stability of a ship is determined by the ability of restoring it to its upright position against inclining moment induced by winds, waves and currents. Restoring moment occurs by the action of buoyancy. When a ship heels, the center of buoyancy $B$ moves away from the centre-plane, and hence it creates restoring moment around the centre of gravity $G$.

The magnitude of this restoring moment is dependent on $GZ$, which is called the restoring arm. $GZ$ is a function of the heel angle $f$, as well as ship geometry. This curve is called the restoring arm, which determines the overall overturning stability.

Since all hull forms in this study had a rectangular cross section, the $GZ$ curve could be determined analytically by examining the movement of $B$ as a function of the heel angle $f$ as follows:
Here KB is the height of B, \( d_0 \), is the draft, and \( B_0 \) is the beam.

### Overturning stability index

The relative safety in overturning moment can be determined by comparing the ability of absorbing overturning energy, which is defined as the area under the restoring arm curve, from zero heel angle to its limiting angle over which flooding occurs into the vessel. In this research, we defined the limiting heel angle \( f_{\text{lim}} \) as the heeling angle when the corner of the roof was flooded.

In Table 3, the limiting heel angle, the area up to the limiting heel angle \( A_R \), and the overturning stability index from \( A_R \) are given for 13 hull forms.

In the ship classification rules, a ship should satisfy two kinds of stability criteria: \( GM \) for small heel angle, and dynamic stability. We applied the ABS (American Bureau of Shipping)'s rule to all 13 hull forms. The results showed that all hull forms except hull #1 sufficiently satisfied all the requirements. It should be especially noted that the Ark was 13 times more stable than the standard for safety required by the ABS rule.

<table>
<thead>
<tr>
<th>Ship No.</th>
<th>( f_{\text{lim}} ) (degree)</th>
<th>( A_R ) (m rad)</th>
<th>Safety Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>31.0</td>
<td>0.805</td>
<td>0.247</td>
</tr>
<tr>
<td>1</td>
<td>53.5</td>
<td>0.321</td>
<td>1.000</td>
</tr>
<tr>
<td>2</td>
<td>40.8</td>
<td>0.694</td>
<td>0.420</td>
</tr>
</tbody>
</table>
Table 3. Results of overturning stability calculations (safest = 0, least safe = 1). See text for definitions of indices.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>22.6</td>
<td>0.794</td>
<td>0.264</td>
</tr>
<tr>
<td>4</td>
<td>14.9</td>
<td>0.710</td>
<td>0.412</td>
</tr>
<tr>
<td>5</td>
<td>42.0</td>
<td>0.836</td>
<td>0.222</td>
</tr>
<tr>
<td>6</td>
<td>35.8</td>
<td>0.855</td>
<td>0.193</td>
</tr>
<tr>
<td>7</td>
<td>26.6</td>
<td>0.739</td>
<td>0.350</td>
</tr>
<tr>
<td>8</td>
<td>21.8</td>
<td>0.643</td>
<td>0.499</td>
</tr>
<tr>
<td>9</td>
<td>21.8</td>
<td>0.964</td>
<td>0.000</td>
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<tr>
<td>10</td>
<td>26.6</td>
<td>0.887</td>
<td>0.120</td>
</tr>
<tr>
<td>11</td>
<td>35.8</td>
<td>0.713</td>
<td>0.409</td>
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<tr>
<td>12</td>
<td>42.0</td>
<td>0.556</td>
<td>0.649</td>
</tr>
</tbody>
</table>

Voyage Limit of the Ark

Although the information about the Ark is not enough to precisely predict the maximum wave height it could have navigated, we could roughly infer it from comparing the estimated ship responses to a modern passenger ship’s safety criteria.

Figure 5 shows the calculated vertical accelerations at FP for several hull forms including the Ark (ARK-0). If we apply the vertical acceleration criteria at FP for a passenger ship as 0.34g significant value, then the voyage limit of the Ark becomes 43 metres, as shown in Figure 5.
Figure 5. Comparison of the structural safety indices for a wave height $H_{1/3} = 11$ metres (safest = 0, least safe = 1)

Similarly, from the results of roll response as shown in Figure 6, we can conclude that flooding of the Ark would not have occurred until the waves became 47.5m high, when the limiting heeling angle was $31^\circ$. 
To calculate the voyage limit from the structure viewpoint, the required thickness of the wood was plotted for varying wave heights (see Figure 7). This showed that the Ark’s voyage limit was more than 30 metres if the thickness of the wood was 30 cm, which was quite a reasonable assumption.

Discussion and Conclusion

Since all the hull forms except hull #1 had sufficient overturning stability compared to ABS’s criteria, we derived the first total safety index as the average of the indices of seakeeping safety and structure safety (see Figure 8). This revealed that the Ark had the second best hull design, with the best hull design in this case being hull #1, which had the worst overturning stability.
When we took the weighted average including overturning stability, such as seakeeping safety 4, structural safety 4 and overturning safety 2, we derived the total safety index as shown in Figure 9. These results also showed that the Ark had superior safety compared to the other hull forms.
In conclusion, the Ark as a drifting ship, is thus believed to have had a reasonable-beam-draft ratio for the safety of the hull, crew and cargo in the high winds and waves imposed on it by the Genesis Flood.

The voyage limit of the Ark, estimated from modern passenger ships’ criteria reveals that it could have navigated sea conditions with waves higher than 30 metres.

Acknowledgement

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- Noah’s Ark Questions and Answers (http://creation.com/noahs-ark-questions-and-answers)
- Noah’s Flood Questions and Answers (http://creation.com/noahs-flood-questions-and-answers)

References

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10. Salvesan, Tuck and Faltinsen, Ref. 6.

Return to Session Two List
Digging Deeper Links for


Ancients’ Couldn’t Have Built a Wooden Ship that Large, Could They?

http://creation.com/the-large-ships-of-antiquity

The large ships of antiquity

by Larry Pierce

Each generation produces a fresh crop of sceptics who are legends in their own minds. C. H. Spurgeon wryly said about such men in his day:

'It is but the shallowness of his mind that permits him to see the bottom of his knowledge.'

We should not be surprised that we are awash today with such experts, falsely so called. The Apostle Peter warned us this would be the case (2 Peter 3:3 ff.). It has become fashionable to scoff at anything biblical.

Noah’s Ark has never failed to be the target of sceptics and the butt of many jokes. ‘Everyone knows’, for instance, that you cannot build a boat as large as Noah did from wood, even using today’s advanced technology. Only when ships were made of steel, in the last hundred years or so, we are told, has man been able to build a ship approaching the biblical dimensions of Noah’s Ark, (137m (450 feet) long, 23m (75 feet) wide, and 14m (45 feet) high).

But these so-called experts display their ignorance of history in making such statements. Let’s look at what ships the ancients actually built, some of which were almost as large as the Ark.

The biblical Ark was within the range of acceptable dimensions for a vessel in ancient times. Though it was huge, other wooden vessels from ancient times were just as large.

Rise in technology of the ancients

In the writings of Pliny the Elder (AD 23–79), I discovered the table (below) about ships of antiquity. This documents the rapid advances the ancients made in ship-building technology in just a few centuries. The time period in the table is from about the seventh century BC to the end of the third century BC.
When we think of warships of antiquity, we think of the tiny ships that were shown in a movie like Ben Hur. They had about fifty or so men, and a single tier of oars. This was the best Hollywood could do on a limited budget. It may reflect our evolutionary thinking, that the ancients were primitive compared to us. While we may flatter ourselves with our supposed knowledge of ancient history, the actual facts that come down to us tell us another story. From this table in Pliny, we can see a rapid rise in technology over a few hundred years which culminated in a ship of forty tiers of oars (when we say forty tiers we mean forty levels of rowers!). Now the question is, do we have any descriptions of these ships so we can comprehend how large they really were? Fortunately, we have a good description of one of the early third-century ships and an excellent description of the largest ship Pliny lists.\(^4\)

The Leontifera

There was a naval battle in the Aegean Sea in 280 BC. The following is Ussher’s description of what happened:

‘When Antigonus, surnamed Gonatas, the son of Demetrius Poliorcetes, heard how Seleucus was murdered, he made an expedition into Macedonia. He planned to get there before Ceraunus could, with his army and naval forces. However, Ceraunus had all Lysimachus’ fleet in readiness, and set out and met him in a good battle formation at sea. In his navy, ships were sent from Heraclea in Pontus, some of six, some of five tiers of oars. These kinds of ships were called “Aphracta”. The largest ship of all had eight tiers of oars and was called the Leontifera. She was admired by all for her large size and exquisite construction. In her were a hundred oars per tier, so that on each side there were eight hundred rowers which made 1600 in all. On the upper deck or hatches there were 1200 fighting men who were under two special commanders. When the battle began, Ceraunus won and Antigonus was forced to flee with all his navy. In this fight, the ships from Heraclea performed the best and among them the Leontifera did the best of all. …\(^5\)

We are not given the dimensions of this ship. However, the oarsmen on each tier would have to be at least three feet apart, the approximate distance between airline seats. (Has anyone ever complained of having too much space between airline seats?!) For 100 rowers per tier, allowing for a bow and a stern, this ship could easily have been 120–150 metres (400–500 feet) long. (The next ship I describe had 50 oars in a tier and was over 120 m [400 feet] long.) If I was in that battle in a ship, I definitely would not want to be in the path of the Leontifera’s ramming prow.

Also consider that these battles were not fought in an afternoon! This ship could have been at sea for a few days before and after this battle. With a crew of over 3,000 men, think of the provisions it would have had to carry!

Other Large Ships

Plutarch briefly describes the fleet which Demetrius built around 294 BC. These were the largest ships built at that time. Although Plutarch gives no dimensions, he does state the following:
'Up until this time, no man had seen a ship of 15 or 16 banks of oars. ... However, in the ships of Demetrius their beauty did not mar their fighting qualities, nor did the magnificence of their equipment rob them of their usefulness, but they had a speed and effectiveness which was more remarkable than their great size.'

The grand-daddy of ancient warships

Athenaeus gives us a detailed description of a very large warship, built by Ptolemy Philopator (c. 244–205 BC).\(^7\) It was 130m (420 feet) long, 18m (57 feet) wide, and 22m (72 feet) high to the top of her gunwale. From the top of its sternpost to the water line was 24 metres (79.5 feet). It had four steering oars 14m (45 feet) long. It had 40 tiers of oars. The oars on the uppermost tier were 18m (57 feet) long. The oars were counter-balanced with lead to make them easier to handle. It had a double bow and a double stern and carried seven rams, of which one was the leader and the others were of gradually reducing size. It had 12 under-girders 275m (900 feet) long. The ship was manned by 400 sailors to handle the rigging and the sails, 4,000 rowers and 2,850 men in arms for a total of 7,250 men. This ship was too large to be of much practical use.\(^8\)

Some things of interest about this ship. First, there are no forests worth mentioning in Egypt. All the lumber had to be imported from elsewhere, likely Lebanon. This ship had a crew that was almost twice as large as that of the largest aircraft carrier we have ever built! The size of the ship approximated the size of Noah’s Ark. Like Noah’s Ark, it would have had to carry provisions for all on board. Oh, for a time machine to go back and capture this ship on film!

Athenaeus describes other very large ships and boats of antiquity. One ship had a catapult designed by Archimedes that could hurl a 55 kg (120 pound) stone over 180 m (600 feet).\(^9\)

Conclusion

What should we learn from this? Firstly, we are not as smart as we think we are! Just because we cannot duplicate something that was done thousands of years ago, it does not mean the ancients could not do it either!

Secondly, we should learn from history. We have nothing to fear from the study of true history, which supports the Bible. In fact, we have much to learn. From these accounts we have given, it is obvious mankind was able to build huge ships that rivalled Noah’s Ark in size. We do not know how it was done, but they did it!

<table>
<thead>
<tr>
<th>Vessel</th>
<th>Inventor</th>
<th>Authority</th>
<th>Approx. Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Double-banked galley</td>
<td>The Erythraeans</td>
<td>Damastes</td>
<td>7th C. BC</td>
</tr>
<tr>
<td>Trireme (three banks of oars)</td>
<td>Aminocles of Corinth</td>
<td>Thucydides</td>
<td>6th C. BC</td>
</tr>
<tr>
<td>quadrireme (four banks)</td>
<td>The Carthaginians</td>
<td>Aristotle</td>
<td>5th C. bc</td>
</tr>
<tr>
<td>------------------------</td>
<td>------------------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>quinquereme (five)</td>
<td>The Salaminians</td>
<td>Mnesiginton</td>
<td>4th C. bc</td>
</tr>
<tr>
<td>galleys with six banks of oars</td>
<td>The Syracusans</td>
<td>Xenagoras</td>
<td>4th C. bc</td>
</tr>
<tr>
<td>up to ten banks</td>
<td>Alexander the Great</td>
<td>Mnesiginton</td>
<td>4th C. bc</td>
</tr>
<tr>
<td>up to twelve banks</td>
<td>Ptolemy Soter</td>
<td>Philostephanus</td>
<td>3rd C. bc</td>
</tr>
<tr>
<td>up to fifteen banks</td>
<td>Demetrius, son of Antigonus</td>
<td>Philostephanus</td>
<td>3rd C. bc</td>
</tr>
<tr>
<td>up to thirty banks</td>
<td>Ptolemy Philadelphus</td>
<td>Philostephanus</td>
<td>3rd C. bc</td>
</tr>
<tr>
<td>up to forty banks</td>
<td>Ptolemy Philopator, surname Tryphon</td>
<td>Philostephanus</td>
<td>3rd C. bc</td>
</tr>
</tbody>
</table>

References and notes


4. Of course, we can never be 100% certain of the accuracy of any ancient document. But as with standard historical research, whenever a document purports to be giving sober history, one trusts the document in the absence of reasons to believe it is a fabrication. In the case of these ancient ships in the Pliny table, there is a consistency to the pattern, and no suggestion of exaggeration.

5. Ussher, J., Annales Veteris Testamenti, Flesher and Sadler, London, pp. 475–476, 1654. (This work is in Latin. I am preparing a new English translation which is scheduled to be published in January, 2001. The paragraph number for this footnote in that revised work is 2750.)


8. It is hard to visualize how such a massive number of banks (tiers) would have been arrayed in practice, and enthusiasts still debate the issue on the internet. It has been suggested that the vessel was really twin-hulled, so that the 40 banks represented two banks of 20 each side. Some diagrams of smaller vessels show that oar openings were sometimes arrayed diagonally, this offset allowing a greater number of banks for a given hull height. Whatever the solutions, it would be a mistake to underestimate the ingenuity of the ancients.

9. Ref. 7, Book 5, Sec. 204c–209e. (2:425–447)
Digging Deeper Links for


Was the Ark Seaworthy? A blogger who called himself, “Froggie” challenged the seaworthiness of Noah’s ark. In a three-part series, Tim Lovett (mechanical engineer with Answers in Genesis) answered his challenges.

Could Noah’s Ark Float without Problems?

http://www.answersingenesis.org/articles/2013/06/07/feedback-could-noahs-ark-float-without-problems

Feedback: Could Noah’s Ark Float Without Problems?

by Tim Lovett

June 7, 2013

Ark Encounter

The Ark Encounter is a one-of-a-kind historically themed attraction. In an entertaining, educational, and immersive way, it presents a number of historical events centered on a full-size, all-wood Ark. Get on board with us to build this incredible Ark designed to remind the world of God’s judgment on sin and to proclaim the life-changing, soul-saving gospel of Jesus Christ.

A blog post titled “More Lies from Ken Ham” appeared as a May 12 posting on the website “The Bushy Tree.” A blogger named “Froggie” offered a scathing commentary on a Noah’s Ark article written by Tim Chaffey regarding AiG’s latest project, the Ark Encounter—a full-size Noah’s Ark to be built south of Cincinnati, Ohio (http://www.answersingenesis.org/articles/2013/05/09/feedback-building-ark-on-land). In reply to “Froggie,” Tim Lovett, who is the primary consultant for Ark theory and design on the Ark Encounter project, offers the following observations.

It’s nothing new to see an anonymous blogger taking potshots at Noah’s Ark and our Ark Encounter project, but this time we have a blogger—“Froggie”—who has written a longer-than-usual critique that also contains many misrepresentations. Thus, in this instance, we believed that a public reply to a posted criticism was warranted.

One of my founding rules of life is to eschew obfuscation; tell it the way it is in as simple and factual way as possible. Occam’s Razor and all that; and sure, I am often guilty of oversimplification, but that’s the way it is here at the pad. So it is no surprise that politicians and commentators on religion incur my ire on a daily basis with their spin. In the case of Ken Ham, I can barely stand to read any more of his mephitic rhetoric, yet about once a week I find myself perusing his website, AIG.
Once a week? And perusing, no less? You should have a good idea of creationist teaching then.

For claiming to bring things to light in such a simple way, you use a lot of complicated words. Furthermore, an atheist who has “founding rules of life” and morality, which produce guilt and reasons to oppose immorality, doesn’t sound like a consistent atheist where rules and morality are optional.

It is usually just more of the same distortions and obfuscation of valid science, but a couple days ago he again tried to make a case for the reality of the myth of Noah’s Ark.

We are not discussing the myths of Noah’s Ark—though there are hundreds of them represented in Flood legends across the globe. Instead we are talking about the real Ark, as discussed in the Scriptures. By the way, you forgot to mention the distortions and obfuscation behind the myth of human evolution (http://www.answersingenesis.org/articles/arj/v2/n1/controversy-in-anthropology).

First of all, I always refer to anything from the AIG as being from Ken Ham because all of the commentators on his site have signed an agreement with the Hamster to publish only material that he has personally endorsed.

This is incorrect. Furthermore, Mr. Ham does not have time to personally endorse the many pieces of content Answers in Genesis produces. Everyone, including Mr. Ham, is subject to the Statement of Faith that was created by a board of directors, and all of the content should be consistent with this document.

Ken Ham is the leader of this sect of fundamentalist, bible literalist Christianity

Not so—each Christian working at Answers in Genesis (or working with us) is actually subject to his own church denomination and ultimately to Christ. We have Baptists, Lutherans, Presbyterians, etc., and this ministry affirms the great confessions of faith held by the church for 2,000 years. We aren’t teaching anything new but those things Christians have adhered to for centuries. Ken is the president and CEO of just one parachurch organization (Answers in Genesis) within the larger realm of biblical Christianity.

and nothing is posted that does not agree with his personal interpretation of scripture.

Not so again. There are things within creation that we debate and so various interpretations of Scripture are permitted.

Criticisms of Noah's Ark

Having said that, the article was supposedly written by one Tim Chaffey. The line that especially caught my attention was:
“I don’t think there are many skeptics and critics of Noah’s Ark who would claim that it couldn’t float—at least initially. Many large wooden vessels have been constructed that have floated without problems.”

I might agree with the first sentence, and furthermore, I agree that the Ark would float quite well, as wood will do, after it broke into pieces after the first few minutes afloat.

But the second sentence is problematic.

Many large wooden vessels have been constructed that have floated without problems.”

Oh? Well, let us have a look at those vessels.

Ham’s/ Noah’s Ark would float in still water for a short spell, but due to the large dimensions, and the fact that the wood will have joints every 20 feet, lengthwise

What an odd restriction, as if Noah has to buy his wood from the local hardware store. While 20 feet (6 m) is convenient for wood carried by truck, shipbuilding is different—especially in the old days when big trees were more common. Even as recently as a 1918 publication, lumber was available in lengths up to 140 feet (43 m).\(^1\) No shipbuilder would comply with your limit of 20 feet. Scarfing large sections will use up at least 8 to 10 feet (2 to 3 m), and you need to scarf both ends.\(^2\) This would produce a keelson of nothing but scarfs!

Or perhaps you mean that twenty feet was the best Noah could find in the Middle East. The Ark landed there, but this was completely unrelated to where it was built because “the ark moved about” (Genesis 7:18). “Gopher wood” doesn’t have to be a desert acacia or even a cedar of Lebanon. It could just as well have been Douglas fir, yellow pine, or even teak.

Or maybe, you have been busy perusing the Panda’s Thumb website and copying a twenty-foot limit from Stevaroni’s four-men-carrying-a-beam “proof.”\(^3\) If the ancients couldn’t handle big things, what will you do about Stonehenge, Easter Island, Egyptian pyramids, and huge obelisks? Surely, you are not suggesting aliens?

and hundreds of joints between the planks heightwise,

No, with planks 14 inches (36 cm) wide on an Ark 45 feet (14 m) high, there would be 38 joints.\(^4\) However, the Ark’s planking was probably closer to 24 inches (61 cm) wide, as seen in a shipwreck discovered off Australia.\(^5\) So “hundreds” is actually 22 or so.

even small swells would rip it apart in hours due to all the mechanical moments and torque action over that length.

In structural terminology, “moment” is “torque.” Now, it would have made more sense if you had said bending moments and torsion, the two primary loads on a ship’s hull.

Next, there will be so many linear joints that as soon as the boat started to stress and torque, the joints would open instantly and leak.
Linear joints? You probably mean “longitudinal joints between planks,” maybe. We can only guess.

I won’t even discuss the effect of wind on a structure three stories tall, of that length.

But I have to discuss it because your assumptions are wrong. A loaded ship sits in the water not on the water, as you imply with all three levels exposed to the wind. Try a more realistic halfway into the water, as suggested by real-life ship researchers one would read about if one perused the AiG website.

You also assume the wind is side-on to this ship (known as a beam sea). This is yet another topic explained on the AiG website (http://www.answersingenesis.org/articles/am/v2/n2/thinking-outside-the-box).

Come back next week for my response to whether wooden ships are reliable as I continue to analyze this critique of our article.

With regards,
Tim

Footnotes

1. Harvey Cole Estep, How wooden ships are built; a practical treatise on modern American wooden ship construction, with a supplement on laying off wooden vessels (Cleveland, OH: The Penton Publishing Co., 1918) p. 8. “Structural timbers of Douglas fir, 18 x 18 inches in section and 120 to 140 feet long, may be obtained from mills at any time, and timbers 36 inches square and 80 or 90 feet long are equally available. By the use of such timbers, the largest boats can be constructed with a minimum of splicing and scarfing, which not only reduces labor costs but materially increases the strength or seaworthiness of the vessel.”

2. Henry Hall, Models and Measurements (1883), notebook in possession of Penobscot Marine Museum, Searsport, Maine. “Scarfs generally eight feet long … Great Republic whose scarfs were 10 feet long.”

3. Stevaroni, comment on “FT Magazine on AIG’s Ark project” Panda’s Thumb, http://pandasthumb.org/archives/2013/04/ft-magazine-on.html#comment-panels. “Stevaroni” disallows any lifting device and claims 20 feet (6 m) as a limit for a 10x10-inch (25x25-cm) beam manually handled by four men (i.e. Noah, Shem, Ham, and Japheth).


5. Jack Loney, Wrecks Along The Gippsland Coast, 8th ed. (Portarlington, Victoria, Australia: Marine History Publications, 1994). Regarding 24-inch planking, Loney notes, “Some of the kauri planks measured forty five feet in length by two feet in width, and the vessel appeared to be double planked suggesting that the vessel may have been built for navigation through the ice.”

Digging Deeper Links for


Was the Ark Seaworthy? A blogger who called himself, “Froggie” challenged the seaworthiness of Noah’s ark. In a three-part series, Tim Lovett (mechanical engineer with Answers in Genesis) answered his challenges.

Are Wooden Ships Reliable?  

[Feedback: Are Wooden Ships Reliable?](http://www.answersingenesis.org/articles/2013/06/14/feedback-are-wooden-ships-reliable)

Last week we started to examine a blog post titled “More Lies from Ken Ham” that appeared as a May 12 posting on “The Bushy Tree” website, by a blogger labeled as “Froggie.” This blogger wrote a scathing commentary on a Noah’s Ark article written by Tim Chaffey regarding AiG’s latest project, the Ark Encounter—a full-size Noah’s Ark to be built south of Cincinnati, Ohio. In reply to “Froggie,” Tim Lovett, who is the primary consultant for Ark theory and design on the Ark Encounter project, is responding to these criticisms of our article.

Anyone who has ever built a wooden boat of any length knows very well that they are impossible to seal 100%.

That’s a sweeping statement. Planked wooden boats are prone to leakage if they flex with *slip*, but a rigid vessel (e.g., cold molded) can be sealed and made watertight. The Bible specifies that Noah used pitch, just like wooden ships from ancient times to the 1900s. In addition, Noah was instructed to use pitch inside as well as out, which may have been to stabilize the wood over a long construction period.

The wood will also expand and contract, further opening the thousands of seams/joints. Wood expands when wet and contracts when dry. If a pitched joint allowed water to seep into the wood, the resulting expansion of the planks acts to seal the faulty joint tight. The
expansion of moist wood *counteracts* the opening of seams and joints, and the wood will not contract again until the Ark is sitting on dry ground, after it’s all over.

Wooden ships were routinely built on land and then sent down the slipway into the water without a problem. To top this, the ancient Greeks seemed quite capable of taking their triremes in and out of the water—drawing them up onto the beach to prevent waterlogging and keep them lightweight.¹

The Ark started out on dry land. With enough water pouring in from “somewhere,” to cover the earth in 40 days indicates ridiculously large waves/ currents/ swells further complicating the idea of a large wooden vessel. After all, creationists claim that all the billions of metric tons of sediment in the geologic column were laid down by the flood, which would take extraordinary flows of water.


According to Dr. John Baumgardner—a world expert in computer modeling of the earth’s mantle and leading proponent of the tectonic mechanism for the global Flood—the initial inundation would be very severe, subsiding somewhat by the time the waters reached a higher altitude Ark launch site.² This would explain why all other ships were destroyed, since they started at sea level.

Once afloat, the average depth of water of almost two miles (three km)³ would have shielded the Ark from tectonic activity. Deep water is safe in a tsunami.⁴ The Ark had to survive the ocean surface, not the massive sediment flows at and near the seabed.

Ironically, such large-scale currents are essential if you want to explain the formation of transcontinental sedimentary layers (http://www.answersingenesis.org/articles/am/v3/n3/transcontinental-rock-layers) that lack the telltale signs of weathering and erosion (http://www.answersingenesis.org/articles/am/v4/n1/no-slow-erosion) between them you’d expect with big time gaps. Without a catastrophic flood there are many loose ends to tie up: fossils of sea creatures high above sea level (http://www.answersingenesis.org/articles/am/v3/n1/high-dry-sea-creatures), rapid burial of plants and animals (http://www.answersingenesis.org/articles/am/v3/n2/world-graveyard), and sediments carried long distances (http://www.answersingenesis.org/articles/am/v3/n4/sand-transported). The global Flood is a much better match for what we find in the geological record.

Occam’s Razor (http://www.answersingenesis.org/articles/2008/05/02/feedback-worldviews-occams-razor), anyone?
Comparing the Ark to Other Ships

The Ark’s dimensions were supposedly 135 meters long, 22.5 meters wide, and 13.5 meters high. That’s 450 feet long, 75 feet wide, and 45 feet high.

Close enough if you were using the short cubit, but if you glanced at the AiG’s website (http://www.answersingenesis.org/articles/am/v2/n2/original-cubit), you’ll find a slightly different cubit.

The largest “wooden” ship ever built, that actually sailed was the Pretoria at 103 m long (338 ft.) and 13.4 m wide (44 ft.) and 23 feet high. She was a barge built for use on the Great Lakes.

A Great Lakes barge? So you conveniently cherry-picked a barge that lasted 5 years while a 1909 wooden schooner of similar length (Wyoming) lasted 15 years, and paid for itself many times over. Another ship of Pretorian length was the 1853 clipper Great Republic, which survived a fire and lasted another nineteen years. These ships were commercial workhorses built as quickly as possible and with an expected working life of only 12–15 years or as little as ten.\textsuperscript{5,6} Yes, they leaked excessively as the hull worked loose because the stiffness of the hull depended almost entirely on the tightness of caulking. Even placing two pins in each plank gave little improvement.\textsuperscript{7}

She had a wooden frame but it was reinforced with Keelson Plates, chords, arches and was diagonally strapped with steel. It leaked so badly that it took 2 dedicated engines to keep the water pumped out of the interior. She leaked like a sieve.

Steel (well, iron actually) is not the only way to brace a wooden ship. House framing needs bracing, too, and this can be done either by steel straps or plywood sheathing.

Now let’s look at the carvel planking technique that dominated wooden shipbuilding in the last few centuries.\textsuperscript{8} The method was simple and quick, but prone to racking because the parallel planks were “nailed” to parallel frames.\textsuperscript{9} The only bracing was the caulking itself, so a new ship didn’t stay a “tight ship” for very long. Larger ships were subject to higher forces, which sped up the loosening of the caulked planks, leading to reinforcement by means of iron straps. These diagonal straps certainly helped improve a bad design and gave the single layer of carvel planking some much-needed shear resistance. But the steel straps were pinned (bolted) to softer wooden frames, a considerable stress concentration especially at the ends of the straps.

This led to the next patch-up: steel plates at the top and bottom to secure the diagonal bracing. Okay, that kept the hull sides intact, but now the problem was transmitted to the top deck.\textsuperscript{10}

Later, during World War I, steel was scarce and wooden supply ships were being built in a hurry.\textsuperscript{11} Naval architects revisiting the carvel hull bending problem made big increases to keelson depth and upper deck reinforcement (using clamp and shelf strakes).\textsuperscript{12,13} One
design aimed to “produce a boat which will have strength equivalent to that of a steel hull without using excessive amounts of timber.”\textsuperscript{14} It had a double layer of diagonal planking under the standard planks. That’s not a carvel hull, that’s cold molded, just like the wooden minesweepers built in the 1990s.\textsuperscript{15}

So the short-comings of a carvel hull are not easily corrected. The better way is to use a planking method with inherent shear strength, akin to a house frame braced with plywood instead of clapboards (also called lap siding or weatherboards).

The Pretoria was built by James Davidson, the preeminent marine engineer of his day. She was launched in July of 1900 and sank in rough weather on lake Michigan in September of 1905, partly due to the Pony Engines failing and the ship filled with water.

Only steel reinforcement allowed the Pretoria to sail, but in 1869 Britain built the largest true wooden ship, the HMS Orlando. She was 335 feet long. She suffered from the strain of her length creating massive leaks and was scrapped in 1871 after a few short voyages.

Sorry, there’s an HMS Orlando (1858-1871) made of wood with iron bracing or a later HMS Orlando (1886-1905) with an iron hull. Read the PBS website.\textsuperscript{16} So I am helping you with your argument, even the 1858 Orlando had iron bracing (although you did try to cut its lifespan down from 13 years to 2).

It is easy to cherry-pick poor performers—Pretoria and Orlando (https://en.wikipedia.org/wiki/List_of_longest_wooden_ships)—because these ships were based on carvel hull anyway, built like a “bundle of reeds.” (http://www.maritime.org/conf/conf-davis.htm) There are much better ways to build a wooden ship.

Another consideration is that the modern wooden ships were far more stable in moderate to high seas due to the fact that they were Keel ships by construction and they were powered, and ‘V’ shaped, which enabled them to “cut through” the waves.

Since you mention “Keel ships” and “V” shapes, you might be referring to deadrise—a “V” shaped bottom—something that has been around since antiquity. Most modern ships have a flat bottom (no deadrise) amidships, which is stable too and increases carrying capacity.

Or perhaps by “V” shaped you mean a pointed bow in conjunction with a prominent keel, improving directional stability when the vessel is making way.

The Ark, being a straight sided box would have been at the mercy of even moderate or light seas with waves and wind smashing against the straight sides.

Keel ships, with their attendant ribs are intrinsically stronger and triangulated frame rather than a box ship with corners that would increase longitudinal torque.

A straight-sided box with corners? Anyone claiming to “peruse” the AiG website on a weekly basis would quickly find a ship-like Ark with three keels (see Feedback: Ark Design (http://www.answersingenesis.org/articles/2011/11/25/feedback-ark-design) and Thinking
Outside the Box (http://www.answersingenesis.org/articles/am/v2/n2/thinking-outside-the-box) for example).

It is also interesting to note that Noah had no engines to pump out water from the interior of the ark and with eight people aboard, it is absurd to think that they bailed it by hand.

Yes, I agree that your idea of hand-bailing is absurd. Power for winching or pumping can come from other sources, like wave motion, wind, or animal draft power.

Finally, Johan Huibers from the Netherlands has built a 1/2 scale ark.

No, he also built a full-scale Ark. Initially he built a half-scale Ark (in 2007)—you can read about it on the AiG website (http://www.answersingenesis.org/articles/am/v2/n2/noahs-ark-sailing-in-netherlands). In 2012, Johan completed his second Ark, this time at full-scale. You can read about it on the AiG website News to Note, December 15, 2012 and Noah’s Ark in the Netherlands!

Even though it has steel reinforcement, it was considered unseaworthy and was installed on barges and towed via some canals to the port of Rotterdam where it is on display.

No, this is misleading (i.e., obfuscation). It was not a wooden vessel but a clapboard (weatherboard) superstructure that was purpose-built on steel barges as an Ark look-a-like (albeit lapstrake or clinker built). Johan’s first Ark was a great demonstration of what one man can do (in two years, I might add), but it is a themed attraction, not a ship-proving test.

But anyway, your comment about a half-sized Ark needing steel reinforcement is invalid.

Not that a half-scale Ark needs any proof: 225 feet (69 m) was a typical size for a large wooden ship. It is not a great deal longer than the world’s oldest wooden ship still afloat, the USSConstitution (1797). There is no steel reinforcing in “Old Ironsides,” despite the nick-name.

Footnotes

1. Lionel Casson, Ships and Seamanship in the Ancient World (Baltimore, MD: The Johns Hopkins University Press, 1995), p. 89. "Every effort was made to keep the hull as light as it could possibly be; . . . Precautions were constantly taken to see that waterlogging did not add unwanted weight."

2. A higher altitude launch would protect the Ark from the violence of the initial inflows of ocean water.

3. "Ocean Facts: Did you know?" http://www.ocean-expeditions.com/ocean-facts/. "If all the land in the world was flattened out, the Earth would be a smooth sphere completely covered by a continuous layer of seawater 2,686 metres [over a mile] deep."

5. George C. V. Holmes. 1906, Ancient and Modern Ships. Part I. Wooden Sailing Ships, http://www.gutenberg.org/files/33098/33098-h/33098-h.htm. Referring to ships in the early 1800s in England, Holmes writes, "It had been felt for many years that the system of building was very defective, and the life of a man-of-war was consequently short, only fifteen years for a ship built of English oak in the Royal dockyards, and about twelve years for similar vessels built in private yards. Amongst the greatest defects was the absence of longitudinal strength to enable a ship to resist the effects of hogging and sagging strains in a sea-way."

6. Tyrone G. Martin, A Most Fortunate Ship: A Narrative History of "Old Ironsides" (Annapolis, MD: Naval Institute Press, 1997), p. 193. "USS Constitution (1797) was built in an era when a wooden ship had an expected service life of ten to fifteen years."

7. H. R. Milner and J. Peczkis, "Wooden Ship Hulls as Box Girders with Multiple Interlayer Slip," Journal of Structural Engineering 133, no. 6 (June 2007): 855–861. "In frame-built construction, there is usually no direct lateral plank-to-plank connection: There is only the friction provided by the oakum rammed between the planks . . . even carvel construction that employs two rows of densely spaced fasteners (instead of the usual single row) fails to achieve complete composite action."

8. A carvel hull is formed by parallel horizontal planking fixed to parallel vertical frames (usually by spikes, trunnels, or bolts) to form a smooth outer surface. Lengthwise joints between the planks are typically caulked with fiber and sealed.


10. H. R. Milner and J. Peczkis, "Wooden Ship Hulls as Box Girders with Multiple Interlayer Slip," p. 859. "...the asymmetric cross section of traditionally built wooden hulls, in which too much timber is already situated in the sides and bottom, and not enough in the deck ‘flange.’"


12. Ibid., figure 36, 37.

13. Ibid., p. 6.

14. Ibid., figure 40.

15. The last Avenger-class wooden minesweeper was commissioned in 1994. The 224-foot (68 m) hull was framed in wood and planked with diagonal layers of fir, then covered with fiberglass. Wood was used to minimize the magnetic signature of the vessel. USS Guardian (MCM-5), launched in 1987, and ran aground near the Philippines on Tubbataha Reef on 17 January 2013. The hull was holed but remained intact for months before being cut into three sections and lifted off the reef by crane ships by March 30, 2013.


Return to Session Two List
**Digging Deeper Links for**

**Noah: The Man, The Ark, The Flood**

**Was the Ark Seaworthy?** A blogger who called himself, “Froggie” challenged the seaworthiness of Noah’s ark. In a three-part series, Tim Lovett (mechanical engineer with Answers in Genesis) answered his challenges.

**Was Noah’s Ark Seaworthy, or is that Impossible?**

[http://www.answersingenesis.org/articles/2013/06/21/feedback-was-noahs-ark-seaworthy](http://www.answersingenesis.org/articles/2013/06/21/feedback-was-noahs-ark-seaworthy)

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**Feedback: Was Noah’s Ark Seaworthy, or Is That Impossible?**

**by Tim Lovett**

**June 21, 2013**

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**Ark Encounter**

The Ark Encounter is a one-of-a-kind historically themed attraction. In an entertaining, educational, and immersive way, it presents a number of historical events centered on a full-size, all-wood Ark. Get on board with us to build this incredible Ark designed to remind the world of God’s judgment on sin and to proclaim the life-changing, soul-saving gospel of Jesus Christ.

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**Plans for Ham's ark remain a tightly guarded secret**

Seems like lots of public information published on the AiG website remains a secret to you. Pictures have been on the website (http://arkencounter.com/) for over two years.

but there is no doubt that it will be built upon a robust foundation. Northern Kentucky experiences freeze/thaw cycles in the winter months and that heaving alone would soon negatively affect the integrity of the structure.

Noah probably built the Ark in a high place on a robust launching platform to minimize the chance of dashing against nearby obstacles. So, yes, Noah would have needed a robust foundation, and so will the (much lighter) AiG structure. But the Ark Encounter is not a ship-proving test either; it is an immersive experience with a structure based on reasoned design.

There are no Marine engineers on planet earth that have concluded that the ark could be seaworthy, that is, without some supernatural agent suspending the laws of physics and nature.

Now is a good time for someone to tell you that there are naval architects and marine engineers. Marine engineers work on ship machinery, whereas seaworthiness is the domain of naval architects.
For example, it was naval architects at the world-class ship research center KRISO (renamed MOERI in 2005) in Korea who studied Noah’s Ark in 1992 and declared the biblical specifications sound (see http://worldwideflood.org/ark/hull_form/hull_optimization.htm for more information). The head of the study (Dr. S. W. Hong, an evolutionist) went on to run the place.

It is impossible for a ship of that material and construction

What construction? If you mean a rectangular box made from twenty-foot scantlings as you propose, then this is certainly doing it the hard way. Or perhaps you mean single-layer carvel construction with sails, like Pretoria and Orlando—or Wyoming or Great Republic even. Either way, this does not rule out other ways to build a seaworthy Ark. Nor does it preclude effective shear-resisting hull structures in wood. Here are a few examples:

- **Diagonal planking (cold molded):** This is the definitive way to build a strong wooden hull. This technique was used in minesweepers for the U.S. Navy (1990s). Modern adhesives and a fiberglass skin helped of course, but the British did the same in 1855 (Schomberg (http://www.dpcd.vic.gov.au/heritage/maritime/shipwrecks/victorian-shipwreck-dive-sites/schomberg-shipwreck)). Also, as already mentioned, diagonal planking appeared in World War I wooden steamers. In 1998, another old ship, the USS Constellation, was switched from carvel to diagonal planking to avoid using clumsy steel beams in order to repair hogging strains.¹

- **Mortise and tenon planking:** Greeks and Romans used this spectacular (almost unbelievable) solution to shearing between planks. The method goes back well before the fourteenth century before Christ, but then it disappeared for centuries until rediscovered conclusively by modern underwater archaeology.² This lends credence to the records of Ark-sized wooden ships of antiquity. For example, Athenaeus discussed a large warship that was 427 feet (130 m) long! It was built by Ptolemy Philopater around 250–200 BC.³ It proved quite capable in war, no less. Then there was the Leontifera—based on the specification of eight tiers of oarsmen, it is estimated at about 393 feet (120 m) long.⁴

- **Multiple layers of planking:** This method was clearly used in Chinese ships, which includes the treasure ships of Zheng He (1400s) with a reported length of 444 chi (137 m or 450 feet).⁵ Also seen in Greek and Roman ships (c. 80–90 BC).⁶ More recently (1800s) multiple layers were employed for impact with floating ice.⁷ Each successive layer of overlapping planking dramatically increases the shear resistance of the planking system. Even a double layer is “vastly superior to single carvel.”⁸

- **Edge bolting:** Vertical pins (drift bolts) connected horizontal members (strakes) together. This technique was used in late American ships to fasten ceiling strakes and keelsons together.⁹

Another problem for these “oversized” carvel ships was weak frames.¹⁰ To make the curved frame profiles, many short segments were bolted together, resulting in lateral flexibility (i.e., they could go out of shape). This could have been addressed by installing lateral shear walls at regular intervals (transverse bulkheads). The Chinese were doing that at least
fourteen centuries earlier, which is twelve centuries before Benjamin Franklin “invented” it.11

So maybe Noah used ancient bulkheads and ancient planking.

to float on water for more than a very short period of time and anyone making the claim that Noah's ark as described in the bible was seaworthy is just plain nuts.

So out of the blackness of the Internet, you call the director general of research at MOERI, Dr. S. W. Hong and his team, “plain nuts”?

In summary, 300 feet (91 m) may well be the practical limit for single layer carvel hull construction, but more appropriate construction methods would extend that boundary by at least 50 percent.

With regards,
Tim

Footnotes


5. G. Deng, Maritime sector, institutions, and sea power of premodern China (Westport, CT: Greenwood Publishing Group, 1999). “Chinese ships were maintained once a year by adding a layer of planks to the hull. As a rule, when six layers were added, the ships were half-retired from the ocean-going fleet to coastal services due to the ship’s loss of speed.” Claims of an Ark-like scale of Zheng He's treasure ships have drawn skepticism (mostly by non-Chinese commentators), but it is agreed they were built with two or three layers of planks.


7. Loney, Wrecks Along The Gippsland Coast.


9. Harvey Cole Estep, How Wooden Ships Are Built: A Practical Treatise on Modern American Wooden Ship Construction with a Supplement on Laying Off Wooden Vessels (Cleveland, OH: The Penton Publishing Co., 1918), p. 13. “In modern wooden vessels built on the coasts of the United States, considerable use is made of edge-bolting to fasten the various keel and keelson elements and the strakes of ceiling together. Edge bolting means fastening the pieces together longitudinally. In other words, the ceiling strakes are bolted through and through to each other, as well as being bolted to the frame timbers. There is no doubt that this form of fastening adds greatly to the strength of the hull structure, particularly in a longitudinal direction, offering resistance to hogging strains. In fact, some experts go as far as to say that the edge-bolting is all that prevents the largest of wooden ships from breaking-up in a seaway. This is probably an exaggeration, although it has been demonstrated that timbers well edge-bolted at least approximate the strength of single pieces of the size of the members so combined.”
10. H. R. Milner and J. Peczkis, "Wooden Ship Hulls as Box Girders with Multiple Interlayer Slip," *Journal of Structural Engineering* 133, no. 6 (June 2007): 855–861. "Frames consisting of many small timbers bolted together are readily deformed, and have frequently been identified as a major weakness of traditional wooden ships."

11. L. Xi, X. Yang, and X. Tang, eds., *The History of Science and Technology in China: Transportation* (Beijing, China: Science Press, 2004), p. 58. "It can now be deduced that the first watertight bulkheads appeared around 410." The Chinese design was a deliberate shear wall, complete with dowel pins and ledges for shear resistance and even limber holes for maintenance. They form watertight compartments, of course, to keep the boat afloat if damaged.
Digging Deeper Links for

Has the Ark been Found?

http://www.answersingenesis.org/articles/cm/v14/n4/special-report-amazing-ark-expose

No matter where you live, if you haven’t already heard about it, the promoters and the media have been making sure you will. What then is the massive boat-shaped formation which rests at 6,300 feet above sea level in Eastern Turkey, about 12–15 miles (15–24 kilometres) from the summit of Greater Mount Ararat?

The Main Claims at a Glance

True/False?

- Radar shows man-made (boat) structure.........FALSE
- There is a regular metallic pattern.............FALSE
- Lab tests show petrified laminated wood........FALSE
- Turkish scientists found metal rods.............FALSE
- Metal artefacts have been proved by lab........FALSE
- There are ‘ship’s ribs’ showing..................FALSE
- There is lots of petrified wood...................FALSE
- Turkish Commission says ‘it’s a boat............FALSE

[Ed. note: see also:
- Refutation of Mary Wyatt’s ‘rebuttal’ of this article (http://www.answersingenesis.org/articles/1992/10/01/ark-expose-rebuttal)
- Has the Ark of the Covenant been found?] (http://www.answersingenesis.org/articles/cm/v21/n2/has-ark-of-the-covenant-been-found)
Introduction

Accordingly first seen by a local Kurdish farmer following an earthquake in May 1948, the world’s attention was drawn to this streamlined boat-shape by the publication of an aerial photograph, taken by a Turkish Air Force pilot, in Australian Pix magazine on July 9, 1960 and American Life magazine on September 5, 1960. Another earthquake in December 1978 is said to have enhanced the relief between the boat-shaped formation and the surrounding terrain, although erosion has since scan actively modifying it.

\includegraphics{mount_ararat.jpg}

\textit{Lesser Mount Ararat. Arrows show similar boat-shaped formations in the area. (Turkish Air Force Photo)}

However, this particular boat-shape is far from unique. The Turkish Air Force released another photograph several years ago showing three similar boat-shapes in the mudflow material on the footslopes of nearby Lesser Mount Ararat. So in reality, if it wasn’t for the fact that this particular boat-shape is the approximate length of the biblical Noah’s Ark* then little attention would have been paid to it, even though it lies within the region the Bible describes as the mountains of Ararat (Genesis 8:4). (*It is much wider than the Ark, but proponents of the site say that this is because the outside walls have been ‘splayed out’ by the weight of mud.)

Claims about this boat-shape were previously discussed in 	extit{Creation}12(4):16–19, September 1990. The site is properly known as the Durupinar site, named after the Turkish Army Captain who first saw the boat-shape on the aerial photograph and who was involved in the first expedition in 1960. Some more recently have called it the Akyayla site, after the region in which it is located. The site has been vigorously promoted by self-styled archaeologist and explorer Ron Wyatt since 1977, when he first visited Turkey and began investigations. Over the years, particularly in the mid-1980s, Wyatt repeatedly tried to interest other people in the site, such as former US astronaut Colonel James Irwin, and ICR scientist Dr John Morris. Neither of these men were convinced after on site inspections. In 1985 Wyatt was joined by former merchant marine officer David Fasold and geophysicist Dr John Baumgardner. Both men have since parted company with Wyatt, Fasold disagreeing
with him over details, and Baumgardner, while originally being cautiously enthusiastic, is now adamant the site does not contain Noah’s Ark.

Australian Dr Allen Roberts first visited the site in 1990 and thereafter initiated the organization Ark Search in order to raise funds to work with Wyatt on an archaeological dig. Their efforts came to world media attention when they were kidnapped (with three others) and held captive by Kurdish guerrillas for three weeks in September 1991.

Both Wyatt and Roberts continue to actively promote the site as the probable remains of Noah’s Ark. In recent years Wyatt was interviewed on a number of US television programs, the footage of which he combined with his team’s on-site footage to make a video that has been widely marketed/circulated among many Christians, who have thus become excited about the possibility that Noah’s Ark has supposedly been found. Meanwhile, during the first half of 1992, Dr Allen Roberts embarked on a systematic Australia-wide lecture tour, and his Ark Search organization produced a booklet summarizing their evidence and marketed a video of his public lecture.

With this brief background we now evaluate the evidence claim by claim and respond. Unfortunately, not one of these seemingly convincing claims stands up.

**Metal Detectors and Hot Spots**

It is Alleged That

Metal detector surveys found a regular pattern of ‘hot spots’ which could be joined to reveal a regular pattern of ‘lines’ lengthwise and across the inside of the formation only. These ‘hot spots’ represent iron concentrations and could be traced by the metal detector along these interconnecting lines or ‘iron lines’.

A standard beach combing type metal detector (the type with a disc-shaped detector head on the end of a long pole) ‘hot spots’ were indeed found, but these were randomly distributed and not in a regular pattern along lines. Since this type of metal detector can only detect metal objects down to a depth of about 1 foot (30 centimetres), these ‘hot spots’ can only represent objects with high metal concentrations buried in the surface mudflow material. Such a description perfectly fits the numerous basalt (a volcanic rock that is everywhere throughout the area) boulders found randomly buried in, and protruding from, the mud. The basalt boulders are often weathered but contain iron oxides that make the instrument respond positively in contrast to the ‘dead’ mud. Furthermore, this instrument did not detect ‘iron lines’ between the ‘hot spots’. That this distribution of ‘hot spots’ was random was confirmed by at least two such metal detector surveys.

**Metal Detectors Mapping Iron Lines**

It is Alleged That

Metal detecting surveys using a ‘molecular frequency generator/discriminator’ mapped out these ‘iron lines’, which represent longitudinal and cross beams containing iron nails and/or
brackets. (These ‘iron lines’ were marked out with bright yellow plastic tape for greater impact.)

A ‘molecular frequency generator’ consists of a pair of brass welding rods bent at 90 degrees near one end, which are placed in sleeves for ease of movement while hand-held, connected by wires to a set of batteries which are carried in the operator’s pocket. (This electrical source is supposed to make the device more sensitive!) A so-called frequency generator is placed on the ground within the area to be surveyed. The dials are set on this ‘instrument’ for it to emit the supposed inaudible frequency of whatever metal (gold, iron, etc.) one hopes to detect. As the operator walks along holding the brass rods out in front, one in each hand, the rods are supposed to cross or separate when the subsurface target is located. Such movement, however, will occur by simple physical principles even when there are no batteries connected. Just as a supermarket trolley (castor) wheel tends to trail behind the direction of motion, there is a tendency for the long arms of the rods to rotate so as to trail behind the direction of walking. The resultant crossing or separating may therefore easily be initiated by the conscious or unconscious expectations of the user.

Qualified scientists have been independently consulted about this gadget, which is generally advertised in treasure-hunting magazines, not scientific journals. They are unanimous that there are no scientific principles employed. Indeed, two of these scientists built and tested working models. The results of this technique can hardly be considered trustworthy, the brass welding rods being used in essence, as divining rods, similar to the use of a forked stick to search for water.* So the ‘iron lines’ on diagrams of the boat shape and the lines of plastic tape in photographs are only an interpretation based on ‘results’ from a pseudo-scientific ‘instrument’. They have not been able to be reproduced or verified by any reputable scientific survey technique, including standard metal detection equipment. This includes the highly sophisticated types of magnetometer used by mining companies (see later). (*Even Baumgardner, to his later embarrassment, was initially taken in by the false claims attributed to this ‘instrument’. Fasold still promotes its virtues and cries ‘foul’ when these ‘home truths’ are pointed out, yet if it were what he claims then every mining company and fortune seeker would own and operate one and be making hordes of money! No mining company uses anything like it.)

Ground Penetrating, Subsurface Interface, and Radar Surveys

It is Alleged That

The pattern of ‘iron lines’ that was located by the metal detecting surveys and marked out by plastic tape was duplicated and verified by other subsurface techniques including ground penetrating, or subsurface interface, radar surveys, particularly the radar scans obtained by Fasold and Wyatt. These radar scans showed an internal structure typical of a boat’s structural framework (‘bulkheads’, ‘keelsons’, ‘walls’, etc.). Tom Fenner of Geophysical Survey Systems Inc. has thus designated the formation as a man-made boat.

In Reality

This claim is utterly false, yet it has been persistently used to give credence to diagrams purporting to show the internal structure of a boat, namely Noah’s Ark.
Both Baumgardner (http://www.answersingenesis.org/articles/cm/v14/n4/special-report-amazing-ark-expose#Baumgardner) and Dr William Shea (http://www.answersingenesis.org/articles/cm/v14/n4/special-report-amazing-ark-expose#Shea) were in Turkey in June-July 1986 waiting to join Wyatt on site. Wyatt and Fasold told them that they went to the site without a permit and in 30 minutes made 10 passes with the radar scanner only over the southernmost portion of the boat-shape, the so-called ‘prow’. Upon rendezvousing with Shea, Wyatt provided him with copies of these radar scans. Shea has forwarded them to us.

The permit was eventually approved, but Wyatt, Fasold and their party were not allowed back to the site with the radar scanner by the local police and military, so the planned follow-up work to radar scan the whole formation never came to pass, at least not at the hands of Wyatt and Fasold, from all published accounts. Yet, Wyatt and Roberts have both published diagrams of the boat-shape showing a supposed internal structure of transverse and longitudinal divisions which they have labelled as ‘bulkheads’ and ‘gunwales’ over the whole ‘boat’, the latter referencing Fasold’s 1986 survey of only part of it.

Furthermore, both Wyatt and Roberts legitimize these claims by using the name of Tom Fenner of Geophysical Survey Systems Incorporated in New Hampshire, who they say looked at the 1986 radar scans and concluded that the formation is ‘a man-made boat’.

So what did these radar scans really show? There are a series of laterally periodic narrow reflections stacked in column-like ‘structures’ at approximately the same depth. Roughly equidistant, they may give a ‘non-natural’ impression at first glance. Fasold called these the ‘subsurface walls’ he thought he had initially ‘detected’ with the ‘molecular frequency generator’ and plotted them as ‘bulkheads’ and ‘gunwales’ on diagrams. However, this interpretation of these radar scans does not take into account the crucial topographic (surface) variations across the site. If it did, Wyatt and Fasold would never have been able to convince themselves, let alone anyone else, about these so-called ‘bulkheads’, etc. Interestingly, Fasold admits on one of his published radar scans that the radar missed some of these so-called ‘walls’.

Geophysicist Tom Fenner says, ‘I was surprised and dismayed to learn that Mr Wyatt was using my name as well as the name of Geophysical Survey Systems Inc. (GSSI) in order to lend credibility to his unsubstantiated claims concerning the so-called “Noah’s Ark site.”’ Fenner goes on to indicate that neither he nor GSSI believes the formation to be manmade. He writes, ‘In 1987 I performed an extensive GPR [ground-penetrating radar] study in an attempt to characterize any shallow subsurface features in the boat-shaped formation at the site… . A great deal of effort was put into repeating the radar measurements acquired in 1986 by Wyatt and Fasold… . After numerous attempts over a period of one and a half days we were unable to duplicate their radar records in any way…. I was never convinced the site was the remains of Noah’s Ark. In fact the more time I spent on the site, the more skeptical I became.’

Instead of finding ‘walls’, Fenner’s 1987 radar survey indicated the presence of a shallow flat-lying reflector likely to be bedrock underneath the surface mudflow material. On the other hand, speaking of the data from the Wyatt and Fasold survey (which could not be
duplicated, anyway) Fenner comments, ‘Their records showed point targets’, not ‘walls’. In
other words, no boat structures (for example, ‘bulkheads’ or ‘gunwales’) were found in the
survey that was conducted by a professional ground penetrating radar operator. Wyatt even
claimed his radar scans showed stairs, which is absolutely unsustainable.

Walls of the Boat

It is Alleged That

In the walls that define the outline of the boat-shape is evidence of a former ship’s ribs,
presumably the timbers that formed part of the original keel structure/hull (‘a few beams
protruding out’).

In Reality

These walls, in places standing 20-30 feet (69 metres) sheer above the immediately
surrounding terrain, certainly give the impression of the outer hull of a boat. However, that
is where all similarity ends. These walls are simply hardened mud, containing boulders of
the various local rock types. They contain no petrified wood holding in the mud in any way
reminiscent of the outer planking of a wooden hulled vessel.

Furthermore, closer examination of the photographic ‘evidence’ of a ship’s ribs reveals that
erosion gullies cutting into the walls at fairly regular intervals, mainly in one area, have
given the appearance at a distance of thick beam structures; however, they are merely the
hardened mud left behind between these erosion gullies.

As the burden of proof rests with those who claim that these are a ship’s ribs, one would
have thought that they would have sampled this material and submitted it for scientific
tests. However, there is no indication that it has ever been sampled by Wyatt or Roberts to
see what they really are. On the other hand, all the other eye witnesses who have been to
the site insist that they only ever saw mud, containing boulders (mudflow debris), forming
these walls.

Trainloads of Petrified Wood?

It is Alleged That

‘There are trainloads and boatloads of petrified wood out there and it is all in the boat
structure.’ Furthermore, the prized exhibit Wyatt shows to visitors, and photographs of
which are regularly displayed, is a sample of “petrified” wood identified as pecky cypress-
removed from inside the “hull” in the presence of the Governor of Agri.’

In Reality

No trained scientist of the many who have visited the site has ever seen any sign of these
‘trainloads’ of petrified wood. Geologist Dr
Bayraktutan (http://www.answersingenesis.org/articles/cm/v14/n4/special-report-amazing-
ark-expose#Bayraktutan) has collected one or two small fragments of semi-petrified wood
which in his opinion have flowed on to the site within the mud from elsewhere. He confirms
that none of the regular rock types of the site are petrified wood. Not one of the other scientists (including geologists familiar with petrified wood) has ever once seen any. Yet Wyatt continues to show untrained people samples of what he claims is petrified wood from the site.

His prize sample, reportedly dug up in the presence of the Governor of the Turkish province of Agri, is not only claimed to be petrified wood, but alleged to be ‘laminated’ and ‘deck timber’. Roberts too has made much of this sample, being photographed with it, and claiming that this ‘petrified laminated timber’ is of major significance, since the Ark was made of gopher wood which, he says, could mean laminated wood.

Both Wyatt and Roberts claim support for the identification of this sample by citing Galbraith Laboratories of Tennessee, yet the laboratory assay certificate shows that they only analysed for three elements-calcium, iron and carbon-no basis at all for calling the sample petrified wood! When telephoned, the laboratory was adamant that they were not asked to give an opinion on what the object was and they were unable to do so.

The only other supportive evidence revealed by Roberts privately was a typewritten statement claiming that the sample (which is said to have no growth rings*) had been ‘identified visually as pecky cypress by John Mackay’. That is all. No one should make such an identification without a microscope thin section which would show, if the sample really was petrified wood, the cellular wood structure. No such thin sectioning has been done, and when urged by Roberts’ group Ark Search to do so (after Creation Science Foundation pointed this out), Wyatt refused to submit the sample for such sectioning and proper scientific testing and assessment. (*Ark Search literature has a photo of one of Wyatt’s specimens of ‘petrified wood’ which, in contrast to the above mentioned, shows what look like growth lines. That specimen is also claimed to show a ‘tenon joint’. To our knowledge, there is a total absence of supportive documentation on that alleged find, which may explain why it is rarely mentioned, in stark contrast to the other.)

A Christian who was researching these claims writes (in a document forming part of Ark Search’s ‘written evidence’) that when he was shown this ‘petrified laminated wood’ sample, Wyatt told him that he had had it analysed by Galbraith Laboratories and the tests indicated that it was silicate replacement (that is, the wood had been replaced by a silicon compound). This cannot be truthful, since the laboratory report, also in Ark Search’s possession, shows that silicon was not even analysed for by Galbraith! No future compliance by Wyatt to have the sample sectioned is feasible without the safeguard of eye-witnesses who are familiar with this so-called ‘laminated’ ‘pecky cypress’.

On the other hand, there are lots of chunks of basalt on the site and buried in the surface mudflow material. Those people we know of with a trained eye who have seen this particular sample of Wyatt’s have all identified it as basalt. Furthermore, their testimony, plus photographic assessment and microscopic examination of basalt samples from the site, strongly suggest the alleged ‘petrified adhesive’ is actually calcite veining.
Higher Carbon in Samples Coming From Within Vessel

It is Alleged That

Soil samples from the site indicate the residue of a decayed wooden vessel with sophisticated metals used for bracing, the samples coming from within the formation having a much higher carbon content.

![Diagram](image)

Depicts an accurately surveyed outline of the site, showing the magnetic contours. Far from confirming the pattern of regularity shown in the Ark Search diagram, this magnetometer data is consistent with definite geological features (see text.).

In Reality

Two soil samples were indeed collected by Wyatt in 1979 and the assay results from Galbraith Laboratories were published by Dr William Shea. It is also true that the samples contained iron, aluminum, titanium and carbon, but such elements are always to be found in soils. Indeed, the assay results of these two samples are exactly what one would expect from soil developed from basalt—the iron, aluminum and titanium originally being present in silicate minerals within the basalt and not as exotic metal fittings as proposed by Wyatt.

Furthermore, the laboratory assayed only for carbon and did not specify that it was organic carbon, so Wyatt and others are wrong to claim that the carbon in these samples comes from decayed wood. On the contrary, most of the basalt boulders on and near the site (including samples collected by Roberts and submitted for scientific assessment) contain abundant calcite, a very common mineral composed of calcium carbonate; that is, it contains carbon in mineral form—not organic carbon. No soil or rock samples gathered at the site are supportive of Wyatt’s claims.

Pitch Found

It is Alleged That

Some pitch has been found (pitch was used to cover the inside and outside of the Ark’s wooden structure).
In Reality

This claim appears to come primarily from Roberts and Mackay. However, no sample has been openly produced and submitted for proper scientific analyses. The only scientific procedure that could verify it as being pitch would be a gas chromatographic analysis—the standard method used worldwide for studying the chemical composition of all organic carbon materials. Tar and bitumen, for example, are routinely identified in this way because gas chromatographic analyses reveal the presence of the ‘heavy’, long-chain carbon molecules that are the hallmark of these substances. Thus, until such analyses are performed on verified samples from the site, this claim cannot be taken at face value.

Rivets, Metal Rods, and Cotter Pins

It is Alleged That

A rusted metal bracket and other fittings and metal artefacts, including a ‘petrified rivet’ and ‘washer structures’, have all been located ‘on the site’. Furthermore, ‘Turkish archaeologists came in and dug in three locations recovering petrified wood plus eight pairs of long forked metal rods, resembling cotter pins with washers.’

In Reality

It is certainly true that samples found on the site has returned assays of around 90% iron oxides. One of these samples appeared to be roughly in the shape of a right angle and was initially conjectured to be the remains of an iron bracket. Baumgardner (he and Fasold each still possess half of it) now concedes that there is no evidence that it is a man-made item. The notable discovery of iron oxide (limonite) nodules in the surface mud is entirely consistent with the weathering of iron sulphide (pyrite) nodules and veins (which are found in the rocks of the area) and not in any way with the rusting of metallic fittings, brackets or artefacts.

The so-called ‘fossil rivet’ is reported to have been found on June 27, 1991 as witnessed by 12 people, in a gully within 50 metres outside of the ‘wall’ on the western side. Three independent assay laboratories are then cited as the proof of an unusual metal content in the ‘fossil rivet’, which in turn is the ‘sophistication’ one would expect from ‘those who manufactured them’ being ‘technologically advanced’—based on the biblical reference to Tubal-cain being a craftsman in brass and iron (Genesis 4:22).

However, photographs of the object show only an impression that vaguely has the shape of a rivet head. A circular pattern around it has been taken to be ‘washers’ in the rock, but there is no evidence of any embedded metallic object. Furthermore, the assays from all three laboratories returned results consistent with the chemical composition of the major local rock type, basalt.*The only metals present in any major amount were all reported as present in silicate minerals. In two of the three assays all the so-called ‘exotic’ metals were less than the detection limits, while in the third assay the quantities were totally consistent with a hydrothermally altered basalt. (*There were, of course, minor divergences between results, but this is hardly surprising given that at least one of the laboratories gave their results as semi quantitative only, with a plus or minus factor of 50%!)

*There were, of course, minor divergences between results, but this is hardly surprising given that at least one of the laboratories gave their results as semi quantitative only, with a plus or minus factor of 50%!
In other words, the results do not show any evidence of exotic metallurgy. Any proper scientific assessment of this sample must involve a microscope thin section being cut so that the minerals in the sample could be identified and any evidence of metals be subjected to microscopic analyses using an electron microprobe analyses. Such is not possible so long as Wyatt refuses to allow sectioning of the sample and consistently violates proper scientific protocol/procedures for verification.

As for the report of the Turkish archaeologists, finding eight pairs of long forked metal rods, etc., the only source of that story is Wyatt himself. It appears that the Turkish authorities sent in their own teams of scientists in September 1985 after Wyatt and his team had left the site and the country. Wyatt claims to have gone back to Turkey in October 1985 and to have seen the field notebooks of the archaeologists, read them and interviewed the archaeologists. Thus the claim about these long forked metal rods, etc. is only as reliable as Wyatt himself (http://www.answersingenesis.org/articles/cm/v14/n4/special-report-amazing-ark-expose#Wyatt).

On the other hand, Dr Bayraktutan, a leading member of one of these Turkish investigation teams, not only most emphatically does not support this and other claims, but is at pains to dissociate himself from almost all of Wyatt’s claims about the site, expressing grave doubts about how much of Wyatt’s ‘evidence’ actually found its way on to the site.

Rocks with High Manganese Content

It is Alleged That

Rocks found within the formation have a high manganese content and an appearance that suggests that they were probably ‘tailings’/’slag’ from metal smelting/refining production by Noah and family. These rocks are inside the formation because Noah used them as ballast within the Ark.

In Reality

Both Wyatt and Roberts make this claim and back it up with an analysis of a sample by Galbraith Laboratories that returned an assay of 84.14% manganese dioxide on a dry basis. However, no microscope thin section has been produced to show whether the samples collected and claimed to be slag do in fact have the internal texture and mineral composition of a true slag. Until that is done this claim is far from proven.

Roberts has been given the opportunity to have his sample cut and microscopically examined and photographed, but to date has not responded. Morris has rightly pointed out that since the basalts in this area are indicative of lavas that flowed out on to a subaqueous surface then these samples could well be manganese nodules, which even today are found on the ocean floor. Again, a microscope thin section carefully examined would establish this. *(In an interesting twist, Fasold has slammed Morris by misquoting him, then used that to say that he didn’t know the difference between manganese nodules and the iron oxide rich samples that were also collected from the site and analysed at the Los Alamos National Laboratory. On the contrary, it is Fasold who is confused because Morris is referring to these manganese-rich samples collected by Wyatt and analysed by Galbraith.*)
Laboratories. Again, any claim about these samples by Wyatt and Roberts remains totally unsubstantiated until microscopic examination takes place.)

Animal Parts

It is Alleged That

‘Positively identified animal coprolite (fossilized animal dung), animal hair, and ‘animal antlers’ are all reported from the site and are thus further conformation that this site contains the remains of Noah’s Ark, because these are the tell-tale signs of the animals that were aboard with Noah and family.

In Reality

Although we have not been shown these items, only photographs of some, it is nevertheless likely that they have been correctly identified. The animal hairs referred to by Roberts had, he told me, been found in the mud in the sides of the ‘walls’. He said they had been identified by three independent scientists in the United Kingdom as being animal hairs. Roberts also indicated that the small fossilized antler tip (not ‘animal antlers’ as reported in his booklet) was first observed in situ projecting from the mud of the western ‘wall’ of the formation. The object was subsequently identified by two scientists, one a geologist and the other a biologist, as a fossilized deer antler. Furthermore, Roberts references the coprolites as being visually identified by Mackay in 1991.

It should be immediately noted that where locational details have been supplied the items concerned have all only been found in the mud in the walls’ —not from deep within the formation or ‘boat’, as one would have expected. Yet the finding of such animal residues in association with the site is hardly surprising when one considers that animals are likely to have roamed across these Turkish hillsides for thousands of years anyway.

Rock Slabs Near Boat Formation

It is Alleged That

A number of large rock slabs found across the valley within sight of the boat formation are so-called drogue stones which were used to steer or anchor vessels. Their proximity to the site suggests that they could well have been giant anchor stones used by Noah to steer the Ark and keep it facing the wind. The stones have carefully made holes and these would have been where ropes were attached. Furthermore, some of these rocks have eight crosses carved on them, one being larger than all the others, representing an iconographic depiction of Noah, his wife, his three sons and their wives.

In Reality

Wyatt, Roberts, Fasold and Shea all make much of these large rock slabs, with photographs and drawings. They measure up to three metres high and each weighs several tonnes. Wyatt on his video says these ‘anchor stones are made of a type of granite that is accessible in Northern Michigan’, whereas both Roberts and Shea insist that they were cut from basalt, a volcanic rock of which there are copious amounts in the area (both Greater and Lesser
Mount Ararats are volcanoes). Noah would scarcely have used as anchor stones slabs of rock indigenous to the area where the Ark came to rest after the Flood. If we are to believe that these could have been Noah’s anchor stones, then the onus is on Wyatt and his colleagues to prove by scientific means (chemical and isotopic analyses and mineralogical determinations) that these rocks are entirely exotic to this area, which consists of late Flood and post-Flood strata.

Now it is claimed that between eight and ten of these stones have been found in an area 10–14 miles (16–22 kilometres) from the boat-shape formation, although one was reportedly found in a gully 100–200 metres up slope from it. One would think that the considerable distance of these claimed anchor stones from the boat-shape itself must diminish somewhat their significance.*

(*In any case, one wonders why Noah needed such anchor or drogue stones on and with the Ark. They are certainly not mentioned in the Scriptures, where there is in fact no mention of any kind of steering mechanism given in God’s instructions for the building of the Ark. Indeed, we are told repeatedly that God was in total command of the situation. For example, we are told that God shut Noah in the Ark. Then when he and his family were inside the Ark they were totally at the mercy of God Who was providing for their safety in the Flood Waters.)

Wyatt, however, counters by suggesting that as the Ark neared dry land at the end of the Flood, Noah simply cut the ropes leaving the anchor stones behind and allowing the Ark to run aground. This, of course, is mere speculation and implies that Noah had something to do with the destiny and direction of the Ark, contrary to the thrust of the scriptural account. Besides, if these were anchor stones, the holes were carved too near the edges of the rocks. Because of their sheer weight the rock around the holes would have too easily broken off. Indeed, there is no sign of any wear of the rock surface around the top side of these holes, which one would expect if ropes had been tied through them to drag these heavy stones around in the water for up to a year.

In any case, there is a far better explanation for these giant stones. To begin with, the number of crosses on them varies from three to 20, the number eight being conveniently overplayed for the purposes of building a connection to Noah and his family. In Wyatt’s book where he has drawings of some of these claimed anchor stones, one of them is shown with 20 crosses. The same stone is shown photographed in the field by Roberts and Shea, in the latter case with Wyatt himself alongside, and again the 20 crosses carved into it are clearly evident.

Turkish Government Declares Site to be a National Park

It is Alleged That

The special Turkish Commission set up in conjunction with the Ataturk University at Erzurum, to investigate the site, has concluded from evidence to date that this is a huge boat. In 1987 the area was officially declared a National Park by the Turkish Government because they believe that this is not only the landing site of Noah’s Ark, but that it contains
its ‘mortal remains.’ Consequently, a visitors’ centre has been built overlooking the site, and an eight-lane highway is being built to the site.

**In Reality**

The Turkish authorities really began to get interested in this site after the Wyatt team’s August 1985 work, when the team left the site marked out with bright yellow plastic tape in square grids. Evidently, three independent research teams of Turkish scientists were then sent to the site in September 1985. Some digging was done, but no artefacts were found. Two of the teams were from Ankara, and both returned with a negative report.

In Reality

The third team was led by Dr Salih Bayraktutan, a geologist at Ataturk University in Erzurum, Agri Province, the same province in which the site is found. His research team, while not declaring the formation to be a boat, was far more cautious so as to keep its options open, and with good reason. The Governor of Agri Province, Sevkit Ekinci, had by this time set up a local Noah’s Ark Commission with himself as the chairman, and made up of Bayraktutan, the regional director of the central government’s Department for Water Works, the regional director for the central government’s Department of Forests, and three other prominent people from Agri Province.

Bayraktutan is a devout Muslim who is aware that Noah’s Ark is also mentioned in the Koran. As both a member of the Governor’s commission and as the chief research scientist appointed by that commission, he has repeatedly investigated the site, not only in 1985, but also in 1987 and 1988. He has personally informed me most emphatically that as far as he is aware the Governor’s Noah’s Ark Commission has never declared the site to definitely be Noah’s Ark or a boat. Instead, the Commission has said that the site has historical value and should be protected in case there is some object in the mud of archaeological significance. Bayraktutan believes that there are features of the site that still need to be investigated so as to settle the claims and counter claims once and for all. Nevertheless, while he knows Wyatt personally, he is at pains to dissociate himself from almost all of Wyatt’s claims about the site, expressing grave doubts about the claimed artefacts and about how some of Wyatt’s ‘evidence’ actually found its way on to the site.

Wyatt and Roberts, in defense of this claim that the special Turkish Commission has concluded this site to be a boat, have produced a single newspaper clipping which says that ‘a Turkish research team has concurred with a Madison explorer’s claim that the remains of Noah’s Ark are buried on a barren mountainside in Eastern Turkey.’ Two minor Turkish Government officials are referred to as saying the research team’s report agrees with Wyatt that it is the Ark, and that Department of Ministry and Tourism officials were discussing the possibility of declaring a National Park. However, the same official also said that ‘No official confirmation has been forwarded to me yet.’

Interestingly, this report appeared in a local newspaper of Madison, Tennessee, which is Wyatt’s home town. Most of the details in the report appear to have come from Wyatt himself. Neither Wyatt, it seems, nor Roberts when queried has been able to produce copies of reports from any Turkish research team or Government Commission, which even if they were in Turkish could easily be translated. Roberts certainly had not known, before going
public with lectures and literature, of the existence of a 1987 research report in English by Bayraktutan and Baumgardner on their geophysical surveys that year.

It comes as no surprise that the Governor of Agri, reputed to be a friend of Wyatt, was featured on Wyatt’s video as conducting a ceremony on the site to officially declare a National Park and, according to the narrator, announce the Turkish Government’s agreement with Wyatt’s findings that the site contains the remains of Noah’s Ark. This is the same Governor who chairs the commission and who had the visitors’ centre built overlooking the site, as well as a road sign erected directing tourists to the site. The same Governor has consistently vetoed efforts to undertake a dig into the site to settle the issue once and for all (see later).

As if to add credence to his claims of Turkish Government support for the site, Wyatt’s video says that an ‘eight lane multimillion dollar highway is near completion which leads to the site.’ The pictures shown are of the highway into neighbouring Iran, and not the one-lane trail of dirt, rock and mud which tortuously winds its way from the village of Telceker to the site about four kilometres away. There is no eight-lane highway to the site or close to it.

Wyatt’s video ends: ‘Because these priceless remains lie open and unguarded, the government hasn’t made a major announcement yet, but hopefully it won’t be much longer before they’re all secured.’ Years later, we are still awaiting that ‘major announcement’, and the Turkish officialdom that has the power to secure the site and its claimed remains have not done so, nor do they seem willing for outsiders to assist them. One is not surprised to hear that investigators visiting the site in November 1989 found the road sign removed, the visitors’ centre not operating, and sheep grazing on the site as they used to before all the excitement!

Dr Snelling and CSF Have Their Own Interests in This Site

It is Alleged That

Dr Snelling/CSF is opposed to this Durupinar/Akyayla site containing Noah’s Ark because he/she has/have a vested interest in supporting Dr John Morris and the Institute for Creation Research (ICR). Morris/ICR have gained their reputation looking on Greater Mount Ararat for the Ark and thus have a lot to lose if the Ark turns up some where else, as well as being rather peeved if the Turkish Government declared this new area as the site of Noah’s Ark based on the research of ‘an amateur’. CSF would also want to protect Dr Baumgardner so that he can continue to deny that this is the Ark in order to keep his job.

In Reality

Dr John Morris and ICR have always freely given advice and support to other groups looking for the Ark, no matter who. Like all true Bible-believing Christians, they would be ecstatic at the Ark’s discovery, no matter by whom, nor where on the ‘mountains of Ararat’. Greater Mount Ararat itself has been the focus of Dr Morris’s search purely because the consensus among historical eye-witness reports of those who claim to have seen the Ark is that the remains were seen on that mountain, even though none of them is able to pinpoint the exact location.
As for Dr Baumgardner, his job at the Los Alamos National Laboratory right from the outset (which was seven years prior to his first trip to Eastern Turkey) allowed him the time to work on geophysical modeling of the earth’s interior processes as they might relate to the Noah’s Flood catastrophe. For similar research he received his Ph.D. at the University of California in 1983. His research at this laboratory continues while he is openly an internationally respected creationist scientist, presenting papers at the 1986 and 1990 International Conferences on Creationism. It is Dr Baumgardner’s achievements in his research work that protect his job, not any (alleged) denial of his creationist beliefs or his (actual) repudiation of his early cautious enthusiasm for Wyatt’s claims.

My/CSF’s interest in these claims about the Durupinar/Akyayla site has only ever been in order to establish their truth or otherwise. After all, false claims made by professing Christians are shameful to the name of Christ. Surely the public claims made by Christians about this site should be able to stand up to rigorous scientific investigation? Yet those who have endeavoured to test these claims scientifically in the past have since had their motives questioned and their characters smeared by some proponents of this site. My/CSF’s opposition then to this site is because when all the so-called evidence is put under rigorous scientific scrutiny it fails utterly.*(Highlighting our concern and the need for Christians to be fully informed is the discovery that at least one major cult has begun advertising these claims to attract new followers via public meetings.)*

If it is Not the Ark of Noah, Then What is it?

In 1987 Bayraktutan and Baumgardner, with a suitably qualified team (including Fenner), conducted systematic, detailed geophysical surveys of the type routinely used by mining companies, involving sophisticated instruments in order to find out what is below the ground surface. They completed a magnetometer survey, the instrument involved not only being capable of detecting shallowly buried magnetic/metallic objects, but also scanning deeply through the surficial cover into the bedrock below. This was followed up with a comprehensive ground-penetrating radar survey that systematically covered the whole formation from north to south along grid lines spaced two metres apart. In the time remaining the team completed three seismic survey lines longitudinally north-south to cover the entire length of the formation.

The data from this drilling, and from these and other surveys, combined with geological mapping and sampling by these and other scientists, enables the conclusion to be made that this site has a perfectly reasonable natural geological explanation.

To begin with, contrary to the views expressed publicly by those who have lampooned Roberts here in Australia, the central outcrop within the formation on its western side is not an intrusion of igneous rock such as granite or one of its equivalents. Rather, the rock is a limestone that contains abundant microfossils (such as the tiny shells of the microscopic
marine creatures called foraminifera), and a further less prominent outcrop of the same rock type occurs some metres to the north on the easterly side of the formation.

The same rock unit can be traced in a line, though offset in places, to the east and west of the formation, including an outcrop just outside the so-called visitors’ centre. This bed of fossiliferous limestone thus cuts right across the formation in an east-west direction and appears to dip steeply to the south. This can hardly be a rocky protrusion on which a ‘boat’ brought down by the surrounding mudflow from a higher elevation became snagged or impaled, as some (e.g. Roberts) would have it. On the contrary, this limestone bed is an integral part of the local geology and because it comes to the surface right across this boatshape the latter, obviously, cannot be a petrified wooden boat.

The other rock type on the site, and which predominates in the surrounding area, is basalt, a rock that is produced by the cooling of molten lavas that have flowed from volcanoes, such as Greater and Lesser Mount Ararats. In the local area, including on Greater Mount Ararat, the basalt has features that are evidence of it having cooled on the ocean floor (that is, under water). While there appears to be no outcrop of basalt within the boat-shape formation, there are numerous basalt boulders on the surface, half-buried in the surface mudflow material, and also buried and later exposed in the hardened mud which makes up the formation’s ‘walls’. Indeed, because of the appearance of some of these boulders in the mud, to the untrained eye they could easily be mistaken for petrified wood, as appears to have been done. Yet every sample from the site that others have suggested might be petrified wood has under the microscope always been basalt.

The magnetometer survey produced absolutely no evidence of any buried metal artefacts, regular patterns or ‘iron lines’. But it did clearly show the presence of three rock units trending east-west across the formation under the surficial mudflow material, plus the presence of a fault trending north-south right down the centre. Indeed, the fault has quite clearly offset the central fossiliferous limestone bed, which is also evident from the outcrops already mentioned above. The ground-penetrating radar scans also pinpointed this fault, particularly in the northern part of the boat-shape. In the same area the radar picked up a clear sub-horizontal reflector, representing a rock boundary at a depth of between six and eight metres below the centre-line ‘hump’ within the formation. The seismic surveys confirmed the presence of that rock boundary, and suggested that it was at a shallow depth in the central portions of the boat-shape.

Finally, the drilling intersected basalt at between six and seven metres depth in the northern portion of the boat-shape, exactly the depth predicted by the radar and seismic work, and exactly the rock type predicted by the magnetic response in the magnetometer survey and present in the mudflow material as boulders at the surface. In the southern portion of the boat-shape the drilling intersected a different rock type, as indicated by the magnetic response in the magnetometer survey, which was very strongly deformed and strongly folded. Between these two drill-intersected rock types is the fossiliferous limestone outcrop, making up the third rock type cutting across the site, as predicted by the magnetometer survey.
The significance of these drilling results should not be lost. Whereas the investigation team were hopeful that the reflector indicated by the radar and seismic surveys was in fact the petrified wood of the deck of the Ark, the drill intersections of solid basement rock below the surficial mudflow and weathered material immediately ruled out any petrified Ark or its remains within this site. Indeed, if this site had contained the Ark one would have expected the ‘boat’ to have not only been covered in with all this mudflow material, but full of mud inside, so there should not have been any basement rock intersected before the bottom of the conjectured ‘hull’ structure was reached.

Then how could this rather convincing looking boat-shape have been produced by natural means at this site, and how is it that it was only recently exposed to view? To answer these questions we need to look at the broader perspective. The boat-shape is situated in a sloping valley and is surrounded by deposits of loose soil and crushed rock which is slowly sliding down hill, flowing much as a glacier flows—a mudflow. As we have seen, the stable area around which this mudflow material flows is an uplifted block and erosional remnant of basement rock, including limestone and basalt. Just as water flows around a rock in a river bed, the site has acquired a streamlined shape due to the dynamics of the slowly flowing mud.

However, added to this is the fact that not only have the geophysical surveys revealed a fault right down the north-south centre-line of the boat-shape, but geological mapping indicates that there is a fault right along the western edge of the boat-shape and other faults in the valley floor. It is thus significant that this boat-shape first came into view as a result of an earthquake in 1948, and then its relief compared to the surrounding terrain was enhanced as a result of a further earthquake in 1978.

This clearly implies that the earthquakes caused ground movements in this area which pushed up this block of basement rock and some of the mudflow material draped over it. Some of this movement occurred along the fault down the western margin of the boat-shape, thus giving the almost near-vertical ‘walls’ which now define so graphically that portion of the outline of the boat-shape. Thus the ‘walls’ at this point are really what are known in geological terminology as fault scarps (that is, cliffs caused by earth movements along faults).* (*A fuller treatment or the technical details and results from these geophysical surveys, the core drilling, and the geological sampling and mapping is planned for a future issue of the Creation Ex Nihilo Technical Journal.)

So there is no mystery about this site and its boat-shape. For the many who had their hopes built up that this may be Noah’s Ark, it needs to be kept in mind that the Bible in no way says that Noah’s Ark would be preserved as a witness to future generations. Nevertheless, it certainly would be an exciting and powerful testimony to an unbelieving world for the Ark to be found, but if that is to happen it will be unmistakably God’s doing in His time and in His way to bring Him the glory. In the meantime, as Christians we need to always exercise due care when claims are made, no matter who makes them, and any claims must always be subjected to the most rigorous scientific scrutiny. If that had happened here, and particularly if the scientific surveys conducted by highly qualified professionals using sophisticated instruments had been more widely publicized and their
results taken note of, then these claims would never have received the widespread credence that they have.

There is an enormous amount of evidence for creation and the Flood, so we don’t need the Ark to be discovered in that sense. Also, the opposition to that evidence and to the clear teaching of the Scriptures, Peter reminds us, is because scoffers are ‘willingly ignorant’ (2 Peter 3:3-7)—it is a spiritual issue. As Christians, we need to do as 1 Thessalonians 5:21 states: ‘Prove all things; hold fast to that which is good.’

The People Involved

Ron Wyatt

A nurse anaesthetist from Madison, Tennessee, Ron is a self-styled ‘biblical archaeologist’ who claims to have found virtually every archaeological site of interest to Christians. His alleged ‘finds’ are nothing short of astonishing and include:

- The true site of the crucifixion
- The Ark of the Covenant
- The true Mount Sinai (with a plaque announcing it as such)
- The site of Korah’s earthquake
- The true site of the Israelites’ Red Sea crossing, also with a marker ‘built by King Solomon’ as a memorial
- Chariot wheels from Pharaoh’s drowned army
- The actual rock Moses struck to release water
- Noah’s Ark (the site discussed here, for which he has been the prime promoter)
- Noah’s grave
- Noah’s house
- Mrs Noah’s grave (containing a fortune—her gold and jewelry)
- Moses’ stone tablets containing the Ten Commandments, held together with golden hinges.

There are more claims like these. Could Ron Wyatt have found and solved problems that have baffled professional archaeologists for more than a century, or is there another explanation? Ron invariably has an ‘explanation’ of why he can’t direct others to see all this hard evidence for themselves at these sites’. His occasional seemingly convincing ‘documentation’ (including video-tape) repeatedly withers under independent scrutiny.
David Fasold

A former merchant navy officer and reputed to be a marine salvage expert, David Fasold worked with Wyatt and his team in 1985 and 1986, but then parted company. As he says, ‘Today, about the only thing Wyatt and I can agree upon is that these are the Ark’s remains.’ Fasold believes that the Ark was made of reeds held together by cement. He is reported as saying that originally he was a fundamentalist Christian, but has since lost all faith in Christianity. He is now openly hostile to literal belief in the Bible and apparently believes in several ‘floods’. [Ed. note: Fasold died in 1998.]

Dr Allen Roberts

With an academic background in history and Christian education, Allen Roberts first became interested in the site in 1960, but didn’t visit it until 1990. While attempting to visit the site again in 1991, both he and Wyatt were kidnapped with three others and held for three weeks by Kurdish guerrillas, an event which brought much media attention. An Australian organization called Ark Search formed around Allen to help raise funds for him to go back to Turkey and conduct a full-scale archaeological dig at the site with Wyatt. In the first half of 1992 he conducted a public lecture series around Australia which again drew much media attention. Yet, while obviously sincere, it appears that Allen has taken much of the evidence merely on Wyatt’s say-so, unaware of the results of the 1987–1988 geophysical surveys and core drilling, for example.

John Mackay

A former school science teacher (and one-time editor of the Creation Ex Nihilo magazine), John has, while disclaiming complete commitment, persistently and widely marketed the Wyatt video, by mail and at his own public meetings. He has negotiated with Ark Search to also market a video of Allen Roberts’ lecture. He is credited by Roberts as having identified a specimen as coprolite (fossilized animal dung), as well as having visually ‘positively identified’ the so-called laminated petrified wood sample as ‘pecky cypress’. John has visited Wyatt, evidently twice, at his home and states that he has been invited to join Wyatt’s next expedition. Trading (with his spouse) as Creation Research Centre he has actively publicized Wyatt’s evidence (e.g. the ‘fossil rivet’) and defended Wyatt’s ‘Ark’ claims in his newsletter.

Sevkit Ekinci

Governor of the Turkish Province of Agri and reputed to be a friend of Wyatt, he is the Chairman of the provincial Noah’s Ark Commission whose research team was the only group to return a cautious open finding on the site (the two others were negative). He was the one to declare the site a National Park with archaeological significance and who had the visitors’ centre built there. One would think that if he really believed the site contains the remains of Noah’s Ark he would have authorized a dig years ago, but he has a number
of times intervened to stop a dig. He and others may not want to run the risk that excavation shows it not to be the Ark, and thus have no further tourist potential.

**Dr William Shea**

Formerly Professor of Old Testament at Andrews University, Berrien Springs, Michigan, he is now Associate Director of the Biblical Research Institute in Silver Springs, Maryland. He has promoted interest in the site, drawing attention to it in articles published in the Creation Research Society Quarterly, Origins and Archaeology and Biblical Research. He finally visited the site in 1986. While intrigued by the boat-shape, he has no faith in Wyatt’s claims about artefacts from the site, and once received a ‘petrified wood’ sample from Wyatt which turned out to be basalt. He totally dissociates himself from all of Wyatt’s other claimed archaeological finds, and appears not to trust Fasold. He indicates he would be equally happy if the site was confirmed as a natural geological formation, which he concedes is certainly suggested by the evidence.

**Tom Fenner**

Geologist/geophysicist/applications engineer with Geophysical Survey Systems, Inc., who originally went to Turkey to do radar scans on the site for Wyatt in 1985, and who is often quoted as concluding from Wyatt and Fasold’s 1986 radar survey that the site is a man-made boat. However, he eventually went to the site with Baumgardner in 1987 to conduct his own full-scale radar survey with equipment he has professionally used in various parts of the world for many years. He says, ‘With the available scientific evidence to date, my opinion is that any statements claiming the authenticity of this site as Noah’s Ark or it being a man-made formation by individuals knowledgeable of these studies is at best wishful thinking and at worst an outright deception.’

**Dr John Morris**

With a Ph.D. in Geological Engineering and Administrative Vice-President of the Institute for Creation Research, San Diego, John has made 13 trips to Turkey in search of the Ark. He has twice visited this Durupinar site and come away convinced that it is not the Ark. His attention understandably has been focused on Greater Mount Ararat because of all the eyewitness testimonies. He has freely given advice and support to other groups, no matter where they wanted to search in the area.

**Dr Salih Bayraktutan**

Geologist and Director of the Earthquake Research Centre at Ataturk University, Erzurum, and a member of the Noah’s Ark Commission of Agri Province, he has repeatedly investigated the site since 1985, including geophysical surveys and core drilling in 1987 and 1988 in a joint project with Dr John Baumgardner and others. He has cautiously kept his options open, but has definitely not concluded the formation to be Noah’s Ark. He disputes such claims made by others, suggesting that not only are they are exaggerating, but some have even used false samples.
Dr John Baumgardner

With a Masters Degree in Electrical Engineering and a Ph.D. in Geophysics from the University of California (L.A.), John works in the Theoretical Fluid Dynamics Research Group at the Los Alamos National Laboratory, New Mexico. John was quite positive about the site after his initial visits there with Wyatt, but after conducting professional geophysical surveys there in 1987 and 1988, and particularly after considering what the core drilling revealed in 1988, he eventually very definitely changed his mind and now is convinced that it is a natural geological formation.

Information Sources


▪ Morris, Dr John D.-face-to-face conversations, April 1992


▪ Roberts, Dr Allen S., 1992. Documents openly shared from his evidence files at a witnessed personal meeting on June 11, 1992, including the various laboratory reports on rock samples and assay results, plus the Madison, Tennessee newspaper clipping.


- Wyatt, Ron, 1991(?). *Noah’s Ark Found?*. Video produced by Wyatt and others and distributed in Australia by Mackay.


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Digging Deeper Links for

The Black Sea Flood

http://creation.com/the-black-sea-flood

The Black Sea flood
Definitely not the Flood of Noah

By Tas Walker

Widely publicised claims have been made in the scientific and popular media that scientists have found positive proof for Noah’s Flood at the edges of the Black Sea. Details of the find are examined and the claim compared with the record of Noah’s Flood in the Bible. The geological finds in the Black Sea suggest that the water rose some 150 m relatively quickly to the present sea level several thousand years ago. However the claim that this represents Noah’s Flood is unfounded speculation and wrong. Not one characteristic of this Black Sea flood matches the Flood of the Bible. The evidence is consistent with a local post-Flood catastrophe around 1650 BC at the close of the Ice Age.

Lately it seems the scientific world has developed a passionate interest in Noah’s Flood. The BBC archaeology and anthropology network produced a television documentary on it in 1996.¹ New Scientist featured Noah’s Flood on its cover in 1997.² The discoverer of the wreck of the Titanic, Robert Ballard, headed up an expedition funded by National Geographic to ‘prove to ourselves that it was the biblical flood’.³ In 1999, a lecture tour across Australia was sponsored by the Australian Geological Society on the geological evidence for the Flood.⁴ Noah’s Flood has been featured in scientific journals,⁵ newspaper stories⁶ and internet reports.⁷

This is surprising considering these sources are usually sceptical of the Bible and disparage creationists who accept literally the Genesis record of Noah’s world-wide flood. Why the sudden change of heart?

Some Christian commentators are viewing these reports positively, seeing them as dramatic new evidence that supports the Bible.⁸ One church in Brisbane (Australia) encouraged members to attend the Geological Society lecture, expecting that it would provide good faith-building material. However, to such enthusiastic Bible-believers, some more cynical commentators have warned, ‘before they break out the non-alcoholic champagne to celebrate, they should know that the two scientists see no evidence for a world-wide deluge in line with a strictly literal reading of Genesis 7.’ ⁹

The two scientists in question are geologists Bill Ryan and Walter Pitman of Lamont-Doherty Earth Observatory in New York, who have published evidence for a large local flooding of a huge area around the Black Sea (Figure 1).¹⁰,¹¹ What has made the news is their linking this local flood to the record of Noah’s Flood in the Bible. This is the conjecture that has caught
the attention of the scientific and popular media. Let’s have a closer look at the claims surrounding this speculation.

An abrupt drowning of the Black Sea?

Ryan and Pitman have assembled an array of impressive evidence that the Black Sea may have filled rapidly thousands of years ago. It had become evident from numerous investigations of sediment cores from the Black Sea shelf and the Azov Sea that the Black Sea was once at least 110 m below the present surface level. The shallow shelves (Figure 1) were dominated by wind-blown loess\textsuperscript{12} deposited during the Ice Age, indicating that they were exposed to the atmosphere. It is clear from the alluvium (sediment deposited by water) that the present rivers flowed hundreds of kilometres beyond their existing mouths across the shelf to the shelf edge. Furthermore, there is evidence of a littoral (beach) zone toward the shelf edge indicating a shoreline of an ancient lake.\textsuperscript{10}

![Figure 1](image)

Evidence that the Black Sea rose rapidly to around its present level emerged from a joint Russian-US expedition in 1993 that surveyed two areas of the shelves (rectangles in Figure 2).\textsuperscript{10} If the sea level had risen slowly over thousands of years, then the rivers would have deposited a wedge of sediment on the shelves as the shoreline gradually transgressed across the land. However, core samples and seismic images of the layers of sediment revealed a thin, uniform drape of fine, soft mud over the entire shelf, consistent with a sudden rise in water level (Figure 3).

The strata below the mud layer were truncated by erosion, well compacted, and contained abundant leafy plant material, freshwater shells, cracks, and roots, suggesting a coastal marsh environment adjacent to a freshwater lake. A thin layer of shell hash was present between the mud and the underlying strata. This hash was composed entirely of bleached
fragments of freshwater shells similar to species alive today in the fresher parts of the Azov, Caspian and Aral Seas and in river mouths in the area. The uncorrected $^{14}$C ‘ages’ of the shells from the lower consolidated strata and the hash ranged from 14,700 to 8,250 years before present (ybp). The ‘ages’ of shells in the upper mud layer were much younger, clustering around 7,150 ybp.

All this suggests that in the past, the Black Sea was an isolated freshwater lake at least 110 m below its present level. The shelves were former terrestrial flood plains with meandering rivers, coastal deltas, coastal marshes and wave cut beaches. At 7,150 ybp (uncorrected radiocarbon ‘age’), there was a sudden rise in water level submerging the former broad land surface by saltwater.

Ryan et al. linked the catastrophic filling of the Black Sea with changing sea levels toward the end of the Ice Age. Water from melting ice sheets to the north flowed into the Black Sea, which was isolated from the Mediterranean by a land ridge across the Bosphorus. Continued melting of the world’s ice sheets raised the level of the Mediterranean until it eventually topped the Bosphorus, gushing catastrophically into the Black ‘Lake’ and rapidly turning it into a salty sea. In the process, the force of the cascade excavated the flow channel through the easily eroded bedrock. Indeed, they argued that these channels are so deep that they could only have been eroded by rapidly flowing water. Every day, more than 50 km$^3$ of water gushed through the channel, inundating a couple of kilometres of Black Sea shoreline. The rate of advance of shoreline would have been less in areas of higher relief.

The permanent submerging of some 100,000 km$^2$ of exposed continental shelf would obviously have displaced the inhabitants of the area. The suddenness of the inundation meant that dwellings would have been abandoned and significant populations needed to find alternative home. Ryan et al. speculate that this event may have accelerated the dispersal of human populations into Europe.

The search for settlements

If the level of the Black Sea had risen rapidly and people were displaced in days and weeks, then some signs of human habitation may still exist beneath the water. The idea of a sudden inundation of the Black Sea has captured the imagination of a number of archaeologists already working in the area and they subsequently incorporated the search for ancient habitations into some of their projects. Evidence for human habitation would include hearths, pottery and other artefacts. It may even be possible to find building material such as mud bricks, provided these could have survived millennia beneath the water. Near the ancient shoreline people may have left behind mounds of clamshells.

In July 1999, Robert Ballard explored the coastal waters of the opposite side of the Black Sea in the vicinity of Sinop, Turkey (Figure 1). David Mindell had previously reported ‘shapes that are too large for a shipwreck and too regularly shaped to not be manmade’. $^{13}$ These were detected by side-scan sonar dragged from a hired fishing vessel in waters 60 to 80 m deep. Unfortunately, the subsequent search for these targets in 1999 failed to record anything significant—in spite of having four boats loaded with remote-
sensing equipment, including side-scan sonar and remotely operated vehicles (ROVs) to relay images from the bottom.\textsuperscript{14,15}

In deeper water some 37 km offshore from Sinop, Ballard claimed to have located what he believed to be the ancient shoreline of the freshwater lake some 155 m below the surface as postulated by Ryan and Pitman. Based entirely on a sonar image of the sea floor, he described the profile as 'the classic beach profile: The flat shore area, the beach berm leading down to the old water level, and a sand bar just offshore. It looked like any beach, anywhere on Earth—except it was under 550 feet of water!' Not a bad description from a sonar image!

Unfortunately the expedition found no conclusive evidence of human habitation at this site either. Due to choppy waves and strong currents, the ROVs were unable to record anything on the sea floor.

Nevertheless, a black pebble and some mud were collected from the exterior of the ROVs as they were hauled on board. In addition, some sediment samples were dredged from the area, consisting either of finely textured grey mud or sea shells. Some waterlogged wood, charcoal (possibly), and a shard of obsidian were also collected. Altogether seven species of saltwater molluscs were identified and yielded \(^{14}\text{C} \) ‘ages’ ranging from 2,800 to 6,820 BP. Two species of extinct freshwater molluscs were identified, similar to species found today in the freshwater Caspian Sea. These yielded much older \(^{14}\text{C} \) ‘ages’ ranging from 7,460 to 15,500 BP.

In the final analysis, the expedition added very little to the previous geological findings on the opposite side of the sea. It confirmed that the bottom of the Black Sea in the Sinop area is also covered with a layer of wet, soft mud, and the waters changed from fresh to saline some 7,000 \(^{14}\text{C} \) BP. Unfortunately the expedition found no evidence for human habitation beneath the waters of the Black Sea, but a further expedition is planned in 2000.

\textbf{Proof of Noah’s Flood?}

Now, in real life, claims need to be justified. We can’t even use a credit card until we prove who we are. Banks want our signature because its unique characteristics are easily recognised. They want to be sure they have identified us correctly.
So too, we need to be sure that Ballard, Ryan and Pitman have identified Noah’s Flood correctly. Of all the floods in the world, how would we recognise Noah’s Flood? We need to compare their signatures. And the Bible is the only place where the signature of Noah’s Flood is found. Unfortunately, when it comes to signatures, Ryan and Pitman have not carefully matched their characteristics with the Bible. Carelessly, they have given credit where it is not justified.

Ryan and Pitman thought the Black Sea flood was Noah’s Flood because it was very large, overwhelming some 100,000 km² of land the size of Texas. But large as this was, it was still only a local flood in the Black Sea area, not the world-wide Flood described in the Bible (2 Pet. 3:6–7).

The biblical flood was so huge that it covered the then highest mountains (Gen. 7:19). But the Black Sea flood simply raised the local water level some 150 m to where it is now. Not even the ‘known’ world was submerged because there was still plenty of dry land left to live on in the area. Even to cover the nearby Krymskiye Gory mountains on the adjacent Crimean Peninsula, the water level would need to have risen a further 1,500 m. The Black Sea flood was not Noah’s Flood, because it did not cover the highest mountains.

And missing from the Black Sea flood is Noah’s Ark—that colossal ship described in the Bible, 140 m long, 23 m wide and 14 m high (Gen. 6:14–16). Ryan and Pitman, aware of this omission, suggest that there were hundreds of arks—thrown together in a few minutes by local farmers ripping their post huts apart to build puny boats to escape the rising waters!¹⁶ But why would they have needed boats at all? With waters rising each day at 15 cm, and creeping only a couple of kilometres across the land, they could have escaped at a leisurely stroll.

Because the waters rose so slowly, Ryan and Pitman say the people would have had plenty of warning. Once the farmers realised the water was not going to subside they would have built boats to escape.¹⁶ Wasn’t Noah warned about the Flood? Voilà, the Black Sea flood matches! Not at all. The Bible does not say Noah was warned by rising water levels. No, God warned Noah years before there was any sign of a flood (Gen. 6:13–14). Anyway, rising water levels would not have given sufficient time for Noah to build the huge Ark and load the animals. The warning that Ryan and Pitman make so much about does not match the warning in the Bible.

With a local flood there would have been no need to save the animals and birds as the Bible records (Gen. 6:19–21). The idea of birds being threatened by the Black Sea flood is ludicrous because they could easily have flown out of the way. As for the animals, most would have migrated out of the area as the waters slowly crept onto the land. Even if some animals drowned, no species would have been threatened with extinction because other
individuals would have lived outside the inundated areas. The Black Sea flood was not Noah’s Flood, because it did not destroy all the animals and birds as the Bible describes.

Neither did the local Black Sea flood drown the people in the area—they were simply displaced from the land. Ryan and Pitman suggest that many of these displaced people migrated to Europe. But, the Bible clearly states that everyone outside the Ark perished, and ‘only Noah was left and those with him on the ark’ (Gen. 7:23). The Black Sea flood was not the Flood of the Bible, because the people were not destroyed.

Nor does the source of water match. For the Black Sea flood, the water gushed sideways through a localised channel, but for the biblical Flood the water came from the fountains of the great deep and the windows of heaven—below and above (Gen. 7:11–12).

The Black Sea flood does not match the record in the Bible. Not one characteristic agrees.

And the Black Sea flood did not go down—that is why there are plans to look for settlements under the water. But the biblical flood receded off the earth while the Ark and its cargo rested on the Mountains of Ararat (Gen. 8:3–4). It was two months before Noah could see the nearby mountains emerge (Gen. 8:5) and another four months before the whole earth was dry enough to unload (Gen. 8:13–14). The Black Sea flood was not Noah’s Flood, because the flood waters have not receded.

So, the signature of the Black Sea flood does not match the record in the Bible. Not one characteristic agrees. The differences are so great that we wonder why the proposal has been entertained at all.

How do they support their claim?

Ryan and Pitman know that their link between their Black Sea flood and Noah’s Flood does not fit with the Bible. So, how do they justify their claim? Simple. They say that the Bible got it wrong. Their Black Sea flood was the real flood. The biblical record is a poorly assembled compilation of the flood legends that arose from their Black Sea flood. They claim it was their flood that was burned into the memories of surviving generations and recounted by word of mouth for thousands of years. After becoming more and more distorted, the stories were eventually written down. So by branding the biblical record a
‘myth’, they feel justified in disregarding all its details. They simply say that they do not read the Bible literally.

So their link with Noah’s Flood is totally arbitrary. They need a flood, so presto, pluck Noah’s Flood out of the air. It is a good flood to pick, because it sells lots of books. Furthermore, the scientists love it. By saying that Noah’s Flood was a local flood they think they can dismiss the implications of the real global Flood described in the Bible, viz. that God judges human sin.

But even their claim that the Black Sea flood is the basis for the flood legends does not make sense. Almost every culture on Earth includes an ancient flood story. Details vary, but the basic plot is the same. The classic example is the Babylonian epic of Gilgamesh, but there are flood stories among the ancient Greeks, Romans, Chinese and even the Irish. Although a long stretch of the imagination, it may be possible to envisage these legends originating from the Black Sea flood some 7,000 years ago. But what about the flood legends of the American Indians and the Australian Aborigines? The latter supposedly entered Australia 40,000 years ago, some 30,000 years before the Black Sea flood. Was there a good news service in ‘Neolithic’ times that carried the stories ‘down under’? Ryan and Pitman’s explanation cannot even account for the flood legends. It makes more sense that all the legends are corrupted memories of the true, world-wide Flood of Noah, as recorded in the Bible.

What really happened?

If we accept that the Black Sea flooded towards the end of the Ice Age, we can link it with biblical chronology and the true history of the world. There is a good case for the Ice Age being post-Flood. Ussher’s chronology places the Flood of Noah at 2348 BC, and Oard suggests that the Ice Age took 500 years to reach its maximum and a further 200 years to melt back. (Remember these are estimates only.) Thus, the Black Sea flood occurred after most of the continental ice sheets had melted, thereby raising ocean levels and allowing the Mediterranean to overtop the Bosporus, some 700 years after the Flood.

So, with the Flood at 2348 BC, the Ice Age peak would have been around 1850 BC and the melt back completed by 1650 BC at which time the Black Sea area flooded. The discrepancy between this and the published date of 5600 BC (7,600 years ago) for the Black Sea Flood is because the date of the Black Sea flood is based on 14C analyses.

The problem is that the 14C dates have not been corrected for the increase in the atmospheric ratio of 14C/12C following the Flood. The sudden burial of masses of vegetation changed the balance in the carbon reservoirs on the earth, and equilibrium is still being approached. The corrected 14C dates would agree with the biblical date. Thus, the Black Sea flood is one of many post-Flood catastrophes that have occurred around the world (e.g. Siberian mammoths, Iceland’s mega-flood).
Conclusion

It is clear from the geological investigations that Ryan and Pitman have made a good case for a sudden drowning of the Black Sea Shelf thousands of years ago. The weight of evidence is compelling, even though clear signs of human habitation have not been found beneath the water, as one would expect.

But their claim to have found Noah’s Flood is wrong—nothing but wild, unsubstantiated speculation. Not one of the characteristics of the Black Sea flood match the tell-tale signature of the Flood described in the Bible. And their assertion that the biblical record is just a corrupted version of flood legends derived from their Black Sea flood is both wrong and arrogant. Their claim does not explain how flood legends arose, especially those in places like America and Australia. On the contrary, the flood legends are corrupted recollections of the one-and-only world-wide Flood, the true account of which is faithfully recorded in the Bible.

Rather than Noah’s Flood, Ryan and Pitman have found evidence for a post-Flood catastrophe at the end of the Ice Age around 1650 BC.

Why is there such a great interest in their claim on the part of scientific and popular media? Do they see this as another opportunity to discredit the Bible? Is it a tactical move to get the real Noah’s Flood off the agenda by wrongly identifying it? We can’t really know, but the overwhelming preoccupation with the idea that Noah’s Flood was a local flood in the Black Sea area is curious.

So, the claim by Pitman and Ryan to have found Noah’s Flood is wrong. Nevertheless, they have probably sold a lot of books.

**Update October 2002:**
An international research team claims that the sediments in the Marmara Sea indicate there never was catastrophic flooding of the Black Sea (http://creation.com/black-sea-flood-may-evaporate-completely)

**Related Articles**

- Claim Robert Ballard discovered Noah’s Flood in the Black Sea is not correct (http://creation.com/Robert-Ballard-did-not-discover-Noahs-Flood)

**Further Reading**

- North Sea Megaflood (http://creation.com/north-sea-megaflood)

- Megaflood origin of Box Canyon, Idaho, and implications for sapping erosion (http://creation.com/box-canyon-megaflood)

**References**


12. Loess is a fine-grained deposit that sits like a blanket on underlying strata. It is generally buff coloured, loosely coherent, and without stratification.


20. Oard, Ref. 18, pp. 128–133.


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Digging Deeper Links for


Was Noah’s Flood Local or Global?

http://creation.com/noahs-flood-covered-the-whole-earth

Noah’s Flood covered the whole earth

Many Christians today think the Flood of Noah’s time was only a *local* flood, confined to somewhere around Mesopotamia. This idea comes not from Scripture, but from the notion of ‘billions of years’ of Earth history.

But look at the problems this concept involves:

If the Flood was local, why did Noah have to build an Ark? He could have walked to the other side of the mountains and missed it.

If the Flood was local, why did God send the animals to the Ark so they would escape death? There would have been other animals to reproduce that kind if these particular ones had died.

If the Flood was local, why was the Ark big enough to hold all kinds of land vertebrate animals that have ever existed? If only Mesopotamian animals were aboard, the Ark could have been much smaller.¹

If the Flood was local, why would *birds* have been sent on board? These could simply have winged across to a nearby mountain range.

If the Flood was local, how could the waters rise to 15 cubits (8 meters) *above* the mountains (Genesis 7:20)? Water seeks its own level. It couldn’t rise to cover the local mountains while leaving the rest of the world untouched.²

If the Flood was local, people who did not happen to be living in the vicinity would not be affected by it. They would have *escaped God’s judgment on sin*.³ If this happened, what did Christ mean when He likened the coming judgment of all men to the judgment of ‘*all*’
men (Matthew 24:37–39) in the days of Noah? A partial judgment in Noah’s day means a partial judgment to come.

If the Flood was local, God would have repeatedly broken His promise never to send such a flood again.

Belief in a world-wide Flood, as Scripture clearly indicates, has the backing of common sense, science and Christ Himself.

References and notes


2. Note that the Bible talks about mountains rising (in connection with God’s rainbow promise, so after the Flood): see CEN Technical Journal 12(3):312–313, 1998. Everest has marine fossils at its peak. Therefore, the mountains before the Flood are not those of today. There is enough water in the oceans so that, if all the surface features of the earth were evened out, water would cover the earth to a depth of 2.7 km (1.7 miles). This is not enough to cover mountains the height of Everest, but it shows that the pre-Flood mountains could have been several kilometers high and still be covered.

3. Some ‘progressive creationists’, who cannot accept a global Flood because of their commitment to millions of years for the ages of fossils, try to promote belief in a ‘universal’ Flood. This leads many unsuspecting evangelicals to think they believe in a world-wide Flood, but what they mean by this is that even though it was a local flood, all humanity outside of the Ark perished in it. However, it boggles the mind to believe that after all those centuries, no one would have migrated to other parts. Or that people living on the periphery of such a local Flood would not have moved to the adjoining high ground rather than be drowned.

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Summary

Any scientific understanding of the Biblical Flood must address the hydrology and sedimentation that occurred during the Flood and in subsequent years as the Earth settled down. A number of scientific models previously proposed for the Flood are summarised and assessed. Further progress will require an integrated approach from many scientific disciplines. As well as the traditional contribution from the geological sciences, coordinated inputs from a number of other disciplines will be needed such as fluid flow, heat transfer, plate tectonics, vulcanology, planetary astronomy, and mathematics, in order to build a possible Flood hypothesis. Any model for the Flood can only be speculative. A coordinated approach will impact current Flood models that have accepted the sequential nature of the geological column and that have put the Flood/post Flood boundary far down in such conjectural reconstructions.

Introduction

Traditionally, for scientists operating from an evolutionary premise, the geological sciences have provided the chronological framework to allow other scientific disciplines to place their data in an historical context. The main principle of uniformitarianism has motivated research into present geological processes so that rocks these scientists regard as ancient can be interpreted in terms of such processes. In the last thirty years there has been a major shift in thinking amongst evolutionary geologists with the development of plate tectonics—all modern geological processes are now seen as part of a global interaction of plate tectonics, which itself has been adopted as the interpretative geological paradigm.
By contrast, scientists working from a creation perspective view all significant geological events within a Biblical chronological framework. Nevertheless, there is still a need for scientific models of these events because the Biblical record is not exhaustive, nor is it intended as a scientific treatise. In particular, creation scientists need to understand the Biblical Flood by addressing the hydrology and sedimentation that occurred during the cataclysm and in the subsequent years as the Earth settled down. Modern geological processes, while instructive, do not have the same standing as for long-age uniformitarian scientists. This is because geological processes during Creation and the Flood were different from what we observe today. So creationists have a greater need to develop an integrated approach from many scientific disciplines. As well as the geological sciences, inputs from many other disciplines are needed, such as fluid flow, heat transfer, plate tectonics, vulcanology, planetary astronomy, and mathematics. In this paper we summarise the current state of a number of scientific models that have been proposed to describe the world-wide Flood and to integrate our understanding of science from the Biblical perspective.

The vapour canopy model

The vapour canopy model of the Flood is the one that has held greatest sway in scientific creationism since serious research began in the 1960s. The book *The Genesis Flood* by Whitcomb and Morris,¹ first published in 1961, and Whitcomb’s later *The World that Perished* (1996) explain this view.² The vapour canopy theory is that the Earth’s atmosphere was surrounded by a water vapour blanket that collapsed at the onset of the Flood. Dillow has extensively explored this concept theoretically.³ This model has led the field for a number of years, but has difficulties in accounting for the large amount of catastrophic upheaval in the Earth at the beginning and through the Flood year.

Catastrophic upheaval is evident, for instance, at the Old Red Sandstone rock formation from Loch Ness to the Orkneys in Scotland where an area 2500 m deep and 160 km across, contains countless fish, buried in contorted and contracted positions, as though in convulsion.⁴,⁵ There is all the evidence of catastrophic burial by processes (it would seem) of greater power than that provided by the vapour canopy theory. Although there may be some substance in these objections to the vapour canopy proposal, it should be noted that this model of the Flood, though it predicts late drowning of creatures by rising floodwaters, should not be regarded as tranquil. Indeed in this model, the rising waters would be
extremely turbulent, and probably involve vast surging tidal waves. Nevertheless it is still difficult to explain the major fossil strata by this method.

Consequently some, such as Garner, Garton, Tyler, and Robinson, object, not only to the vapour canopy model of the Flood, but also (more fundamentally) to the basic premise that the Flood caused most of the fossils. Their objection arises from their belief that the geological column represents a real time sequence (though on a fast time-scale of the one-year Flood followed by many post-Flood disasters). Because there is evidence deep in this geological column that many animals were alive on land, and yet are buried above waterborne sediments, they propose that most of the geological column was deposited after the Flood. Thus, they propose that the Flood removed all trace of land air-breathing creatures and that most of the fossils found on the Earth were buried by post-Flood catastrophes. Known as the ‘European Flood model’, we have sought to show in a companion article that Biblically, this is greatly straining the straightforward meaning of Genesis 6–9. Here we seek to show that to regard the geological column as a true chronological record is at best a questionable assumption. We agree with Froede that there needs to be a complete rethink of how to interpret the geological layering so evident in the rocks. Woodmorappe rightly points out that the way the supposed ten periods are assigned can be quite subjective. In this paper we question whether we really yet have any firm grasp of the way all the strata have been laid down. Even the basic notion that ‘bottom is oldest’ is not proven.

One of the major difficulties raised by Flood models of fossilisation (including the canopy theory) is the problem of dinosaur nest sites within the fossil record. These certainly pose quite a difficult problem to solve in the context of Flood sedimentation.
Garner points out that the eggs are obviously in neat patterns, suggesting that they have to be regarded as *in situ*, and cannot be accounted for by sediments deposited elsewhere and transported in before final fossilisation. Garton shows that there are dinosaur tracks all the way from the Cretaceous to the Tertiary and Quaternary rocks. He concludes that this must be evidence of post-Flood activity. Tyler believes the vast chalk deposits (usually taken to be the crushed remains of marine shells) need decades to form and also concludes that the Cretaceous is post-Flood.

Because of such evidence, critics of Flood fossilisation in general, and the Whitcomb and Morris model of the Flood in particular, have maintained that the Flood/post-Flood boundary is low down in the geological record, in the Paleozoic, as explained by Tyler. (This geological column term is used simply for communication purposes. The order of the strata may well be incorrect for reasons outlined later.) Such critics have maintained that all Flood models which attribute most fossils to the Flood, are incorrect, and propose that the Flood left no trace whatsoever of all air-breathing land creatures—the so called ‘blot out’ theory. In a companion paper, we give important Biblical reasons why fossils are the most natural evidence expected from the Flood. However these authors are right to criticise the vapour canopy model if it does not provide enough sedimentation to achieve such a vast thickness of fossil-containing strata. This is why we discuss other models in this paper, which, we believe, yield a more plausible picture of the Flood year.

The hydroplate model

The hydroplate theory has the advantage of explaining great devastation in the first 40 days. This theory for the catastrophic formation of the sedimentary rock layers during the
Flood has been proposed by Dr Walter Brown (former chief of Science and Technological Studies at the Air War College, and Associate Professor at the U.S. Air Academy).\textsuperscript{18–20}

The main proposal for the origin of the Flood waters is massive catastrophism in the first 40 days of the Flood. (We agree with the European Flood proponents that the initial devastation was exceedingly great, but we dispute that there remains no evidence of the \textit{mabbul} and its effects on creatures in the geological record.) The Brown hypothesis\textsuperscript{18,20} is that the Earth’s crust was fractured (maybe by an impact), releasing vast subterranean waters (the ‘\textit{fountains of the great deep}’) under great pressure into the atmosphere, perhaps as high as 30 km. Brown’s model essentially deals with water, but in the following continental drift phase includes volcanic activity\textsuperscript{21} as a result of the fast tectonic movement caused by the widening rupture in the Earth’s crust. Thus he states:

‘In some regions, the high temperatures and pressures formed metamorphic rock. Where this heat was intense, rock melted. This high pressure magma squirted up through cracks between broken blocks, producing other metamorphic rocks. Sometimes it escaped to the earth’s surface producing volcanic activity and “floods” of lava outpourings such as we see on the Columbia and Deccan Plateaus. This was the beginning of the earth’s volcano activity.’\textsuperscript{22}

Brown states further:

‘Shifts of mass upon the earth created stresses and ruptures in and just beneath the earth’s crust. This was especially severe under the Pacific Ocean, since the major continental plates all moved toward the Pacific. The portions of the plates that buckled downward were pressed into the earth’s mantle. This produced the ocean trenches and the region called the “ring of fire” in and around the Pacific Ocean. The sharp increase in pressure under the floor of the Pacific caused ruptures and an outpouring of lava which formed submarine volcanoes called seamounts.’\textsuperscript{23}

Thus the initial rupture of the Earth’s crust under this view would hurl rocks and sediments in gigantic muddy fountains of water which then lead to intense precipitation (consistent with \textit{Genesis} 7) for the 40 day period. These fountains would eventually be followed by many large volcanic eruptions in the ‘Ring of Fire’ around the Pacific, all with the force of Krakatoa. This volcano exploded in 1883 sending rocks and dust into the atmosphere to a height of 55 km. The explosion was so intense that it could be heard 4,600 km away. Dust
fell at a distance of 5,327 km ten days after the explosion, and a tsunami (tidal wave) 30 metres high travelled right across the Indian Ocean at 720 km/h. Similarly, during the Flood, on top of the water borne sediments, and sometimes mixed with them, vast layers of magma would be poured out or catastrophically exploded into the atmosphere.

The rain in the first 40 days of the Flood involved not only the return to the Earth of the jets of superheated steam ejected into the atmosphere (which would partly fall as hail and snow), but great quantities of rock debris as well. Many fossils could have formed within the first few weeks of the Flood in this model. In the next 110 days, further vast layering, scouring and re-layering of the continents would occur under the ravages of the Flood waters. The final catastrophic drainage of the waters occurred at the end of the continental drift phase when, after massive tectonic upheaval, the land eventually re-appeared as the Earth’s crust found a new equilibrium. It is significant that Genesis 8:3 speaks of the waters ‘returning from off the earth’ (literally ‘going and returning’ in the Hebrew).

Some have criticised the rupture phase of the hydroplate model with its vast quantities of hot steam ejected at enormous speeds into the atmosphere, causing immense rainfall. However, the ‘explosive mixing of water and lava’ targeted by these objections, is very possibly how the ‘windows of heaven’ were opened as described in the Flood account.

Within the context of the hydroplate model, it is entirely feasible that many creatures would flee in vain to survive. We would expect to find fossil evidence of this, such as tracks in mud subsequently covered quickly by sediment. Furthermore, since it was a full year before Noah came out of the Ark, there is certainly room within the Genesis account for some late-Flood and post-Flood disasters as the waters receded. Thus the Grand Canyon may well have been formed when a vast natural inland lake (left behind after the Flood receded) burst its banks and scoured out the canyon. In this process, vast quantities of silt and debris would be carried to the Pacific coast-line. Brown, describing the aftermath of
the hydroplate catastrophe, agrees with Austin that the Grand Canyon formed in this way. The Toutle Canyon was observed to form catastrophically in a similar manner, but on a much smaller scale, after the Mount St Helen’s eruption in 1980. Such catastrophic processes may account for the burrows of small marine creatures in rocks at one horizon, but which are now covered by further sediments.

Catastrophic plate tectonics and runaway subduction

The theory of catastrophic plate tectonics (CPT) was initiated by Baumgardner, and later developed in conjunction with other creation scientists. Reed et al. provide a good review of plate tectonics as interpreted within a catastrophic framework, but make the point in their conclusions that the original driving mechanism behind continental plate displacement and subduction is not known. CPT theory starts with the assumption that the Flood was initiated when slabs of oceanic crust broke loose and subducted along thousands of kilometres of pre-Flood continental margins. It is suggested that subducting slabs of material locally deformed and heated the mantle, locally lowering its viscosity. With lowered viscosity, the subduction rate increased—and this in turn caused the mantle to heat up even more. This, it is argued, led to a thermal runaway instability, and allowed subduction rates of metres per second. Baumgardner shows that rapid, large-scale subduction would furthermore initiate global-scale flow of the mantle beneath the Earth’s crust. This in turn would cause strong convection currents in the Earth’s outer core and explain how geomagnetic reversals took place. Magnetic reversals of course had been thought to have taken place slowly over millions of years on the evolutionary geological timescale. However, the extension by Humphreys of the CPT theory of Baumgardner to account for the Earth’s magnetism gives an underlying cause for the quick reversals. In that evidence for rapid reversals has been discovered in thin lava flows, the magnetic field deductions from CPT theory gives considerable confidence in the theory of continental plate collision and subduction as being a primary mechanism for major global upheaval during the Flood.
It is only recently that the implications of the mathematical modelling of CPT have been successfully understood. It was necessary to solve numerically the stiff partial differential equations governing the behaviour of silicate rock material, taking full account of the large dependence of effective rock viscosity on temperature and strain rate. The highly nonlinear relationship between viscosity and stress implies that the effective viscosity decreases sharply once the material is subjected to a strong shear stress. This liquefying effect increases dramatically as the temperature increases, even though it may only be at 60% of its melting temperature. An important feedback mechanism then comes into play. As the cold upper boundary layer of the Earth’s mantle sinks into the hot mantle underneath (due to the liquefying stress), it heats the mantle locally. This reduces the viscosity even further, thus allowing the plate to sink faster. The two effects (strong shear stress and the peeling away of the upper cool boundary of the mantle) effectively reinforce each other, and consequently thermal runaway begins. As Baumgardner states in his paper:

‘A compelling logical argument in favor of this mechanism [subduction] is the fact that there is presently no ocean floor on the earth that predates the fossiliferous strata. In other words all the basalt that comprises the upper five kilometers or so of today’s igneous rocks has cooled from the molten state since sometime after the Flood cataclysm began.’

He then asks where the pre-Flood seafloor went. The model convincingly suggests the answer that the original sea-floor was catastrophically subducted, so that we now have a relatively new sea-floor—formed as igneous flows from the Earth’s mantle deposited in very thick (five kilometres or so) layers at the bottom of the present-day oceans.

The hydroplate theory previously discussed and CPT are usually regarded as mutually exclusive. But this need not be so. There is considerable room for volcanic activity during
the continental drift phase of the hydroplate theory. The breaking of the Earth’s crust (possibly by an impact) may well have released large volumes of subterranean waters into the atmosphere, and led to the rapid movement of the broken continental plates from the impact centre. Subsequently, a subduction mechanism may then have taken over from the initial catastrophe, driving continuous upheavals in the Earth’s mantle under the seas, and sustaining the disaster for the rest of the Flood year.

The importance of research in sedimentology

Guy Berthault has produced some landmark research into sedimentology. First on a small scale, but more recently on a larger scale, he has studied the deposition of heterogeneous mixtures from flowing water. His results indicate that different sediment layers do not deposit one after the other in a vertical direction, but all at the same time horizontally. Applying these findings to the Grand Canyon, the different layers would have been deposited under strong water currents and laid down horizontally, not vertically. Thus many of the layers of the canyon would have been deposited simultaneously, and do not necessarily represent different periods of time. If proved, this has immense implications for the whole theory of sediment formation world-wide. Clearly we must avoid saying that all sediments were laid down this way. The vast coal seams would be one example of deposition in a non-flowing environment. However Berthault’s sedimentology experiments have overturned previous belief that layers form one after the other in stages. Such surprising results may help us understand why the apparent order of the so-called geological column is reversed in some parts of the world.
Furthermore it is interesting to note that the preliminary results of the work by Baumgardner and Barnette support Berthault’s basic premise. They considered the simplified problem of a shallow, homogeneous and inviscid fluid (water) flowing over a rotating sphere. Their fully transient solution to this problem produced some unexpectedly fast flowing regions of strong cyclonic gyres with velocities of 40–80 m/sec. The effect of such fast flowing currents on deposits of material carried with the water is not yet understood, but this shows that there is a great deal to be done with heterogeneous flows where the shallow water assumption is lifted. Generic studies, both experimental and numerical, are needed.

A method for classifying rock formations without direct appeal to the geological column (with collapsed time-scales) has been proposed by Walker. This method advocates different types of flood formations as the waters rose and subsided. The hydroplate method or Baumgardner’s approach can both be used as possible driving mechanisms for the Flood within such a classification.

A possible Flood fossilisation scenario

It is vital to remember that no one theory is probably entirely adequate to reckon with all the data, but nevertheless, one can speculate about possible answers to perceived problems. For example, Garner has rightly pointed out the difficulty with certain basalt flows appearing ‘late on’ in the supposed geological column. Since these seem to require a sub-aerial environment, one can understand his conclusion that the post-Flood boundary must be earlier than the basalts. Thus with the water drained from the land, the subsequent volcanic activity in the Mesozoic and Cainozoic would be sub-aerial. But if we accept the hydroplate model of the initiation of the Flood, then the first 40 days would involve immense destruction consistent with the Paleozoic (some even include most of the Precambrian) record. The waters of the oceans were still rising, parts of the land were still not covered entirely by water—there may even have been a brief lull. Certainly this is not inconsistent with the account in Genesis 7:17–24. In the next 110 days, immense volcanic upheaval occurred on the land masses, but still not all the land was finally covered. At the same time, upheavals of the land masses were also occurring, so that some of the land that had been covered was exposed, albeit briefly—of the order of weeks. It is conceivable that dinosaur tracks could have been made in this time. Garton rightly points out that these dinosaur tracks go right through the Mesozoic and into the
Cainozoic. Under our scenario, tracks in the Mesozoic are consistent with ground still being available at the late stage of the 150 days. Some tracks may already have been made earlier, just after the 40 days’ initial onslaught, and then pushed upwards when the mountains rose. Similarly, tracks showing no sign of chaotic motion in the Pyrenees in Spain may also be at the late stage of the 150 days, again pushed upwards as the mountains rose. Finally the waters with vast amounts of debris and sediment overpowered these large creatures which, not surprisingly are buried in the same part of the strata as the later tracks and usually ‘higher’ up the column. We do not claim that such a scenario explains everything. There is a vast amount of work still to be done to understand the mechanisms involved. But we suggest that a willingness to expect and look for the unusual is always important for advance in scientific research.

Dinosaur tracks and nests during the Flood?

Egg-laying by dinosaurs in Mesozoic strata, well above what appears to be the initial fossils of marine creatures in the lower strata, challenges the view that most of the fossils were formed by the Flood. Robinson gives further evidence of other apparently in situ fossils including plant roots in the Jurassic as well as marine fossils apparently in situ right up through Cretaceous into Tertiary rock. Robinson argues against the vapour canopy model, stating:

‘The sudden death of the dinosaurs and other animals at the end of the Cretaceous is a phenomenon for which the received Flood model [i.e. the vapour canopy model of Whitcomb and Morris] has no explanation.’

However, the model suggested by Robinson, Garner, Garton and others involving many post-Flood catastrophes gives no real answer either to the sudden death of dinosaurs in the Cretaceous. Their post-Flood fossilisation hypothesis, in our view, becomes a serious scientific problem.

Marine fossils are found high up in mountains in the Alps, often deposited with great violence (as suggested by the Jurassic marine fossils at lower altitude on the North East Coast of Yorkshire near Whitby). The burial of large dinosaurs, by their thousands in Alberta and Montana, South Dakota, Kansas and Colorado with vast continental sedimentation (in some places thousands of feet thick) would not be possible without causing gigantic upheaval in other parts of the Earth. It seems inconceivable that post-Flood disasters could deposit such thick strata without causing violent effects all round the world. The scale,
depth and the sheer number of fossils argues strongly that these must be part of the Flood. Rather than forcing the interpretation of mabbul to mean the removal of all possible evidence of any creatures (the ‘blot out’ theory—to allow suggested post-Flood activity), it seems wiser to question whether we have properly understood the scientific evidence.

In his article, Robinson states that Oard’s post-Cretaceous model for the Flood/post-Flood boundary is ‘not a straightforward interpretation of Scripture’. He argues that the position on the geologic column whereby the Flood killed the dinosaurs is ‘a paradigm constraining the interpretation of Scripture’. However, the alternative position he advocates, of entirely blotting out all animal remains without trace is, in our view, forcing a tenuous meaning on the word mabbul. This and the requirement of post-Flood disasters on a continental scale are leading to a much greater difficulty in the natural interpretation of Scripture.

We suggest that the burial of the dinosaurs by Flood waters is consistent with the evidence. We have suggested, as one option, that the dinosaurs and their nests were buried late in the Flood. Other scenarios could be possible. For example, sea creatures may have been buried by vast submarine landslides, which were then pushed above sea-level in the first few days of the Flood. At the same time, sediments containing dinosaurs buried in the early stages of the Flood may have then been transported only a short distance across the newly exposed submarine deposits. It seems clear that some dinosaurs must have been buried by catastrophic waterborne sediment, at least in the case of the Mongolian examples of burial in the Cretaceous layers.

A third option, and possibly the most plausible view, for the occurrence of dinosaur tracks late in the strata is that advocated by Garton. He suggests that large creatures (including dinosaurs) were trapped in the floating Carboniferous forests. The evidence for these vast islands of vegetation carried by the heaving seas seems to be particularly strong. Garton maintains that these creatures swarmed the inhospitable land in the final stages of the Flood. (In that he allows a few creatures to have survived the first 40 days, we presume he does not regard the ‘blotting out’ to be fully comprehensive.) This option explains the apparent anomalies and suggests that there may have been some protection from the initial inundation from above in the early stages of the Flood. Scheven’s excellent work on floating mats of vegetation seems to explain the Carboniferous coal measures very ably. It is conceivable that as these mats struck land, the continued pounding of the seas as the
waters rose to their maximum height could cause violent deposition of sediments with vast ocean waves criss-crossing the continents. The waters at this stage were not necessarily tranquil. In fact, this is most unlikely. Great geological activity seems to have been going on still, even though the rains had stopped. The bringing up of the mountains and the sinking of the valleys (Psalm 104:8 ‘The mountains ascend, the valleys descend’) occurred immediately after the earth was finally covered (Psalm 104:6).

It is therefore entirely conceivable that further giant mudslides trapped the dinosaurs as the rafts struck land in the final stages of the 150 days, or that some escaped onto land, only to be buried as the rising waters finally covered the land. The burial of birds in the later strata is all consistent with the final stages of the 150 days, where no land was available.

Conclusion—an integrated approach needed

It is important that all scientific disciplines be utilised to understand the possible processes of the Flood. It is not only geology that should be considered. Hydrodynamics also must play a part in understanding sedimentation processes. Berthault has rightly stated ‘Determination of initial hydraulic conditions from sedimentary structures, resulting from sedimentological data is, therefore, a research priority.’ Today, in the experience of the lead author (in fluid dynamics and thermodynamics research), a multi-disciplined approach is usually needed before scientific advances can be made in the understanding of complicated and unusual phenomena. Progress is not generally possible when it is insisted that only experts of one discipline can solve the underlying physics of a particular problem.

The modelling of the flow of heterogeneous mixtures with the full laws of conservation of energy, mass, momentum, is one of the greatest challenges that computational fluid dynamics has faced. A very careful and thorough approach is demanded when the particle size of the material carried with the water varies widely. The problem involves materials of different densities, different viscosities, with very large variations in local Reynolds number (convection divided by viscous diffusion) and hydraulic conditions. Furthermore, boundary layers have to be modelled with particular attention to the possible change from turbulent to laminar flow. The experiments of Berthault have already clearly shown that surprising lamination can occur in the sediment deposits from such flows. These conditions now need
to be modelled by fluid dynamicists and mathematicians, so an understanding of the larger picture can emerge by carefully constructed mathematical models.

On the larger scale modelling of solid earth geophysics, we acknowledge the impressive work already under way with the investigations of Baumgardner and Barnette. Interaction between geologists and other scientists (particularly those researching in fluid dynamics), is essential if there is to be progress in Flood geology, beyond (the not unnecessary) basic description of what rocks and fossils are found at particular locations. Only as there is greater interaction between the relevant scientific disciplines will some of the unanswered problems of the Biblical Flood models be solved.

Related Articles

- Excellent summary of scientific evidence for Creation and the Flood, but controversial in some areas (http://creation.com/review-snelling-earths-catastrophic-past)
- Flood models (http://creation.com/flood-models)
- Flood models and biblical realism (http://creation.com/flood-models-biblical-realism)
- Analysis of Walt Brown’s Flood model (http://creation.com/genesis-and-catastrophe)

References

22. Brown, Ref. 18, p. 91.
24. Whitchcomb and Morris, Ref. 1, p. 264.
32. Brown, Ref. 18, pp. 82–92.
42. Robinson, Ref. 41, p. 57.
45. Garton, Ref. 7, p. 97–98.
47. It has been argued that Psalm 104:6–9 is referring to the third day of the Creation Week. However the context of Psalm 104:6–9 is of a perpetual decree that the waters ‘may not pass over’ (Hebrew abhar). The parallel passages Isaiah 54:9 and Jeremiah 5:22 use the same word (abhar) and refer to the Rainbow Covenant concerning the sea not being allowed to cross over the boundary of the shore. Thus there is a good case that although Psalm 104:1–5 is referring to Creation, Psalm 104:6–9 is speaking of the Flood. Whitchomb, Ref. 2, p. 40–41. See also Taylor, C.V., Did mountains really rise according to Psalm 104:8–7? Journal of Creation 12(3):312–313, 1998, and discussion in Journal of Creation 13(1):68–71, 1999.
48. Berthault, Ref. 34, p. 216.

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Drowned from below

There is still a vast reservoir of subterranean water inside the earth

The globe-covering Flood of Noah involved, among other things, the breaking up of ‘all the fountains of the great deep’ (Genesis 7:11). This suggests a world-wide fracturing of the earth’s crust and the violent expulsion of water, vapours and other subterranean material such as volcanic lava. New evidence from inside the earth casts intriguing light on this global-scale scenario.

Scientists have long thought that the hot interior of the earth would be very dry, because the heat would have vaporised and driven off any water. But according to a report in New Scientist, certain minerals, even under the intense heat and pressure deep underground, can store lots of water.¹ Models of the mantle, that part of the earth between the molten core and the solid crust, and notably the ‘transition zone’ between the upper and lower mantle, now describe it as ‘sopping wet’.²

What’s more, it seems that hot wet rocks are more unstable than hot dry rocks. This new information may now explain ‘why massive volcanic outbursts suddenly flood[ed] hundreds of thousands of square kilometres [of land] with lava’, as observed in a number of different parts of the geological record.³
Who could ask for a more graphic description of the behaviour of the ‘fountains of the great deep’? It is interesting that even today, up to 70% or more of what comes out of volcanoes is water, mostly in the form of vapour.

So how much water is stored in the mantle? Estimates vary from 10 to 30 times the amount in all the earth’s present oceans! Is it possible for the mantle to suddenly release this water and for the earth to be ‘drowned from below’? The author concluded that a ‘sudden outpouring of water, Noah-style’, was unlikely. His conclusion is consistent with God’s promise to Noah, sealed by the sign of the rainbow, never to destroy the earth with water again (Genesis 9:11–17).

We know from Scripture that water once poured from the ‘fountains of the great deep’ for five months, so that the ancient world was once literally ‘drowned from below’.

Even after all that, there is still a vast reservoir of subterranean water inside the earth. Its very existence, and the dramatic effect it has on the behaviour of the earth’s hot interior, indicates once again that the ancient Bible stories are not mythical but are historical facts and simple descriptions of a sobering physical reality.

References and notes


2. The earth’s crust is, on average, about 25 km (16 miles) thick, while the core is about 2,900 km (1800 miles) below the surface. The mantle transition zone extends roughly from a depth of 400 km (250 miles) to 670 km (420 miles).

3. Ref. 1, p. 23.


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In recent decades, unmanned planetary rover missions have sent back more and more photographs and other data from the mysterious ‘red planet’. Each time, it seems, most researchers are increasingly convinced that water caused the surface features of Mars. In fact, they have often proposed massive planetary-scale flooding. One imagined ‘epoch’ in Mars’ geological past, which is said to have coincided towards the end of that era with extensive flooding by water, is called the Noachian Epoch. An associated large southern landmass on the planet has been named Noachis Terra, or “Land of Noah”.

Whether or not these reconstructions of the geological history of Mars are accurate, it has always been particularly ironic to creationists. I.e. secular researchers have no problem accepting a global or near-global flood or floods on Mars, despite not having found a drop of liquid water anywhere on Mars to date (and even before there was any ice found). But a global Flood on Earth, a planet that is mostly covered by water? No way! How could that be?
“Where is all the water for such a flood?”, they mockingly ask, seemingly oblivious to the fact that they are standing on a planet that is mostly covered by water.

Ask what happened to the water for the massive flooding on Mars, and there is no shortage of theories. It might have been locked up beneath the surface, then come out and since evaporated, dissipating to space. Or perhaps it has gone back down there again. Or both.

‘Where is all the water for such a flood?’, they mockingly say, [while] standing on a planet that is mostly covered by water.

“Ah, you mean, like fountains of the great deep on Mars?”

“Yes, you could call it something like that.”

“So could that have happened here on Earth, like it says here in Genesis?”

“Whaat? No way!”

All the fountains of the great deep broke up …

Adding to the irony is a recent news release on analysis of images from the Mars Express. It claims that deposits called LTDs, which most closely resemble Earth sediments, were formed “when large amounts of groundwater burst on to the surface”.¹

And now, in addition, comes a claim of still more frozen water on Mars—from the well-regarded journal Science (322, p.1235, 21 November 2008). Ground-penetrating radar on NASA’s Mars Reconnaissance Orbiter suggests the presence of “vast Martian glaciers of water ice”.² To date, the only ice found on Mars has been at polar latitudes. The report suggests that because the ice exists “under protective blankets of rocky debris” this has prevented it from evaporating into outer space. True, there still has been no liquid water found on the red planet, but these ‘blanketed’ storehouses of ice are huge. Added to the water at higher latitudes,³ it would probably represent enough water to cover the entire planet to some 20 cms in depth. And remember that they think this is the remnant of water that has not yet dissipated into space—either because it is at high (cooler) latitudes or protected under insulating layers of dust and rock.
Water, water, everywhere …

On top of this are other recent discoveries suggesting a huge reservoir of subsurface water on Saturn’s moon Titan. The same article points out how there are now three other Solar System objects suspected of having huge, deep oceans—the moons called Ganymede, Callisto and Europa.

“Fountains of the great deep” are not a problem, it seems—anywhere but on Earth which is two-thirds covered with water. In fact, there is so much water in Earth’s oceans alone that if its surface features were smoothed out, the water would cover the planet to a depth of about 3 km (1.8 miles). Furthermore, seismic studies suggest that beneath the surface, in one form or another, there is still sufficient water to fill Earth’s oceans more than ten times over again.

But then, the Apostle Peter wrote long ago of “scoffers” who would be “willingly ignorant” of the fact that “long ago by God’s word the heavens existed and the earth was formed out of water and by water. By these waters also the world of that time was deluged and destroyed.” (2 Peter 3:3–6)

Postscript: One hardly hears anything about Mars’ polar icecaps anymore—perhaps because these have been progressively shrinking, a politically incorrect fact. Why so? Because on Mars, any ‘global warming’ can’t be due to human activity. If Earth and Mars are both warming, it would tend to point the finger more at increased solar activity.
Related Articles

- Mars (http://creation.com/mars-red-planet)

References

3. The polar icecaps have long been said to be composed of carbon dioxide ('dry ice').
5. See ‘Drowned from below’ creation.com/article/246.
6. See news.nationalgeographic.com/news/2007/02/070228-mars-warming.html. For CMI’s general approach to this debate, see creation.com/article/4817

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Geologists are uncovering mounting evidence of asteroids and meteorites that struck the earth during the past. Are these extraterrestrial missiles somehow related to the initiation of the Flood?

Have you ever wondered what triggered the Genesis Flood? Genesis 7:11 tells us that a unique geologic event took place at the same moment as the Flood began: “In the six hundredth year of Noah’s life, in the second month, the seventeenth day of the month, on that day all the fountains of the great deep were broken up, and the windows of heaven were opened.”

Most creation geologists believe that the opening of “the fountains of the great deep” refers to the breakup of the earth’s crust into plates.¹ The subsequent rapid, catastrophic movement of these plates would have released huge quantities of hot subterranean waters and molten rock into the ocean. As the hot water gushed through the fractured seafloor, the water flashed into superheated steam and shot high into the atmosphere as supersonic steam jets, carrying sea water that eventually fell as rain.

But what catastrophe might God have used to cause the earth’s crust—many miles thick—to crack? Some have suggested a meteorite or asteroid impact of unprecedented size and scope.² Do we find any evidence? Geologists have discovered some gargantuan remnant craters and piles of debris, leftover from massive impacts that easily fit the bill.

**A Smoking Gun in Australia?**

One example of an impact powerful enough to trigger the Flood is the 56-milewide (90 km) Acraman impact crater in South Australia. It apparently resulted from a 2.5-mile-wide (4 km) asteroid that slammed into the Outback at almost 16 miles per second (26 km/s) (Figure 1).³ The explosion would have been equivalent to the detonation of 50,000–100,000 hydrogen bombs all at once! The impact blasted some of the pulverised pre-Flood crystalline basement rocks to sites 280 miles (450 km) away, and the debris accumulated in a layer 16 inches (40 cm) thick within some of the earliest Flood deposits.⁴

An asteroid impact—or several simultaneous impacts—that triggered the Flood may also have been part of an ongoing, solar-system-wide catastrophe that lasted for months or years.⁵ If so, we would expect to find evidence of many other meteorites that subsequently hit the earth during God’s judgment on the planet. Two lines of evidence can be used to support this inference: (1) the rapid rate of past cratering during the Flood, and (2) the fields of meteorites left by this bombardment.
Impact Crater Early in the Flood (*Figure 1*)

A massive asteroid, perhaps 2.5 miles (4 km) wide, slammed into the earth at the start of the Flood, leaving a 56-mile-wide (90 km) impact crater in South Australia. Did this explosion, which equaled 50,000–100,000 hydrogen bombs, help trigger the Flood?

Continuing Impacts Throughout the Flood

Many meteorite impact craters have now been identified across the earth’s surface. These have been imprinted and preserved in layers deposited by the Flood⁶ and are also visible on today’s post-Flood land surface, such as the famous Meteor Crater just east of Flagstaff in northern Arizona.

A History of Craters: Two Interpretations (*Figure 2*)

Geologists have found over a hundred impact craters on earth. On this table 39 of the 110 impacts were deposited in the uppermost rock layers, and the rest were spread over the many lower layers.

If all these layers were deposited slowly over millions of years, then impacts have been more common in recent times. But if most layers were deposited during the year-long
Flood, 71 impacts occurred during only one year. The other 39 were spread over the next 4,500 years.

The impact “ages” of 110 craters (as estimated using the secular dating methods) are tabulated in Figure 2. Secular geologists thus believe that large meteorites crashed into the earth at a rate of 1–8 every 30 million years, but that the rate was much higher in recent times. However, those scientists who believe that the bulk of the fossil record was deposited during the Flood reach a very different conclusion. According to the Flood model, the first 71 of these 110 impacts would have occurred during the year of the Flood, and the other 39 were spread out over the 4,500 years since the Flood.

The rate during the Flood was catastrophic—71 in one year versus an average of only one impact every 115 years. Even most of those 39 post-Flood impacts likely occurred in the first few decades after the Flood, as the catastrophic processes that triggered the Flood slowed to today’s snail’s pace.

**Fossil Meteorites in Sweden**

Not surprisingly, fossil meteorites have been discovered in various layers of the Flood’s geologic record. One of the most meteorite-dense areas in the world known to date is found in Ordovician limestone beds in central and southern Sweden. These deposits are among the earliest laid down by the Flood.

Forty fossil meteorites have been identified over the area within the Thorsberg quarry at Kinnekulle, southern Sweden. They vary in size from 0.28 x 0.40 inches (7 mm x 10 mm) to almost 6 x 8 inches (15 cm x 20 cm), and were recovered from a quarry area of almost 65,000 square feet (6000 m²). So far, no impact crater has been found associated with these fossil meteorites. Numerous chemical analyses have determined that these are all ordinary chondrite meteorites. Roughly 80% of meteorites that have fallen to the earth since the Flood are also chondrite meteorites.

These forty fossil meteorites were recovered from Ordovician marine limestone beds, which are part of the Orthoceratite Limestone that was deposited across at least 100,000 square miles (250,000 km²) of the Baltic-Scandinavian region. The quarried section holding the meteorites is 10.5 feet (3.2 m) thick and has been divided into twelve named beds (**Figure 3**).
“Meteorite Fall” During the Flood (Figure 3)

At a quarry in Sweden, over forty meteorites have been found in a 10-foot (3 m) section of limestone. The fragments are scattered in twelve thin beds deposited early in the Flood. They share the same metallic qualities, as though they came from one meteor, which exploded when it entered the earth’s atmosphere.

According to secular dating methods, these beds are estimated to have accumulated over 1.75 million years at an average rate of only 0.08 inches (2 mm) per 1,000 years. Interestingly, many of these forty fossil meteorites were discovered embedded at the contact surfaces between layers where secular geologists claim that nothing was being deposited for periods ranging from 100 to 1,000 years. Thus, secular geologists suggest that these meteorites fell on at least twelve different occasions.

However, entombed with these fossil meteorites are abundant fossilized straight-shelled nautiloids, many up to about 16 inches (40 cm) long and about 2.5 inches (6 cm) thick. This begs the question—how could these fragile nautiloid shells be buried and preserved with their internal anatomy intact, and exhibit no signs of decay or erosion during such long periods when no sediments were being deposited? And how could water deposit these limestone beds and their fossil contents so evenly over such a vast area of at least 100,000 square miles (250,000 km²)? Even though the fossilized nautiloid shells show no particular orientation, they had to be buried rapidly to be so well preserved. Such rapid sedimentation over such a wide area requires a catastrophic flooding event.

Furthermore, since all these fossil meteorites are essentially the same, and all likely accumulated during rapid sedimentation and catastrophic flooding, they could easily
represent the remains of one meteorite fall. Such a catastrophic meteorite bombardment is consistent with the global judgment during the biblical Flood.

**The Flood of Noah’s Day**

We cannot be certain whether God used an asteroid or swarms of asteroids to begin the Flood event and the resulting breakup of the earth’s crust into plates. However, we do find evidence that asteroids were striking the earth at catastrophic rates during the Flood and that these asteroids were spread over the earth’s surface. Asteroids surely contributed greatly to the horrific and violent geologic events that took place during God’s year of judgment of the earth.

In Genesis 6:7 and 6:13 God declared that He would destroy man, beasts, creeping things, and fowl “with the earth.” This global Flood cataclysm would destroy the landscape of the original earth (2 Peter 3:6). The original landmass was broken, flooded, and pulverized. The many impact craters and fossil meteorites are stark, sober reminders that God keeps His Word.

These signs of judgment also remind us that all who trust God for salvation, like Noah, are recipients of His grace and mercy through the Lord Jesus Christ. Jesus is our Ark of salvation, delivering us from the judgment by fire yet to come (2 Peter 3:7).

**Dr. Andrew Snelling** holds a PhD in geology from the University of Sydney and has worked as a consultant research geologist in both Australia and America. Author of numerous scientific articles, Dr. Snelling is now director of research at Answers in Genesis–USA.

**Footnotes**


10. There are three major types of meteorites—iron, stony-iron, and stony. Chondrite meteorites are a kind of stony meteorite. They derive their name from their texture. Dispersed more or less uniformly throughout the rock are spherical, sub-spherical, and sometimes ellipsoidal structures called chondrules, ranging in size from a fraction of an inch in diameter to about half an inch. Chondrites are primarily made of silicate minerals such as olivine and pyroxene, similar to what is found in earth’s volcanic rocks, along with sulfide and metallic minerals. O. R. Norton, *The Cambridge Encyclopedia of Meteorites* (Cambridge, UK: Cambridge University Press, 2002).
John Baumgardner (B.S, M.S., Ph.D (UCLA)) is a geophysicist employed at the Los Alamos National Laboratory in New Mexico. His work involves detailed computer modeling of the structure and processes of the earth's interior, as well as a variety of other fluid dynamics phenomena.

**[Creation magazine]:** Dr Baumgardner, some say that because of continental drift (the idea that the continents have broken apart and moved thousands of miles) one has to believe in ‘millions of years’.

**[John Baumgardner:]** Well, I believe there is now overwhelming evidence in favour of continental break-up and large-scale plate tectonic activity. The acceptance of these concepts is an amazing example of a scientific revolution, which occurred roughly between 1960 and 1970. However, this revolution did not go far enough, because the earth science community neglected and suppressed the evidence for catastrophism—large-scale, rapid change—throughout the geological record. So the timescale the uniformitarian scientists today are using is dramatically too long. The strong weight of evidence is that there was a massive catastrophe, corresponding to the Genesis Flood, which involved large and rapid continental movements. My conclusion is that the only mechanism capable of producing that scale of catastrophe and not wrecking the planet in the process had to be internal to the earth.
I am persuaded it involved rapid subduction (sinking) of the pre-Flood ocean floor, pulling the ‘plates’ apart at the beginning of the Flood, and was probably associated with the breaking up of the ‘fountains of the great deep’ described in Scripture.

[CM]: A 1993 *New Scientist* article spoke highly of your 3-D supercomputer model of plate tectonics.²

[JB]: There are to my knowledge three other computer codes for modeling the earth’s mantle and so on, in the world. These other three use a mathematical method not so well suited for the modern parallel supercomputers. The one I developed uses the finite element technique and performs very well on the new, very large supercomputers. So, many of my colleagues are recognizing it as the most capable code in the world.

Last year NASA funded this effort as one of the nine grand challenge projects for the next three years in their High Performance Computing and Communication initiative, and are supporting two post-doctoral researchers to collaborate with me to improve it, and apply it to study the earth.

This code is comparable to what are called general circulation models for the atmosphere and oceans, which are some of the largest codes in the world in terms of how much machine power they consume. It’s got lots of physics in it to model the details of the mechanical behaviour of the silicate rock inside the earth. My present focus is to make the representation of the tectonic plates even more realistic. So the code is in an ongoing state of development, but it’s come a long way in the last 15 years.
[CM]: We understand you’ve shown that as these floating blocks of rock push down into the material below, things get hotter, so the ‘slipperyness’ increases and there’s a runaway effect. The faster they sink the hotter they get, so the faster they can sink.

[JB]: Yes—rock that represents the ocean floor is colder, and therefore denser than the rock below it and so can sink into the earth’s interior. And the properties of the rock inside the earth, especially at the high temperatures that exist there, make it possible for the colder rock from the earth’s surface to peel away and sink in a runaway manner down through the mantle—very rapidly.

[CM]: So this ‘happens’ on your computer model all by itself, from the laws of science—over a short time-scale, not millions of years?

[JB]: That’s correct. Exactly how long is something I’m working to refine. But it seems that once this sinking of the pre-Flood ocean floor (in a conveyor-belt-like fashion down into the earth, pulling things apart behind it) starts, it is not a slow process spanning millions of years—it’s almost certain that it runs to completion and ‘recycles’ all of the existing floor in a few weeks or months.

[CM]: You’re part of a team of top creation scientists which is developing a model of catastrophic plate tectonics based on this mechanism, which believes the continents broke up (from a single landmass) during, not after the Flood as some have proposed.
[JB]: Yes. There is compelling evidence from the fossil-bearing sediments on the continents that the breakup occurred during the time these sediments were being deposited. We are convinced that this 'continental sprint' as it's been called, was during the time of the Flood, and part of the mechanism for it.

[CM]: How did you become a Christian?

[JB]: Primarily through a verse by verse Bible study in the Gospel of John, in a college Sunday School class when I was 26 years old. It focused on the question of who is this Jesus Christ, and is he authentic or not? I had little church background prior to that point, but a lot of scientific training. I was well schooled in evolution, and it took several months before I started to realize the problems with this idea. Later, I was exposed to the evidence for a young earth and realized that the case for it was indeed solid.

[CM]: Why is six-day, recent creation important?

[JB]: I believe it’s a pivotal issue in regard to the reliability of God’s Word. It ultimately bears on the authenticity of Jesus, because Jesus put his stamp of authority on the writings of Moses, which taken at face value, indicate that the original earth was a perfect world, one which included man and woman, one in which there was no death. There were no carnivorous animals—all the animals and man were given the green plants to eat. To make sense of the history of the world as the Bible lays it out, does not allow for millions of years, but does require that there be a catastrophe which destroyed all the air-breathing land life except for that preserved in Noah’s Ark. So I believe there is no negotiation possible on this question.

[CM]: So did your current interest in plate tectonics, and continental drift, arise out of your Christian faith?

[JB]: Entirely. I recognized that this was probably one of the most burning Bible apologetics issues in my century, and as far as I could see there was no one working on it. I sensed the call of God actually. While giving lectures on creation/evolution at university, I realized one of the biggest deficiencies in the creationist position was this lack of an alternative geological model, in particular one accounting for large-scale tectonics. I was 34 when I went back to get a Ph.D. in a field that I previously had not had a single course in. I believe Christians with scientific talent need to be encouraged—just like they’re encouraged to become missionaries—to go and get the credentials and the training they need, and work at a professional level in these fields. God has opened incredible doors for me and others.

[CM]: We published a careful exposé of the claims made by a Ron Wyatt, and more recently by one Jonathan Gray, concerning an alleged ‘Ark site’—an almond-shaped formation in Eastern Turkey. In trying to attack our article, they often quote statements from you supporting this possibly being the Ark site. This was before your research at the site caused you to definitely conclude this could not be the Ark. They say you now oppose their claims for fear of losing your job.
[JB]: Ron’s claims here are just as bogus as his claims about that site. Far from hiding my creationism, I’m well known for it (especially through letters in the local newspaper) in this scientific community, which has more Ph.D.s per capita than any other place in the U.S. My employer and my colleagues know exactly where I stand.

[CM]: You gave a poster presentation on this ‘runaway rapid continental drift’ mechanism at the American Geophysical Union meeting in 1994, so at least some of the 6,000 scientists there would have seen it. What was the feedback?

[JB]: Many people were interested in the numerical techniques I used for such a calculation, because it’s a significant computational challenge. Almost no one seemed to appreciate the implications of it. Actually, this concept of ‘runaway subduction’ [rapid sinking of the ‘plates’ as described earlier] has been in the literature for over 30 years. It was picked up in the geophysical community in the early 1970s, but for some reason the interest disappeared. People in my field are not ignorant of this possibility, it’s just not seriously explored.

[CM]: Why do you think that is?

[JB]: Well, there’s no real motivation to pursue it. Some toyed with the idea that such runaway effects might have been involved in recent volcanism in the southwestern US. But in their framework, they’re not really looking for worldwide effects.

[CM]: So their framework of thinking is really like blinkers, preventing a full consideration of all the relevant evidence?

[JB]: That’s correct, exactly. The same kind of uniformitarian ‘glasses’ prevent them from giving much attention to the evidence for catastrophism in the sedimentary record. Such basic philosophical biases profoundly affect the way science approaches problems and weighs the evidence. So it’s not simply ‘facts speaking for themselves’—the framework one starts from can and does profoundly affect the conclusions that are drawn.

[CM]: Dr Baumgardner, thank you very much.
Seafloor ‘zebra-stripes’ don’t mean slow and gradual.

The mid-ocean ‘ridges’ are undersea mountain chains with volcanoes at the boundary between two ‘plates’ of the earth’s outer shell. It is believed that here, molten magma from below can well up as the plates move apart, making new oceanic crust—a process called ‘seafloor spreading’. As the new crust cools down, it ‘freezes’ within it the direction of the earth’s magnetic field at that time.

When instruments measuring magnetism are towed (on the ocean surface) across these ridges, they detect bands of alternating magnetic direction, like a ‘zebra-stripe’ pattern, with each side of the ridge mirroring the other. This is interpreted to mean that as new seafloor had gradually formed on each side of the ridge, the earth’s magnetism had slowly reversed many times, over millions of years. However, DR Baumgardner says this pattern does not mean the spreading was slow. He says,

‘From an estimate of the viscosity of the outer core, where the currents associated with the earth’s magnetism exist, there is no reason why the magnetic field can’t reverse rapidly. Moreover, there is field evidence that it has reversed rapidly, within weeks.’

In addition, drilling the sea floor has shown that, regardless of the overall direction of the magnetism detected from the surface, the magnetic direction within a drill core frequently varies widely. This is less consistent with slow spreading than with a rapid welling up of new magma during a period of rapid reversals; the magma in contact with the surface will reflect the direction at that time, but by the time the deeper magma cools a few weeks later, the direction has switched again—and so on for deeper levels.

References and Notes

1. 1. Plate tectonics: The concept that the earth’s outer shell consists of separate, huge ‘plates’ on which the continents ride, capable of movement relative to one another.


3. 3. In alphabetical order: Drs Steve Austin, John Baumgardner, Russell Humphreys, Andrew Snelling, Larry Vardiman, Kurt Wise—sometimes affectionately known as the ‘Gang of Six’. Note that the chapter on continental drift in CSF’s The Answers Book (one of the co-authors of which is a member of this team) is being modified, in the light of many new findings, for future editions.
4. R.S. Coe, M. Prevot and P. Camps, 'New evidence for extraordinarily rapid change of the geomagnetic field during a reversal', *Nature* **374**:687–692, April 20, 1995. The finding (by highly respected experts in paleo-magnetism) of 'astonishing' rates of reversal, has now been duplicated more than once.


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Digging Deeper Links for


What Geologic Processes were Operating during the Flood?
by John D. Morris, Ph.D.

What Geologic Processes Were Operating During the Flood?

The great Flood of Noah's day was a time of unthinkable geological upheaval, such that "the world that then was, being overflowed with water, perished" (II Peter 3:6). No flood in human history has rivaled its destructive magnitude.

Though we are far from a full understanding of the Flood, the Bible does give us a clue when it says, on that "same day were all the fountains of the great deep broken up, and the windows of heaven were opened. And the rain was upon the earth forty days and forty nights" (Genesis 7:11-12). Geologists note three succinct mechanisms which God used that bear our consideration.

The trigger for the rest was that "all the fountains of the great deep" were ruptured. The fountains may have been underwater volcanos or materials from deep inside spewing out into the ocean basins.

Evidently there were great subterranean chambers of water which belched forth their contents causing volcanism and tectonism on a broad scale. After being emptied some collapsed to become deep sedimentary basins which uplifted later in the Flood to form mountain chains.

Today when a volcano erupts under water, or if there is an underwater earthquake or mud slide, it causes a tsunami or tidal wave; a dynamic energy wave which pushes water toward the continents, devastating coastal areas. At the start of the Flood all the fountains of the great deep were rent open sending repeated pulses of water toward the continents from every direction bringing sediments and marine fossils to the land. Cyclic ocean currents and tidal actions would have left their imprint on these sediments.

Along the mid-ocean ridges once molten rock and other super hot fluids would have encountered the relatively cold ocean waters, evaporating huge volumes of sea water, ultimately yielding intense rainfall and precipitating their dissolved solids.

Torrential rain poured down. This was a special rain for forty days and forty nights but it continued for a hundred and fifty days, through the first half of the Flood. This continually replenished source of water would have bombarded the earth, eroding and redepositing sediments on a global scale.

For the next six months, the waters "prevailed" (7:18) upon the earth with water driven back and forth on the world oceans. Tides were unchecked by shorelines and until the fountains were stopped and the flood gates closed (8:2-3) any unstable deposit would be susceptible to reworking in a high energy environment.

Finally, six months after the start of the Flood, the waters "returned from off the earth" (8:3). They "decreased continually" for the next several months until the tops of the mountains were seen (v.5) exposing and drying the land, making it fit for life. This implies both continental uplift, ocean basin sinking, and sea floor spreading. This redistribution of the topography implies extensive deformation of soft, freshly deposited sediments. A great wind aided this drainage (8:1).

The Flood was unmatched by any event in our experience, yet both Scripture and science demands it. Any attempt to reconstruct earth history which ignores the Genesis Flood is certain to be in gross error.

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Summary

The Genesis Flood should be regarded as the main mechanism for laying down the fossil record. While there may have been some localised post-Flood disasters, the sedimentary deposits of a continental scale can only have been deposited by the Flood because of the huge global effect of Flood hydrodynamic activity. Bibically, there is little warrant for insisting that ‘blot out’ means complete removal without trace. Rather, the natural meaning of Genesis 6–8 is the sudden death of many creatures in the Flood. To progress our understanding of some of the apparent anomalies in the fossil record, the various scientific disciplines need to interact far more. Only then can we properly model the complex fluid dynamics of heterogeneous flows and the consequent pattern of sedimentary layering that took place in the Flood year.

Introduction

The Genesis 6–8 account of Noah’s Flood very graphically describes the world-encircling cataclysm that affected the earth. In recent years, there has been a growing interest in understanding rock formation as a result of the Flood and to a certain extent, after the Flood. Nevertheless a debate has begun between geologists,¹ all of whom reject billions of years, but who take different positions concerning where the Flood ends in the rock strata.² Some have argued that considerable sedimentation occurred after the Flood, as the earth adjusted to a new equilibrium. What has led geologists, such as Garner,³ Garton⁴,⁵ and others to this view, is that many dinosaur and bird tracks have been found in the rocks which (they maintain) can only be interpreted as post-Flood. Some go further and suggest all fossils of air-breathing land creatures are post-Flood.⁶–¹⁰ The traditional view advocated
by Morris and other workers has been that rising flood waters engulfed creatures at
different stages during the Flood—first the 40 days (Gen. 7:11,12) of the deluge from above
and below, and then the persistence of the waters for about 5 months (Gen. 7:24).\textsuperscript{11–14} This
view, though sometimes referred to by its opponents as the ‘tranquil Flood’ model, in fact
regards the waters as vast surging tidal waves, with water coming from beneath the earth
as well as from above (possibly from a pre-Flood vapour canopy (http://creation.com/arguments-we-think-creationists-should-not-use#canopy)). In a
companion paper\textsuperscript{15} we consider a far stronger alternative view of the origins of the water
from beneath.

How any post-Flood activity occurred is not easy to prove since we have no way of doing a
full-scale experiment! The various theories are not within the purpose of this brief article—
the debate on this continues. But all involved in the debate accept that we must always
come back to Scripture to test all our thinking. What then are the key points that can be
established?

\textbf{The Flood was cataclysmic and worldwide in scale}

Whatever post-Flood disasters may have taken place, one must never marginalise the Flood
itself. Clearly Genesis 6–8 is there to show to mankind that in a very major way, God
judged the world in its entirety. The Hebrew word \textit{mabbul} in the Old Testament and the
Greek \textit{kataklusmos} in the New are used only of the Genesis Flood. Psalm 29:10 provides a
less certain use of \textit{mabbul} outside Genesis, but the destruction of cedar forests (v. 5), the
movement of an entire geographical area (Lebanon, v. 6) and the shaking of the deserts (v.
8) seem reminiscent of Flood events. The Psalm shows that the power unleashed was never
for a moment out of God’s control. A glance at a concordance will show that there are other
Hebrew and Greek words used which can be translated to the English ‘flood’, but
\textit{mabbul} and \textit{kataklusmos} are generally the words reserved as technical terms for the
Genesis Flood.\textsuperscript{16,17}

In a companion article,\textsuperscript{15} we suggest that the geological and meteorological upheavals of
the first 40 days were indeed the major event, possibly with water coming from above
because of vast fountains ejected from beneath.

The extent of the Genesis Flood is partly determined by the meaning of the word ‘earth’
(Hebrew \textit{erets}) in Genesis 1–10, and (Greek \textit{kosmos}) in 2 Peter 3:5–7. What
is erets in Gen. 6:1 referring to? It cannot indicate Eden (Gen. 2:8), since Adam and Eve were evicted from it (Gen. 3:23). Nor can it be restricted to the ‘land of Nod’, where Cain and his descendants settled (and from where they may have spread, Gen. 4:16), since those who had increased in numbers included the descendants of Seth (Gen. 5:6ff.) Genesis 6:5–7 suggests that the reference is therefore to the ‘earth’ of Gen. 1:1 and 2:1 (i.e. all that is not the ‘heavens’), for in Gen. 6:7 there is an echo of the creation (Hebrew bara) of men and animal life recorded in Gen. 1:20–30. Moreover the words of Gen. 8:22 would hardly follow, if the promise in v. 21 applied only to the inhabitants of the early Middle East, for ‘seedtime and harvest’ are universal phenomena, in the same way that ‘day and night’ bring us to the universal context of creation (Gen. 1:5). This apparent universality continues in Gen. 9, where it is not regional man whose life is protected by law, but man made in God’s image (v. 6). Accordingly, the covenant of Gen. 9:9ff. establishes the universally experienced rainbow as the pledge of God’s promise never again to destroy the whole earth (the word again is erets).

2 Peter 3 clinches this line of reasoning, for in this chapter, Peter refutes uniformitarianism (v. 4) and proclaims that uniformitarians are ‘willingly ignorant’. He then states that after the creation of the heavens and the earth in Gen. 1:1–2, the ‘world [Greek kosmos] that then was, being overflowed with water, perished’ (v.6). The fact that the ‘heavens and earth which are now … are … reserved unto fire’ (v. 7), and will be replaced by ‘a new heavens and a new earth’ (v. 13) strongly suggests that the ‘world’ in v. 6 (equivalent to the erets of Gen. 6) was universal in extent.

The agent of the Flood was water

That water was the main agent of destruction may seem obvious, but it needs stating clearly. 2 Peter 3:6 states that the mechanism for the mabbul (Flood) recorded in Genesis was that ‘the world being overflowed with water, perished.’ In principle, the same command, but a different mechanism (fire) will bring in the Day of Judgment to come (2 Peter 3:7). This is relevant to those who suggest that in just the first few days of the Flood all air-breathing land creatures were entirely destroyed without a trace. To remove bones in their entirety would generally require fire, which is not the primary agent recorded in Genesis 6–8. We accept that fire may have played some part during the Flood, with magma flowing from volcanic eruptions, but scripturally the main agent of destruction was water. Fire could not have been the dominant force. Biblically, as discussed later on with the
phrase ‘blot out’, it is difficult to make a strong case for all air-breathing land creatures being destroyed without trace. The argument requires that the word *machah* (Gen. 6:7—‘destroy’ in the KJV) have only one possible meaning, as ‘blot out’. However, there are other equally valid, but more plausible translations of *machah* as discussed later.

Scientifically, it is very difficult to justify that all air-breathing land creatures were entirely destroyed (bones and all) by the hydrological action of the water alone. One can accept that some creatures out of the millions engulfed by the violence of the first 40 days were dismembered, and that other creatures were pulverised by rocks etc. But to say that every single one of the millions of air-breathing land creatures in existence was annihilated is not consistent with the fluid dynamics of heterogeneous mixtures. Certainly the geological evidence does not support the argument that all land air-breathing creatures were annihilated while the sea-going creatures were not. Land creatures are found fossilized throughout the strata—not only in lower Palaeozoic strata which most Flood geologists accept are Flood deposits, but also in the higher Mesozoic and Cainozoic. The geological evidence suggests that the argued distinction between land and sea creatures is a false distinction since the churning waters would have contained both. Matt. 24:39 confirms that water was the agent responsible for the death of the people for it states ‘until the Flood came, and took them all away.’ The word translated ‘take away’ is the Greek *airô* which is often used in the sense of ‘take up’ or ‘lift’ (e.g. John. 5:8 ‘Rise, take up your bed’). The biblical evidence is of rushing waters sweeping up people and animals into a vast watery grave. The straightforward truth from Gen. 6–8 is that the agent of global scale devastation by the Flood was water. It is a good rule to take the straightforward meaning of Scripture, unless there is strong testimony otherwise from other Scriptures.

The combination of both words *mabbul* and *mayim*

Garton,\(^4\) Robinson\(^8\) and Garner\(^1\) maintain that the *mabbul* only lasted 40 days. Kline\(^18\) (no friend of creationism) writes ‘*mabbul* … denotes the cataclysmic phenomena of the 40 day period (7:12, 17) dated in v. 11. Apparently *mabbul* is also applied in extension of the precise usage in the Flood record proper to the year-long episode (9:11, 15, 28; 10:1, 32; 11:10).’
Hence there is some warrant for allowing *mabbul* to refer in a general sense to the whole year of the Flood.

But we must also consider a second word, that is *mayim* which means ‘waters, sea(s), ocean’. The way the two key Hebrew words *mabbul* and *mayim* are used is instructive. It seems from their articles that Garton, Robinson and Garner consider *mabbul* refers to the catastrophic precipitation and release of subterranean water, resulting in the *mayim*. However, they miss the fact that in the Hebrew, the words *mabbul* and *mayim* are linked, so that one is part of the other. This is shown by the fact that they are in the standard grammatical construction to show the genitive (possessive) relationship. In Hebrew, the noun which is possessed is in the *construct* form, followed by the possessor noun in its normal form.\(^1\)

Thus, for example, *sus ham-melek* means ‘the-horse [of] the-king’ and *devar hannabi’* means ‘the-word [of] the-prophet’. In the Flood narrative the words *mabbul* and *mayim* occur in *reversible genitive relationships*. In Gen. 6:17 the Lord says, ‘I will bring floodwaters [literally, ‘the-*mabbul* (of) the-*mayim*’] upon the earth.’ Then in Gen. 7:7 Noah and his family ‘entered the ark to escape the-*mayim* (of) the-*mabbul*’ (cf. Gen. 7:10: ‘The-*mayim* [of] the-*mabbul*’ came [Hebrew ‘were’] on the earth). *Therefore the mabbul may be part of the mayim and themayim may be part of the mabbul.* Unlike (say) ‘the king’s horse’ or ‘the prophet’s word’, where the order cannot be changed, the two nouns are reversible. This implies that the *mayim is not simply* the effect of the *mabbul*, unless by the same token *mabbul* can be regarded as the effect of the *mayim*. Thus the most sensible way to interpret these expressions is to see that in the Flood narrative *mabbul, mayim, mabbul-ha-mayim and mayim-ha-mabbul* are all the same thing.

So the warning in Gen. 6:17 is that God will bring a catastrophic deluge and release of subterranean waters which will inundate the planet and wipe out the whole of life. The catastrophe would not end after 40 days.

Similarly in Gen. 7:4 (where neither *mabbul* nor *mayim* are used) the rain ‘will wipe from the face of the earth every living creature’. But if the rain had been able to drain off the land, there would have been no *mabbul*, for *mabbul* necessarily implies *mayim*. In consequence ‘the-*mabbul*’ was literally ‘*mayim* upon-the-earth’ (7:6), for *mabbul* and *mayim* are two sides of the same coin, so to speak. Obviously the *mayim* of 7:24 are still
the *mayim* of the *mabbul*, and it is the end of the *mabbul* which is described in 8:13 (‘the *mayim* had dried up from the earth’). This is underlined in 9:28 where it says that Noah lived 350 years after the *mabbul*. Since he was 599 at the outset of the *mabbul* (7:11) and just turned 600 at its end, it is obvious that the *mabbul* lasted one year, showing that *mabbul* must here refer to the whole Flood year.

This shows that *mabbul* and *mayim* are used almost interchangeably and underlines the importance of regarding *mabbul* as connected with the whole Flood year notwithstanding the fact that there are places in the text (e.g. Gen. 7:17) where *mabbul* is especially used in reference to the first 40 days.

Thus the destructive force of the 150 days of the waters ‘increasing’ (7:17), ‘prevailing’ (7:18), ‘increasing greatly’ (7:18), ‘prevailing exceedingly’ (7:19), ‘returning from off the earth’ (literally ‘going and returning’, 8:3) should not be underestimated. It is significant that the death of living creatures (7:21–24) is recorded *after* the waters had covered ‘the high hills’ (7:19). The account of chapters 6–8 is so detailed an account of all the events before and during the Flood, that it is difficult to escape the conclusion that biblically there was a process of at least 150 days (7:24) involved in destroying all the land creatures (including man). The only other alternative is to have the waters covering ‘the high hills’ (7:19) after 40 days with protracted coverage till 150 days (7:24)—which still implies that the destruction of 7:21–23 carried on till the end of the whole 150 day period. Certainly the vast majority of land creatures would have been destroyed in the first 40 days, particularly if the waters from above were due to gigantic fountains of water emanating from beneath the earth (see our companion article where possible models are discussed).

However, the Scriptures record the final destruction of all land creatures (which was always the expressed purpose of the Flood) near the end of the first 150 days (7:21–24). The significance of this important point will be considered with the meaning of the word ‘blot out’ in a later section.

**Underground water was involved**

The ‘fountains of the great deep’ seem more consistent with subterranean water pushed up from large, deep, underground cavities rather than relatively small terrestrial springs. Although the latter may explain the removal of all land creatures quickly, it is not consistent with the straightforward understanding of Gen. 7:17–24, which speaks of the waters prevailing *exceedingly* (7:19) for 150 days (7:24). However,
this prevailing is entirely consistent with subterranean fountains issuing water to the oceans with, no doubt, tsunami of continental proportions crisscrossing the globe and leading to gigantic tidal waves on reaching the shorelines of any exposed land.

The floodwaters had to drain off the land, and since all the high ground of the pre-Flood earth was inundated, new ocean basins had to be formed to accommodate the much greater amount of water now on the earth. This fits well with Psalm 104:8 which probably speaks of the mountains rising and the valleys sinking. This implies huge geological upheaval.

The ‘fountains of the great deep’ were literally the ‘springs of the ocean’. Were these visible? Being the springs of the oceans would they be on a vaster scale than those on land? If they were (and the hydroplate model referred to in the companion article would suggest this), considerable geological activity must have taken place on the ocean floor.

The stated purpose of the Flood

Genesis 6:7, 17 and 7:21–23 state clearly God’s purpose was to destroy all air-breathing land creatures. The word ‘destroy’ used in Genesis 6:7 is machah which means to wipe out. That used in Genesis 6:13, 9:11 and 9:15 is shachath which means to ‘corrupt, ruin, decay’. In particular, Gen. 9:11 speaks of never again destroying either the earth or all flesh (Gen. 9:15). The earth was not annihilated (that is made non-existent or all traces removed), though it was devastated. Similarly by implication, neither were the creatures totally annihilated. That is why Gen. 7:4 states that all creatures would be destroyed ‘from off the face of the earth.’

In the New Testament, Luke 17:27 says ‘the Flood came, and destroyed them all.’ The Greek word here is apollumi which, with persons as the object, means to ruin or destroy. The Greek word apollumi, is also commonly translated to ‘kill’ (e.g. Gen. 20:4; Mark 3:6; Luke 19:47). Obviously the action of killing results in a corpse, therefore Luke 17:27 does not support the idea that the Genesis Flood caused total annihilation. The word apollumi does not demand or imply destruction without trace. Vine writes, ‘... the idea is not extinction, but ruin, loss, not of being, but of well-being.’

Generally the word apollumi means ‘ruin’, ‘destroy’, ‘lose’ or simply ‘failure to obtain’. The force of this word comes out in another passage in the same Gospel. The same word apollumi is used in Luke 15:32, ‘for this thy brother was dead ... was lost, and is found.’
lost son was not utterly removed without trace. Rather the prodigal son was removed from the father.

We also have a further insight from Matthew 24:39 that ‘the Flood came, and took them all away.’ The operative word is airŏ which means ‘to take away, bear away, carry off’. Could this be clearer? All of these shades of meaning to the word airŏ simply say that the Flood swept all air-breathing land creatures out of sight. Extinction and annihilation of all remains is not ruled out, but is very unlikely in the light of the specific reference to the final death of all creatures taking place at the end of the 150 days. The strong suggestion is death by the initial onslaught of the enormous force of flowing water, or subsequent drowning if some creatures survived the initial waves. This is all consistent with violent, catastrophic burial by sediments and the fossils we observe today.

The word ‘destroy’ in Gen. 6:7 (Hebrew machah) is matched in the Septuagint by the corresponding Greek word apaleiphŏ which, in classical Greek, means ‘to wipe off, expunge, esp. from a register’.22

The NIV also translates shachath as ‘devastate’ (Joshua 22:33), ‘destroy’ (1 Sam 23:10—at the worst this would have left Keilah in ruins), ‘ruin’ (Jer. 12:10—in a parallel expression ‘trample down my field’) and ‘destroy’ (Ezek. 26:4). In this last reference the extreme nature of the destruction is indicated: ‘I will scrape away her rubble and make her a bare rock.’ However Wiseman says that excavations have traced some of the ancient foundations of Tyre.23 Evidently, even in this context, ‘destroy’ did not imply that no traces would survive.

Returning to the Genesis account of the Flood, the Lord says in Genesis 6:11, 12a and 12b, that the earth was ‘corrupt before God’. The word for ‘corrupt’ is the same as that used in Genesis 6:13, ‘I will destroy them with the earth.’ The key to the Flood account lies in this word ‘destroy’ (shachath). God did not annihilate all evidence of the creatures, any more than He annihilated the earth. Rather, as men were already corrupt spiritually, God had them destroyed physically, drowned, and removed from sight (‘from the face of the earth’). This is exactly the same way that at the final judgment unbelievers will be put into outer darkness, destroyed (apollumi) and cast into hell (gehenna) (Matt. 10:28). This does not mean, of course, that all fossils of all people destroyed in the Flood are preserved, but suggests that we should expect to find some evidence of catastrophic burial.
The word ‘blot out’ in Genesis 6:7

Robinson, Garner and Garton all consider that the Flood requires ‘blot out’ to mean ‘eliminate without trace’ and claim Psalm 51:1 as support. If the word ‘blot out’ does not mean ‘eliminate without trace’ in Psalm 51:1, they ask what sort of salvation do Christians have? If our sins have been totally eliminated without trace by the saving work of Christ, then the pre-Flood world must also have been eliminated without trace. Hence, the fossils must have been formed after the Flood etc. This may seem a strong argument.

However, the passages listed in Young’s Concordance under the Hebrew word machah do not support Garton and Garner’s view. Consider Psalm 51:1 which speaks of David’s adultery with Bathsheba and its subsequent cover-up. David asks God to blot out his sin which God does. However, the fact that we know of David’s sin implies that God did not blot it out completely. It is still recorded in Scripture. Revelation 5 teaches us that even those in heaven worship the Lamb, that is the Lamb of God who took away their sin and by that redemptive act redeemed His people by His own blood (Rev 5:9). Therefore, not all trace of the sins of God’s people will be eliminated, for the Lamb will be a continual reminder of our great debt. McCheyne’s hymn, ‘When this passing world is done’, expresses this thought at the end of every verse with the statement, ‘then Lord shall I fully know, not till then how much I owe.’

In Deuteronomy 9:14, the threat to ‘blot out [the name of Israel] from under heaven’ did not mean that they would disappear without historical trace, for future generations would surely read of them in Scripture. The very formation of a new nation from Moses would require the reason for it to be written down. ‘Blot out’ in this case just means that they would have no descendants and cease to exist as a nation. Similarly in the case of the Amalekites, total destruction did not mean annihilation without trace. For although Deuteronomy 25:19 says to Israel: ‘you shall blot out the memory of Amalek from under heaven’, they were not eliminated without trace. Otherwise their memory ought not to have been preserved in Scripture. As noted earlier in the discussion of shachath and apollumi, eternal destruction is not annihilation, therefore, the threat of Deuteronomy 29:20 to ‘blot
out’ a man’s name ‘from under heaven’ does not mean that God will destroy him without trace.

One use of *machah* which clearly cannot mean ‘eliminate without trace’ occurs in Num. 5:23 which sets out the procedure for trying a woman suspected of infidelity. She has to drink of bitter water, which has previously been used to ‘blot out’ the curses the priest has written in a book. The curses, written in ink on a parchment scroll, were *washed off* (NIV; KJV *blotted out*) into a receptacle containing ‘bitter water’. The curse was removed from the scroll, but not ‘without trace’, since it was an essential part of the ritual that the ink should *continue to exist in solution*. The blotted out curses thus certainly left traces.

Another most instructive use of the word *machah* is in Prov. 31:3b: ‘Do not give your strength to women, nor your ways to that which destroys kings.’ This very aptly shows what the word means. The man who lusts after women will find he is *destroyed* spiritually—as many kings and presidents have been. There is no implication of annihilation or wiping out.

We see therefore that the word *machah* does not mean ‘eliminate without trace’. To say it does is to argue from a shaky linguistic foundation. There is no scriptural proof for this position. These points are developed further in the excellent article by Fouts and Wise which studies the meaning of the words used in the Flood account in Genesis. They agree there is no clear evidence exegetically that the word *machah* is linked with complete removal without trace. Certainly Robinson’s thesis, presented at the same conference, that the Flood destroyed the earth’s crust in its entirety, is very conjectural.

The rainbow

Robinson argues that graveyards of mammoth, dinosaur and all other land air-breathing creatures are all post-Flood. For thousands of mammoths to be buried across America and Asia after the Flood they would have all had to be descended from the original pair from the Ark and spread across the continents. Though we recognise the possibility that frozen mammoths in the Arctic are examples of post-Flood fossilisation (as these seem to be localised burials near the surface), the burial under great sediments of reptiles, dinosaurs, mammals (including other mammoths) is worldwide. Such fossilisation with water borne sediment would require enormous upheaval, such that one requires events on the scale of the Flood itself which God said would never be repeated (Gen. 8:21, 9:11, 15). The burial of dinosaurs ten metres tall, by their thousands in Alberta and Montana and vast tracts of
territory from South Dakota, Kansas and Colorado\textsuperscript{29} would require vast \textit{continental} instability just before Abraham’s time, 350 years after the Flood.\textsuperscript{6} (The 350 years is required by Robinson, Garton\textsuperscript{4} and others to allow dinosaurs and other creatures to multiply and spread out over the globe.) But such vast continental sedimentation (in some places thousands of feet thick) would not be possible without causing gigantic upheaval in other parts of the earth—in particular in the Middle East where the descendants of Noah were repopulating the earth.

Although one does accept the possibility of some post-Flood disasters as the earth settled to a new environment, the extent of burial in such events must be considered local. Burial on such a vast scale of land air-breathing creatures is surely beginning to break the principle that the Flood was the major event in earth’s history. Those who consider most of the fossils to be post-Flood must face the important question, ‘How is it that God has destroyed vast numbers of post-Flood creatures, when He clearly said He would not destroy all flesh again?’ (Gen. 8:21–22). And the problem is not removed by saying that these catastrophes only happened for a few years after the Flood as the earth was settling down. Even if we allow that the population of creatures had vastly increased, is it consistent with the Lord’s mercy in the rainbow covenant to instigate such immense destruction? And this so soon after executing a similar judgment (flooding) on a comparable continental scale? This is a very real difficulty rarely addressed by those who advocate post-Flood catastrophes as being the \textit{main} origin of all the fossils.

A significant feature of Genesis 8:21–9:17 is the expression ‘never again’ (NIV):

‘\textit{Never again will I curse the ground}’ (8:21), \textit{‘And never again will I destroy all living creatures}’ (8:21), \textit{‘Never again will all life be cut off by the waters of a flood}’ (9:11) and \textit{‘Never again will the waters become a flood to destroy all life’} (9:15).

The formation of the sedimentary rocks and the fossilisation of animals on the vast scale said to have occurred would have required a second cataclysm. This would conflict with the promises made after the Deluge.

The one verse which Robinson, Garton, Garner and others propose for justifying a major post-Flood disaster is Gen. 10:25. The division of the earth referred to in this verse is a mystery. In the present state of knowledge, dogmatism is out of the question.\textsuperscript{30} Wiseman
notes that ‘Peleg’ itself means ‘water course, division’ (watercourse = canal?) and suggests ‘the development ... of cultivation, using artificial irrigation canals (Assyr:plagu).’ 31 Kidner simply remarks that it is a ‘matter of conjecture’. 32 If the division were the physical splitting of the continents, then the ensuing catastrophe would have been worldwide. It seems unlikely that Genesis 10–11 could proceed serenely along without more reference to these events than 10:25! Moreover, how could the promises to Noah have been kept, since such upheavals would have had immediate global impact? Kevan thinks it was probably the division of mankind after Babel. 33 Indeed, many commentators, writing well before plate tectonics was in vogue, believed that the division of Peleg referred to the linguistic/territorial division resulting from Babel. 34

In Genesis 9:13–15, God formed a rainbow to indicate there would be no repeat of ‘a Flood to destroy all flesh.’ Holt rightly asserts that to invoke large post-Flood disasters of continental proportions would imply tsunamis encircling the globe. 12 There is a limit to localised activity involving further large sedimentation because it is extremely difficult to avoid immediate effects elsewhere on the globe. The comparatively small eruption of Mount St Helens in 1980 showed this with subsequent atmospheric disturbances, and the eruption of Mt. Krakatoa last century in the Far East caused 30-metre tidal waves. Such large quantities of ash were ejected into the atmosphere that Tennyson referred to striking sunsets in England, thousands of miles distant. 35 These disasters did not have continental implications. Thus to suggest that Genesis 10:25—the division of the earth in Peleg’s day—was a possible post-Flood disaster involving the physical splitting of continents (and thus providing a mechanism for catastrophic burial of the fossils) would necessitate gigantic tidal waves across the continents, thus negating the rainbow promise. One must always give biblical priority to the Flood as the major disaster affecting the earth, never to be repeated.

We agree with Snelling’s introduction to the discussion papers on this subject, that there is room for some post-Flood activity. But we consider that there is the need to ‘research strategically, thinking laterally or in novel ways if we have to, in order to find explanations for baffling puzzles.’ 36

We agree with Whitcomb and Morris that the best fit with the biblical text has most of the fossils produced by the Flood. 11 However the Whitcomb and Morris mechanism (rising flood water) may not necessarily be the correct model. Morris 37 has reiterated this view of the
Flood and though some may disagree with the mechanism, it is hard to escape the important hydrological issues which he and others rightly say must be properly addressed. The hydroplate model advocated by Brown\textsuperscript{38,39} suggests a much more violent alternative. Although we do not say necessarily that this is the only way to postulate the violence of the first 40 days of the Flood year, it nevertheless offers a plausible explanation for the origin of, and evident force for, the underground waters and the waters from above. The hydroplate theory (different in mechanism from that proposed by Morris), still leads to the same conclusion—that the vast majority of fossils were laid down during the Flood. And in the hydroplate model, a good number would be laid down in the first 40 days.

Another theory advocated by Baumgardner et al.\textsuperscript{40,41} proposes catastrophic tectonic plate activity. In this model, part of the earth’s crust is subducted with the initiating of a global-scale flow of the mantle beneath the earth’s crust and vast volcanic activity. All these studies warrant further careful research which should not necessarily regard the geological column as sacrosanct (these alternatives are considered in a companion article\textsuperscript{15}). The events of those first 40 days and right through the Flood year may well have laid and possibly relaid sediments on a continental scale. In the light of this, it is not wise for some to suggest that the thesis of Whitcomb and Morris is ‘fundamentally flawed’. It is premature to draw any such conclusions on the Flood/post-Flood boundary while much research continues—particularly in the area of hydrological sedimentation. We believe there is room for some post-Flood fossilisation (which Whitcomb and Morris\textsuperscript{11} did not address), but the biblical text strongly implies that the evidence of catastrophic water-borne sediments burying vast numbers of land (and sea) creatures is due primarily to the Flood.

Conclusion

We recognise that there is a clear need to be open-minded concerning some post-Flood catastrophism as the earth settled to a new equilibrium after the gigantic disturbances of the Flood year. However it is not exegetically correct to suggest all air-breathing land creatures were annihilated without trace by some unknown force. Biblically, the words machah (blot out), shachath (destroy) in the Old Testament Hebrew, and apollumi (lose, destroy) in the New Testament Greek, do not justify such an interpretation. The context strongly indicates that the logical and straightforward meaning of these words is that the greater part of air-breathing land creatures were buried by water-borne sediments.
That there may have been some post-Flood disasters is not precluded by the text, since fossilisation is not referred to in the Flood account. But to regard the vast majority of fossils as being from post-Flood disasters runs the risk of (a) marginalising the Flood, (b) weakening the force of the rainbow promise (thousands of feet of sediment over continents hardly seems consistent with God’s promise not to destroy flesh [animal as well as man] by a flood) and (c) gives too much weight to our supposed knowledge of the order of deposition (i.e. the geological column).

There is a great need to gather scientists from all disciplines to consider the problems that have been rightly brought to the attention of the biblical creationist community—problems such as footprints of dinosaurs above vast stretches of sediment and dinosaur eggs at high positions in the strata. The role of sedimentology and the flow of heterogeneous mixtures requires hydraulic engineers, fluid dynamicists as well as geologists to carefully unravel these difficulties. Experience shows that major research problems require interdisciplinary teams to make progress.

Acknowledgments

The authors are grateful for the helpful exchange of ideas with a number of colleagues which includes Dr Peter Williams (who kindly checked the original manuscript and made very helpful suggestions), Dr David Tyler, Dr Michael Garton, Mr Randall Hardy, Dr Andrew Snelling, Dr Peter Senior and others. Not all will agree with our conclusions, but the spirit of open and courteous debate is to be encouraged.

Related Articles

- BioLogos and the age of the earth: Pushing an anti-biblical doctrine (http://creation.com/biologos-age-earth)
- Excellent summary of scientific evidence for Creation and the Flood, but controversial in some areas (http://creation.com/review-snelling-earths-catastrophic-past)
- Flood models (http://creation.com/flood-models)
- Flood models and biblical realism (http://creation.com/flood-models-biblical-realism)
- Analysis of Walt Brown’s Flood model (http://creation.com/hydroplate-theory)
• Flood geology vs secular catastrophism (http://creation.com/flood-geology-secular-catastrophism)

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20. Bauer et al., Ref. 17, p. 94.


26. Robinson, Ref. 9, pp. 63–64.

27. The frozen mammoths of Siberia certainly are an argument for catastrophe (see Dillow, J.C., The Waters Above: Earth's pre-flood vapour canopy, Revised edition, Moody Press, Chicago, p. 351, 1982, and the summary concerning mammoths by Whitcomb, J.C., The World that Perished (http://austore.creation.com/catalog/world-that-perished-p-138.htm?osCsid=b9j7h1s3of594tuduc5lv6m75), Revised edition, Baker, Grand Rapids, pp. 77–86, 1996). It might first appear that there does not seem to have been enough time between the Flood and Abraham (for instance, when most think of a relatively stable world) to have such vast numbers of mammoths around in Siberia alone. However the burial so close to the surface and in present river valleys suggests they might have been buried by flash floods from melting ice (see for example, How did millions of mammoth fossils form? (http://creation.com/how-did-millions-of-mammoth-fossils-form) Creation 21(4):56, 1999). This article argues that a population of 8 million mammoths would have been possible 550 years after the Flood—that is, up to the end of the probable Ice Age subsequent to the Flood. Some mammoths could have been buried in ice bursts similar to those observed recently in Iceland in 1996 (see Snelling, A., Iceland's recent 'mega-flood', Creation 21(3):46–48, 1996).


33. For example, Calvin, J., Genesis, 1554; Banner of Truth, Edinburgh, p. 324, 1984: 'For after he [Moses] has mentioned Arphaxad as the third of the sons of Shem, he then names Peleg, his great grandson, in whose days the languages were divided.' Also Keil C.F. and Delitzsch, F., Commentaries on the Old Testament; n.d., original German in the 19th century, English translation published by Eerdmans, Grand Rapids, MI, The Pentateuch, Vol. 1, p. 171: 'Among the descendants of Arphaxad, Eber's eldest son received the name of Peleg, because in his days the earth, i.e. the population of the earth, was divided, in consequence of the building of the tower of Babel.' Again, Leupold, H.C., Exposition of Genesis, Baker Book House, Grand Rapids, MI, p. 378, 1942: 'Peleg means "division", for he lived at the time when the earth was divided (niphlegah) and the name given to the man is in memory of this event. The event referred to must be the one under consideration—the Confusion of Tongues.'


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New evidence of Noah’s Flood from Mexico

Dinosaur dig reveals dramatic insights into the degree of devastation, not so long ago

by Tas Walker


A new dinosaur find from Mexico gives a vivid insight into the enormous extent of Noah’s Flood catastrophe as well as the magnitude of the processes involved. An international research team led by scientists from the Utah Museum of Natural History unveiled the fossilized remains of one of the casualties of that event, a previously unknown species of dinosaur, which they called *Velafrons coahuilensis*. ¹,²

The team, of course, did not report the evidence within a Flood framework. So, although the team hopes the find will give fresh insights into the ancient environments of western North America, they have not considered the most important factor—Noah’s Flood. It’s a bit like trying to explain the history of Europe without reference to the Second World War.

**Rapid sedimentation**

The dinosaur skeleton was excavated in the 1990s in north-central Mexico about 27 miles west of Saltillo, near a small town called Rincon Colorado in the state of Coahuila.
A creature was a hadrosaur, or duck-billed dinosaur, with a large crest on its head that looked like a small sail.

Even though the animal was judged to have been young when it died it would still have been some 25 feet long. Its remains would have needed to be buried promptly to be preserved, and this would require a considerable quantity of sediment.

The sedimentary layers in which the remains of the animal were buried were thick. They are part of the sedimentary rock unit called the Cerro del Pueblo Formation, and its characteristics indicate something of the enormous magnitude of the watery catastrophe involved.
Paleocurrent analysis reveals that the floodwaters were flowing to the east while the enormous quantities of sediment comprising the formation were deposited in huge sheets over a wide geographical area.³

The thickness of the formation varies from about 500 m in the west to 150 m in the east near Saltillo, a distance of 70 km. The Cerro del Pueblo Formation is part of a much larger sedimentary package many kilometres thick deposited in the extensive Parras Basin.⁴ Such a huge depth of sediment would not accumulate unless the relative sea level in the area was rising continually to provide the necessary accommodation.

The flow of water was highly variable during deposition, as indicated by characteristics of the different strata. There was ample evidence of cross-stratification within the strata, including planar cross-stratification, trough cross-stratification and ripple cross-lamination, all of which indicate strong water flow.⁵

Some sandstone strata contained pebbles and granules, which also give insight into the water currents involved.

Another indication of the power of the water was the thicknesses of the individual strata. The beds of sandstone were frequently massive and many metres thick. There were numerous multi-metre beds of massive mudstone that coarsened upwards, suggesting repeated, enormous and extensive mudflows. Beds often displayed what is called ‘soft sediment deformation’, indicating a deposition so rapid that the beds slumped and moved before they had time to settle and consolidate.

Widespread devastation

Reconstructed skull of *Velafrons coahuilensis*.

It’s clear that the events that deposited the sediments had a devastating effect on the living environment, unlike anything that we see happening in storms and floods today. Not only was the hadrosaur, *Velafrons*, buried, but excavations unearthed a second kind of duck-bill dinosaur, a horned dinosaur similar to *Triceratops* with two massive horns and a long bony frill. They also uncovered several large tyrannosaurs (related to *T. rex*), and smaller animals with hooked claws on their feet like *Velociraptor*.

The dinosaur remains were not just buried as isolated skeletons, but excavations uncovered large beds containing the bones of duck-bill and horned dinosaur skeletons all jumbled together. Team leader, Terry Gates said that the region was outstandingly prolific, yielding large numbers of high quality, well-preserved dinosaur fossils.

The catastrophe affected both the land and the sea. Other vertebrate fossils recovered from the formation included turtles, fish, and lizards—that is, both terrestrial and marine animals buried together.

The Cerro del Pueblo Formation also includes fossils of snails, marine clams, ammonites, marine snails, oysters, non-marine snails, fossil wood, leaves and fruit.⁶ Again, terrestrial and marine life within the same formation.

What happened?


Field crew at site where *Velafrons coahuilensis* was found

The researchers tried to reconstruct the sort of environment that could explain the remarkable evidence they were finding in the area, but by ignoring Noah’s Flood they were
hard pressed to make a plausible story. It was clear that the sediments pointed to a large watery catastrophe involving mass deaths but they were straining to find a modern analogy.

The team speculated that the events were associated with high sea levels that caused the flooding of the low-lying areas (the Cretaceous is recognized as a period of high sea level around the world). They suggested that powerful storms devastated miles of fertile coastline, killing off entire herds of dinosaurs. Perhaps, they said, the storms were like the storms that occur around the southern tips of Africa and South America today. But storms in these areas do not kill and bury entire herds of animals, such as crocs, along with fish, and lizards, shells, wood and leaves. Such storms do not preserve the remains of such creatures in animal graveyards buried in metre-thick layers of mud and sand.

*Where is the time represented in the geological section? How could animals be buried and preserved at such a slow sediment accumulation rate?*

Rapid and catastrophic deposition of sediments, of course, means that they would not take much time to accumulate. In other words, there is a problem with the age of 72 million years quoted for the sediments, which was established from the standard geological column (based on the kinds of fossils found). There is also a problem with the average deposition rate for the formation of 0.55 mm per year, which was based on magnetostratigraphic data. The long-age paradigm has a time problem. Where is the time represented in the geological section? How could animals be buried and preserved at such a slow sediment accumulation rate?

Towards the end of the inundation stage

Within a biblical framework, that is, the historically documented eye-witness account of history, the sediments would have been laid down as a result of Noah’s Flood. It’s clear that they do not represent events during Creation week because there was no death or suffering at that time, hence no fossils. It’s also clear that they do not represent sediments deposited before or after the Flood because of the sheer geographical extent and physical thickness of the sediments. We can conclude that the sediments were deposited as the floodwaters were rising on the earth, because the land animals were still alive, as indicated by the assemblages of dinosaur trackways found in the area. It’s likely that these sediments were deposited just before the time when the floodwaters covered the entire earth.
The new dinosaur find from Mexico and the associated investigations of the geology provide a new and exciting window onto past events. They reveal vivid insights into the conditions and devastation associated with the largest watery catastrophe of all time—Noah’s Flood—and into the sorts of animals that were caught up in that event.

- Huge dinosaurs flee rising waters of Noah’s Flood in Australia (http://creation.com/kimberley-dinosaur-footprints)
- In the footsteps of giants (http://creation.com/in-the-footsteps-of-giants)
- Newly discovered dinosaur megatracksites support Flood model (http://creation.com/images/pdfs/tj/j16_3/j16_3_5-7.pdf)

References

Digging Deeper Links for


Is Hawaii an Aftermath of the Flood?

http://www.answersingenesis.org/articles/am/v9/n1/hawaii-volcanic-origins

Hawaii’s Volcanic Origins—Instant Paradise
by Andrew A. Snelling
December 9, 2013

The biblical worldview changes how you see everything, even a “paradise” like Hawaii. If the Flood destroyed the earth, where’d these islands come from? Only catastrophic earth movements—a result of the Flood—can explain this string of jewels.

Mention Hawaii, and it conjures up thoughts of a tropical paradise. Pristine waterfalls, luxuriant creeping vegetation, and squawking, duck-like coots remind millions of annual visitors about the Creator’s handiwork.

The Hawaiian Islands’ landscape is a product of catastrophic forces unleashed by Noah’s Flood. But red hot lavas slowly moving across fields and engulfing roads are never far away. Indeed, the Hawaiian Islands are a string of active and extinct volcanoes that hint at a catastrophic past. No Garden of Eden, this charming landscape is a product of catastrophic forces unleashed by Noah’s Flood. This modern-day “paradise” speaks unmistakably of God’s recent judgment.

If the volcanoes that formed Hawaii’s eight major islands had been formed before or during Noah’s Flood, the Flood would have deposited sediments on their flanks. But they have none. So we know the volcanoes must have erupted following the Flood.

So how did eight islands pop up in a neat row in the middle of the Pacific Ocean after the Flood, 3½ miles (19,297 feet, or 5882 m) above the surrounding seafloor? The origin of these gems gives us a fascinating window into the incredible tectonic forces that tore apart the planet during the Flood. Indeed, we now have enough geologic clues to begin reconstructing what took place in the Pacific while Noah’s family was landing on the mountains of Ararat and then settling the Near East.

Paradise Revisited
The Hawaiian Islands are an archipelago of eight major islands, numerous small islets, and undersea mountain peaks called seamounts (Figure 1). They extend in an arc some 1,500 miles (2,400 km) from the island of Hawaii (the “Big Island”) in the southeast to the Kure Atoll in the northwest. The total land area of the Hawaiian Islands is a mere 6,423.4 square miles (16,636.5 sq. km), small compared to the world’s largest archipelago—the Malay Archipelago—which includes 24,000 islands and covers a million square miles.

Figure 1—Rising Lava and a String of Pearls
The Hawaiian Islands are the last in a string of volcanic islands that arose as the Pacific Plate moved over a “hot spot” in the crust. At the end of the Flood, eruptions began to produce dozens of islands stretching over 3,600 miles (5,800 km). The hot spot currently sits under Hawaii’s Big Island. The first islands, called the Emperor Seamounts, were small
and most never grew large enough to reach the ocean surface. Radiometric potassium-argon dating shows that these seamounts are oldest, and the Hawaiian Islands are youngest. These islands formed quickly, over a few years, not “millions of years.”

Yet the comparison is not fair. The Malay islands are made out of crust material from the nearby continents of Asia and Australia, while the Hawaiian Islands are made out of volcanic rock from the earth’s mantle. These volcanic islands are part of an even longer chain that extends all the way to Alaska. It is estimated that volcanic material in this chain would be enough to cover the entire state of California one mile thick. That was a lot of lava belching out of the earth in the past! 

The Big Island at 4,028 square miles (10,432.5 sq. km) is made up of five broad, rounded, still-active shield volcanoes, the tallest being Mauna Kea, which towers to 13,803 feet (4,207 m) above sea level. If measured from its base on the ocean floor, its height is 33,100 feet (10,100 m), making it taller than Mt. Everest! Its still-active neighbor Mauna Loa, just 120 feet (37 m) lower, is the largest volcano in the world, covering a land area of 2,035 square miles (5,271 sq. km).

**Where Do the Lavas Come From?**

The earth has an outer skin or crust, beneath which lies the mantle. Scientists believe the molten basalt that erupts from these huge volcanoes rises from the upper mantle. There is even evidence that a plume of hot rock is still welling up from the mantle and feeding the
active volcanoes on the Big Island (Hawaii). This mantle plume has pushed up the ocean floor beneath Hawaii, forming a huge, shallow “blister” or swell over 620 miles (1,000 km) wide. Currently the most active volcano is Kilauea on the Big Island, but the newest volcano is the Loihi Seamount, just to the southeast of Hawaii.

Maui is the next largest island in size and the next in the chain. The islands quickly become smaller and smaller. Maui’s area is only 727.2 square miles (1,883.4 sq. km). Furthermore, its largest volcano, Haleakala, is only 10,023 feet (3,055 m) tall and is no longer active. Indeed, the volcanoes and the volume of lavas get progressively smaller as you progress along the chain toward the northwest.³

Intriguing Chains
This intriguing pattern does not end with the eighth island. Farther northward is yet another line of seamounts (undersea mountain peaks). Known as the Emperor Seamounts, this chain stretches another 2,100 miles (3,400 km) northward to Alaska’s Aleutian Trench (Figure 1). These seamounts are the remnants of former volcanoes but do not rise above the ocean surface. (Curiously, a few of these seamounts are flat-topped, implying they once were exposed above sea level and were eroded off.)

A very interesting pattern appears. The largest and active volcanoes are at one end. As you move northward along the chain, the past lava output and volumes become progressively less and the volcanoes smaller, until the volcanoes don’t even rise above the surface and are long dead. What caused this progression?

One clue is the relative ages of the rocks on the Hawaiian Islands and Emperor Seamount chains. Using the standard radiometric dating technique that measures the radioactive decay of potassium to argon (the potassium-argon method), we learn that the youngest volcanic rocks are on the island of Hawaii. (That’s what we would expect since its volcanoes are still active.) The volcanic rocks become progressively older northward along the chain. The central islands of Midway Island and Kure Atoll are said to be 28 million years old, and then the seamounts along the Emperor Chain date from 47 million years northward to 81 million years (Figure 1). While creationists strongly dispute the actual ages, they agree with the relative nature of the measurements (more later).

The Moving Pacific Plate
The discovery that the earth’s crust is broken into moving plates has provided us with an elegant explanation for the islands’ pattern. The Pacific plate (making up much of the floor of the Pacific Ocean) has been moving northwestward. As the plate moved over the essentially stationary Hawaiian mantle plume, the rising molten rock built a series of seamounts and islands in quick succession (Figure 2).
Most of the world’s volcanoes form where crustal plates crash into each other, but Hawaii is different. It lies over a “hot spot,” or mantle plume, where hot material breaks through the thin ocean crust.

Radiometric dates show progressive “aging” from Hawaii (the youngest) to the seamounts (the oldest). These measure radiometric decay over months and years, not “millions of years (Ma).”

Thus the seamount at the northern end of the Emperor chain was formed first, when that point was over this “hot spot,” incorrectly dated by the faulty radiometric method at some 81 million years ago. As the plate moved, it eventually reached the position where it is today, with the island of Hawaii and the Loihi Seamount sitting on top of the mantle plume (Figure 2).

Old-earth, secular geologists say this plate movement has always been slow and gradual. To bolster their supposed case, they point to an interesting correlation. If you plot the radiometric ages of the different islands and seamounts against the distances from Kilauea, the rate of 2.6–3.6 inches (6.6–9.1 cm) per year just “happens to be” about the same as the plate movement today. However, if the plate motion had been uniformly slow at today’s rate, all the volcanic islands should have been of similar sizes.

As for the “bend” where the Emperor and Hawaiian chains meet, it is thought the direction of the Pacific plate’s motion changed, starting some “47 million years ago” according to evolutionary scientists. No one knows yet why this direction changed. Perhaps the answer will provide some new interesting insights. It has also been suggested, though, that before this “bend” occurred the “hot spot” may also have been moving slightly.

Figure 2—Hawaii Is a Hot Spot
So what are we to make of all this within the biblical framework for the earth’s history?

Creation geologists do not dispute that plate tectonics has occurred. However, they believe substantial evidence confirms that it occurred catastrophically during the Flood. Furthermore, as the Flood was waning, the plate motions decelerated from tens of feet (meters) per second to their current snail’s pace of only an inch or two (mere centimeters) per year. Any movement of the hot spot also would have ceased, while catastrophic outpourings of lavas from the hot spot rapidly decreased.

And this view makes even better sense of the observed evidence, such as the sizes of the recent islands, which grew bigger due to larger volumes of lavas. As the plates slowed, there would have been more time for the upwelling mantle “hot spot” to send up lavas, even if the eruptions decreased. Thus the island of Hawaii is much larger than the other islands.

In contrast, the plate was moving so rapidly when the Emperor chain was being formed that few of the volcanoes had time to grow big enough to breach the ocean surface.

Perhaps the plate began slowing down as it changed direction to produce the bend between the two chains. Only when the plate motion slowed was there enough time to build the Hawaiian Islands, even if the lava outpourings slowed to a comparative trickle.

Those Radiometric Dates?

But what about those potassium-argon millions-of-years dates? There are good reasons they must be regarded as greatly exaggerated.

Excess argon rises with the lavas from beneath the earth’s crust, contaminating them so that they yield excessively old dates. This volcanic argon gas does not arise from radioactive decay of the potassium in the rocks, but instead it is trapped in the basalts, making them “read” older. Furthermore, potassium-argon dates of volcanic rocks on seamounts can increase with depth underwater, regardless of actual age.

This type of faulty assumption behind radioactive dating leads to exaggerated dates. Another crucial, unverifiable assumption made by evolutionary scientists is that the decay rate has been constant throughout time—that is, the radioactive “clocks” have always ticked at the same rate. But creation research has demonstrated that all the decay rates were grossly accelerated in the recent past, during the global Flood cataclysm.

This finding indicates that, just as plates accelerated during the Flood and then decelerated, so radioactive decay rates accelerated, apparently in lockstep, and then decelerated. Thus the volcanic rocks that formed earlier as the Pacific plate moved over the “hot spot” yield exaggerated radioactive dates due to quickly ticking radioactive clocks. As the Flood ended, both plate motions and radioactive decay rates slowed. These are not true absolute dates because the “clock” was ticking faster than it does today.

God’s Judgment and Promise

So while the Hawaiian Islands today appear to be a tropical paradise, they were built during the aftermath of the Flood cataclysm. Not only were the tectonic plate motions and volcanic eruptions catastrophic, but even radioactive decay was occurring at catastrophic rates.

However, God mercifully ended His judgment by decelerating catastrophic processes, allowing time for the volcanic lavas to build today’s island paradise. Meanwhile, the
occasional volcanic eruptions are a reminder of the islands’ catastrophic past and God’s promise never to flood the entire earth again.

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**Footnotes**

2. A. A. Snelling, “Journey to the Center of the Earth,” *Answers* 8.3 (July–September 2013): 72–75.
3. The flanks of the islands have also been reduced in size by giant landslides. Huge blocks (up to 20 miles long and 1 mile thick) lie on the ocean floor surrounding the islands. See J. Whitmore, “The Potential for and Implications of Widespread Post-Flood Erosion and Mass wasting Processes,” in *Proceedings of the Seventh International Conference on Creationism* (Pittsburgh, Pennsylvania: Creation Science Fellowship, 2013).
6. For example, the potassium-argon dates obtained from the basalts of the 1800–1801 eruptions of Hualalai on Hawaii were 1.4, 1.6 and 22.8 million years, from the basalts of the Kilauea Iki eruption of 1959 on Hawaii, 8.5 million years, and from basalts erupted from Kilauea on Hawaii <200 and <1,000 years ago, 21 and 42.9 million years respectively. See: A. A. Snelling, "Geochemical Processes in the Mantle and Crust," in *Radioisotopes and the Age of the Earth: A Young-Earth Creationist Research Initiative*, L. Vardiman, A. A. Snelling, and E. F. Chaffin, eds., (El Cajon, California: Institute for Creation Research, and St. Joseph, Missouri: Creation Research Society, 2000), pp. 123–304.

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Huge dinosaurs flee rising waters of Noah’s Flood in Australia

by Tas Walker
Published: 30 October 2012 (GMT+10)

In October 2012, Catalyst, the science television show of the Australian Broadcasting Corporation, featured amazing dinosaur footprints from the Kimberleys in north-west Australia.\(^1\)
Dampier Peninsula

At James Price Point, 60 km north of Broome on the Dampier Peninsula, paleontologist Steve Salisbury was filmed checking multitudes of footprints preserved in the rocky platforms.

Catalyst reporter Mark Horstman says, “You’ve gotta be quick to study the fossils here. This tide is racing. And this was dry a few minutes ago. The tidal range is up to 10 metres, and the fossils are only visible at the lowest of low tides, so that’s for a few hours for a few days for a few months every year.”

Sand is washed in and out of the area, continually revealing new footprints. The program shows Steve Salisbury measuring a recently-exposed sauropod footprint about 1.7 metres long—a world record. He said the animal that made that print could be 7 or 8 metres high at the hip and more than 35 metres long.

These footprints were made during the global Flood of Noah’s day as recorded in the Bible.

These footprints were made during the global Flood of Noah’s day.

There are so many clues in the rocks at that point to the catastrophe of Noah’s Flood, yet Steve Salisbury and his team did not make the connection. They have been trained for years to think in one particular way, and Noah’s Flood is not on their radar. Worse still, if
they ever did seriously float that possibility they would almost certainly lose their jobs (see Expelled (http://creation.com/not-too-old-to-be-expelled)). Indeed, the footprints help us work out the timing of when the rocks were laid down during that year-long catastrophe. Clearly the land animals were alive when they made the prints, so the floodwaters had not yet peaked. After that, there would be no footprints because all land animals perished. Other evidence of the timing comes from the geology and from the landscape. This indicates it was not long before everything was inundated. The scale of this destruction is graphically described in the Bible:

“The waters prevailed above the mountains, covering them fifteen cubits [~7.5 metres] deep. And all flesh died that moved on the earth, birds, livestock, beasts, all swarming creatures that swarm on the earth, and all mankind. Everything on the dry land in whose nostrils was the breath of life died.” (Genesis 7:20–22)

One clue that we are looking at an unprecedented geological catastrophe is the enormous extent of the sedimentary deposits. Host Mark Horstman explains that the footprints are preserved in the Broome Sandstone, which extends for 200 km along the coastline and is up to 280 metres thick. He says, “At the time this was a vast river plain of muddy swamps and sandbars.” Actually, there was not a lot of mud. Mostly it was fine to very coarse sand with areas of gravel. The Broome Sandstone is known to cover the whole of the Dampier Peninsula. A river plain of such an enormous extent is monstrous compared with the rivers on the earth today. The Broome Sandstone points to an exceptionally large depositional system.

The surface of the sediment was soft and wet, and the animals walked on it soon after—before it had gone very firm. Steve Salisbury describes the tracks of a stegosaurus:

“It’s got four stubby little fingers on the hand and then quite a fat three-toed foot, and that combination is really characteristic of stegosaurs. ... he’s gone for a bit of a slip down there. It looks like there’s a double step—he’s kind of slid for a bit and then had to gain his grip, and got to the bottom there and probably quite relieved that he’s made it ... and then continued up that way.”
The idea of a river plain comes from the pattern of cross-bedding in the sandstone. These beds indicate that the water was flowing as the sediment was deposited. Some of the cross-beds are very large, so large that they indicate water flows of biblical proportions. In order to avoid such an interpretation, the sand deposits with the large cross-beds have been interpreted as forming in a desert. That’s right—a desert. This switch implies a puzzling sequence of environments. How could there have been a fast flowing river system, followed by a dry desert, followed by another river system? By ignoring the possibility of Noah’s Flood these palaeontologists create problems for themselves as they try to interpret what was going on.

As Steve Salisbury is filmed walking over the rocks we are told we are “exploring an extinct ecosystem as we walk through a landscape frozen in time.” However, what is preserved is quite unusual compared with ecosystems we see today. Fossils in the sandstone include marine organisms such as plankton and bivalves as well as land plants such a pine trees and ferns. Describing it as an ecosystem gives a misleading impression. So many different kinds of plants, animals and organisms that would be found in a normal ecosystem are missing from the deposits. That is because the dinosaurs, during the Flood, were not part of a normal ecosystem. The landscape was in the process of being destroyed by a devastation that impacted both the land and the ocean. This particular situation represented by the Broome Sandstone lasted for only a few weeks and months.

_Catalyst, ABC_

Host Mark Horstman pointing to dinosaur tracks (highlighted).
It’s interesting that Steve Salisbury recognises the transience of the situation. He says, “Most of the track sites that we see probably only represent, you know, between a few days and a couple of weeks, 130 million years ago, so they really do provide a fantastic snapshot.”

Note, “A few days and a couple of weeks”, and “snapshot”.

The footprints are the clear evidence for this brief, short time frame. They were made in soft sediment, and that provides a tight time constraint. And the imprints have been well preserved, which also constrains the time before the subsequent sediment was deposited on top. If the footprints had been exposed for any longer than a few weeks they would have been eroded away.

Clearly, people who talk about those mind-numbing time periods of 130-million years have a time problem: where do they propose to insert all those millions of years into the sediments?

Most people would imagine that the 130 million years was measured by precise laboratory equipment using hi-tech radioactive dating. That is not the case. The quoted date was decided by comparing the mix of fossils found in the sandstone with fossils found in other parts of the world. Actually, it is impossible to measure the ages of sedimentary rocks, or any other rocks, by analysing samples in the present (see The way it really is (http://creation.com/the-way-it-really-is-little-known-facts-about-radiometric-dating)).

The Catalyst program captured the dramatic attempts of dinosaurs trying to escape the rising waters of Noah’s Flood some 4,500 years ago. Although the program made no reference to this global event, and presented the information exclusively in terms of evolution over millions of years, the evidence is plain to those who know what to look for. As my friend who brought this program to my attention said, “I have to admit I just thought of dinos running from flood waters when I saw it.”

Related Articles

- Watery catastrophe deduced from huge Ceratopsian dinosaur graveyard (http://creation.com/watery-catastrophe-deduced-from-huge-ceratopsian-dinosaur-graveyard)
- Dinosaur soft tissue and protein—even more confirmation! (http://creation.com/dinosaur-soft-tissue-and-protein-even-more-confirmation)
• Dinosaur herd buried in Noah’s Flood in Inner Mongolia, China (http://creation.com/dinosaur-herd-buried-in-noahs-flood-in-inner-mongolia-china)
• Terrible lizards trapped by terrible Flood (http://creation.com/terrible-lizards-trapped-by-terrible-flood)
• In the footsteps of giants (http://creation.com/in-the-footsteps-of-giants)

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4. Thulborn T., Impact of Sauropod Dinosaurs on Lagoonal Substrates in the Broome Sandstone (Lower Cretaceous), Western Australia, PLoS ONE 7(5): e36208. doi:10.1371/journal.pone.0036208, 2012. Thulborn interprets the environment as lagoonal which is contrary to the interpretation of a river plain Salisbury gives on the Catalyst program. One reason for the lagoonal interpretation is the huge geographical area of the sandstone. In other areas the sediments show cross bedding, which indicate flowing water. McCrea, R.T., Lockley, M.G., Haines, P.W. and Draper, N., Palaeontology Survey of the Broome Sandstone—Browse LNG Precinct, Department of State Development, Government of Western Australia, pp.12–13, 2011, report various interpretations by various authors at different outcrop locations.
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An international team of scientists have uncovered graphic evidence of the deadly terror unleashed on a herd of dinosaurs as they were buried under sediment by the rising waters of Noah’s Flood in western Inner Mongolia (figure 1).

Dinosaur bones were first discovered at the site, located at the base of a small hill in the Gobi Desert, in 1978 by a Chinese geologist. After about 20 years, a team of Chinese and Japanese scientists recovered the first skeletons, which they named Sinornithomimus, meaning “Chinese bird mimic”.

A few years later in 2001, the international team excavated the remains of more than 25 dinosaurs, creating a large quarry in the process as they as they followed the skeletons into the base of the hill.

Remarkable excavation

As the team carefully mapped the location of the bones and strata that contained them (figure 2), it became clear that the dinosaurs were all within the same layer of mudstone (i.e. the same bedding plane), generally facing the same direction and remarkably well preserved.
Figure 2. Map of some dinosaur remains at the site in Inner Mongolia. Note the skeletal parts have generally remained together indicating that the animals were buried before their remains disintegrated.

Most of the dinosaurs were buried in a life-like crouching posture and, even more surprisingly, the limbs of the dinosaurs were plunging down into the underlying mud as deep as 40 cm (figure 3). Their hind legs were often still bent indicating that they were struggling to escape. Two of the skeletons were found one right over the other where they apparently fell. This fossil find captures in stone how the dinosaurs perished when they became mired in the mud.

The thick layer of mud in which the animals were trapped displayed bedding that was twisted and convoluted indicating that the sediment was only recently deposited from flowing water and still soft when it was disturbed. There was an absence of bioturbation (such as burrowing by worms or crustaceans) in the underlying mud, which also indicated that the mud was only recently deposited.

Not only was the thick under layer of sediment recently deposited, but the overlying sediments were deposited soon after the animals were trapped, burying the animals before their soft parts had a chance to rot away. Nearly all the fossil bones were surrounded by a drab, blue-gray halo indicating how far the soft tissue extended (figure 3), and that the carcasses had decomposed after being buried, not before. In addition, gastroliths (stomach stones) were found in the fossilized ribcages of some animals, as well as carbonized stomach contents (figure 3). So promptly were the animals buried that the delicate bones in the eye (sclerotic rings) of some animals were preserved. The team interpreted the site as a “catastrophic miring of an immature herd”.

Image from Varricchio et al., ref. 2
Figure 3. Fossil skeletons 3 and 4 (see figure 2) recovered from site. Note the bluish-gray halo surrounding all the bones indicating the skeletons were buried with the soft parts intact. A. Plan view of the two skeletons. Note how they overlap. B. Snout and unusual neck curvature likely indicating death throes. C. Pelvis almost all preserved. D. Gastrolith (stomach stone) mass and carbonized stomach contents within rib cage indicating rapid burial. E. Cross-section of rear leg mired deep in mud and in bent position and F. cross section of foreleg deep in the mud, both indicating catastrophic entrapment. White scale bars are 10 cm.

Noah’s Flood?

When I read of such a large herd of animals being frantically trapped in thick mud that was only recently deposited and then rapidly buried by more sediment I immediately think of Noah’s Flood. The fossil evidence is exactly the sort of thing that you would expect as a result of the global catastrophe described in the Bible.

“The waters rose and increased greatly on the earth, and the ark floated on the surface of the water. They rose greatly on the earth, and all the high mountains under the entire heavens were covered. The waters rose and covered the mountains to a depth of more than twenty feet. Every living thing that moved on the earth perished—birds, livestock, wild animals, all the creatures that swarm over the earth, and all mankind. Everything on dry land that had the breath of life in its nostrils died. Every living thing on the face of the earth was wiped out; men and animals and the creatures that move along the ground and the birds of the air were wiped from the earth. Only Noah was left, and those with him in the ark. The waters flooded the earth for a hundred and fifty days. (Genesis 7:18–24.)”

However, Noah’s Flood is not an explanation that came to the minds of the paleontologists who excavated the dinosaurs in Inner Mongolia. Consequently, they struggled to explain
what they found. Their main problem was that they were looking for a modern environment that corresponds with the evidence but Noah’s Flood was a unique event. There has been no geological disaster in the last 4,500 years that has come anywhere close to what happened during the Flood.

A herd of juveniles

Lead author, David Varricchio, assistant professor of paleontology at Montana State University, USA, indicated his surprise at what the team uncovered and alluded to their inability to explain it with a modern environment. “Finding a mired herd is exceedingly rare among living animals”, he said.

*Nearly all the fossil bones were surrounded by a drab, blue-gray halo indicating how far the soft tissue extended, and that the carcasses had decomposed after being buried, not before.*

One problem that the paleontologists encountered is that according to uniformitarianism the fossils layers preserve a living environment that existed at that time. Therefore, the team was surprised that the dinosaurs consisted only of juveniles without any adults or hatchlings present. However, that is perfectly understandable in the Flood catastrophe when animals were fleeing. You would expect the hatchlings to have already perished and the adults to have fled and abandoned the youngsters.

In scientific circles these sorts of anomalies are never reported as a problem. Rather, the paleontologists reported this unexpected result as a “new discovery”. They said it was evidence of “distinctive dinosaur sociality” where the immature dinosaurs were left to fend for themselves in juvenile herds while the mature adults were occupied elsewhere with parental care of eggs and hatchlings. What an amazing story.

All that mud

Another problem for the team was the thickness of the mud in which the dinosaurs were trapped. They suggested the area was a low energy lake environment, which is the standard interpretation that uniformitarians invoke to explain muddy sediments.

“The lamination and very thin beds of the intervening unit represent slow deposition under quiet, low-energy conditions and an absence of significant invertebrate or vertebrate bioturbation.”

However, recent laboratory experiments have shown that such an automatic interpretation is almost certainly incorrect because mud readily deposits from flowing water.

In order to account for the depth of mud in an area where the animals could be trapped the team claimed the water level of the lake was lowering as a result of drought. That could account for the mud depth in a limited region close to the shore. But it is hard to imagine how, under normal conditions, so many animals could have become trapped together so suddenly in a small area of mud at the edge of a lake.
‘Finding a mired herd is exceedingly rare among living animals’—David Varricchio, assistant professor of paleontology at Montana State University, USA

It is also hard to account for the absence of bioturbation in the mud. If you say that worms and crustaceans had not colonized the sediment because the mud had only been recently deposited then you would have to explain what sort of process would deposit half a metre of mud so quickly. And, how could such a thick deposit have been laid down at the edge of a lake? The authors opted to say that the unbioturbated laminae suggested the mud was situated in deeper water. But deeper water would help the animals escape because water would help to support their body weight.

Another problem is that the team found mudcracks on the mud, which they also interpreted as indicators of drought. Mudcracks form when mud emerges from the water and has dried for a day or so. How could the mudcracks form on the mud surface if it was in deeper water?

This array of evidence that conflicted with their expectations puzzled the team and they once again presented the results as an “exceptional” discovery. However, the thick mud deposit, rapid sedimentation and catastrophic entrapment of the animals are easily explained by the Flood catastrophe. And mud does not need to be exposed above water for mud cracks to form. Shrinkage cracks will form in situ once the overlying sediments have been deposited and the water within the mud is expelled and the mud contracts.9

A desert?

These dinosaur fossils were found in the Cretaceous sediments of Inner Mongolia that were interpreted as being deposited on the continent. More specifically they were found in the Ulansuhai Formation of the Upper Cretaceous, which is interpreted as being a desert environment.

“Through this period the region experienced an increase in overall aridity and a shift from lacustrine [lake] and fluvial [river] Lower Cretaceous facies [rocks] to predominantly aeolian [desert] dune and associated interdune facies in the Upper Cretaceous.”10

What were these herds of dinosaurs doing in a desert? Where did they get the food then needed? How was such a large herd trapped in mud so quickly in a desert? And how were they buried so quickly in a desert, before the soft flesh had time to rot away and before the skeletons had disintegrated? The fact that sediment was able to accumulate to such a depth over the animals (now at the base of a small hill) indicates that the depth of the water was rising on the continent to provide the necessary accommodation, not falling.

So, it was not a desert. Uniformitarian geologists invoke a desert interpretation in an attempt to explain the large thickness of the sandstone strata and the huge sand dunes within the beds. They say it was a desert to hold onto their uniformitarian philosophy that it was like a modern environment and thus try to avoid acknowledging the huge volume of water that must have been necessary, as indicated by the obvious signs of catastrophe within the sand. So they are prepared to propose an explanation where lakes and rivers
turn into deserts full of dinosaur herds that become trapped in thick mud and are buried quickly. One wrong interpretation leads to another.

Take off the blinkers

*Blinkers change the way a horse sees the world and the uniformitarian paradigm has a similar effect on scientists.*

Blinkers change the way a horse sees the world and the uniformitarian paradigm has a similar effect on scientists. Even though they carefully excavate and document the fossil dinosaurs buried around the world the philosophy of uniformitarianism biases the way they look at the evidence, stops them exploring all the options and controls the sort of explanations they promote.

Here in Inner Mongolia in the middle of Asia the historical reality of Noah’s Flood explains the new dinosaur finds elegantly. The herd of dinosaurs was a casualty of the enormous watery catastrophe that engulfed the region during the Flood. They were overwhelmed during the first half of the catastrophe as the waters were rising on the earth, while air-breathing, land-dwelling animals were still alive. Sediment continued to accumulate on the continent during this Inundatory stage as the waters continued to rise. Then, when the waters receded from the continents they eroded some of the overlying material, shaping the landscape, and leaving occasional erosional remnants, such as the small hill where the geologists were able to excavate this dinosaur graveyard.

Related Articles

- Huge dinosaurs flee rising waters of Noah’s Flood in Australia (http://creation.com/kimberley-dinosaur-footprints)
- Of barons, bones, birds and dinosaurs (http://creation.com/barons-birds-dinosaurs-bones)

Further Reading

- Sensational dinosaur blood report! (http://creation.com/sensational-dinosaur-blood-report)
- Watery catastrophe deduced from huge Ceratopsian dinosaur graveyard (http://creation.com/watery-catastrophe-deduced-from-huge-ceratopsian-dinosaur-graveyard)
- Did a meteor wipe out the dinosaurs? What about the iridium layer? (http://creation.com/did-a-meteor-wipe-out-the-dinosaurs-what-about-the-iridium-layer)
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7. Because they rely on modern environments to explain evidence they imagine the dinosaurs were buried 92 million years ago. In modern environments sedimentation is not that rapid. But once you allow that Noah’s Flood was a real event that engulfed the whole earth the raging waters sweep the millions of years away. And the evidence for rapid deposition is overwhelming.


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Digging Deeper Links for


The Mystery of Coal

http://blip.tv/origins/origins-the-mystery-of-coal-6482088

If this link gets broken, you can find this video on www.youtube.com. Search for “Mystery of Coal, Origins with Dr. Steve Austin”.

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Did Natural Gas Take Millions of Years to Form?

by Brian Thomas, M.S. *

Coal, oil, and natural gas are precious earth materials that are used to power many modern human activities. It is commonly believed that these "fossil fuels" formed over millions of years after plant and animal remains were buried and then subjected to tremendous pressures. But how well-grounded is this popular position?

A recent article titled "Natural gas: A modern fuel millions of years in the making" reported that the refined gas used in barbecue grills "marks the last step in a process that began more than 500 million years ago."1

But that's not so. Natural gas can be produced by adding heat and water to brown coal. Underground gas and oil, mixed with water, rise from a heated coal deposit until they are either trapped by an overlying rock formation or emerge at the earth's surface. Converting this coal to liquid or gaseous hydrocarbons does not take much time, nor does the upward migration of such material. So where is the evidence that points to millions of years?

In an exhaustive 2009 book, geologist Andrew Snelling summarized experiments that were performed on coal from Australia's Gippsland Basin. He wrote, "Brown coals from the onshore part of the basin were heated under conditions that simulated accelerated sedimentary burial conditions." This produced "liquid and gaseous hydrocarbons from the contained waxes, and leaf, pollen, and spore cuticles, all in a matter of two to five days."2 These hydrocarbons were identical to those harvested offshore, where they had been trapped above the coals from which they must have originated.

Some coal is being converted to oil and natural gas even now, and it is not taking millions of years.

Snelling also pointed to California's Kettleman Hills, where the natural gas is trapped between Miocene layers and overlying Pleistocene deposits. Both of these are Ice Age deposits that biblical creationists think formed after the Flood roughly 4,500 years ago. But even based on the evolutionary age assignment of 100,000 years for this Pleistocene oil, a 1967 textbook on petroleum concluded, "The time it takes for oil to accumulate into pools may be geologically short, the minimum being measured, possibly, in thousands or even hundreds of years."3

Oil and gas form in days, and they migrate through sedimentary strata to form pools in thousands of years or fewer. Where are the presumed millions of years supposed to fit in this timeline? Articles such as the one listed above present eons-long fossil fuel formation as undisputed fact. But both science and the Bible indicate that oil and gas were not "millions of years in the making," but are only thousands of years old.
Nothing of what is known about oil and gas formation requires or even suggests vast time spans.

References


* Mr. Thomas is Science Writer at the Institute for Creation Research.

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Have you been taught that folded rocks were deformed over millions of years by gradual application of heat and pressure? That’s what I was taught at high school.

However, geologic formations commonly show clear evidence that the rocks could not have been hard and brittle before they were folded.

When I was studying at university, I inspected numerous rock outcrops on geology excursions. At the majority of outcrops where the rocks were folded, lecturers would explain that the rock must have been deformed while the sediment was still unconsolidated and saturated with water.

They said this because, although the rocks were obviously severely deformed, there was hardly any fracturing. We all realized that the rock could not have been brittle when it was folded so tightly. It must have been soft and plastic. If the rocks had been hard and solid before they were deformed, they would have fractured, not folded.
In my work as a geophysicist, I have observed many examples of soft sediment folding, including rocks at Turon River (Images 3–4) and Ulladulla (Image 7) in Australia and at Jaipur in India (See image 8, image 10, image 11).
The lecturers also wanted us to carefully examine the minerals and texture of the rock outcrops. They pointed out that there was no evidence that the rocks had been subjected to much heat or pressure. Instead, it was clear that bending had taken place at normal temperatures.

Many of the folded layers of rock that we observed were enormous. What could have formed these folds? In most cases, the lecturers could only point to catastrophe. They could not suggest any gradual process that could deform rocks into tight folds under normal temperature conditions without fracturing them. Even the thick strata in Grand Canyon were still soft and plastic when they were deformed. (See Grand Canyon strata show geologic time is imaginary. (http://creation.com/grand-canyon-strata-show-geologic-time-is-imaginary))

Enormous forces

However, there are other instances where it is obvious that the folding occurred while the rock was solid. Deformation experiments have shown that such folding is possible under extreme pressure in a short time or under moderate pressure in a long time. Some tightly folded rock layers are so large that they can only be properly observed from the air (Image 6).
Massive folds in hard rock over such a huge area had to involve enormous forces that can only be explained by enormous catastrophe. Could continental-scale earth movements during the Genesis Flood have produced the great forces needed to fold such large, tight folds quickly?

**Global catastrophe**

Many scoff at the thought of the global Flood, claiming that normal climatic events could not cause such an event. They are right! It was not a normal event. The Flood started when ‘the fountains of the great deep broke forth and the floodgates of the heavens were opened’ (Genesis 7:11). The Bible is very clear that the Flood was a real event—an incredible worldwide catastrophe.

In spite of this, some people imagine that the Bible must be describing a local flood. And they only look for evidence for large local floods in the Middle East. However, if they could bring themselves to accept (even if only for the sake of the argument) the immensity of the Flood, they would soon ‘see’ that the geological evidence for global cataclysm is overwhelming.

**Logical explanation**

Many creationist geologists believe that the Genesis Flood involved rapid movement of the huge plates comprising the crust of the Earth. This explains why so much sediment was still soft when it was deformed. No sooner would floodwaters have deposited great volumes of mud and sand than moving plates would have crumpled and deformed the sediment while it
was still saturated. The Flood also explains the colossal forces needed to fold enormous areas of hard rock.

The Biblical Flood is a simple, logical, and valid explanation for why we find so much rock that has been catastrophically deformed on all the continents.

Folded limestone

In the Peruvian Andes (Aancash Province), limestone has been folded (Image 1) as an oceanic plate pushed against the edge of the South American Plate.

Image 1

Fossilized shells found in the rock (Image 2) were once in the sea.

Image 2 Fossil shells
Dinosaur footprints have also been found at this location. Experiments with deforming limestone\(^1\) show that strata such as these could have been folded within the year-long Genesis Flood.

Tectonic movement during the Genesis Flood has pushed these Peruvian strata 5,000m (16,000 ft) above sea level. During this upheaval, rapid erosion by a rushing mixture of water and rock, followed by glacial erosion in the post-Flood Ice Age, would have left the landscape as observed in Image1. Today, the glaciers have receded and erosion has slowed down. Even at the present rate, erosion is occurring much too fast for these mountains to have existed nearly as long as the evolutionary geological timescale suggests.\(^2\)

**Folded mud**

All the rock in Image 3 is tightly folded—the close-up (Image 4) shows one fold. The minerals in the rock indicate that it has not been heated much, so it must have been folded when the sediment was water-saturated and unconsolidated. The Genesis Flood provides a logical explanation of how such large volumes of sediment could have been folded so tightly before they had a chance to consolidate. (Chelseigh Formation, greywacke and shale on the Turon River, west of Sofala, New South Wales, Australia.)

**Great and small**

![Image 5](image5.png)

Folds of all scales proliferate in the rocks of the Earth—many are so small that they can only be seen under the microscope (Image 5). Others are so large (Image 6) they can only be seen from the air. Image 5 (at 160x magnification) shows severely deformed quartz and muscovite mica (from near Cooma, New South Wales, Australia). Mineralogy of the photomicrograph suggests that in this case the rock was solid when deformed. Folding like
this has been reproduced and recorded during experiments in the laboratory, so millions of years are not required.³

In contrast, the aerial photo below (Image 6) shows enormous folds near Mt Isa, Queensland, Australia.

![Image 6](image)

Rapid plate movement during the Genesis Flood would have provided the immense forces needed to compress and fold such great volumes of rock. In this case, the evidence is consistent with some heating of the rock, probably due to the forces involved.

Faulting and sliding

Not only is there a vast amount of evidence around the world for catastrophic folding of soft, waterlogged sediment, but also for faulting and sliding of huge blocks of material. In Image 7 above, a 4 km² block of sediment broke away and slid into this position rapidly.⁴ Under the front of the block, the sediment is extremely deformed. If this sediment had been laid down over millions of years, it would have consolidated and solidified, making such incredible movement impossible. However, during the global Flood, the frequent movement of large blocks of water-saturated unconsolidated sediment would be anticipated. (Ulladulla Mudstone, Warden Head, Ulladulla, New South Wales, Australia.)
‘Rainbow cake’ mix

A vast expanse of catastrophically deformed mudstone north of Jaipur, Rajastan, India (Image 8), was deposited by water and severely deformed before it could solidify into rock. No gradual process taking place over millions of years can explain such large-scale deformation.

Other rock at the same location in India (See image 9, image 10, image 11) has been deformed so much that it looks like a rainbow-cake mix (Image 12).
The catastrophic global Flood is the event which logically explains how such mixing could have taken place—not small, gradual, everyday events over millions of years.

Just as swirls in a rainbow cake were formed quickly before the mix was baked into cake, folds in much of the crust of the Earth were formed quickly in a great watery catastrophe before the rocks were solidified. Mineralogical evidence confirms that such folds could not have formed slowly over millions of years. All such occurrences can, however, be well explained in the context of the Biblical Flood.

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Many creationist geologists have proposed that the Grand Canyon (GC) was formed by a catastrophic dam-breach event. This would have released large quantities of water from impounded lakes east of the canyon that had remained on the plateau after the Flood. This event would have carved the GC, starting from the east moving to the west. Yet there are many features of the GC that cannot be adequately explained by such a dam-breach event.

A better explanation is that the GC was formed while the waters of Noah’s Flood receded from the American continent. As this receding water flowed from east to west, the GC was mainly carved out in the opposite direction, from west to east. This scenario explains many characteristic and unusual features of the GC, such as its location through the top of a ridge, its branching structure, its numerous major and minor side canyons, its meandering and the presence of multiple ‘outflow points’ in its terminal escarpment.
**Figure 1.** A Digital Elevation Model of the Grand Canyon region with an artificially raised water level. It shows the contours of the lakes that could have formed east from the Kaibab Plateau when the GC still would have been ‘closed’. The arrow indicates a more logical point for a breaching event than through the current higher point of the Kaibab Plateau.

The breached-dam theory

Contrary to the uniformitarian view that the origin of the Grand Canyon (GC) was a slow process over 7 million years, creationists have claimed it was carved by a single catastrophic event by the breaching of an enormous natural dam. This breached-dam theory (BDT), as it is called, says that the water from two lakes lying east of the Kaibab Plateau, called Hopi Lake and Green River Lake (or Grand Lake), catastrophically carved through this higher-lying plateau and formed the GC.

Walt Brown presented an account of the BDT in his book *In The Beginning*, which was first published in 1980 and is now in its 8th edition.¹ In the late 1980s, Edmond Holroyd defined the boundaries of the two lakes.²³ Steve Austin *et al.* summarized the BDT in his 1994 book about the GC.⁴

Figure 1 is a Digital Elevation Model of the region around the GC and indicates by joining lines of equal contour (calculated by software) the raised water level that defines the possible outline of the lakes.⁵
Brown most explicitly describes the process of the dam-breaching, whereas Austin only roughly outlines the general idea of such a breach. Most often when a BDT is discussed, reference is made to other ‘canyons’ that have been catastrophically carved, such as:

- Mount St Helens canyons, which were carved following the 1980 volcanic eruption.
- The Scablands, caused by “The Lake Missoula Flood”.
- Burlingame Canyon near Walla Walla, Washington,\(^6\) caused by the drainage of storm water.

**Figure 2.** Wide-angle view of the Grand Canyon, clearly showing its branching structure. The Colorado River flows from right to left (east to west). Arrows show some side branches of the canyon.

Nevertheless, as we will see in detail further on, there are many features of the GC that are not adequately explained by such a dam-breach event. To begin with, there are obvious physical differences between the GC (see figure 2) and the canyons listed above. For instance, the canyons of Mount St Helens (figure 3) do not show the branching structure exhibited by the GC. The Scablands has an explicit multi-channelled pattern (figure 4), which is completely absent in the GC, but would be expected if the large amount of water from the two lakes had been unleashed on that landscape.
The edges of the ‘Little Grand Canyon’ at Mount St Helens are relatively straight and do not exhibit the branching structure of the Grand Canyon. Mike Oard\textsuperscript{7} has listed five objections against the BDT and suggested the possibility that it was carved from west to east as the waters of Noah’s Flood receded to the west. This paper discusses some of the major and unique characteristics of the GC that need to be explained by any theory for the origin of GC and how these characteristics fit with a so-called Receding Flood Scenario (RFS).
Figure 4. The multi-channeled and parallel structure of The Channeled Scablands in northwest US is quite different from the Grand Canyon. The channels do not exhibit the branching structure evident with the Grand Canyon.

Method of studying: Google Earth

Because the Flood was a global event, the unprecedented possibilities of Google Earth can help to better understand the scale of the impacts the Flood must have had in shaping the landscapes of the earth.

Besides the use of scientific literature, Google Earth has been an important tool in studying the origin of the Grand Canyon. Google Earth uses detailed satellite images of the earth’s surface which are projected onto a 3D Digital Elevation Model of the landscape. In that way spectacular overviews and ‘flybys’ of the area of interest can be generated that are impossible to realize by ground or field work. Because the Flood was a global event, the unprecedented possibilities of Google Earth can help to better understand the scale of the impacts the Flood must have had in shaping the landscapes of the earth and in this case, the GC.
Features of the Grand Canyon that need to be explained

Feature 1: The GC is carved through the higher points in the landscape

Figure 5 shows a north-south cross-section through the GC area, starting from the northern mountains on the left to the Kaibab Plateau and the GC on the right. This is the so called ‘Grand Staircase’. It can be seen that the GC cuts through the higher parts of the Kaibab Plateau on the right and not through the lower level near the Chocolate Cliffs in the middle, which roughly corresponds with the area in figure 1 indicated with the arrow. Why would any breaching occur in a higher part right through a ‘mountain’ rather than in a lower part?

Figure 5. A north-south cross-section through the so called ‘Grand Staircase’ illustrating the geological strata that comprise the walls of the Grand Canyon, which is at the far right.

The Receding Flood Scenario (RFS) is able to explain a cut through higher ground very well. Consider the GC area (indeed the whole North American Continent) being completely covered with water to a depth of 1 km or more. This immense body of water would extend 500–600 km to the east and have a similar north-south dimension. We will call this body of water the Grand Canyon Inner Sea and discuss it in detail later.

Because the continents are being compressed and the ocean basins are sinking, the area of the Colorado Plateau is uplifted and therefore the water within the GC Inner Sea is retreating in a westward direction and the water-level is lowering. The water follows many routes flowing out of the area from higher to lower regions. When there is a submerged landform, such as a plateau, mountain, hill or ‘sandbank’, the water will not only flow to the
left and right of the landform but also over its top as long as it remains submerged. The water flowing over the top will, at a certain point, increase in speed, since there is less and less room for the water to find a way. Therefore some parts of the top of the landform will start to erode faster than other parts or the sides. In this way a channel or gully will form right through the higher parts of the elevation (figure 6).

**Figure 6.** Schematic of how a canyon is carved through higher ground as water levels lower (phases 1–5). Image B is a cross-section of image A at the vertical dotted line. When the water in image A flows from right to left over a submerged elevation it may carve out a gully in the elevation (image B), even though water still flows at the sides. As the gully deepens, it grows in the opposite direction of the water flow (image A).


**Figure 7.** The Wadden Sea in the Netherlands, a tidal area with sandbanks, illustrates how the daily tides cut through the higher points in the sandbanks to allow the retreating seawater to pass.
As the water level keeps falling, the sides of this initial channel will emerge from the water (phase 1 in figure 6). But water will continue to flow rapidly because of the enormous volume of water that still needs to drain out. The underwater mountain hinders the receding water and therefore the water will take every possible route out. Thus the channel will be carved deeper and deeper, even though there might still be water flowing along the sides of the elevated landform. Provided the water level of the Inner Sea lowers slowly enough, water will keep flowing through the channel and erode it deeper and deeper as the water level lowers (figure 6B). As a result, the channel will grow longer in an upstream direction, beginning in the area where the landform is highest and moving to the area where the landform is lower. The most remarkable thing about this process is that the direction in which the gully is carved is opposite to the direction the water flows (figure 6A).

Another remarkable feature of this drainage process is that, once the channel has achieved a certain length, it will start to branch out like a tree as the water continues to drain from the plateau. The main channel will develop side channels, which in turn will develop side channels, and so on. The side channels develop because, as the main channel grows in length, the water on the plateau is then able to flow sideways into the channel. This sideways flow eventually initiates secondary channels that continue to grow sideways (Feature 2 and 6).

It is possible to see today how this process produces a branching structure by observing tidal areas with lots of sand, such as in the Wadden Sea to the north-west of the Netherlands. Gullies are cut by the daily tides through the a submerged landform, such as a plateau, mountain, hill or 'sandbank’, the water will not only flow to the left and right of the landform but also over its top as long as it remains submerged. The water flowing over the top will, at a certain point, increase in speed, since there is less and less room for the water to find a way. Therefore some parts of the top of the landform will start to erode faster than other parts or the sides. In this way a channel or gully will higher points in the sandbanks to allow the retreating seawater to pass through. Figure 7 shows an example of this effect in the Wadden Sea. The lighter coloured areas are already dry. The dotted line indicates the higher point of the sandbank. The large black arrows indicate the direction of the flowing seawater when the sandbank is submerged. It can be clearly seen how several gullies have been cut through the higher levels (the narrow white arrows pointing upward in the foreground) and branch out in the lower levels that are still underwater in this picture (the
narrow white arrows pointing downward in the middle). The structure of these gullies is not exactly the same as in the GC, but this is likely due to:

- The scale of the GC, which is more than an order of magnitude larger.
- The amount of water flowing through these gullies, which is many orders of magnitude less than in case of the GC.
- The GC having been a one-time event, with maybe some limited tidal effects. The sandbanks and gullies of the Wadden Sea are the result of long periods of tides, day in and day out.

Image generated by Google Earth™ 2008

**Figure 8.** The branching structure at the western part of the Grand Canyon. Branches are shaped as a V or U with the width tapering away from the outlet of the branch. The branching shapes resemble fractals.

Feature 2: The branching structure of the western half of the GC
Figure 8 shows the typical branching structure apparent along the western part of the GC. The dotted line indicates one side or ‘bank’ of the GC. At several positions branches can be observed extending away from the GC and these branches become narrower as they extend further away. This narrowing means the edges of these branches tend to have a triangular shape. The branches themselves also have branches, and those might even split further. The edges of the branches always seem to be shaped as a V or a U. A ‘sudden’ high-velocity current caused by a dambreach would carve out parallel channel-like structures, as can be observed in the Scablands (figure 4). It would not create this sort of branching pattern, nor would it create these V- and U-shaped gullies.

A spectacular example of such similar V- or U-shaped erosion on an escarpment, which is still eroding up to this present time, is the notch of the Niagara Falls (figure 9). This shows that a relatively constant supply of low velocity water on the plateau can explain the origin of a V- or U-shape better than a breach event can. Notice also that the Niagara Falls is eroding backward in the opposite direction to the water flow, as discussed previously with figure 6. Once the V-shape of the main canyon is established, three conditions are needed to form the typical branching type canyons observed in the GC:

**Figure 9.** The Niagara Falls illustrates how steady erosion by a constant flow of water produces a U shape. Erosion of the Falls is in the *opposite* direction to the flow of water.
There needs to be a relatively constant (or regular) supply of a large volume of water covering the raised area and flowing into the main canyon.

The raised area/plateau needs to be rather flat so the water can flow into the main canyon from both sides. The steeper the downstream slope on the raised area, the shorter and narrower the V-shape of the main canyon will be. When the raised area is flat, it will result in a main canyon with a long, broad V and with more branching.

The sediments need to be relatively soft; otherwise the erosion would be too slow to keep pace with the lowering water level. In hard rock the water would have flowed away over the sides of the raised area before any gully/canyon had time to be eroded.

The receding water of the Flood is precisely what is needed to create branching V-shaped cuts along the sides of the GC by flowing sideways into the canyon. Therefore we can conclude that many, or all, the cliffs of the GC are former waterfalls! That must have been a spectacular sight. The water had been flowing over the edges into the GC and thus carving out V-shapes.

The much deeper channels in the middle of the GC were formed after the main canyon was cut, and they are still being eroded today by the normal drainage of the Colorado River that flows through it (see feature 5, p. 111).

Along the coast of Argentina we can also find beautiful examples of branching structures caused by receding tidal water as shown in figure 10. Note the similarity of the wide flat

Figure 10. Branching type channels on the coast of Argentina have an appearance similar to the branching in the Grand Canyon.
mud flats, cut by the narrow gully in the middle, with the features of the GC. Also note the steeper ‘cliffs’ on the sides and the branching ‘canyons’ towards the lower-lying parts behind the cliffs.

Feature 3: The non-branching structure of the eastern half of the GC

As shown in figure 2, the eastern part of the GC northwest of the Kaibab Plateau does not exhibit the branching structure evident in the western part. On the North Rim, the canyon shows a typical erosion pattern that can also be observed in mountainous areas. The cliffs located on the South Rim look much like a collection of landslides that slipped into the GC. These features indicate that the process that formed the eastern part of the GC is likely different from the process that formed the branching part in the west. It suggests that the GC was formed in two major steps, a western step and an eastern step. Both steps would have initially involved cutting through higher ground—one through the Kaibab Plateau and one through the Hualapai Plateau (see feature 4 below). Both would likely have been formed at the same time. However, the western arm would eventually extend to connect to the eastern Kaibab section when the water level had lowered enough.

Neither the BDT nor the regular uniformitarian views can adequately explain these differences.

Feature 4: The multiple ‘outflow points’ at the end of the GC

**Figure 11.** The westward end of the Grand Canyon looking east across the escarpment to the Hualapai Plateau. Apart from the outflow point of the Grand Canyon (point number 5), there are a number of similar but smaller ‘outflow’ points (numbered 1 to 4 and 6 and 7).

Figure 11 shows the area where the GC exits at its western end (looking in an eastward direction). This area is characterized by a huge escarpment/ridge (indicated by the white line), which is about 160 km long and up to 1,000 m high. The GC presently cuts through the Hualapai Plateau and ends at the escarpment at marker 5. The Colorado River, which flows through the GC, emerges from the escarpment at this point and runs into Lake Mead, which can be seen in the foreground.

However, there are several other ‘outflow points’, or gorges, cut back into the escarpment. Although they are smaller than the GC, they have a similar appearance. Markers 1 to 4 identify some of these smaller outlets in the vicinity of the GC. These gullies/canyons are not currently operating as drainage outlets for the catchment area behind them. Marker 6 identifies another such outlet, which is currently operating as a drainage outlet. Marker 7 is on the other side of the GC at another outlet, and this one is even harder to explain in terms of being formed by the present drainage system because the GC is right behind it and takes care of all the drainage.

The elevation of the entire plateau area surrounding the GC rises slowly as we move downstream along the GC from east to west, forming a ridge. The elevation of the plateau ‘suddenly’ drops off at the ridge/escarpment mentioned above. Figure 12 is a view south along this escarpment, with the high plateau to the left and the lower landscape to the right.
The global Flood provides a simple, plausible explanation for these multiple outflow points through this escarpment. In the second half of the Flood, as the waters of the GC Inner Sea were receding from the continent into the Pacific Ocean basin (because the continent was compressed and the GC area uplifted), water flowing from the east was trapped behind this ridge. This water was forced to flow over and through the ridge at those 7 outlet points, thus eroding the deep canyons at these points and carving out the branching, V-shaped structures that can be observed at these locations.

As the water level dropped, only one of those outflow points (probably the longest and deepest at that time) continued to flow, whereas the others ceased to serve as outlets. Outflow point number 5 in the Hualapai Plateau remained in service to drain the rest of the water behind it and, as such, continued to erode deeper and further eastward. This is an example of cutting through higher ground similar to that which we saw with the Kaibab Plateau.
Different erosion patterns on the north and south rim of the GC outlet

Allen Roy concluded that a ‘recent gigantic flood’ eroded the Hualapai Plateau. An outflow point, as described above, fits this observation very well. Strangely enough, branching, V-shaped structures are not present on the southern side of this GC outflow point as they are on the northern side. When we examine the landscape, we can see that this must have been because the northern parts served as outflow points for the higher northwest region of the plateau, but the southern parts did not need to drain the lower southern area. They served as a bend in the miles-wide ‘river’ mouth of the receding water (see figure 15) and thus more smoothly eroded the Hualapai Plateau there.

At the most southerly point (at the ‘question mark’ in figure 15, called Peach Springs) there might even have been another second large, but temporary, outflow point for this GC ‘river’.

Figure 13. Schematic cross-section of the Grand Canyon, showing the dual structure: section A, which is wide and shallow, and section B, which is narrow and deep.

Feature 5: The dual cross-section of the GC

As shown in figure 13, the cross-section of the GC has two distinct shapes. The canyon of section A is broad and relatively shallow. The canyon of section B sits in the middle of section A. It is much narrower, is carved much deeper and has steeper sides.

The Colorado River flows through section B. The present size of the Colorado River is a good fit with the size of this deeper canyon, indicating that this deeper section was eroded by the Colorado River over time. It also means that the flow in the Colorado River in the past (when the narrow canyon first began eroding) was similar to the flow in the river at the present time.
However, the broader section, A, could not have been eroded by a river with the same size and flow as the Colorado River. It would have had to have been eroded by a river with an immensely larger volume of flow. Using Google Earth, we can estimate the size of the ‘river’ and superimpose it on the map (figure 14 and figure 15). By connecting all the sides/banks of the GC (ignoring the side canyons), we can see this is an immense river of unparalleled scale. We may conclude that this broad river represents the Flood drainage-river that carved the section-A portion of the GC.

Image generated by Google Earth™ 2008

**Figure 14.** When lines are drawn at both sides of the Grand Canyon alongside the innermost projections of the intact sides, the size of the immense ‘river’ that drained the receding floodwaters becomes clear.
Figure 15. When the sides/banks of the Grand Canyon are connected (ignoring the side canyons), the magnitude of the initial water channel that carved the canyon becomes clear. The channel is much broader at its mouth (to the left of the figure in the west) than upstream toward its source (to the right in the east). This whole ‘river’ is basically another V-shape.

This ‘river’ is much broader at its mouth than at its beginning, which basically is another stretched V-shape drainage structure. In other words, the volume of water flowing through the long canyon was greater at its outlet than in its upstream portions. This is because a lot more water flowed out of the area when the water level was high than when it had lowered.

This dual cross-section indicates that the initial volume of water flowing through the GC outlet point must have been huge. When the water level lowered, its volume decreased, creating a narrower river and eroding a narrower channel in the lower parts.

The deeper canyon (figure 13 section B) in the middle of the broad canyon (section A) only started to erode after all the floodwater on the plateau has drained. It was eroded by the
normal drainage of the huge Colorado basin, which continued to flow through section A. Erosion at this reduced scale continues up to the present day.

**Feature 6: The large side ‘arms’ of the GC**

The GC has two very large side canyons visible in the middle of figure 2, one extending north and the other south. It also has several smaller side arms on its western part. The larger branch in the north is called Kanab Canyon and the one in the south is called Havasu Canyon. Those side arms themselves also exhibit the typical branching, V-shaped structure. They are broad where they join the GC and narrow at their extremities. On first impression, these branches look like drainage systems for the catchment area they are located in, not like channels caused by a sudden flood of water from the east. The side branches are perpendicular to the direction of the main part of the GC, which means they cannot have been formed by a dam-breath event. A dam breach releasing water from behind the Kaibab Plateau would have carved canyons in the direction of flow, as illustrated in figure 4, not perpendicular to it.

However, these side branches are beautifully explained by the RFS. These canyons would have formed in a similar way to the rest of the GC but after much of the CG Inner Sea had drained from the plateau. The side branches extend into regions where there were still huge amounts of water that still needed to drain. The only way these enormous amounts of water could drain was to the lowest point in that area, which was toward the GC channel.

We can simulate the water flows at the time the floodwaters receded by ‘lowering’ the water level in the GC region using software and a Digital Elevation Model. Figure 16 shows a sequence of six steps as the water level drops, making it clear what areas of the landscape emerge and what areas remain underwater at subsequent stages.
Figure 16. Simulation of the Grand Canyon region as the water level lowered. The white lines indicate local elevations by which the huge northern and southern lakes are separated from the Grand Canyon. Arrow A shows where the northern lake connects to the Grand Canyon. Arrow B indicates the direction of water flow from the northern lake as it carved Kanab Canyon. Arrow C shows the direction in which Kanab Canyon was carved as the water lowered and the northern lake emptied. 

It can be seen that a large lake forms in the northern part. As this lake drains into the GC, its borders decrease, closely following the tip of the arm of Kanab Canyon right until the lake is completely drained. This is in line with the speculations of Williams et al.\(^9\) who stated that the drainage of a lake formed Kanab Canyon.

We need to take into consideration that a lot of water from the northeastern part of the Colorado Plateau also would have found its way through Kanab Canyon until the water level was so low that the gap north of Kaibab Plateau at Chocolate Cliffs (arrow in figure 1) was closed.

The Havasu Canyon to the south only shows a lake in the first picture of figure 16. It does not show a diminishing lake at its very tip as occurs with Kanab Canyon. This may suggest that Havasu Canyon would have formed differently or much quicker than Kanab Canyon. Yet, it is the larger of the two and it still has exactly the same patterns. Therefore it seems
justified to conclude that there might have been some relative tilting of the southern part compared to the northern part after the canyon was created.

**Figure 17.** Possible temporary situation where two large northern and southern lakes drain their contents into the Grand Canyon. The arrows indicate the location of the initial waterfalls which carved backwards to excavate the side canyons as the lakes emptied.

This simulation assumes that the levels of the landscape today are still similar to the levels when the GC originated, which, of course, would not necessarily be correct if the whole plateau had tipped in the process. It is well known that the region has undergone severe uplift and compression. From a Flood perspective, it is likely that this uplift was the driving force behind the drainage of the area. Therefore it would not be unreasonable that the landscape today has remained similar to what it was back then and that the subsequent changes have only been relatively small.

To compensate for the possible tilting of the southern part and to make a more accurate estimation of the situation with the side arm lakes, figure 17 has been created. This figure illustrates how that, as the water level was lowering and the GC ‘river’ was diminishing, two lakes formed on the plateau, one trapped to the north and the other to the south. These lakes released their water into the side branches of the GC in the same way that the GC Inner Sea earlier flowed into the GC on the Hualapai Plateau. At the overflow points of these lakes (indicated with the arrows) waterfalls like the Niagara Falls, but much larger in size, were carving both side canyons at the same time.
Figure 18. In Marble Canyon the Colorado River meanders through hard rock, which is impossible. The arrows indicate branches that face upstream against the flow of the Colorado River.

Figure 18 shows the Colorado River at the level of Marble Canyon, and, as can be seen, it is meandering in hard rock!

One prerequisite for a river to meander is that the sediments it flows across are soft, not hard. Meandering is caused by a combination of erosion and deposition of sediments. What could possibly explain that the Colorado River is meandering in hard rock? The likely answer to this would be that such rock wasn’t that hard when the Colorado River originally carved its first shape.

Another prerequisite for meandering is that the water has to flow slowly enough to deposit the sediments. Therefore the BDT is not adequate to explain this, but the RFS is.

The uniformitarian explanation for this feature is that the river first formed in deposited alluvium and that after uplift of the Colorado Plateau it continued eroding down through the hard rock. Nevertheless, at Marble Canyon there is no alluvium on the plateau, neither is there any trace of a previous alluvium.
Figure 19 is an example of meandering gullies caused by receding tidal water in Wadden Sea. It clearly demonstrates that slowly receding waters are well capable of creating meandering structures. This means receding Flood water is the best explanation for the meandering Colorado River at the level of Marble Canyon.


**Figure 19.** Meandering gullies (example at arrow) caused by receding tidal waters in the Wadden Sea, The Netherlands.

**Feature 8:** Some branching canyons in Marble Canyon point in the opposite direction

Some of the side canyons of the Colorado River in Marble Canyon point upstream to the river instead of the normal downstream direction (see arrows in figure 18). Brown¹ tries to use this as evidence for a dam-breath theory, but a more logical explanation is provided by the RFS. The level of the rim of Marble Canyon and the surrounding plateau slopes ‘uphill’ against the direction of the flow of the Colorado River. Of course the river doesn’t flow uphill, but it does cut through higher ground and therefore the rim becomes higher as we go downstream. The reason that the Colorado River flows through an uphill area is the same reason that explains the other parts of the Colorado River: receding waters cut it out. Therefore the side arms connecting to the Colorado River point in their logical direction: downhill to the east, which happens to be in upstream direction of the Colorado River that now flows to the west.
The Receding Floodwater Scenario

We cannot be completely certain of the precise extent and size of the drainage basin, the GC Inner Sea, that emptied through the area of the GC because, for instance, there has been compression in the north of the region and the Colorado Plateau has been uplifted. Nevertheless a rough impression of its size can be made by following the current higher mountains as its borders (hatched area, figure 20). However, the current drainage system of the Colorado River extends even further north beyond the borders of the map. It is possible that there might have been another continental sea of similar size, the water of which eventually also found its way out through the GC area (plain area, figure 20).

Figure 20. Possible extent of temporarily impounded water on the western part of the continent forming an inland ‘sea’ that drained through the Grand Canyon into the ocean.

According to the RFS, the erosion process had already begun before the waters of the inner sea became completely trapped. This is because water flowing across the continent would have flowed over and around submerged mountain ridges. For a small period of time during this stage of the Flood there would have been simultaneous overflow points at several locations that left their mark on the landscape. But the carving of the GC fully began when
that complete body of water became trapped and had no other way out than through that one single outflow point.

There is something to say for simultaneously cutting the canyon at two locations. Because the Kaibab Plateau is also at a high point in the landscape, the carving process should have begun there before the lower side arms began to form. This means that there might have been a western and an eastern part of the GC that only interconnected later on when the water was low enough. We have to take into account that the region has been uplifted. This would have been caused, not only by tectonic compression, but also the removal of the weight of water resting upon it.

As with any model, the RFS is based on certain assumptions. The first, of course, is that the entire region, and thus the whole American continent, was fully covered by water. It also assumes that any continental movement associated with the concept of plate tectonics happened quickly, over weeks and months, during the year of the Flood (as in the Runaway Subduction Model). In addition, the consequent compression of the western part of the American continent probably was nearly almost finished by the time the waters started to recede.

These considerations result in the following scenario:

1. As the floodwaters were receding the GC likely started eroding at the two higher points in the landscape, first in the east (Kaibab Plateau), since that was probably higher than in the west (Hualapai Plateau). At this point all the sediments, which were deposited earlier in the Flood, were still soft and wet and not hardened rock.

2. On the escarpment/ridge to the west some 5 to 7 overflow points developed simultaneously as the waters receded. One of these points carved further, faster and deeper and therefore remained to serve as an outflow for the GC Inner Sea that became trapped on the continent behind the ridge. The other overflow points stopped releasing water as the level dropped.

3. The upper cliffs of the borders of the western Grand Canyon are former waterfalls that drained the water of the GC Inner Sea into the GC and created the branching structures. These waterfalls were relatively short lived. At this time the ‘Grand Canyon’ was a huge ‘river’ kilometres wide.
4. When the southern Havasu and northern Kanab side arms were cut, the waters that kept flowing through the Kaibab outflow carved a connection with the main system, thus establishing almost the entire length of the GC.

5. Eventually, Marble Canyon was cut out by the waters trapped behind the Kaibab Plateau after its level was so low that it was not able to flow through the northern opening anymore.

6. During the process the entire area was gradually lifted up, partly because tectonic forces were compressing the continent, and partly because the weight of its Inner Sea was decreasing, resulting in isostatic adjustment of the continent.

7. In the ages after the Flood, the sediments dried out and hardened to solid rock. The Colorado River continues to flow through the GC but is a magnitude smaller than the GC ‘river’ that drained the receding floodwater. Therefore the rate and pattern of erosion dramatically changed compared to what it had been initially, carving the narrower, deeper and steeper, inner canyon. More ‘normal’ post-Flood weathering and smaller-scale drainage erosion has also extended the borders and cliffs of the GC but only in a relatively small measure.

Conclusions

There are a number of unusual and characteristic features of the GC that need to be explained by any model for its origin. These features include the branching structure of the western half of the GC, its numerous major and minor side canyons, and the location of the canyon in the higher parts of the region. Other unusual characteristics of the GC include the meandering parts of the Colorado River and the existence of multiple ‘outflow points’ from the escarpment, some of which are now ‘dried up’.

These characteristic features of the GC also run counter to a sudden draining of post-Flood lakes in a dam-breaching event.

These features demonstrate the shortcomings of the uniformitarian model, which assumes only present-day processes to explain the canyon and therefore needs to fall back on *ad hoc* secondary hypotheses.

These characteristic features of the GC also run counter to a sudden draining of post-Flood lakes in a dam-breaching event.
A Receding Flood Scenario, whereby the North American continent was once covered by water kilometres deep that needed a way out after becoming trapped in a gigantic bowl when the area was uplifted, is a relatively simple model that incorporates and explains all of these features elegantly. The volume and extent of the water that drained was of a scale even larger than the entire GC itself and the processes involved are hard to research or even imagine without satellite images and modern software.

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- Grand Canyon - Evidence for Noah's Flood (Creation Magazine LIVE! 3-06) (http://creation.com/media-center?fileID=jLtV1fUCoE)

References

Yellowstone National Park, the oldest national park in the United States, spans parts of three states: Wyoming, Montana, and Idaho. It is famous for its geothermal activity, including 10,000 hot springs and 200 geysers, including ‘Old Faithful.’ There are also mountains, including one of black obsidian (volcanic glass), cooled and hardened basalt lava flows, deep valleys and canyons, rivers, lakes, forests, petrified wood (wood turned into rock), and wildlife.

Petrified forests?

In some places in Yellowstone Park, erosion of a hillside reveals layers of upright petrified trees. At Specimen Ridge, there are said to be 27 layers, while Specimen Creek contains
about 50. This means that the Specimen Creek formation is especially huge—its total vertical height is 1,000 meters (3,400 feet). This raises the question: how did the petrified tree layers form?

**The evolutionist explanation**

Evolutionists and other long-agers usually teach the following scenario:

1. Each layer is the remains of a forest.
2. Each forest was buried where it grew by volcanic ash and other debris.
3. Dissolved minerals were soaked up by the trees, petrifying them.
4. After about 200 years, the ash weathered into clay, then into soil.
5. A new forest grew on top of where the previous one had stood. From the well-preserved tree rings, the oldest tree in each layer was about 500 years old on average.
6. The new forest was buried by volcanic ash, and the process repeated.
7. The entire stack of layers was eroded, such that their edges are now exposed in a cliff (see diagram on p. 21 of the magazine).

If this scenario were true, it would have taken nearly 40,000 years to form the entire series at Specimen Creek. However, since this scenario is based on the unobservable past, it is not part of normal (operational) science, as this deals with repeatable observations in the present. But as we will see, there are certain features of Specimen Ridge that make no sense under this explanation.¹

Photos by Clyde Webster

Some of the views of the upright tree trunks in the Yellowstone petrified ‘forest’.
Problems with the long-age scenario

The arrows indicate some of the visible stumps on this hillside at Specimen Creek. Although they look as if they grew in these positions, the evidence indicates otherwise.

- Growing trees have extensive root systems, usually 20–30% of the total dry mass of the tree. But the Yellowstone petrified trees have their large roots broken off, leaving ‘root balls.’ This happens when trees are forcefully pushed out of the ground, e.g. by a bulldozer.

- A forest buried in place would be expected to have many petrified branches and much petrified bark. But the Yellowstone petrified tree trunks, mostly 3–4 meters (10–12 feet) tall, have very little bark and very few branches. Something has stripped most of the bark and broken off most limbs, leaving only knots in the trunks.

- Some of the trees extend into the ‘forest’ layer above. But if the next layer had to wait hundreds of years for the ash covering to weather into soil (so the ‘next’ forest could grow), then the exposed tree top would have completely decayed. But if the trees were all laid down quickly, this observation should not be surprising.
• When trees fall in forests, especially with a flat floor, they have an equal chance of lying in any direction. But in the petrified ‘forests,’ the prostrate (lying down) trees tend to align in the same direction. Also, even the upright trunks are turned so their long axis is aligned the same way. This is consistent with a common force, e.g. moving water or mud, having acted on both after they were uprooted.

• If the layers had been buried by volcanic eruptions thousands of years apart, the mineral content of each would probably have been quite different. But the mineral content remains the same throughout over a kilometer of vertical height. This suggests one or few volcanic episodes, with many pulses within each episode, all within a fairly short time frame.

• Growing forests have definite soil and humus layers, with lots of rootlets as well as a thriving animal population. However, the petrified ‘forests’ lack all these.

• Studies of the Yellowstone plants, including pollen analysis, show that there are many more plant species than would be expected in a forest. And often the pollen doesn’t match the nearby trees. However, this would be explainable if the trees had been uprooted and transported from several places.

• In a real forest, plant debris forms an organic layer on the forest floor. The deeper the material, the older it is, so the more time it has had to decay. But the petrified forests lack this pattern of greater decay with depth. There are also finely preserved leaves—since leaves do not retain their shape for very long after they fall off the tree, these leaves were probably buried very quickly.

• Volcanic minerals such as feldspars quickly weather into clay when exposed to water and air. But the petrified ‘forest’ layers lack clay. This suggests that none of the layers were exposed for very long.

• The patterns of particle sizes in rock layers often indicate how they formed. Consider a bag of mixed nuts—often they will be randomly mixed. Or, if they are shaken, the large brazil nuts end up on top as the smaller nuts fall down through the gaps. But many rock layers which have been laid under water show patterns different to these. The large grains have sunk to the bottom, and been covered by smaller grains—a pattern
called *graded bedding*. Also, if the water is moving horizontally, alternating layers of coarse and fine grains form.\(^2, 3, 4, 5\) The Yellowstone ‘forests’ are associated with rocks which contain these laminations, consistent with being formed under water. Some beds of coarse material have tongues of ash penetrating them. Also, such flat beds would seem to require a lot of water so the material can flow over such large distances. Some volcanic rocks in New Zealand that are generally accepted to have been deposited under water look very similar to the Yellowstone rocks.\(^1\)

- Under normal circumstances, a tree adds a growth ring every year. The thicker the ring, the faster the tree grew in that time, and this depends on the weather, among other factors. So trees growing at the same time and roughly in the same area should show matching patterns of thick and thin rings. On the other hand, trees growing hundreds of years apart would show different patterns. Because he believed the biblical framework, geologist Dr John Morris predicted in 1975 that trees in different layers of the Yellowstone formations would have matching patterns, rather than completely different ones.\(^6\)

Years later, Dr Michael Arct analyzed cross-sections of 14 trees in different levels spanning seven meters (23 feet). He found that they all shared the same distinctive signature, and that four of them had died only seven, four, three and two years before the other ten. These ten had apparently perished together, and the evidence was consistent with them all having been uprooted and transported by successive mud flows.\(^7\)

**New explanation needed**

As shown above, the slow ‘one after the other’ explanation for the Yellowstone petrified trees is incompatible with the evidence. It also clearly contradicts a straightforward reading of Scripture which teaches a young age for the earth (see How long were the days of Genesis 1? (http://creation.com/how-long-were-the-days-of-genesis-1) and Six Days?—Honestly!). (http://www.christiananswers.net/q-aig/aig-c011.html) We weren’t there to see it happen, and we should not trust such scenarios when they contradict God’s infallible written Word. Starting from a biblical framework, we should expect that the ‘forests’ were buried recently, and probably by a catastrophe.
One of Yellowstone’s premiere tourist attractions, a geyser nicknamed ‘Old Faithful’.

A recent catastrophe has given us some insight into what might have produced the Yellowstone petrified ‘forests.’ On 18 May, 1980, Mt St Helens in Washington State erupted with the energy of 20,000 Hiroshima bombs. Although tiny by the standards of most eruptions, this eruption flattened millions of trees in 625 square kilometers (240 square miles) of forest. The eruption also melted snowfields and glaciers, and caused heavy rainfall. This resulted in a mudflow that picked up the fallen logs (some of which traveled upright), so that both forks of the Toutle River were log-jammed. An earthquake, Richter magnitude 5.1, caused a landslide that dumped half a cubic kilometer (one-eighth of a cubic mile) of debris into the nearby Spirit Lake. This caused waves up to 260 meters (860 feet) high, which gathered a million logs into the lake, forming a floating log mat (see photo on p. 21 of the magazine). Most of them lacked branches, bark and an extensive root system.

Since roots are designed to absorb water, the remains of the roots on the floating logs soaked up water from the lake. This caused the root end to sink, and the log tipped up to
float in an upright position (see photo on p. 21 of the magazine). When a log soaked up even more water, it sank and landed on the lake bottom. Debris from the floating log mat and a continuing influx of sediment from the land (in the aftermath of the catastrophe) buried the logs, still in an upright position. Trees that sank later would be buried higher up, that is on a higher level, although they grew at the same time. This was confirmed by sonar and scuba research by a team led by Drs Steve Austin and Harold Coffin.\textsuperscript{8,9} By 1985, there were about 15,000 upright logs on the bottom. Later, the lake was partly drained, exposing some of the bottom, revealing upright logs stuck in the mud (see photo on p. 21 of the magazine).

There is ample evidence that petrifaction need not take very long. Hot water rich in dissolved minerals like silica, as found in some springs at Yellowstone, has petrified a block of wood in only a year.\textsuperscript{10}

Imagine if the logs on the bottom of Spirit Lake were found thousands of years later. Evolutionists would probably interpret them as multiple forests buried in place, rather than trees living at the same time that were uprooted, transported, and then sunk at different times.

\textbf{Why does it matter?}

One historian of science, Ronald Numbers, placed his faith in fallible human theories about the past, and used this as an excuse to apostatize (fall away from his professed faith). As he said in his book on the history of creationism,\textsuperscript{11} a supposedly objective study:\textsuperscript{12}

'I vividly remember the evening I attended an illustrated lecture on the famous sequence of fossil forests in Yellowstone National Park and then stayed up most of the night ... agonizing over, then accepting, the disturbing likelihood that the earth was at least thirty thousand years old. Having thus decided to follow science rather than Scripture on the subject of origins, I quickly, though not painlessly, slid down the proverbial slippery slope toward unbelief.'\textsuperscript{13}

Of course, he was not following ‘science,’ in the sense of repeatable observations in the present; that is, the type of science that sent men to the moon. More importantly, he presumed that he knew all the facts, which he obviously did not. We should remember the lesson of ‘Piltdown man.’ Before the hoax was discovered in 1953, this
convinced many that evolution was true. Those convinced included the eminent English Christian surgeon Arthur Rendle Short, who unlike Ronald Numbers never apostatized. But Rendle Short agonized over long ages of death and suffering, which clearly conflict with the biblical teaching that there was no death before the Fall (Genesis 1:29–30, 3:19; Romans 5:12; 1 Corinthians 15:21–22).¹⁴ There is evidence that his view was moving back to biblical creation, although he didn’t quite live to see ‘Piltdown man’ exposed as a hoax.

We now have answers to both the Piltdown and Yellowstone challenges. We should remember, if confronted with other ‘unanswerable’ challenges to the biblical world view, that even if we don’t have all the answers, God does. And He, in His good time, may raise up godly scientists to discover them.

Related Articles

- Natural rafts carried animals around the globe (http://creation.com/natural-rafts-carried-animals-around-the-globe)

Related Media

- More evidences for a recent creation (Creation Magazine LIVE! 3-10) (http://creation.com/media-center?fileID=YspxDwHLxpE)

References and notes

12. Although well-researched, his prejudices are evident. The book majors heavily on personalities, with subtle (and some not-so-subtle) character assassinations, while the high scientific qualifications of many creationists are downplayed. He invariably gives the last word to the evolutionist, which often leaves an impression contrary to the facts as can be seen upon checking the sources. However, he exposes the ‘strained efforts’ of re-interpreting Scripture to fit evolution, and the deceit of some theistic evolutionary college professors ‘[s]tretching the truth to the breaking point’ (p. 182) when trying to hide what they really believed from conservative parents and donors. See also review by Prof. Edgar Andrews, *Origins (Journal of the Biblical Creation Society)* 8(20):21–23, 1995.

13. Ronald Numbers, Ref. 11, p. xvi.


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As I stood staring at the gaping hole left after 10 per cent of the mountain had been removed as the result of an earthquake, a gigantic rockslide and debris avalanche, together with a colossal steam explosion, I was reminded afresh of how small and vulnerable man is, but how awesome must be the power of the God who created the earth and its mountains. As Habakkuk says, ‘the mountains saw thee, and they trembled’ (Habakkuk 3:10).

It was hard to believe that on May 18, 1980, right where I stood, 900°C swirling gases and debris from the explosion had devastated the landscape as the energy equivalent to 400 million tonnes of TNT (approximately 33,000 Hiroshima-size atomic bombs) was unleashed on this once beautiful landscape of lush conifer forest—now looking as barren as the surface of the moon.

What a phenomenal opportunity to visit the site of an event that not only received world headlines, but has since challenged the very foundation of evolutionary theory. I had joined the annual Institute for Creation Research ‘Mount St Helens tour’, led by geologist Dr Steven Austin.

I had heard Steve Austin speak many times at our Back to Genesis seminars about the events at Mount St Helens. The information he communicates on this subject is ‘mind blowing’. People in the audience get so excited. I have seen non-Christians challenged by this evidence in ways I never thought possible. So, I decided to see some of the evidence myself. And what better way than to join Dr Steve Austin and others who had come from all over America and other parts of the world to hike around Mount St Helens and observe the geologic and biologic features produced by this catastrophe.
The first thing I learned was that the eruption of Mount St Helens was a rather small and localized event. Even though this explosion toppled 150 square miles (about 390 square kilometres) of forest in six minutes, compared to many other recorded eruptions it was rather small. I soon realized that if a small explosion like this could cause such catastrophic results, what could happen if there were larger explosions all over the earth?

I was thinking this way because the Bible states in Genesis 7:11, concerning the beginning of the great Flood of Noah’s day, that ‘all the fountains of the great deep [were] broken up’. I believe this is a reference to great volcanic activity across the earth. The devastation must have been cataclysmic.

**Noah’s flood**

In fact, all over the earth, there is evidence that in the past there has been much volcanic activity. On the floor of the Pacific Ocean alone, there are an estimated 20,000 volcanoes. Observing the destruction at Mount St Helens gave me a glimpse of the sort of events that must have occurred at the time of the Genesis Flood.

The second thing I learned was that the erosive force of water was far greater than I had imagined. Just north of the mountain is Spirit Lake. As a result of the explosion, its water surface is now 247 feet (75 metres) higher than its pre-eruption level, and now covers an area of four square miles (10 square kilometres)—almost twice the area before the eruption.

As we stood on the edge of Spirit Lake, Dr Austin explained that on May 18, 1980, a Richter magnitude 5.1 earthquake occurred directly under the mountain. As a result of the ensuing landslide, one-eighth of a cubic mile of avalanche debris (one-quarter of the avalanche), landed in the basin of Spirit Lake depositing an average of 300 feet (91 metres) of material on the lake floor. As a result, a giant water wave (or waves) up to 860 feet (262 metres) high scoured the north slopes of the lake and dumped one million logs into Spirit Lake forming a floating log mat.

We stood in silence on the edge of a now peaceful lake as we looked at another ‘moonscape’, and again contemplated the destructive force of water.
But Dr Austin went on to explain something even more astounding. Many of the logs showed a strong tendency to float upright. Over the first 10 years after the eruption, about half of the original logs which floated in the lake sank to the floor of the lake. When Dr Austin and other scientists used sonar and scuba to examine the bottom of the lake, they found that about 10 per cent of the deposited logs were in **upright position**—looking like an underwater forest!

The sonar indicated tens of thousands of upright logs. Many of these logs still had roots attached to them.

Some of the logs were solidly buried with three feet of sediment around their bases. Others had no sediment around theirs. Thus, the upright trees were at different levels, because they were deposited at different times.

If Spirit Lake could be drained, it would look like forests of trees which had grown at different levels and at different times—perhaps over thousands of years. Dr Austin went on to explain that this has helped scientists reinterpret the ‘fossil forests’ of Yellowstone National Park.

At a place called Specimen Ridge at Yellowstone, there are petrified upright trees, at many different levels. These have been interpreted as representing many different forests, growing successively on the same place over long periods of time. This is supposedly one of the best evidences evolutionists use to ‘prove’ long time periods for the earth’s history. However, it is now possible to explain this same evidence in terms of a similar event to that at Mount St Helens—a catastrophic event that enables scientists to reinterpret the evidence at Yellowstone as having formed within a short time.

**Geology in hours**

Exciting stuff! But there was more to come. The third thing I learned was that events associated with the explosion had accomplished in seconds, hours, or just a few days, geologic work that normally would be interpreted as having taken hundreds or even millions of years.

On the third day of the tour, we set off on a nine-mile hike in the blast zone to Loowit Canyon. Before we reached the Canyon, Dr Austin had us view another area across the
valley that had been covered with landslide debris. We used binoculars to see an area with several canyons that were formed as a result of mud flows.

One particular canyon was of great interest, because it had been named the ‘Little Grand Canyon’. Around 100 feet (30 metres) deep and somewhat wider, it is about a one-fortieth scale model of the mighty Grand Canyon. It also has many characteristics that Dr Austin said reminded him of features he had observed at the Grand Canyon. This ‘Little Grand Canyon’ was formed in one day from a mud-flow that eroded material that had blocked the North Fork of the Toutle River. As a result, the new river then flowed through the canyon formed by the mud flow.

Now I remember being taught in school, that when you saw a canyon with a river running through it, you assumed that the river took a long time to erode the canyon. My teachers would have said the same thing about the Toutle River and the Little Grand Canyon, if we had not seen the events that produced the canyon rapidly.

This reminded me of how easy it is to come to wrong conclusions if you were not present to see an event, and if you don’t have access to all information. I wonder how many of the world’s canyons which we did not see form, actually formed quickly. From a creationist perspective, they have formed during the Flood or within the thousands of years since.

Dr Austin went on to explain something else about the ‘Little Grand Canyon’ that really excited him. As a result of the events of the eruption and landslide, up to 600 feet (183 metres) of new strata were formed in places. The erosion of ‘Little Grand Canyon’ enabled scientists to see some of the layers that were laid down. What astonished them were features such as the 25-feet-thick deposit that consisted of thousands of thin layers—layer upon layer of material.

Like Dr Austin, I was taught at school that you assume layers like this were laid down at the rate of one or two per year. Thus you can estimate how long it took for such a deposit to form—thousands, hundreds of thousands, or perhaps millions of years.

However, this 25 feet (8 metres) thick series of layers was formed in less than one day—in fact it probably took only about three hours! It was formed by flowing ‘rivers’ of volcanic ash (not lava) moving at speeds up to 100 miles per hour (160 kilometres an hour). Most
scientists had never entertained the idea that such flows could deposit multiple layers of materials like those we observe at Mount St Helens.

Brainwashed In Evolution

People throughout the world are indoctrinated by evolutionists to believe that layers like those we see at the Grand Canyon took millions of years to be laid down. The idea that the earth is billions of years old is foundational to evolution. What happened at Mount St Helens is a powerful challenge to this foundation.

In fact, it makes one realize that a world flood with lots of volcanic action and other forces operating could explain features like the Grand Canyon’s forming within a short time. This really does show that one can logically accept that the Flood of Noah’s day could have accomplished extraordinary geologic work such as the laying down of sediments in massive quantities all across the globe—just like we see.

I had never realized geology could be so exciting. But there was more to come.

At Loowit Canyon, we peered 100 feet down to see where hard rock had been eroded by mud flows in short periods of time. I had not perceived before that mud could cut through hard rock in such a short time. But then, I have heard of a tool which engineers use to cut steel and which basically uses water under pressure.

What I came to understand was that water, mud, and steam, etc., under the right conditions, can produce results in a very short time that evolutionists are telling the world have to be interpreted as having taken millions of years.

Dr Austin told us so many other things that we were all staggered at the overwhelming evidence we can use to help understand that the Bible can be trusted when it tells us there was a global flood just thousands of years ago. He has put all this information into a video presentation, which I strongly urge you to obtain.

Warnings

As we trudged back to our buses, we talked about the destruction we had seen, and the people who had died in the explosion. Those people had been warned about the impending
eruption—but they did not heed the warning, and so they ended their lives on earth to face their Creator.

In Matthew 24, Jesus used the past event of Noah’s Flood as a warning that God had judged the earth with water, and is going to judge again—next time with fire. Of course, if the Flood of Noah’s day did not really happen, as evolutionists insist, then they do not have to heed the Bible’s warning of another judgment in the future.

But, just as surely as God sent the Flood—and the evidence is all over the earth staring at everyone who cares to look—so He will also keep His Word about coming judgment by fire.

Peter writes, ‘But the heavens and the earth, which are now, by the same word are kept in store, reserved unto fire against the day of judgment and perdition of ungodly men’ (2 Peter 3:7). The judgment to come is going to be an enormous explosion—much bigger than Mount St Helens. ‘But the day of the Lord will come as a thief in the night; in the which the heavens shall pass away with a great noise, and the elements shall melt with fervent heat, the earth also and the works that are therein shall be burned up’ (2 Peter 3:10).

There were those who did not listen to the warning of the approaching explosion of Mount St Helens. When it occurred, it was swift and destructive. There are those today who will not listen to the warning of the approaching destruction of this earth by fire. When it occurs, it will also be swift. But, for those who have accepted God’s Word and who trust in His Son the Lord Jesus Christ as their Saviour, there will be a heavenly home in the new heavens and earth which the Creator God will make for those whose names are ‘written in the Lamb’s book of life’ (Revelation 21:27).

Scripture also states that those whose names are ‘not found written in the book of life’ will be ‘cast into the lake of fire’ (Revelation 20:15), which is described as ‘everlasting punishment’—‘And these shall go away into everlasting punishment; but the righteous into life eternal’ (Matthew 25:46).

Sadly today, many Christians don’t like to talk about the judgment reserved for those who do not put their trust in the Lord Jesus Christ. However, the truth is that the fiery event of Mount St Helens took only about six minutes—the fiery judgment for those who reject the God of creation is eternal.
What a witnessing tool Mount St Helens is! I encourage you to obtain the new video (with many additions of onsite footage) of Dr Austin’s presentation of Mount St Helens, and use it to show people that evolution has no foundation, but that the true history of the world is recorded in the only infallible, inerrant book in the world—God’s Word, the Holy Bible.
Digging Deeper Links for

*Noah: The Man, The Ark, The Flood*

Mount St. Helens—Explosive Evidence for Creation

[http://youtu.be/flrhqjN5BH0](http://youtu.be/flrhqjN5BH0)

If the link to this video breaks, log onto youtube.com and search for “Mount St. Helens, explosive evidence for creation, Dr. Steve Austin”

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Keith Swenson

When Mount St Helens erupted on 18 May 1980, the resulting devastation of the area around the volcano left many stunned at the sheer scale of the destruction. More than 200 square miles (over 500 square km) of what had been a vast green blanket of pristine forest, clear mountain streams and tranquil lakes was now a monotonous grey ash-covered wasteland of fallen timber, steaming pumice plains, barren mudflows and avalanche debris. Shortly after the eruption, the then U.S. President Jimmy Carter compared it to a moonscape. Scientists studying the affected area referred to an ‘apparently sterile
landscape', lamenting that ‘It will never be again, in our lifetime’ and speculating that it would even be 'impossible for insects to recover at all.'

Nicknamed the ‘stonewind’, the rock-laden, ground-hugging steam blast advanced rapidly outward from the volcano, flattening over 200 square miles of forest in less than ten minutes.

Gloomy predictions wrong

Scientists who flocked to study the devastated area soon found that the initial pessimistic forecasts of long-term barrenness were largely unfounded. For example, within just three years, 90% of the original plant species were found to be growing within the blast zone. As is evident from the ‘before-and-after’ photographs on these pages (more photographs were originally included with this article), the innate resilience of the creation had been greatly underestimated.

Life’s return—the details

However, many species were completely eliminated from the Mount St Helens blast zone because of the eruption. While most volcanoes erupt in an upward fashion, Mount St Helens initially exploded sideways, spewing its oven-hot blast over the forested landscape to the north. Nicknamed the 'stonewind', the rock-laden, ground-hugging steam blast advanced rapidly outward from the volcano in a 180° arc, flattening over 200 square miles (500 square km) of forest in less than ten minutes. The extent of biological destruction was staggering. The timber felled by the eruption would have been sufficient to build almost 500,000 three-bedroom houses. Virtually all the visible mosses, ferns, shrubs and wildflowers vanished. Not only did all living organisms in the upper North Fork Toutle River die, but 15 miles (24km) of the river itself was no more! The estimates of animal deaths by the Washington State Department of Game included 11 million fish; 1 million birds (including 27,000 grouse); 11,000 hares; 5,000 deer; 1,500 elk; 1,400 coyotes; 300 bobcats; 200 black bears; 15 mountain goats; and 15 cougars. In addition, 57 people were counted as dead or missing.
Photos by Keith Swenson

Virtually all species of medium-to-large sized mammals in the affected area,\(^9\) and presumably all bird species,\(^{10}\) were obliterated. But many have come back, by immigrating from outside. Various bird species were recorded in the area soon after the eruption, probably feeding on insects (the first helicopter crews to land in the devastated area reported that flies and other conspicuous insects had preceded them).\(^{11,12}\) Although not all of these insect migrants survived (herbivorous insects could not live until plants had started to grow again), many species did survive—often by consuming their airfall companions, both alive and dead. Among the aerial arrivals were millions of wind-borne spiders,\(^{13}\) plant seeds and fungus spores.

*Mt St Helens has forced ecologists to rethink their theories of ecological ‘succession’, as both ‘pioneer’ and ‘climax’ species were found growing side-by-side!*

Once vegetation had begun to regrow, the large herbivorous mammals such as elk and deer re-entered the blast zone. Elk, being highly mobile, were able to move into and out of the blast zone at will, and this further hastened plant recovery, as their dung contained seeds and nutrients transported from outside the devastated area. Beavers from the adjacent forests followed water courses upstream to blast zone lakes. Amazingly, salmon and trout maturing in the Pacific Ocean at the time of the eruption (and thought to be intolerant of anything other than cold, clear, well-oxygenated streams), successfully ascended muddy and ash-clogged waterways in their instinctive urge to spawn.\(^{14}\)
Although millions of organisms living above ground at the time of the eruption were wiped out, many life-forms within the devastated area survived the fury of the blast. How? Ants survived in underground colonies, salamanders in the soft wood of decomposing logs, fish in ice-covered lakes, and roots of plants were protected from the blast inferno by soil and snowpack. Although large numbers of these subsequently succumbed to the unforgiving post-eruption environment, some lived on and reproduced. In fact, ecologists acknowledge that the presence of such ‘unexpected survivors’ greatly accelerated recovery. The aquatic and streambank areas exhibited the most rapid recovery. At least 10 of the 16 original species of amphibians (frogs, toads and salamanders) survived the eruption. Frog and toad survivors exploded onto the recovering landscape, rapidly establishing large breeding populations by the mid-1980s.

Keith Swenson

Today, the diversity of species (e.g. birds) living in the area devastated by the eruption of Mount St Helens in May 1980 is approaching its pre-eruption levels. The kinds of birds and animals that have not yet returned are mostly species preferring old-growth forest habitat. While it will probably take at least 200 years before old-growth forest again occupies the blast zone (providing another disturbance does not intervene), Mount St Helens has forced
ecologists to rethink their theories of ecological ‘succession’. This was because they found both ‘pioneer’ and ‘climax’ species growing side-by-side!

Mount St Helens and the world-wide Flood

Observing the return of life to Mount St Helens can provide some insight into the return of life to the world after Noah’s Flood. Both Mount St Helens and the world-wide Flood were cataclysmic geologic events involving extreme volcanism (Genesis 7:11), flooding, and the destruction of life—one on a local, the other on a global scale. In both, organisms survived and repopulated the post-disturbance landscape. Consider:

1. *Many species were completely wiped out from the blast zone, particularly the birds and the large land mammals (e.g. deer and elk).*

In the Flood, everything on dry land that had the breath of life in its nostrils died; the only ones to survive were those with Noah in the Ark. At Mount St Helens, these species returned to the devastated landscape through migration from beyond the zone of destruction. After the world-wide Flood, animals migrated out from the Ark’s landing place, multiplying and repopulating the earth.

Interestingly, reproductive rates of elk (large herbivores) early in the recovery period at Mount St Helens were among the highest ever seen, probably due to availability of high-quality forage from recovering vegetation. Survival of offspring also increased, probably a reflection of the low numbers of predators, which only moved in and multiplied later once herbivore herd numbers had increased.

Just as hunting pressure drove elk into the blast zone at Mount St Helens (local authorities had put restrictions on hunting in the devastated area), the post-Flood human population, as it spread across the earth following the dispersion from Babel, must have induced wild creatures to move to more distant regions. With their much higher reproductive rates, herbivores probably occupied the far-flung unoccupied zones of the earth well in advance of predators and man. Birds, with their capacity for flight, are likely to have been at the forefront of the dispersal into the devastated post-Flood landscape, as at Mount St Helens. This may explain why birds such as New Zealand’s Moa that could have lost the ability to fly through mutation (loss of genetic information)
were able to survive in apparently large numbers—until hunters eventually migrated to the area.

Interestingly, the animals and birds that were the first to colonise the devastated landscape at Mount St Helens are known by ecologists as ‘generalists’, i.e. able to tolerate a wide array of environmental conditions and dine on a variety of foods. Among the most conspicuous of the first colonisers at Mount St Helens was the common raven, known to eat almost anything, including carrion. Back in Noah’s day too, it was the raven that was the first to leave the Ark (Genesis 8:7), weeks before the dove was able to survive in the devastated post-Flood world (Genesis 8:8–12).

Tourists and researchers visiting Mount St Helens and Spirit Lake are amazed—not only by the extent of destruction wrought by the volcano, but by the incredible ‘bounce back’. The area has given great insight into rapid formation of such things as layers and canyons; now, also, into how rapidly ecosystems can recover from cataclysm. Photos by Keith Swenson

2. Many species—plants, microbes, insects, amphibians and aquatic creatures—survived within the blast zone, if not in adult form, then as seeds, spores, eggs and/or larvae.

It is noteworthy that God brought only birds and air-breathing land animals to the Ark. Mount St Helens shows us that species not taken on board the Ark can indeed survive cataclysmic geologic events.

Though many plants, amphibians and fish died in the eruption (as undoubtedly occurred in the Flood, as per the fossil evidence), many survived to reproduce. As for insects, it is known that there are billions of insects in the air column, even up to
altitudes of 4,500m (15,000 feet). Though most if not all would not have remained aloft during the 40 days of rain, many insects would have survived the Flood in floating logs and other debris.

Even dead insects would, through their carcasses, have been an important source of food for survivors and nutrients for the vegetation sprouting as the Flood waters receded. And as at Spirit Lake (see aside below) legions of microbes probably helped restore the volcanically degraded post-Flood lakes and seas. Animals on the Ark could thereafter have migrated gradually from the Mount Ararat region into a prepared landscape, already populated by abundant microbial, plant, insect and aquatic life.

Resilience of the creation

The overarching conclusion to be drawn from Mount St Helens is the extreme resilience of the creation. Sceptics often argue that recovery from a global catastrophe such as the Flood would be impossible within a short biblical time-frame. Mount St Helens, however, demonstrates how quickly and completely recovery can occur in the natural world. So, following the Flood of Noah’s day, the regreening and repopulating of the earth could also have happened within a very short time-frame. Just like the Bible says.
On the morning of May 18, 1980, Spirit Lake, a paragon of tranquility and beauty, was virtually obliterated. About one-third of the avalanche of debris ploughed directly into this azure jewel, causing its water to slosh over 240 metres (800 feet) up the mountain slopes to the north, where it picked up the soil and vegetation of an old-growth forest, including a million logs. When this organic soup returned, it was to a new lake basin, elevated over 60 metres (more than 200 feet) above its pre-eruption level. Oven-hot flows of volcanic debris boiled into the lake’s south shore, and volcanic rocks and ash rained from the sky. The first helicopter crews into the blast zone reported they were unable to find Spirit Lake. They did not recognise it with its surface obscured by a mantle of floating logs and pumice.

When scientists returned to Spirit Lake in June of 1980, they found it had been ‘transformed into a roiling [‘roil’ = to stir, to make muddy], steaming body of degraded water choked with logs and mud.’ They predicted it would take 10–20 years to return to its ‘pre-eruption chemical and biological condition.’ As it turned out, it took closer to five! How did this happen so quickly?
After the eruption, Spirit Lake became a ‘paradise’ for microbes. Its waters, once cold (10°C = 50°F) and clear, became warm (over 32°C = 90°F) and muddy, laden with organic debris, mineral nutrients and other chemicals. Bacteria proliferated to an astounding degree in this broth, ultimately peaking at half a billion bacterial cells per millilitre—a ‘concentration that is possibly unprecedented in the annals of environmental microbiology.’ For a time, the oxygen levels were so depleted by the decomposition activity that the lake could support only anaerobic (i.e. can live without oxygen) microbes. Spirit Lake thus bubbled like a cauldron from escaping carbon dioxide, methane and hydrogen sulfide generated by these bacteria in bottom sediments. For scientists visiting the area, the odour was overwhelming! However, the ‘no oxygen’ bacteria were crucial in decomposing the huge amounts of organic debris settling on the bottom of the lake during this phase of the recovery process.

Restoration was greatly hastened by the coming of the winter rains. This seasonal influx of fresh water diluted the concentration of toxic chemicals and raised oxygen levels. Wind, waves and seasonal lake turnover stirred in still more oxygen, enabling the return of oxygen-dependent microbes, which absorbed mineral nutrients from the water, and thus helped clear the lake of these and other chemicals. Water clarity improved, and with increased light penetration the phytoplankton reappeared. They produce food by photosynthesis and release oxygen as a by-product. Within just five years, the water quality had nearly returned to its pristine pre-eruption state—a remarkable transformation.
Log mat floating on Spirit Lake following eruption disaster.

References

2. Ref. 1, p. 170.

Related Articles

- Surtsey still surprises (http://creation.com/surtsey-still-surprises)
- ‘Asexual’ lizards and pioneer plants (http://creation.com/lizard-parthenogenesis)
- Biogeography (http://creation.com/biogeography)
- Plants and animals around the world (http://creation.com/plants-animals-biogeography)
- Natural rafts carried animals around the globe (http://creation.com/natural-rafts-carried-animals-around-the-globe)

References and notes

5. Ref. 1, p. 198.
6. A resident along the Toutle River described a mudflow passing his house on the afternoon of May 18, 1980, as having the consistency of wet concrete and looking like ‘a sandy beach going by’ with ‘fish flopping on top’. Other observers noted salmon and trout jumping out of the Toutle; the water had suddenly heated from normal 45°F (7.2°C) to over 90°F (32.2°C).
7. Mountain goats from the Olympic Mountains (Washington) were relocated to the Mount St Helens area in 1972 by the State of Washington Game Department, and were known for occasionally chasing hikers. All 15 goats died in the eruption.
10. It is estimated that approximately 80 species of birds would have been present in the blast zone during May (permanent residents, winter residents and some migrants). See Ref. 18.
13. Many species of spiders ride the wind in a process known as ‘ballooning’. A long silken thread is released into the air and acts as a kite or balloon which transports the spider even hundreds of miles. Entomologists (refer Ref. 12, p. 332) identified over 75 species of spiders ballooning onto the pumice plain at Mount St Helens, and estimated that two million spiders fell per square mile each day from June to October 1983.

15. Ref. 8, p. 88.


17. Figures based on data from Karlstrom, E.L., Amphibian recovery in the North Fork Toutle River debris avalanche area of Mount St Helens, in: Keller, Ref. 4 (modified based on additional information).

18. 'Before-and-after' comparisons of numbers of bird species at Mt St Helens must take seasonal variation into account. As mentioned in Ref. 10, it is estimated that 80 species of birds were present at the time of the eruption. Asikainen, M., Birds of Mount St Helens (checklist), *Mount St Helens National Volcanic Monument*, 1996, reports that by 1996, 118 species of birds, 80 of which were nesting species, were regularly observed in the blast zone!


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Chapter 17
How did animals get from the Ark to places such as Australia?

• How did the animals get from remote countries to the Ark?
• After the Flood, did kangaroos hop all the way to Australia?
• What did koalas eat on the way?

Let us begin by reaffirming that God’s Word does indeed reveal, in the plainest possible terms, that the whole globe was inundated with a violent, watery cataclysm—Noah’s Flood. All landdwelling, air-breathing creatures not on the Ark perished and the world was repopulated by those surviving on the Ark (see Chapter 10, *Was the Flood global?* pp. 141 ff.).

**How did the animals get to the Ark?**

Sceptics paint a picture of Noah going to countries remote from the Middle East to gather animals such as kangaroos and koalas from Australia, and kiwis from New Zealand. However, the Bible states that the animals came to Noah; he did not have to round them up (Gen. 6:20). God apparently caused the animals to come to Noah. The Bible does not state how this was done.

Neither do we know what the geography of the world was like before the Flood. If there was only one continent at that time (see later in this chapter), then questions of getting animals from remote regions to the Ark are not relevant.

**Animal distribution after the Flood**

There are severe practical limitations on our attempts to understand the hows and whys of something that happened once, was not recorded in detail, and cannot be repeated.

Difficulties in our ability to explain every single situation in detail result from our limited understanding. We cannot go back in a time machine to check what happened, and our mental reconstructions of what the world was like after the Flood will inevitably be deficient. Because of this, the patterns of post-Flood animal migration present some problems and research challenges for the biblical creation model. However, there are clues from various sources which suggest answers to the questions.

**Clues from modern times**

When Krakatoa erupted in 1883, the island remnant remained lifeless for some years, but was eventually recolonized by a surprising variety of creatures, including not only insects and earthworms, but birds, lizards, snakes, and even a few mammals. One would not have expected
some of this surprising array of creatures to have crossed the ocean, but they obviously did. Even though these were mostly smaller than some of the creatures we will discuss here, it illustrates the limits of our imaginings on such things.

**Land bridges**

Evolutionists acknowledge that men and animals could once freely cross the Bering Strait, which separates Asia and the Americas.¹ Before the idea of continental drift became popular, evolutionists depended entirely upon a lowering of the sea level during an ice age (which locked up water in the ice) to create land bridges, enabling dry-land passage from Europe most of the way to Australasia, for example.

The existence of some deep-water stretches along the route to Australia is still consistent with this explanation. Evolutionist geologists themselves believe there have been major tectonic upheavals, accompanied by substantial rising and falling of sea-floors, in the time-period with which they associate an ice age. For instance, parts of California are believed to have been raised many thousands of feet from what was the sea-floor during this ice age period, which they call ‘Pleistocene’ (one of the most recent of the supposed geological periods). Creationist geologists generally regard Pleistocene sediments as post-Flood, the period in which these major migrations took place.

In the same way, other dry-land areas, including parts of these land bridges, subsided to become submerged at around the same time.²

There is a widespread, but mistaken, belief that marsupials are found only in Australia, thus supporting the idea that they must have evolved there. However, living marsupials, opossums, are found also in North and South America, and fossil marsupials have been found on every continent. Likewise, monotremes were once thought to be unique to Australia, but the discovery in 1991 of a fossil platypus tooth in South America stunned the scientific community.³ Therefore, since evolutionists believe all organisms came from a common ancestor, migration between Australia and other areas must be conceded as possible by all scientists, whether evolutionist or creationist.

Creationists generally believe there was only one Ice Age after, and as a consequence of, the Flood.⁴ The lowered sea level at this time made it possible for animals to migrate over land bridges for centuries. Some creationists propose a form of continental break-up after the Flood,⁵ in the days of Peleg. This again would mean several centuries for animals to disperse, in this instance without the necessity of land bridges. However, continental break-up in the time of Peleg is not widely accepted in creationist circles (see Chapter 11).

**Did the kangaroo hop all the way to Australia?**

How did animals make the long journey from the Ararat region? Even though there have been isolated reports of individual animals making startling journeys of thousands of kilometres, such abilities are not even necessary. Early settlers released a very small number of rabbits in Australia. Wild rabbits are now found at the very opposite corner (in fact, every corner) of this vast continent. Does that mean that an individual rabbit had to be capable of crossing the whole of Australia? Of course not. Creation speakers are sometimes asked mockingly, ‘Did the kangaroo hop all the way to Australia?’ We see by the rabbit example that this is a somewhat foolish question.

Populations of animals may have had centuries to migrate, relatively slowly, over many generations. Incidentally, the opposite question (also common), as to whether the two kangaroos

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² Note that the region around the north of Australia to Southeast Asia is a tectonically active part of the world.
hopped all the way from Australia to the Ark, is also easily answered. The continents we now have, with their load of Flood-deposited sedimentary rock, are not the same as whatever continent or continents there may have been in the pre-Flood world.

We also lack information as to how animals were distributed before the Flood. Kangaroos (as is true for any other creature) may not have been on an isolated landmass. Genesis 1:9 suggests that there may have been only one landmass. (*Let the waters under the heavens be gathered together into one place, and let the dry land appear.*) For all we know, kangaroos might have been feeding within a stone’s throw of Noah while he was building the Ark.

It may be asked, if creatures were migrating to Australia over a long time (which journey would have included such places as Indonesia, presumably) why do we not find their fossils *en route* in such countries?

Fossilization is a rare event, requiring, as a rule, sudden burial (as in the Flood) to prevent decomposition. Lions lived in Israel until relatively recently. We don’t find lion fossils in Israel, yet this doesn’t prevent us believing the many historical reports of their presence. The millions of bison that once roamed the United States of America have left virtually no fossils. So why should it be a surprise that small populations, presumably under migration pressure from competitors and/or predators, and thus living in any one area for a few generations at most, should leave no fossils?

Charcoal by Robert Smith

**Unique organisms**

Another issue is why certain animals (and plants) are uniquely found in only one place. Why is species x found only in Madagascar and species y only in the Seychelles? Many times, questions on this are phrased to indicate that the questioner believes that this means species y headed only in that one direction, and never migrated anywhere else. While that is possible, it is not necessarily the case at all. All that the present situation indicates is that these are now the only places where x or y still survive.

The ancestors of present-day kangaroos may have established daughter populations in several parts of the world, but most of these populations subsequently became extinct. Perhaps those marsupials only survived in Australia because they migrated there ahead of the placentals mammals (we are not suggesting anything other than ‘random’ processes in choice of destination), and were subsequently isolated from the placentals and so protected from competition and predation.
Palm Valley in central Australia is host to a unique species of palm, *Livingstonia mariae*, found nowhere else in the world. Does this necessarily mean that the seeds for this species floated only to this one little spot? Not at all. Current models of post-Flood climate indicate that the world is much drier now than it was in the early post-Flood centuries. Evolutionists themselves agree that in recent times (by evolutionary standards) the Sahara was lush and green, and central Australia had a moist, tropical climate. For all we know, the *Livingstonia mariae* palm may have been widespread over much of Australia, perhaps even in other places that are now dry, such as parts of Africa.

The palm has survived in Palm Valley because there it happens to be protected from the drying out which affected the rest of its vast central Australian surrounds. Everywhere else, it died out.

Incidentally, this concept of changing vegetation with changing climate should be kept in mind when considering post-Flood animal migration—especially because of the objections (and caricatures) which may be presented. For instance, how could creatures that today need a rainforest environment trudge across thousands of kilometres of parched desert on the way to where they now live? The answer is that it wasn’t desert then!

**The koala and other specialized types**

Some problems are more difficult to solve. For instance, there are creatures that require special conditions or a very specialized diet, such as the giant panda of China and Australia’s koala. We don’t know, of course, that bamboo shoots or blue gum leaves were not then flourishing all along their eventual respective migratory paths. In fact, this may have influenced the direction they took.

But, in any case, there is another possibility. A need for unique or special conditions to survive may be a result of specialization, a downhill change in some populations. That is, it may result from a loss in genetic information, from thinning out of the gene pool or by degenerative mutation. A good example is the many modern breeds of dog, selected by man (although natural conditions can do likewise), which are much less hardy in the wild than their ‘mongrel’ ancestors. For example, the St Bernard carries a

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6 Actually, the koala can eat other types of gum leaves. Australia has around 500 species of eucalypt (gum) trees. Koalas eat the leaves of about 20 species, with the blue gum a favourite. Recent work has shown that the koala’s insistence on eucalypt is actually an *addiction* to certain chemicals in the leaf which it first eats in the mother’s milk. Bottleraised koalas can survive on a non-eucalypt diet (*see Journal of Creation* 8(2):126). Also, the giant panda, which normally only eats bamboo shoots, has been known to eat small animals occasionally.
mutational defect, an overactive thyroid, which means it needs to live in a cold environment to avoid overheating.

This suggests that the ancestors of such creatures, when they came off the Ark, were not as specialized. Thus they were more hardy than their descendants, who carry only a portion of that original gene pool of information.\(^7\) In other words, the koala’s ancestors may have been able to survive on a much greater range of vegetation. Such an explanation has been made possible only with modern biological insights. Perhaps as knowledge increases some of the remaining difficulties will become less so.

Such changes do not require a long time for animals under migratory pressure. The first small population that formed would tend to break up rapidly into daughter populations, going in different directions, each carrying only a portion of the gene pool of the original pair that came off the Ark.

Sometimes all of a population will eventually become extinct; sometimes all but one specialized type. Where all the sub-types survive and proliferate, we find some of the tremendous diversity seen among some groups of creatures which are apparently derived from one created kind. This explains why some very obviously related species are found far apart from each other.

The sloth, a very slow-moving creature, may seem to require much more time than Scripture allows to make the journey from Ararat to its present home. Perhaps its present condition is also explicable by a similar devolutionary process. However, to account for today’s animal distribution, evolutionists themselves have had to propose that certain primates have travelled across hundreds of miles of open ocean on huge rafts of matted vegetation torn off in storms.\(^8\) Indeed, iguanas have recently been documented travelling hundreds of kilometres in this manner between islands in the Caribbean.\(^9\)

The Bible suggests a pattern of post-Flood dispersal of animals and humans that accounts for fossil distributions of apes and humans, for example. In post-Flood deposits in Africa, ape fossils are found below human fossils. Evolutionists claim that this arose because humans evolved from the apes, but there is another explanation. Animals, including apes, would have begun spreading out over the Earth straight after the Flood, whereas the Bible indicates that people refused to do this (Gen. 9:1, 11:1–9). Human dispersal did not start until Babel, some hundreds of years after the Flood. Such a delay would have meant that some ape fossils would be found consistently below human fossils, since people would have arrived in Africa after the apes.\(^10\)

We may never know the exact answer to every one of such questions, but certainly one can see that the problems are far less formidable than they may at first appear.\(^11\) Coupled with all the

\(^{7}\) See Chapter 18, *How did all the different ‘races’ arise?* for an example of the way in which a very light-skinned ‘race’ deriving from a mid-brown one is missing some of the information in the parent population.


\(^{10}\) Dr Sigrid Hartwig-Scherer, paleoanthropologist, on the DVD, *The Image of God*, Keziah Videos.

\(^{11}\) In recent literature about some of the problems of animal distribution, even within an evolutionary framework, there has been an occasional suggestion that early man may have been a much better boat-builder and navigator than previously thought. Various
biblical, geological, and anthropological evidence for Noah’s Flood, one is justified in regarding the Genesis account of the animals’ dispersing from a central point as perfectly reasonable.\textsuperscript{12} Not only that, but the biblical model provides an excellent framework for the scientific study of these questions.

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According to the Bible, the only nostril-breathing, land-dwelling animals that survived the Genesis Flood were those on board Noah’s Ark. This means, that all the land vertebrates alive on the earth today must be descended from the offspring of the Ark travellers. Moreover, these must have migrated to their current habitats from the place where the Ark finally came to rest, somewhere on the mountains of Ararat, in the Middle East. Various theories have been put forward to explain how this could have happened, some of which seem quite plausible, such as migration across land bridges, which have now fallen below sea level, and transportation by humans.

Another explanation which is gaining increasing support is the rafting hypothesis.

Interestingly, the potential for dispersal of plants and animals across large stretches of water by natural rafts has been accepted by evolutionists for many years. Professor Paul Moody of the University of Vermont argued,
Iguanas colonised Anguilla in the West Indies on rafts.

“In times of flood, large masses of earth and entwining vegetation, including trees, may be torn loose from the banks of rivers and swept out to sea. Sometimes such masses are encountered floating in the ocean out of sight of land, still lush and green, with palms, twenty to thirty feet [7 to 10 m] tall. It is entirely probable that land animals may be transported long distances in this manner. Mayr records that many tropical ocean currents have a speed of at least two knots; this would amount to fifty miles [80 km] a day, 1000 miles [1600 km] in three weeks.”¹

More recently, the rafting idea has been advanced by evolutionists to explain the presence of the Bear Cuscus (*Ailurops ursinus*) and the Dwarf Cuscus (*Strigocuscus celebensis*) on the island of Sulawesi² and of lemurs on the island of Madagascar.³ In 1995, fishermen witnessed the colonisation of the island of Anguilla in the West Indies by iguanas. These were washed up on one of the island’s eastern beaches, having floated there on a mat of logs and uprooted trees, a few weeks after two hurricanes hit the islands of the Lesser Antilles. Scientists believed that the iguanas had rafted 320 km from Guadeloupe.⁴,⁵

Significantly, biogeographers sometimes refer to oceans rather than continents as the main biogeographic regions. This is because, very often, patterns are seen, where many terrestrial organisms are distributed around the land bordering an ocean. So clear was this to the twentieth century biogeographer, Léon Croizat, that he spent much time drawing “tracks” to chart repetitious occurrences of these patterns.⁶,⁷
for example, is shown in fig. 1, and it is one that is shared with a multitude of other plants and animals. 8,9

![Figure 1](image.png)

**Fig 1.** Tracks showing occurrence of Oreobolus plants around Pacific Ocean.

The destructive power of large volumes of fast-flowing water is enormous and, in the early stages of the Genesis Flood, would have been sufficient to rip-up large amounts of woodland. Although some of this would have been buried in sediments, many billions of trees would have been left floating on the surface of the waters, as enormous ‘log mats’.

*These rafts would have facilitated their dispersal after the Flood, as they multiplied and migrated away from the mountains of Ararat (Genesis 8:4).*

These islands of vegetation, regularly watered by rainfall, could have easily supported plant and animal life over significant periods of time. Ocean currents would have moved these massive ‘rafts’ around the globe, sometimes washing them up beside land, where animals and insects might ‘embark’ or ‘disembark’, and then transporting them back out to sea. I’m not suggesting that land animals survived the Genesis Flood on rafts. Rather, these rafts would have facilitated their dispersal after the Flood, as they multiplied and migrated away from the mountains of Ararat (Genesis 8:4).

The ability of ocean currents to distribute floating objects around the world was seen recently, when thousands of bathtub rubber ducks were lost off a container ship in the
North Pacific in 1992. In less than three months, these had floated to Indonesia, Australia and South America, and subsequently into the Arctic and Atlantic oceans.\textsuperscript{10,11}

Interestingly, the patterns of plant and animal distribution throughout the world are not random, as might be expected from evolutionary theory. Instead, we often find many different species clustered in what biogeographers describe as “areas of endemism”—where many different plants and animals are concentrated in the same distinct and often small regions.

Moreover, and most significantly, the areas of high plant endemism generally correspond to areas of high animal endemism.\textsuperscript{12,13} This, together with the fact that there are often many floral and faunal similarities between areas of endemism\textsuperscript{14}, provides strong support for the idea that the plants and animals were transported to these places—and by the same means. Further support for the rafting theory was provided by researchers at Bryan College, Tennessee, who showed that the intersections of ocean currents with land masses appear to correspond with the areas of endemism found throughout the world.\textsuperscript{15}

Explaining patterns of biogeography is difficult because the events in question all occurred many years outside of living memory. Creation scientists, however, have an advantage over other scientists, as the Bible provides a historical framework which can guide their thinking. And, as with other areas of creation research, the field data is increasingly seen to fit the biblical model better than the evolutionary model.

Related Articles

- How did animals get from the Ark to places such as Australia? (http://creation.com/images/pdfs/cabook/chapter17.pdf)
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References and notes
14. Ref. 6, preface and pp. 21,34, 87.

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