

# Good science versus bad science and the Genesis flood story

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A very large percentage of the adult population (38 to 46 %) in the U.S. believes that the earth is 6,000 to 10,000 years old and that the sedimentary rocks and fossils found in and near the Grand Canyon and in other parts of the world were deposited by the worldwide Noah's flood about 4,350 years ago. These beliefs are promoted by young-Earth creationists who assert that the book of Genesis in the Bible must be interpreted literally. From many kinds of scientific evidence, these beliefs are misguided and not true. Such beliefs are bad science. Thomas H. Huxley (1825-1895) said: "The great tragedy of science – the slaying of a beautiful hypothesis by an ugly fact." Thus, just one fact can destroy the young-Earth belief, and eight ugly facts that can be easily understood by people who do not have a science background are presented here. These facts represent good science that make the young-Earth creationist model untenable.

## 1. Marine reptiles and cetaceans

In the Mesozoic era (the Age of the Dinosaurs; **Figure 1**) marine reptiles (ichthyosaurs, plesiosaurs, and mosasaurs) lived alongside dinosaurs then but not after that time.

## Geologic Time Scale

Eras	Periods	millions of years ago	
Cenozoic	Quaternary - Q	Holocene	0
		Pleistocene	0.01
	Neogene - N	Pliocene	2.6
		Miocene	5.3
	Paleogene - P <sub>G</sub>	Oligocene	23
		Eocene	34
Paleocene		56	
Mesozoic	Cretaceous - K	66	
	Jurassic - J	145	
	Triassic - T <sub>R</sub>	201	
	Permian - P	252	
Paleozoic	Pennsylvanian* - P	299	
	Mississippian* - M	323	
	Devonian - D	359	
	Silurian - S	419	
	Ordovician - O	444	
	Cambrian - C	485	
	Proterozoic - P	541	
Precambrian	Archean - A	2,500	
		4,600	

\*Mississippian and Pennsylvanian were known first in the UK as 'Carboniferous'.

**Figure 1.** Geologic time scale.

Therefore, this age should also be known as the Age of Marine Reptiles. Marine reptiles are creatures that lived in ancient oceans and had shapes similar to cetaceans (dolphins, whales, and porpoises; **Figure 2**).



Ichthyosaur Stenopterygius

Common dolphin

**Figure 2.** Comparison of a fossil Jurassic marine reptile (ichthyosaur Stenopterygius) and a cetacean (common dolphin).

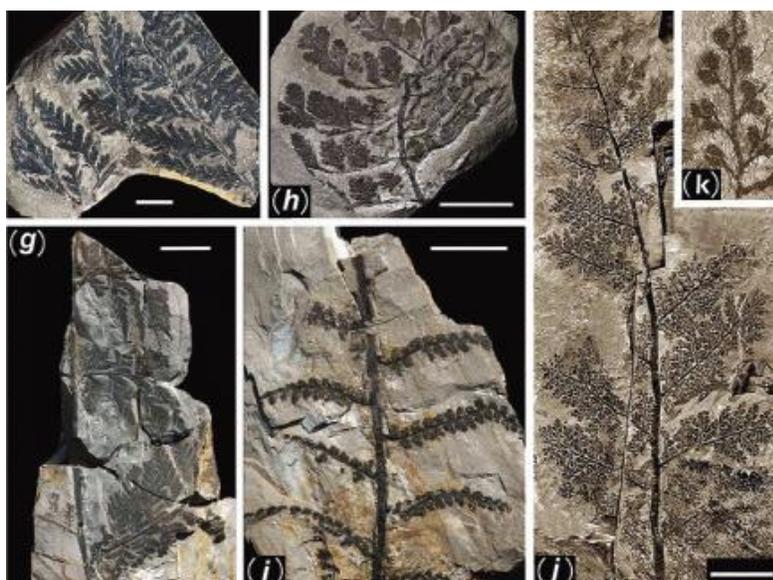
Both marine reptiles and cetaceans lived in the same deep, mid-level, and shallow environments. If all creatures were formed in the biblical six days of creation (Genesis 1:1-26) at the same time, then both marine reptiles and cetaceans should be found as fossils in the same marine sedimentary rocks, but that is not the case. Cetacean fossils are found only in rocks that were deposited much later (Eocene and younger, **Figure 1**) after Noah's flood occurred (said to be during the Paleozoic and Mesozoic Eras by the young-Earth creationists). Cetaceans are mammals, and the first mammals evolved from reptiles that lived on land. But later some of these mammals adapted to living in the ocean and became the cetaceans. Therefore, the absence of cetacean fossils where marine reptile fossils are found is, not only good evidence that evolution of life through time is a valid concept, but also that Noah's flood was not global in extent. If it were global, this flood should have engulfed both life forms at the same time, at the same level in the geologic column, and at the same places around the world, and that did not happen.

## 2. Fossilized plants in China and Illinois

In China a place has been found in Permian rocks (**Figure 1**) in which two coal layers occur that enclose a volcanic ash layer that is about three feet thick. In this volcanic ash are fossilized remains of different plants, insects (such as dragonflies), salamanders, and frog fossils. Excavation of this ash over a large area shows the distribution of each kind of fossil in an ancient forest community (**Figure 3**). Among the plant fossils are tree ferns, lycopods (scale trees, *Lepidodendron*, now extinct but somewhat like a modern tall palm tree), cycads, and horsetails. Some former, fully grown, but fallen scale trees that were buried flat in the ash give evidence that these trees in some places were as much as 100 feet tall. The volcanic ash preserved the delicate leaves of many different plants (**Figure 4**) such that the leaves cannot have been deposited by the rush of tsunami waters of Noah's flood which would have mixed the leaves in tangled masses.



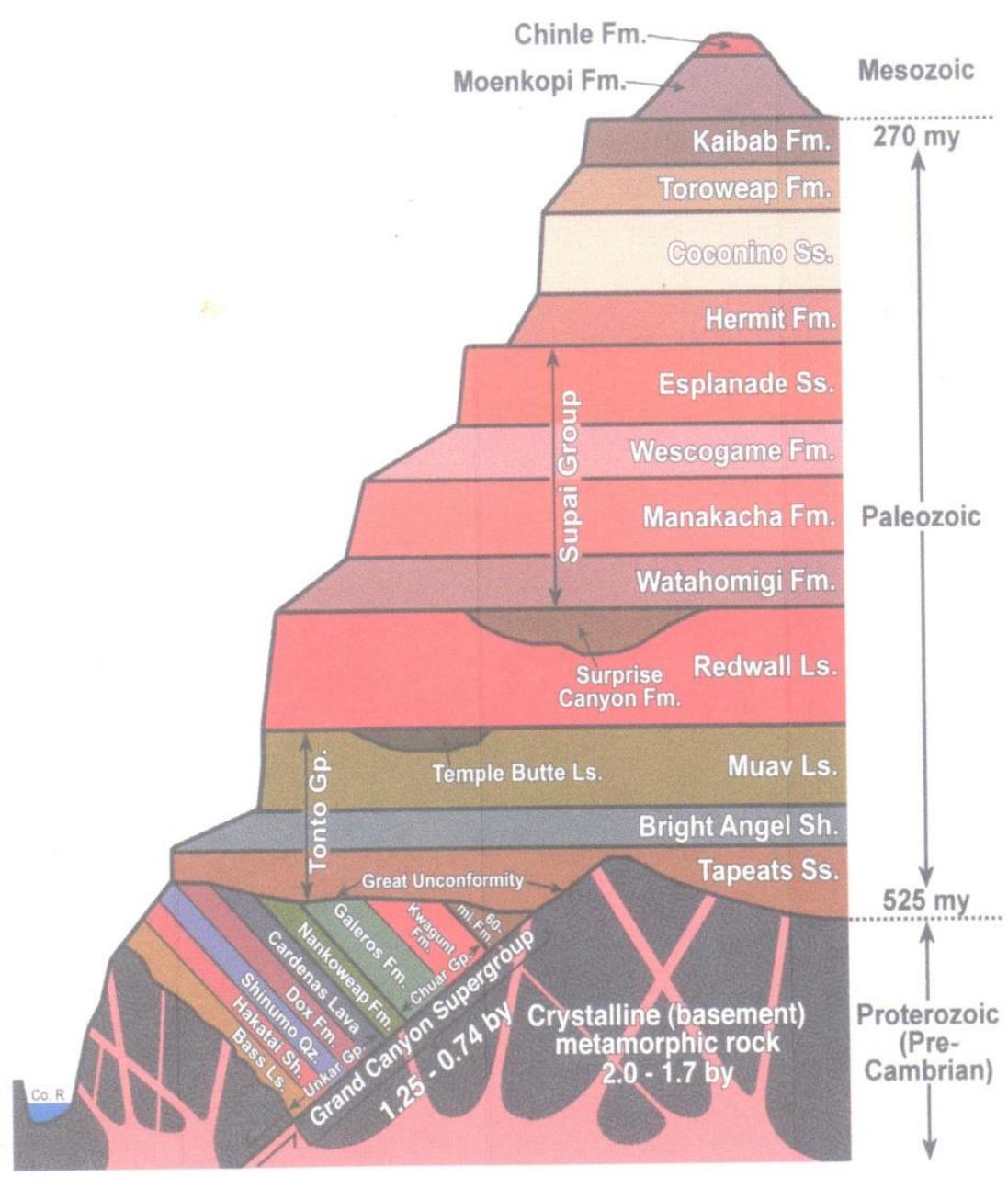
**Figure 3.** Forest community imagined from excavated Permian volcanic ash in China.



**Figure 4.** Examples of leaf fossils in China's 298-million-year-old buried forest. (f) and (g) *Sphenopteris cf. tenuis*; (h) *Sphenopteris* sp. 1; (i) *Sphenopteris* sp. 2 with abnormal pinnule (*Aphlebia*) at the very base of each; (j) and (k) unidentified.

It is the leaves that fell off these plants that later were compressed under high pressure and temperature and which then were converted into coal. Note that the growth of trees 100 feet tall and the accumulation of leaves to form coal is a slow process and cannot have happened in the time of one year during Noah's flood, particularly when new plants some of which must have also grown 100 feet tall (**Figure 3**) would have been needed to produce the leaves to form the overlying coal layer on top of the ash bed.

In Illinois, there are as many as fifteen coal layers of Pennsylvanian age which also contain *Lepidodendron* leaf fossils, and these coal layers are separated by deposits of river flood-plain muds, and each coal layer is locally cut by sand-filled river channels. Fifteen different coal layers cannot have been formed in the one year of Noah's flood because leaves in each layer likely came from trees that grew 100 feet tall. Moreover, meandering streams that cut each of these coal layers would not have been created during Noah's flood. Although the Permian Kaibab limestone along the rim of the Grand Canyon (**Figures 5 and 6**) could theoretically have been deposited by Noah's flood, it is clear that all Permian layers (and Pennsylvanian-aged layers) around the world were not deposited by tsunamis but were created very slowly during quiet-water deposition and while trees were growing slowly during many tens of years.



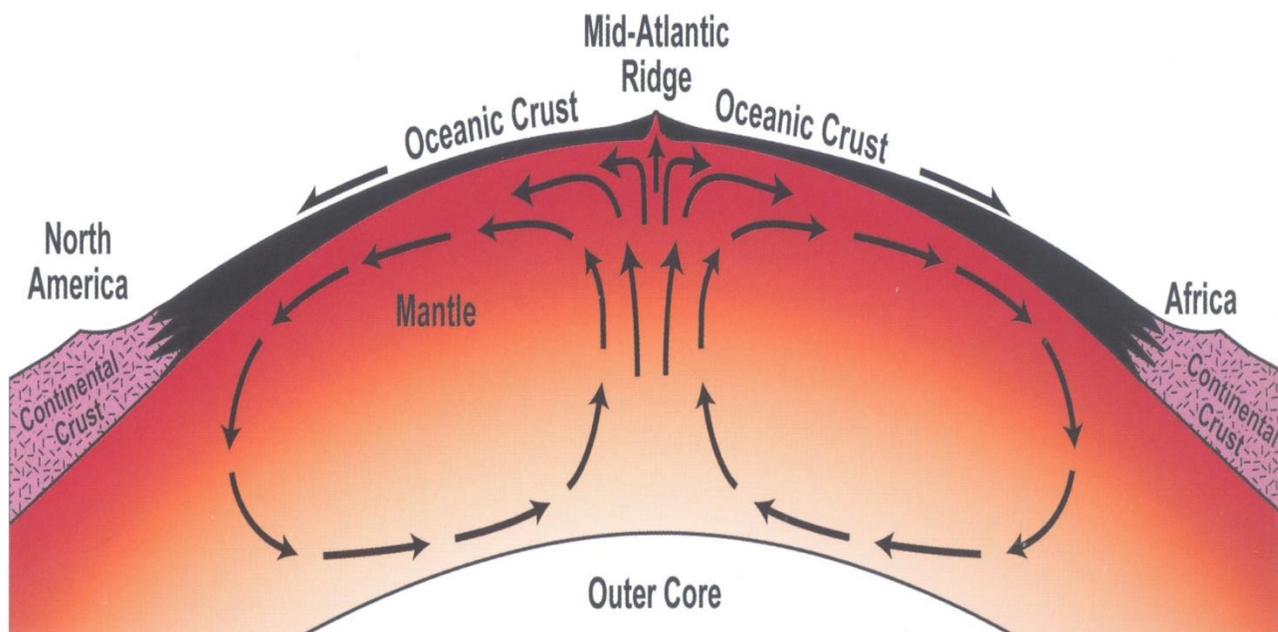
**Figure 5.** Grand Canyon geology. (from Grand Canyon book listed at the end of this article)



**Figure 6.** View of north rim of the Grand Canyon showing the Kaibab limestone (white) that forms its flat top. Below it is another white layer, the Coconino sandstone.

### 3. Salt deposits

On almost all continents and in rock layers of many different geologic ages, layers of rock salt can be found in thicknesses that range up to 3,000 feet. Normally, to form such salt deposits, evaporation of large volumes of salty water is required. Young-Earth creationists have proposed that hot water, saturated in dissolved salt, was ejected from “fountains of the deep” along mid-oceanic volcanic spreading centers during Noah’s flood (Genesis 7:11) (**Figure 7**).



**Figure 7.** Mid-Atlantic spreading center where supposed “fountains of the deep” are said to come from the center of the Mid-Atlantic Ridge. This ridge is a chain of volcanoes from which basalt lava emerges.

Mid-ocean volcanic spreading centers are places where volcanoes emerge when the Earth’s crust is split apart by motions of rock below the Earth’s surface during plate tectonics. Iceland is one such place where such volcanoes have risen above the ocean along the Atlantic Ocean spreading center. However, if such hot water that was saturated in dissolved salt were once ejected from ancient spreading centers, one would expect salt deposits to be found near these spreading centers, but none is. All are found in the interiors of continents. Even if cooling of possible hot, salt-saturated water would cause the salt to precipitate, the landing of this fountain-ejected, salt-saturated water in the large volumes of Noah’s flood water would immediately disperse the dissolved salt in these volumes so that the salt could never concentrate and be precipitated. Moreover, the layers of salt are commonly associated with red beds traversed by mud cracks (**Figure 8**).

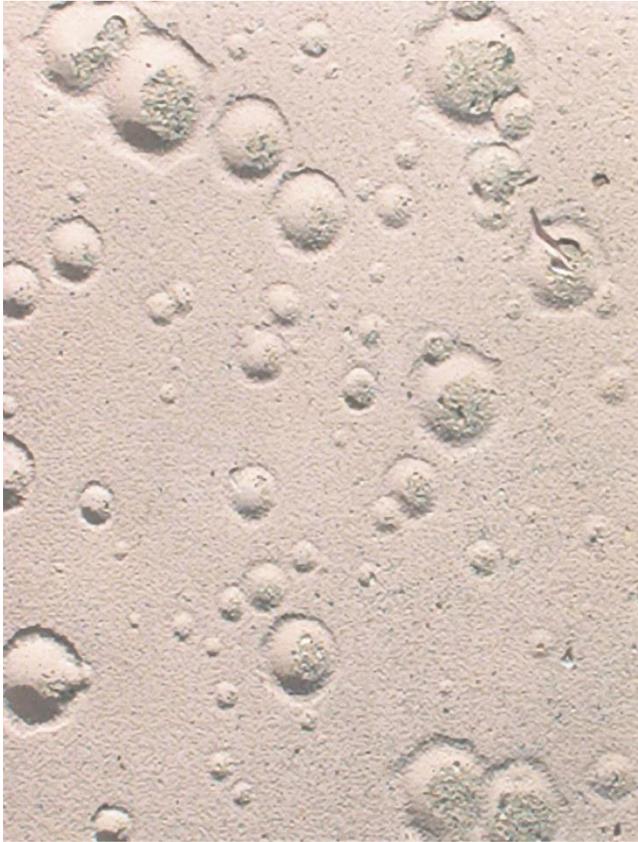


**Figure 8.** Fresh mud cracks in delta muds and polygonal cracks in reddish clay (mud).

Mud cracks result where mud deposited from water dries and shrinks to produce polygonal patterns of cracks. Around the salt deposits, streams draining into basins of water that are evaporating to precipitate the salt, produce deltas that contain the mud, and this mud is commonly red because iron-bearing minerals in the mud are exposed to oxygen in the air and become red hematite (oxidized iron). Mud exposed to air would not be present during Noah's flood because all mud would have only been deposited under water. On the basis of all these observations, it is also clear that in the midst of 40 days and 40 nights of rain during Noah's flood, there cannot be several different times of drying-out to precipitate salt because the salt deposits have many different geologic ages within the time period for the flood (e.g., Devonian in Michigan, Pennsylvanian in Utah, Permian in Nebraska, Cretaceous in Austria; **Figure 1**, and because the only time in which drying-out is said to have occurred in the Bible is at the end of the flood when Noah sent out a dove to check on the condition of the land surface (Genesis 8:11).

#### 4. Fossil raindrop prints

When raindrops fall on soft mud, their impact can create a shallow, bowl-shaped depression with a splash rim that projects above the depression (**Figure 9**).



**Figure 9.** Fossil raindrop prints; underside view with bowl-shaped basins projecting upward and splash-rims projecting into the mud.

Such muds can later become consolidated into rock called shale, and in some places raindrop impressions may be preserved as fossil prints on surfaces of the shale layers. Muds deposited under water, as during Noah's flood, should never have any fossil raindrop prints because any rain would only fall on water. Because many shale layers exist around the world with several different geologic ages at the supposed time of Noah's flood (Silurian, Devonian, Permian, and Triassic; **Figure 1**) and have preserved fossil raindrop prints in them, this is clear evidence that a worldwide flood never happened.

## 5. Cross-bedding in sandstones

Cross-bedding in sandstone layers is produced either by wind or water erosion in which transported sand grains can move in such a way that the grains spill down a slope. Under water, the maximum angle of this slope is generally less than 30 degrees, but in desert areas, this angle in sand dunes can be more than 30 degrees. Because cross-bedding angles in the Grand Canyon area in both the Jurassic Navajo sandstone (**Figures 1 and 10**) and the Coconino sandstone (**Figures 5 and 6**, near top of the canyon) have been measured at 30 degrees and larger angles (**Figure 10**), it is clear that these sedimentary rock layers could not have been deposited during Noah's flood but were produced by blowing wind during dry desert conditions.

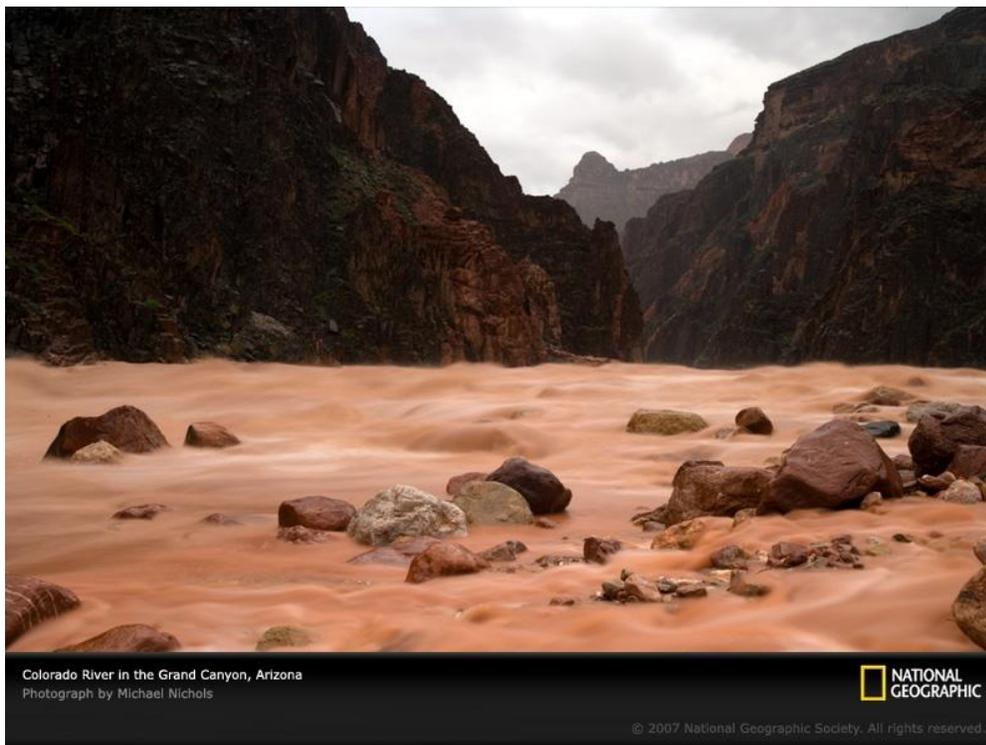


**Figure 10.** “The Wave,” dune cross-bedding in Jurassic Navajo sandstone formation, North Coyote Buttes, Coconino County, Arizona, showing dip angles greater than 30 degrees.

## 6. Rates of erosion in the Grand Canyon rocks

It is very appealing to suggest that the Grand Canyon was carved by the draining of water in a large lake left over after Noah's flood supposedly extended around the world. Young-earth creationists suggest this is how the canyon was formed and that it was like the draining of Lake Missoula in Montana. This ancient lake was one once created by water being blocked by a tongue of glacial

ice, and water from this lake burst through the ice blockage and carved parts of the Columbia River canyon. But the evidence in the Grand Canyon does not support this kind of rapid carving. At the bottom of the Grand Canyon is the Precambrian Zoroaster crystalline granite (**Figure 5**, pink with dikes) in which the Colorado River has cut a V-shaped valley 100 feet deep. The amount of water flowing through the Grand Canyon varies with climatic conditions so that in parts of the year at times of low precipitation, this granite is exposed at the bottom of the canyon and has a highly polished eroded surface. In times of high precipitation, this granite is submerged under deep water such that the canyon floor cannot be seen. It is a simple matter to observe and measure the amount of erosion of the granite from year to year when it is exposed and see that the amount of erosion per year is in thousandths of an inch. Thus, it is not the great volume of water in a supposed left-over lake after Noah's flood, rushing out in less than one year that could have caused the Zoroaster granite to become deeply eroded at the bottom of the Grand Canyon (**Figure 11**).



**Figure 11.** Bedrock boulders in the Colorado River at the bottom of the Grand Canyon. Pink Zoroaster granite shown in the distance.

Nor is the erosion done by great amounts of suspended sand grains in the flowing water. They make little to no contact with the granite. It is the repeated rolling of bedrock boulders bumping against the granite year after year after year that erodes it (**Figure 11**). A single rush of a large volume of water from a remnant lake at the end of Noah's flood would have created almost no erosion of the sedimentary rocks in the Granite Canyon and certainly not of the very hard Zoroaster granite at its bottom. Granite is a very hard rock and not easily eroded as can be observed in Maine where hurricane waves pounding on granite shorelines do very little damage from year to year, and streams eroding the granitic rocks in the Sierra Nevada show almost no amount of erosion from year to year. Thus, it is apparent that erosion of the Zoroaster granite in the Grand Canyon is so slow (thousandths of an inch per year) that it would take millions of years to carve a narrow V-shaped valley 100 feet down into this granite. Thus, the Grand Canyon cannot be 4,350 years old or even 10,000 years old. Most reputable scientists believe that it took 5 to 6 million years to carve the Grand Canyon, and many other kinds of geologic studies support this opinion.

## **7. Continuous deposition**

If the rocks that form the walls of the Grand Canyon were deposited by Noah's flood, one would expect the deposition of sediment, from bottom to top, would occur without interruption on the basis that all this sediment was deposited quickly in less than one year. Yet, the Redwall limestone of Mississippian age (**Figures 5 and 12**) has caves and sinkholes in its upper parts which show that this marine limestone was once raised above the water in which it was deposited so that rain water slowly seeped down into exposed limestone at the Earth's surface to dissolve out the calcium carbonate to produce the caves and sinkholes. This process would take much, much more time than one year to happen before other overlying sedimentary rocks could be deposited on top of the Redwall limestone. Moreover, in other places, deep erosional river channels, as much as one-half mile wide and 400 feet deep, cut the Redwall limestone in the Surprise Canyon Formation, and erosion channels of the Temple Butte Formation, as much as 100 feet deep, cut the top of the Muav limestone (**Figure 5**). Conglomerates at the bottom of the Surprise Canyon Formation have boulders of the Redwall limestone (some more than 9 feet in diameter); therefore, the Redwall limestone cannot have been soft sediment when this erosion occurred, as the young-Earth creationists

have suggested. It is clear from this evidence that continuous deposition did not occur during Noah's flood. The deposition was interrupted several times.



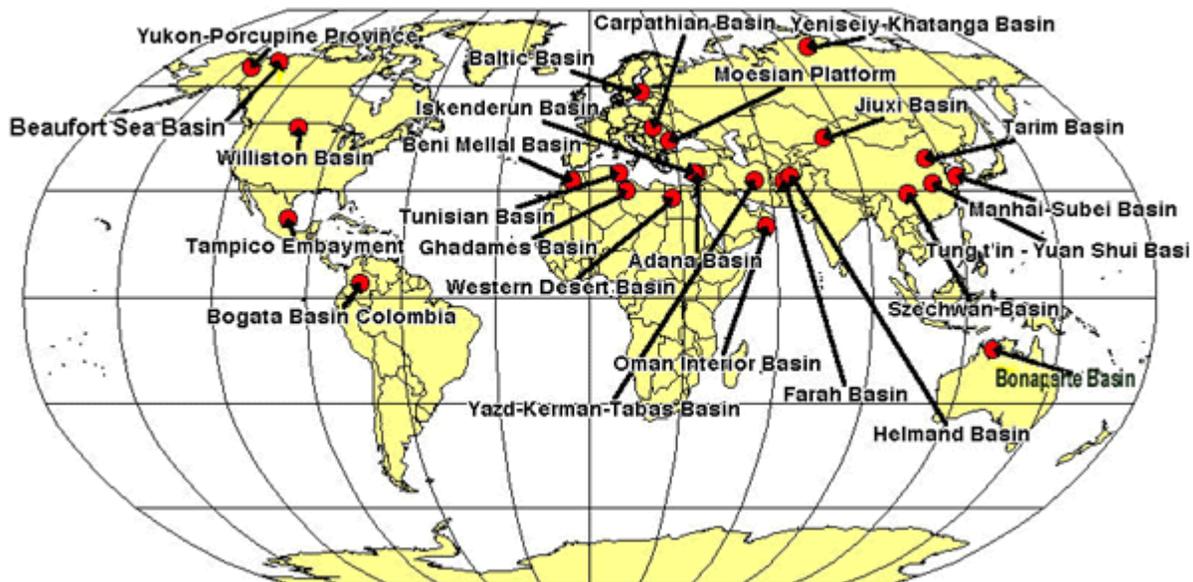
Figure 7.7 Cave in the Redwall Limestone, near Galesburg, Iowa. Photo by Scott Stettin.

**Figure 12.** Redwall limestone with caves.

## 8. Ecological environments

Young-Earth creationists propose that Noah's flood deposited different rocks and buried creatures in different ecological environments that produced these rocks so that fossils of these creatures show the different places on Earth where each kind of creature lived prior to when Noah's flood advanced and overwhelmed them in these places. But this model is not true because complete geologic columns of different life (represented in fossils) show layers of the fifteen different geologic ages above the Precambrian (**Figure 1**) which are stacked from oldest at the bottom to youngest at the top and which occur in twenty-five different places around the world (**Figure 13**). This observation is based on drilling through as much as 30,000 feet of sedimentary rocks in these places where oil companies

were searching for petroleum. Thus, the environments and life can be shown to change *vertically* through time in all places on Earth and in all geologic time progressively and not *horizontally* during the one year of Noah's flood.



**Figure 13.** Twenty-five different sedimentary basins in which all fifteen geologic ages above the Precambrian are present.

### **Conclusion and more information about Noah's flood story**

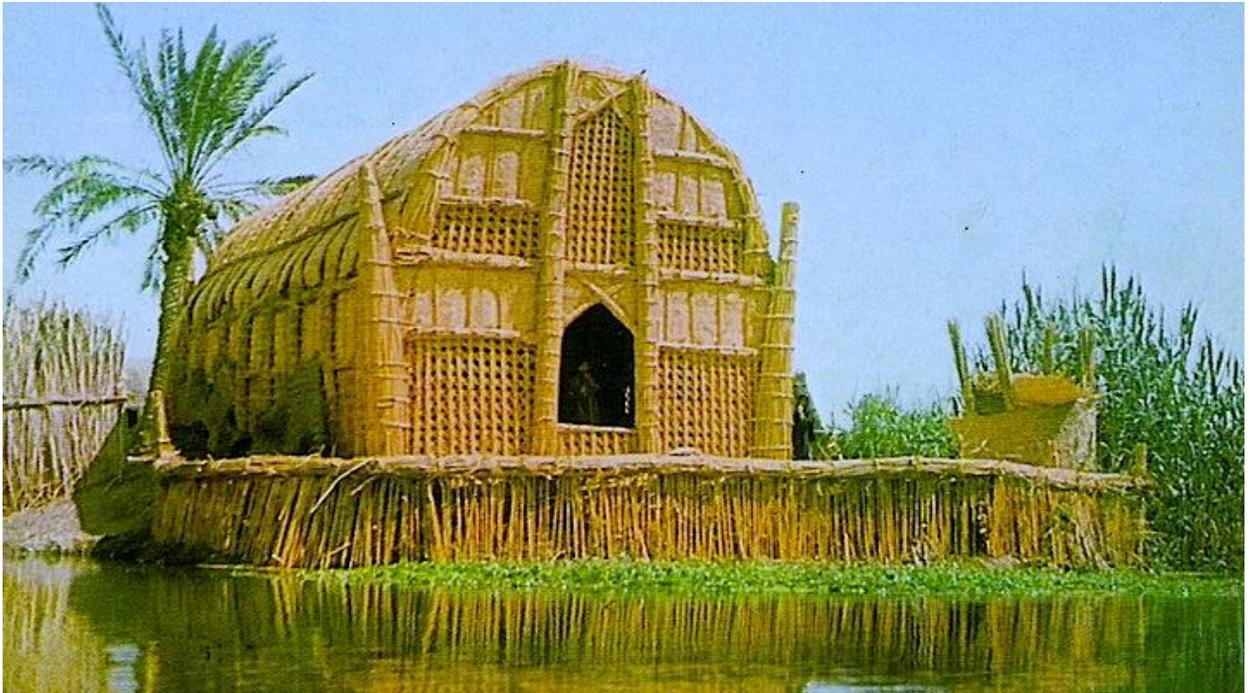
All the above “ugly facts” show that the Bible was not written to be a science text but to give good theology. There were no scientists living at the time when Genesis was written, and the author of Genesis was presenting ideas that made sense to the people living at that time in a culture entirely different from the culture and the time in which we live with abundant scientific knowledge.

A simple bit of evidence to support this observation is the statement in Genesis 9:13-16 “I have set my rainbow in the clouds, and it will be the sign of the covenant between me and the earth. Whenever I bring clouds over the earth...” This passage and what follows suggest that the Bible declares that it was only after Noah's flood that rainbows first occur. But science clearly shows by the laws of optics, that the many colors of sunlight passing through raindrops are refracted to spread the colors out into an arc of colors or two arcs with reversed orders of colors. So, rainbows clearly must have been present from the time in which the

first rain ever fell on Earth, but Hebrews in ancient cultures would not have known this, and the theological message of why a rainbow was produced by God would have been what they needed to hear – not a scientific explanation of how a rainbow is created.

When we understand that the story of the rainbow was written to give a theological message to the Hebrew people, we can also suggest that the flood story was a re-telling of ancient history that was reported in the epic of Atrahasis, the epic of Gilgamesh, and a Sumerian flood story that was passed down in oral tradition. On this basis, a huge flood could have occurred about 5700 BC instead of about 4,350 years ago that is in the young-Earth creationists' model, and Moses used this history to write a meaningful theological message for the Hebrew people.

Many large floods occur on a yearly basis in southeastern Mesopotamia where broad, joined, flood plains of the Euphrates and Tigris Rivers occur. Some floods are larger than others, depending on climatic conditions. In this area the people built raised mounds of earth, called "tells," to which the people moved to find high ground to survive such floods. Reeds grew abundantly in the flood plains, and the people could use obsidian, flint, and highly fired clay with sharp-edges, available at that time, to make tools to cut the reeds and bundle them to form reed rafts. A fence around the rafts could be built to keep animals from falling off and appear like a basket, similar to the basket that supported the baby Moses on the Nile River. Noah (or an ancient epic hero) could have built a very large raft (an acre in size) to support a house-like structure (called a mudhif) on top of the raft (**Figure 14**). Such are seen in modern Iraq and are entirely composed of bundles of reeds. The reeds in the arched roof could have been coated with pitch for rain-proofing. Pitch was available from the area near Hit in Mesopotamia. Three layers of crisscrossed bundles of reeds in the foundation of the raft could look, from a side view, like three decks in Noah's ark.



**Figure 14.** Mudhif composed of bundles of reeds in the Marsh Arabs of southern Iraq. It is on pilings because the water is only 4 feet deep and too shallow for a raft.

Because the joined flood plains are nearly 200 miles wide and nearly flat, an unusually large flood could have overwhelmed the tells and any remnant hills in this area that rise only 25 feet above the flood plains. Because the curvature of the Earth causes the horizon to drop about 8 feet per mile, during a very large flood the distant foothills of the Zagros Mountains and higher peaks could not have been seen below the horizon. On that basis, the whole world to these people could have been inundated with no land in sight. Some of the water from rain falling in the Zagros Mountains in Iran and water from melting snow there commonly goes underground into tunnels (caves) in limestone bedrock and then emerges from these tunnels as gushing springs in Mesopotamia (Iraq). This up-flowing gushing water could have been the “fountains of the deep” (Genesis 7:11). A huge flood created by rain that lasted a long time (40 days and 40 nights, the Hebrew way of saying a long time) could have generated so much water covering the flood plains that in such a flat area, the draining of this water into the Sea of Eden would take many months to occur before the land would dry. A window in Noah’s mudhif

could have been opened through which he released a raven and a dove to see if the land was once again dry.

Note that in this model of the flood, Noah's ark is not ever subjected to large waves in a tsunami, rushing around the surface of the Earth's globe to deposit sediments and the remains of buried animals that became fossils. Instead, the ark is like a floating basket that gently rises in place as the flood waters across the flood plains of the Euphrates and Tigris Rivers slowly increased in depth during an extra-large rain storm. Likely, when the flood waters finally subsided at the end of the flood, the mudhif and reed raft (ark) just settled back down on dry land.

We also have to understand that in 5700 BC the obsidian, flint, and fired clay tools available to ancient people in the epic stories could not have been used to construct the supposed replica of the ark in the Ark Encounter Park in Williamstown, Kentucky, which is promoted by young-Earth creationists as being what Noah's ark looked like even though they have applied no pitch to its outer surface as described in the Bible (**Figure 15**).



**Figure 15.** Scale model of Noah's ark in the Ark Encounter Park, Williamstown, Kentucky.

The quantity of planks for a wood ship of this size would be 3,300,000 board feet of lumber (a board foot being a plank 12 inches by 12 inches by 1 inch), and this amount of lumber is the equivalent of 625 miles of 12 inch planks. Nor would these ancient people have had enormous cranes to lift extremely heavy beams in place, needed for the pillars and deck supports, or iron bolts to hold the structure together. However, Moses in telling the Genesis flood story would not have been concerned with practical construction problems or for Noah obtaining huge quantities of lumber from trees that were not growing in Mesopotamia. These observations strongly support the idea that the original ark of the epic stories was a mudhif composed of bundles of reeds on a reed raft that people at that time built. Thus, Moses used all the information from the ancient epics and what existed in the culture of the time in which he lived to present a theological message of great meaning to the Hebrew people.

This article gives eight different bits of evidence, using good science that demonstrates that a global flood never happened during the Paleozoic and Mesozoic Eras, and shows that Moses did not use the knowledge of modern science to write his story about Noah and the flood. Moses was not writing a science text. Moreover, this article totally ignores the long period of time in which dolphins, whales, and porpoises lived in the Cenozoic Era. Furthermore, if the time of these three eras are combined, this time represents only a very small part of geologic history because more than 90 percent of geologic history occurs in the Precambrian (**Figure 1**). Young-Earth creationists say that all geologic events that occurred in the Precambrian happened on day three of the six days of the Genesis week which makes no logical sense and is bad science. As Galileo said: “I do not feel obliged to believe that the same God who has endowed us with senses, reason, and intellect has intended us to forego their use.”

On the basis of the true facts presented in this article, in today’s modern world we need to teach our children in all kinds of schools “good science” and not “bad science.”

All the facts and arguments presented in this article are supported by articles in the website “Opposition to Creationism” at <http://www.csun.edu/~vcgeo005/creation.html>.

Among these articles are:

Yes, Noah's Flood May Have Happened But Not Over the Whole Earth.  
<http://www.csun.edu/~vcgeo005/Collins2.pdf>.

More Geological Reasons Noah's Flood Did Not Happen.  
<http://www.csun.edu/~vcgeo005/Collins3.pdf>

When Was Grand Canyon Carved – Millions of Years Ago or Thousands of Years Ago? <http://www.csun.edu/~vcgeo005/GrandCanyon.pdf>

Glacial tillites, geologic history, and biblical scientific accuracy.  
<http://www.csun.edu/~vcgeo005/Nr40tillites.pdf>.

Twenty-one Reasons Noah's Worldwide Flood Never Happened.  
<http://www.csun.edu/~vcgeo005/Nr38Reasons.pdf>.

Response to Ken Ham and YouTube Comments by Andrew Snelling.  
<http://www.csun.edu/~vcgeo005/Nr42Response.pdf>.

Biological Reasons Young-Earth Creationists' Worldwide Flood Never Happened. <http://www.csun.edu/~vcgeo005/Nr45Biological.pdf>.

Is Genesis History? Analysis.  
<http://www.csun.edu/~vcgeo005/Genesis.pdf>.

Additional information can be found in the book: Carol Hill, Gregg Davidson, Tim Helble, et al. (eds), 2016, **The Grand Canyon – Monument to an Ancient Earth: Can Noah's Flood Explain the Grand Canyon?** Grand Rapids, MI, Kregel Publications.

Other articles of interest include the following.

Bogus "Noah's ark from Turkey exposed as a common geologic structure."  
<http://www.csun.edu/~vcgeo005/bogus.html>.

A supposed cast of Noah's ark in eastern Turkey.  
<http://www.csun.edu/~vcgeo005/Sutton%20Hoo%2014.pdf>.

Noah's Ark near Dogubayazit, Turkey?

<http://www.csun.edu/~vcgeo005/Dogu.pdf>.

Have the ancient cities of Sodom and Gomorrah been found?

<http://www.csun.edu/~vcgeo005/Sodom.pdf>.

Christianity and science – are they contradictory?

<http://www.csun.edu/~vcgeo005/bible.htm>.

Does the Bible contradict accepted biological concepts?

<http://www.csun.edu/~vcgeo005/heart.html>.

The above website has thirty-two other articles that could be of interest to you.

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