

## ARTICLE

# More Geological Reasons Noah's Flood Did Not Happen

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### INTRODUCTION

Young-earth creationists believe that there was a worldwide flood covering the earth and that virtually all fossil-bearing sedimentary layers, up until the most recent, were deposited by that Flood in about one year (Genesis 7:11–24 to 8:1–13; Whitcomb and Morris 1961; Morris and Parker 1987). Although the time for deposition by a one-year flood of the nearly 3.75 kilometers of sedimentary rocks on top of the Precambrian strata (Figure 1) to the present seems impossibly short, Oard (2002) argues for Flood Geology nonetheless. His conclusions rest on the notion that the modern evidence cannot be used as a key to the past, as the uniformitarian principle is typically applied (Oard 2002).

He writes

uniformitarianism is a poor organizing principle and often invalid. For instance, sandstones, which make up approximately 20% of the sedimentary rocks on the earth, are consistently different from modern sand deposits. As an example, pure quartzites (orthoquartzites) are common in the older record but none seem to be forming today. Quartzite is metamorphosed sandstone. (Oard 2002:8)

Of course, even if uniformitarianism (as Oard [2002] has framed it) were completely false, it still would not make his alternative—a world-wide flood—true. He would need other evidence to support his model. So he goes on to say

Furthermore, in the modern world sand generally accumulates in linear deposits while ancient sandstones form very large sheets: It is noteworthy that the most common sites of sand accumulation in the modern world are linear (beaches and rivers); yet most sands of the past form extensive stratiform deposits (Pettijohn 1975). (Oard 2002:8)

Therefore, he argues, “The evidence is consistent with the global Flood, which would be expected to deposit sand in sheets” (Oard 2002:8).

Thus, he believes that the deposition of the various sedimentary rocks around the world could have occurred in this incredibly short period of one year rather than over thousands or millions of years.

### The uniformitarian principle and modern geologic interpretations

First of all, creationists who claim that uniformitarianism is an unreliable basis for interpreting the past do not seem to understand that modern geologists do not apply this prin-

# Grand Canyon's Three Sets of Rocks

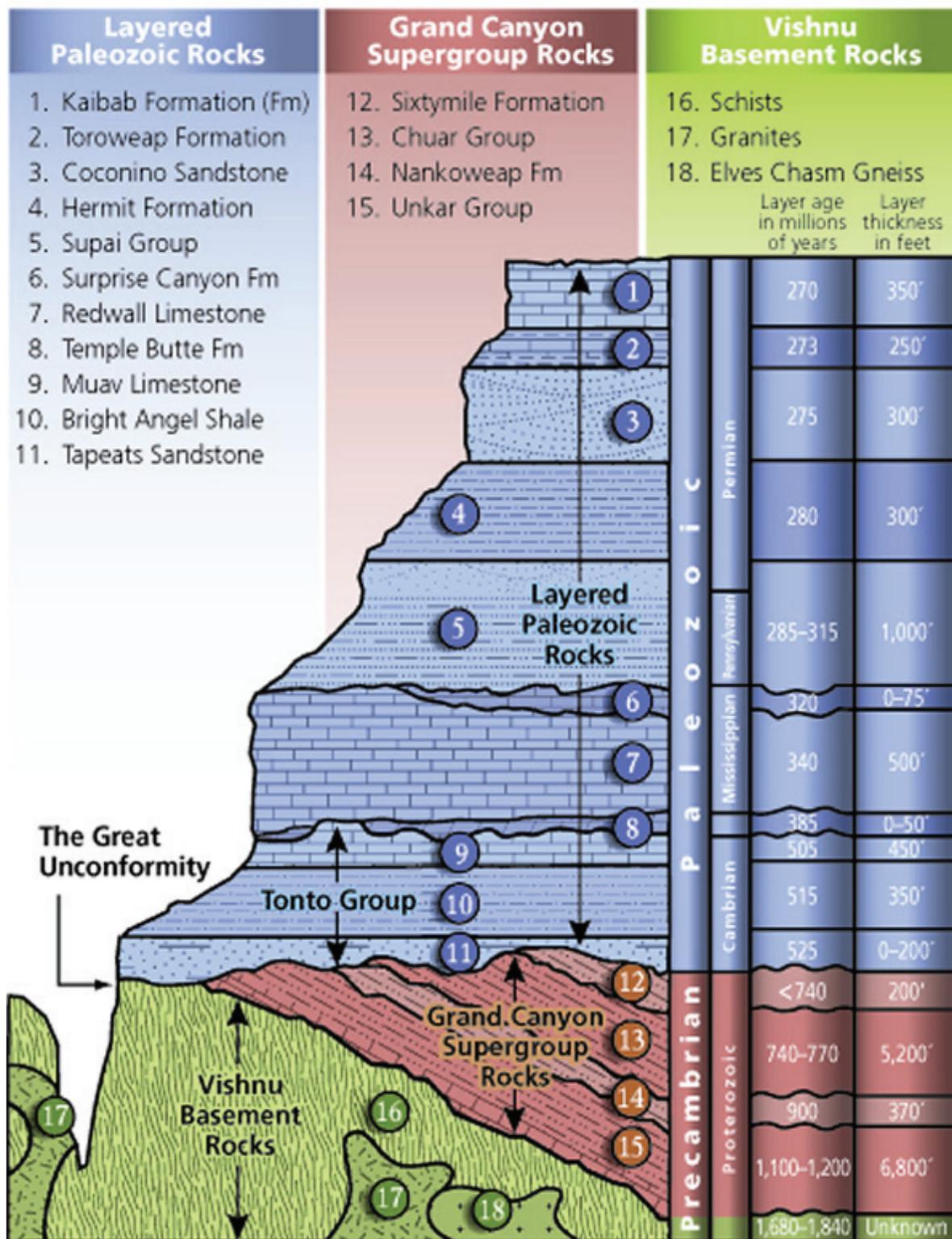


FIGURE 1. Geologic time scale, showing period names and ages in millions of years of strata in the Grand Canyon. Copyright Grand Canyon Association. Used with permission.

principle to every geologic situation. It is merely the philosophical principle of simplicity. As Shea says (1983:105),

Contrary to creationists' allegations, modern uniformitarianism makes no assertions about nature, but instead, tells scientists to choose the simplest hypothesis that both fits the observations and leads to greatest simplicity in overall theory. What the creationists attack, therefore, is not uniformitarianism as it is used by contemporary geologists, nor uniformitarianism as it has been clearly explained in several careful analyses published since 1965, but a false 19th[-]century uniformitarianism that has been abandoned.

The uniformitarian principle has been a useful idea, but too many examples exist in which the present is not the key to the past. For example, today we have an atmosphere with relatively abundant oxygen. In the past, the atmosphere was likely very poor in oxygen and rich in methane. Therefore, processes happening today would be different from those happening in the past. Modern geologists no longer strictly apply the idea of uniformitarianism except where the formations of rock structures, such as ripple marks, cross-bedding, and mud-cracks, can be observed that look like similar features in ancient rock layers. On that basis, Oard's (2002) harping on the shortcomings of uniformitarianism is both a straw-man argument and an example of what Abrahamson and Smith (1993) called a "black/white" fallacy. Neither of these is a valid argument that automatically makes a global flood the only alternative.

Second, Oard (2002) makes some untrue statements about ancient sandstones in the geologic column (Figure 1). If Oard's descriptions of the sandstones were correct ("Quartzite is metamorphosed sandstone"), then these sandstones would be in the form of quartzites associated with marble, slates, schists, and gneisses; yet these co-existing metamorphic rocks do not occur in the geologic sedimentary column (Winter 2001). If the layers of sand in the geologic column were quartzites, as Oard (2002) claims, then they would have no pore spaces in them to enable them to be aquifers or reservoirs of methane gas or oil, as they commonly are.

Sand grains in sandstones in the geologic column are generally glued together by various kinds of cements (calcite, traces of hematite, which make the layers red, and/or secondary silica). Most sandstone layers in the geologic column are cemented by calcite or by calcite plus traces of hematite. Where secondary silica is the glue, the sandstone is generally harder and called orthoquartzite (or quartz arenites). Although orthoquartzites are uncommon in both modern and ancient environments (Scholle and Spearing 1983; Walker and James 1992), clearly Oard (2002) is misinformed about orthoquartzites being formed by metamorphism. Furthermore, orthoquartzites would not have formed under different conditions in the past from what we see today.

Third, it is simply not true, as Oard (2002) claims, that most modern sandstones are linear and ancient sandstones occur in sheets. It is true that along California's west coast, only linear beaches of sand are visible, and those extend from San Francisco to San Diego. Nevertheless, in several places, the drifting sands carried by long shore currents along these beaches drain down submarine canyons and then are deposited as sheets at the bottom of adjacent deep ocean basins (Inman 1980). On that basis, what we observe in ancient

sandstone sheets of the supposed Noachian Flood can also be seen in recent basin deposits extending either from former submarine fans or from deltas that connect ultimately to the streams that brought the sands to these basins—in other words, normal transport of sand in water currents and not the result of a sudden or prolonged flood.

Sandstone sheets can be present in recent deposits and not only in ancient sandstones as Oard (2002) claims. Indeed, in the modern world most sands that are deposited are not in linear arrangements but in sheets that are deposited in a multitude of different environments. These include (a) glacial sands in outwash aprons at the foot of a melting glaciers, (b) eolian (wind) deposits in vast sheets of sand, as in the Sahara Desert and in other deserts around the world, (c) sand layers in alluvial fan deposits, (d) lacustrine layers of sands in lake beds, (e) fluvial sands in wide flood plains, (f) delta sands, (g) estuarine sand deposits, (h) sands in tidal flats, and even (i) sheets of sand in continental shelf and slope deposits (Scholle and Spearing 1983; Walker and James 1992).

In addition, some linear sandstone deposits occur among the layers of sandstones in the geologic column which Oard (2002) says were deposited during Noah's Flood. An example is the Cretaceous *Cardium* sands reservoirs of Alberta (as Ken Wolgemuth pointed out to us). These ancient linear deposits are like the offshore barrier bars that occur as the Galveston Island in South Texas. These sandstone bars are bounded on one side by marine shales and on the other side by brackish-water shales of former lagoons. The similar *Cardium* offshore-barrier bar sands become traps for introduced oil. Thus, there are both linear sandstones and sheet sandstones that occur in the present as well as in the ancient past. Therefore, Oard's (2002) arguments are false, and in the case of sandstone deposits, the present can be the key to the past.

In order to evaluate Oard's (2002) position regarding the deposition of sand during Noah's Flood properly, we need to examine his whole model from a scientific viewpoint. For example, if the average geologic column of sedimentary rock deposited during Noah's Flood is about 5000 meters thick (Morton 2001), and it took less than one year to deposit this column of rock, then 50 meters of sandstone in the column should take less than 4 days to be deposited during the one year of deposition if all the various sedimentary rocks were deposited in 365 days. Is such a rapid rate of deposition of sandstone at all possible?

Before we answer this question, there are several important issues that Oard (2002) does not address. What rate of erosion is required to produce enough sand grains so that they could be part of a sedimentary column 5000 meters thick and be deposited during Noah's Flood? What rate of deposition is needed to deposit the sand grains in a single solar year? Where were all the sand grains before the Flood? Had they been turned into stone? Is Oard (2002) considering the rate of erosion during the first 2000 years prior to the Flood or during the Flood? Oard (2002) does not say if the sand was just lying around the planet until the Flood, which then picked it up and threw it around, or whether the Flood actually eroded granite masses and created the sand during the Flood or some combination of both.

#### **FORMATION OF SANDSTONE**

To address these issues, we need to start with how sandstone is formed. Sandstones consist of quartz grains that are produced and deposited by various eroding agents (streams,

wave action, wind) and which ultimately are glued into a solid mass by some kind of cement (calcite, hematite, or secondary silica). These quartz grains, however, have to come from somewhere, and granitic igneous rocks are the probable sources. Oard (2002) fails to indicate sources of the sands that are supposedly deposited in one year. It is important to note that coarsely-crystalline granitic rocks (granite, granodiorite, and diorite), on average as a whole, contain about 10% quartz (personal observations; Winter 2001).

When granitic rocks are eroded, the quartz grains are loosened and carried away in streams, and these quartz grains would drop out early, forming layers of sands. How long would it take to make enough sand to form a layer of sandstone 50 meters thick? Because the earth in the creationists' model was formed about 2000 years before Noah's Flood (Whitcomb and Morris 1961; Morris and Parker 1987), a thickness of 500 meters of granite would need to be eroded in 2000 years to release enough quartz grains to enable the production of 50 meters of sandstone. On that basis, the rate of erosion would be 4 meters of granite per year. That is a lot of granite loss in those early days. One study indicates erosion rates of granite today to be about 0.0000137 meters per year (Duxbury 2009). Because sandstone layers that are alleged to have been deposited during Noah's Flood are many times thicker than 50 meters, the erosion rate of granite needed by the creationists to produce 20 percent of all the formations in the geologic column during Noah's Flood would have to have been very fast.

Then, would it even be possible for sand grains, if they were present in sufficient quantities, to be deposited in sandstone layers 50 meters thick during the Flood in just one year? Because sand grains have a relatively large size and are heavy, they do settle out of water readily—if the flood waters could suspend and move that quantity of quartz (including pebbles and cobbles in co-existing sandstone conglomerate beds) in the first place. So if there were sufficient quantities of sand grains available, then they might have precipitated from the flood waters, but the release of enough grains from the earth's rocks in 2000 years so that they were available to be deposited by the Flood would require a rate of erosion slightly more than 29 000 times what we observe today. And even dropping strict uniformitarian expectations, that is an exceptionally rapid rate of erosion. In any case, before or during the Flood, sand grains do not exist without extensive erosion requiring many thousands to millions of years unless the Creator just miraculously produces them, but then that option is not science.

#### **What are the co-existing rocks that are interlayered with the sandstones?**

Sandstone layers in the geologic column are commonly interlayered with shales and limestones. Many such shale layers have fossilized mud-crack prints in them, which are also associated with evaporite (gypsum and rock salt) deposits. Both the mud-cracks and the evaporite deposits can have formed only in surface-drying conditions that cannot have occurred if these were under water during Noah's Flood (Collins 2009). Other co-existing rock layers of Carboniferous, Permian, Triassic, and Cretaceous ages contain fossilized charcoal that indicates the prior existence of huge fires that also cannot have happened under water during Noah's Flood (Shen and others 2011; Senter 2011). Still other co-existing limestone layers in some places have caves and collapsed structures (sink holes) of karst topography that can have formed only when the limestone layers were raised above water and exposed to surface weathering conditions—for example, the Redwall Limestone in the

Grand Canyon (Hill and Moshier 2009) and some limestones in the geologic column in the Williston Basin (Morton 2001).

Thus, the many different kinds of geological scientific evidence show that Oard's (2002) belief that the sandstone layers sheets were formed during Noah's Flood has no merit.

#### **OARD'S UNIFORMITARIAN ARGUMENTS ABOUT RADIOLARIAN CHERTS**

Oard (2002) also argues that because there are no known radiolarian cherts being formed today, the present cannot be a key to the past. He uses this observation to claim that deposition of the geologic column of sedimentary rocks was different during Noah's Flood from what occurs today. Chert is a rock that commonly occurs as rounded nodules or irregular globs a few centimeters wide and consists of cryptocrystalline quartz in which the fibrous crystals are too tiny to be seen with the unaided eye. This kind of quartz is also called chalcidony or flint when the nodules are found in limestone or chalk. It fractures in smooth curved surfaces, and several cultures have used this rock to make arrowheads, blades, and other tools because of its breakage pattern that produces sharp edges.

Radiolarian chert occurs in two forms: bedded chert associated with volcanic rocks and fine-grained terrigenous clastics (earthy fragmental grains) and nodular chert that occurs in limestone (Schwab 1992). Bedded chert is formed from the recrystallization of masses of radiolarian fossils in oceanic oozes in which the radiolarians have been almost entirely welded together as solid quartz (Chester 2003). In this kind of chert, remnants of the former radiolarians can be seen. We would expect that nodular chert or flint occurring in limestone (or chalk) without remnants of radiolarians would have a different origin, such as from dissolved silica carried into the oceans by continental streams.

Because the solubility of silica is very low at temperatures that are normally found in streams and in the ocean and also quite low where the water is acidic (Rowe and Fournier 1977), the dissolved silica that is carried into the ocean tends to come out of solution quickly where the oceanic water is relatively acidic. Thus, it can coalesce into gel-like masses (opal) that eventually accumulate and harden to form flint. Any dissolved silica that is incorporated into opal in radiolarians is eventually dissolved and precipitated in the chert nodules (Prothero and Schwab 1996).

Because quartz is very insoluble in surface waters, the source of the silica ultimately to form the chert comes from weathered feldspars that release the silica during hydrolysis to produce clay. Like the source of sand for the sandstone layers in the geologic column, which takes thousands of years of erosion of granite to produce the sand grains, both the source and time needed to produce large quantities of dissolved silica also require weathering of feldspars in granite during this same long period of time before the formation of large quantities of radiolarians can occur. As with the erosion of granite in the 2000 years creationists allow before Noah's Flood and the one year during the Flood, the weathering of feldspars cannot produce enough silica in sufficient quantities in all the many different chert-bearing formations in the many different geologic periods (Figure 1). This is another reason why a global Noachian Flood did not happen.

However, there is no geologic environment today that is both supplying abundant dissolved calcium that might be precipitated by organisms in tiny carbonate shells to form limestone

or chalk while simultaneously supplying abundant dissolved silica. So there are no places where flint is being formed today in limestone or chalk beds. So what Oard (2002) states is true in the strict sense: the present in this case is not the key to past. But he does admit that radiolarian oozes are currently being deposited on the ocean floor. Nevertheless, in order to examine Oard's (2002) claims properly, we need to look at the whole issue of radiolarians and how radiolarian chert is formed.

### **What are radiolarians and how fast are they converted into chert?**

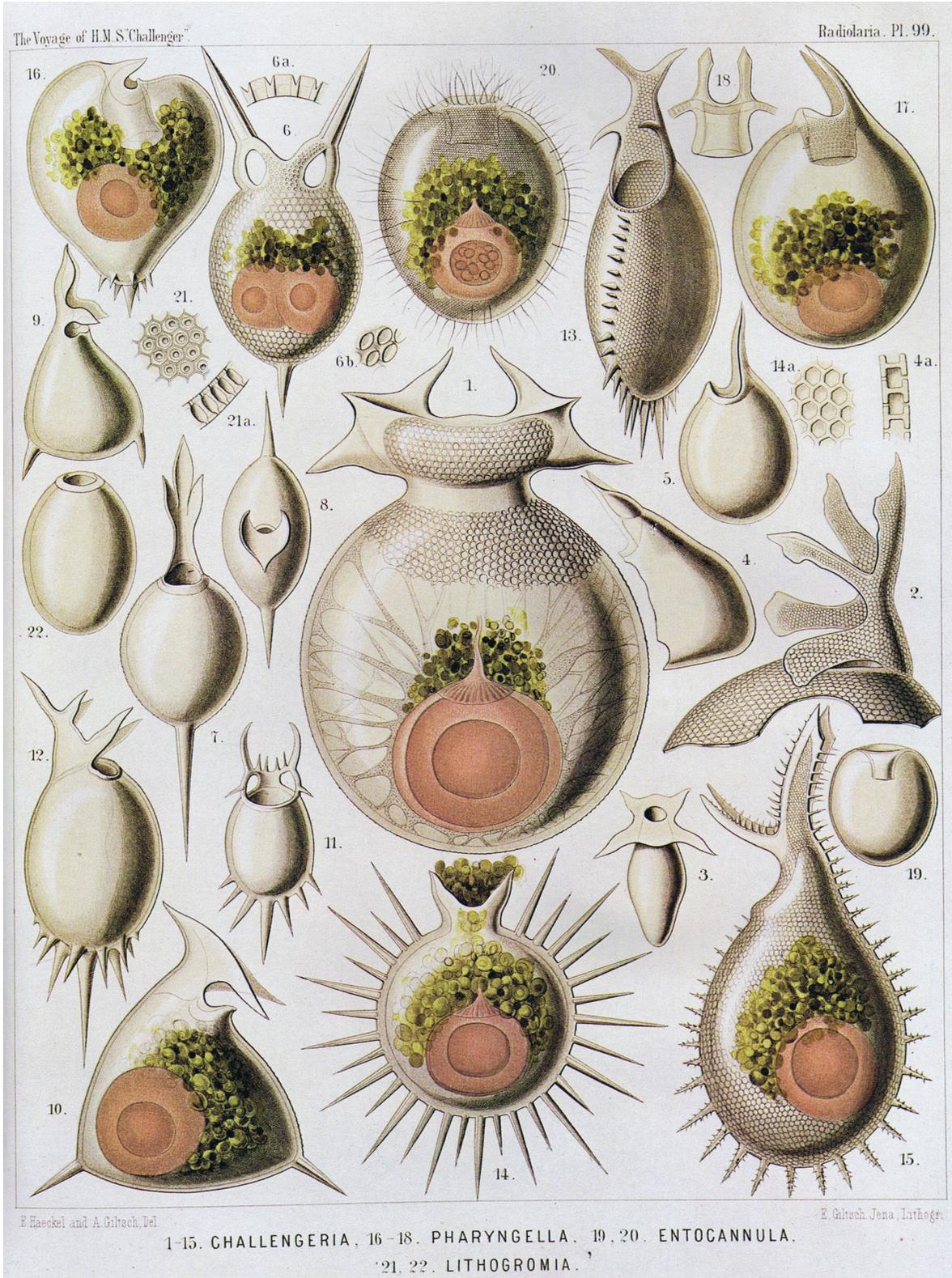
Radiolarians are tiny organisms that live in the oceans and have skeletal structures (Figure 2) composed of amorphous silica (opal A). To form radiolarian chert, opal A in the radiolarians, after long periods of time, converts to another kind of amorphous silica (CT opal) which transforms into tiny crystals of cristobalite and tridymite (varieties of quartz), then into chert.

Although radiolarian-bearing oozes are not as abundant as other kinds of oozes, they are produced where abundant silica-bearing, hot, hydrothermal fluids come from volcanic sources, such as "black smokers," on the ocean floor (Roberts 2009; Hüneke and Mulder 2011). High temperatures (>350°C) and basic rather than acidic waters are needed to carry significant amounts of dissolved silica (Rowe and Fournier 1977), and these conditions occur around volcanic vents (black smokers) near oceanic spreading centers. These high temperatures and pressures are required to cause these transformations (personal communication from Rudi Pohl; Roberts 2009; Hüneke and Mulder 2011). The absence of these conditions is the reason why Oard (2002) has never observed modern, thick, radiolarian chert beds being formed from radiolarians. Nevertheless, the process of radiolarian-bearing chert begins with the deposition of radiolarian oozes on the ocean floor, and that is going on in the oceans today. Under the right conditions, these deposits eventually will become part of radiolarian chert beds (Roberts 2009; Hüneke and Mulder 2011).

Moreover, there is no logical physico-chemical reason why rates of conversion of radiolarians into chert should be any different today than in the past. Radiolarians today are also being subjected to increasing temperatures and pressures as their exoskeletons precipitate to the ocean floor and are progressively buried to greater depths. Therefore, it is clear that the process that produces the radiolarian ooze—which is the first step in the formation of radiolarian chert—is going on today. So there is no need for any additional explanation, and certainly not a proposal of an accelerated rate of transformation of radiolarians into chert during the supposed single year of deposition during Noah's Flood, but let's examine what that proposal would entail.

### **Deposition of radiolarian fossils**

To produce a 50-meter-thick radiolarian chert layer in 4 days (the deposition rate required for 5000 meters of rock to be deposited during a 1-year flood), one must consider how fast radiolarian skeletons can accumulate on the ocean floor. Takahashi (1981) and Takahashi and Honjo (1983) found that radiolarians will take from 2 to 56 weeks to fall through a water column of 5000 meters, which is far, far longer than the 4 days that are available in the young-earth model used in Flood Geology. The slow rate is because radiolarians have pores or projecting spines in their skeletal structures (Figure 2) that increase friction with the water and will slow their descent. Therefore, if natural physical laws are obeyed, the accumulation of astronomical numbers of such tiny radiolarian fossils to be parts of a



**FIGURE 2.** Examples of the variety of shapes of radiolarian skeletons. Source: Ernst Haeckel, Report on the Radiolaria collected by HMS *Challenger*, Report of the Scientific Results of the Exploring Voyage of HMS *Challenger* during the years 1873–1876, vol 18, pt 3, plate 99. Edinburgh: Her Majesty's Stationery Office, 1887.

layer 50 meters thick is certainly going to take much, much more time than the 4 days that would be available during Noah's Flood.

In our modern oceans other deposits also show similar slow rates of accumulation. For example, there are several kinds of other oozes composed of diatoms, coccoliths, foraminifera, globigerina, and pteropods. These oozes occur in different environments from those where radiolarian oozes occur for a variety of geochemical reasons. Such oozes cover as much as 48% of the Atlantic and Pacific Ocean floors. Calcareous deposits (oozes) composed of foraminifera, coccoliths, and pteropods, accumulate at a rate of about 0.3–5 centimeters per 1000 years and range up to 1400 meters thick (Riley and Chester 1971). If this range of deposition rates of the organisms is correct, then it would take several million years to form deposits that are 1400 meters thick. Comparable rates for deposition of radiolarians in modern oceans certainly could not have accumulated in the 4000 years since Noah's Flood or in one year during the Flood. (Note that the Creation Museum's date for the Flood is 2348 BCE.) If Oard (2002) counters with the argument that the deposition rates were different then, those rates would be so very different from any that happen naturally that they would require miracles to occur; and including miracles in the model would not be basing the model on science.

Furthermore, because radiolarian cherts are interlayered with sandstones in the geologic column at many different levels (Grünau 1965), and if both kinds of materials are deposited in one year in a huge "bath tub" of water called Noah's Flood, there are two competing rates of deposition. The "heavy stuff," the sand grains, should settle out relatively rapidly at first and go to the bottom of the column, and the "light stuff," the radiolarians, which settle extremely slowly because of friction, should settle out last and be on top. But that is not what we observe. During a major flood, it would not be physically possible to alternate settling heavy and light stuff. Moreover, Noah's Flood would not be able to sort more than 4000 different species of radiolarians (Takahashi and Honjo 1983)—all of which are essentially the same size—into the evolutionary sequence that appears in the geologic record.

## CONCLUSIONS

Young-earth creationists need to provide scientific data and research that honestly supports their models. True scientists cannot choose only data that fit their models and ignore data that do not fit. Although Oard (2002) claims he is basing his arguments on science, his model only seems to work because he overlooks or ignores extensive geologic literature. Contemporary geologic research contradicts his creationist model that sandstones deposited during Noah's flood are unique in their characteristics and that radiolarian chert layers can be deposited in one year. He might as well just have said "and then a miracle occurred" as a basis for his Flood model. Of course, there is no scientific argument against a miracle.

The scientific evidence strongly suggests that a global Noachian Flood did not happen. Oard's (2002) model requires not only the rejection of strict uniformitarian models, as he claims, but also a repudiation of practically all the geologic processes that geoscientists have studied and confirmed for decades. A model of geologic processes that only works by rejecting the fundamental knowledge in the geosciences is not a scientific model at all, but little more than wishful thinking.

## ACKNOWLEDGMENTS

We wish to thank Rudi Pohl for contributions regarding radiolarites, Peter Fischer for providing information about submarine canyon depositions off the coast of California, and Ken Wolgemuth for many suggestions regarding the geology of oceanic oozes and other associated topics as well as many excellent editorial suggestions. We also acknowledge the help of two reviewers whose critical comments markedly improved the article.

## GLOSSARY OF TERMS

**black smoker:** a chimney-like structure on the ocean floor near volcanically active areas through which hydrothermal fluids move carrying dissolved minerals and gases; often black.

**coccolith:** a microscopic calcite skeletal plate that protects certain marine phytoplankton and in a fossilized state forms chalk and limestone deposits.

**cryptocrystalline:** a rock texture composed of such tiny crystals that its crystalline nature is only barely revealed in microscopically thin sections.

**diatoms:** a major group of algae that has siliceous shells, most of which are single celled.

**diorite:** a coarsely crystalline igneous rock that contains sodic plagioclase feldspar and ferromagnesian silicate minerals, such as biotite, hornblende, and pyroxene.

**Foraminifera:** a large group of amoeboid single-celled animals that live in surface waters.

**Globigerina:** one-celled marine Foraminifera with calcareous shells.

**granite:** a coarsely crystalline igneous rock that contains quartz, more potassium feldspar than plagioclase feldspar, and ferromagnesian silicate minerals (commonly biotite).

**granitic rock:** a coarsely crystalline igneous rock that contains varying percentages of quartz, plagioclase feldspar, potassium feldspar, and ferromagnesian silicate minerals, such as biotite and hornblende.

**granodiorite:** a coarsely crystalline igneous rock that contains quartz, more sodic plagioclase feldspar than potassium feldspar, and ferromagnesian silicate minerals, such as biotite and hornblende.

**limestone:** carbonate rock;  $\text{CaCO}_3$ .

**oceanic oozes:** fine-grained sediment that has accumulated by settling of particles through sea water to the ocean floor. The particles can be composed of hematite iron oxide, meteorite dust, clay, radiolarians, diatoms, coccoliths, foraminifera, globigerina, pteropods, and radiolarians.

**pelagic:** derived from material that has fallen to the bottom from the upper waters of the sea.

**phytoplankton:** microscopic plant-like organisms.

**pteropod:** a specialized group of free-swimming sea snails and sea slugs.

**radiolarians:** one-celled animals that produce intricate skeletons of silica.

**uniformitarian principle:** "The present is the key to the past."

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