semi-technical

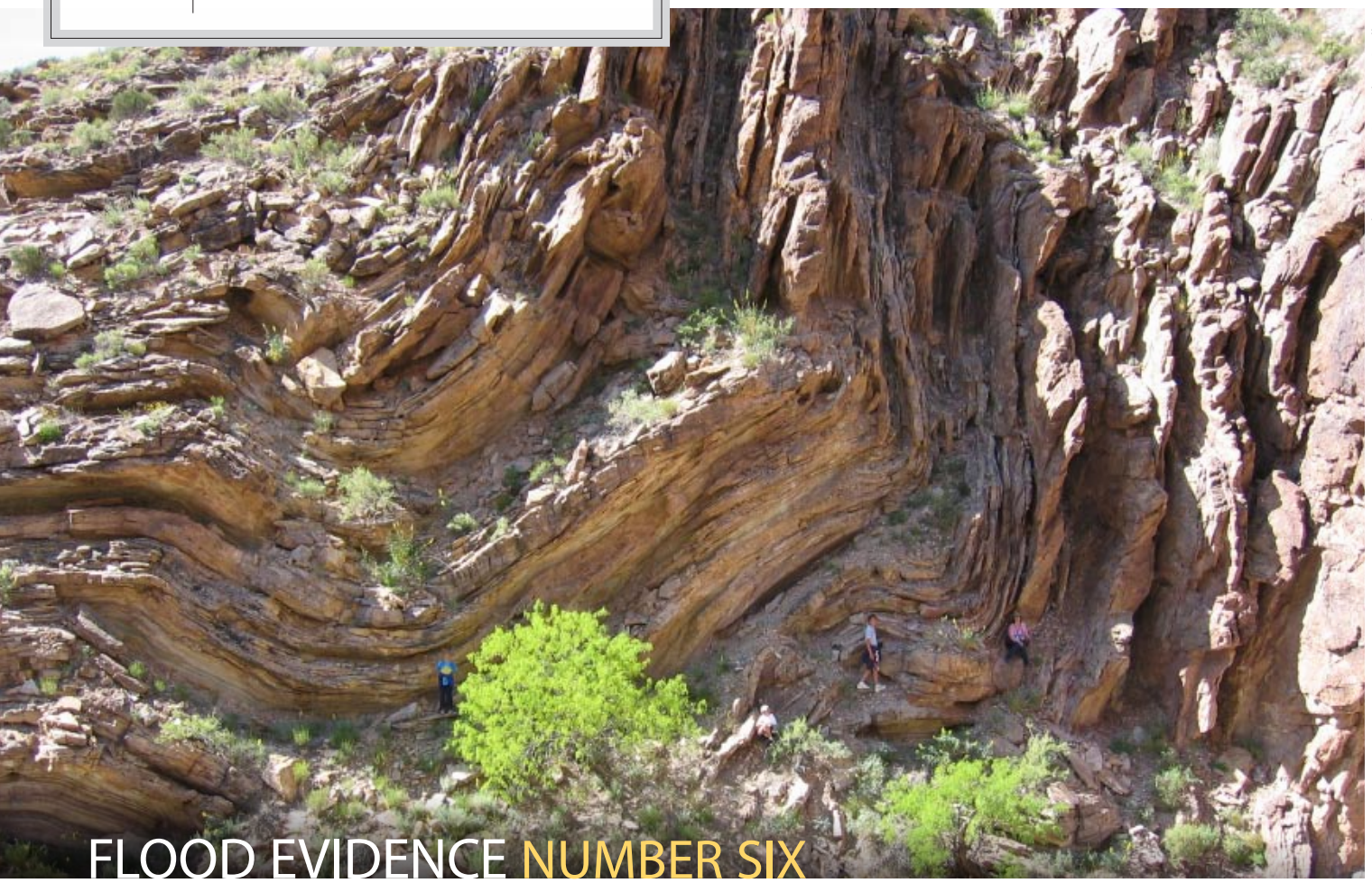


photo courtesy Dr. Andrew Snelling

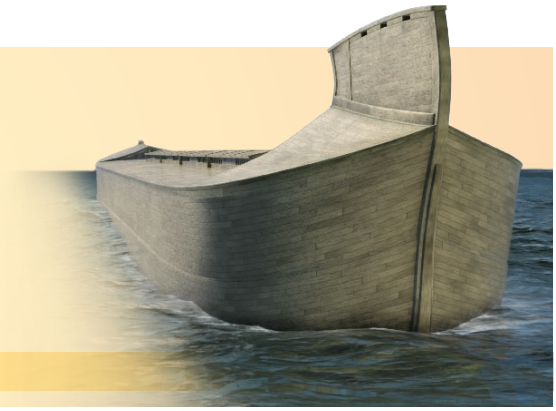
FLOOD EVIDENCE NUMBER SIX

Rock Layers Folded Not Fractured

by Andrew A. Snelling

How could a series of sedimentary layers fold without fracturing? The only way is for all the sedimentary layers to be laid down in rapid succession and then be folded while still soft and pliable.

Six main geologic evidences for the Genesis Flood



If the global Flood, as described in Genesis 7 and 8, really occurred, what evidence would we expect to find? Wouldn't we expect to find rock layers all over the earth that are filled with billions of dead animals and plants that were rapidly buried and fossilized in sand, mud, and lime? Yes, and that's exactly what we find.

This article concludes a series on the six main geologic evidences that testify to the Genesis Flood.

The fossil-bearing geologic record consists of tens of thousands of feet of sedimentary layers, though not all these layers are found everywhere around the globe, and their thickness varies from place to place. At most locations only a small portion is available to view, such as about 4,500 feet (1371 m) of strata in the walls of the Grand Canyon.

Uniformitarian (long-age) geologists believe that these sedimentary layers were deposited and deformed over the past 500 million years. If it really did take millions of years, then individual sediment layers would have been deposited slowly and the sequences would have been laid down sporadically. In contrast, if the global cataclysmic Genesis Flood deposited all these strata in a little more than a year, then the individual layers would have been deposited in rapid succession, one on top of the other.

Do we see evidence in the walls of the Grand Canyon that the sedimentary layers were all laid down in quick succession? Yes, absolutely!

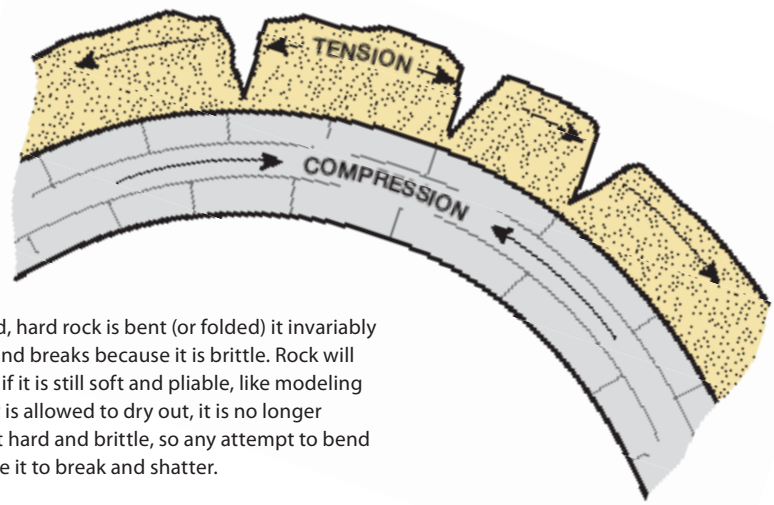
The previous article in this series documented the lack of evidence for slow and gradual erosion at the boundaries between the sediment layers. This article explores evidence that the entire sequence of sedimentary strata was still soft during subsequent folding, and the strata experienced only limited fracturing. These rock layers should have broken and shattered during the folding, unless the sediment was still relatively soft and pliable.

Solid Rock Breaks When Bent

When solid, hard rock is bent (or folded) it invariably fractures and breaks because it is brittle (Figure 1).[1] Rock will bend only if it is still soft and pliable—"plastic" like modeling clay or children's playdough. If such modeling clay is allowed to dry out, it is no longer pliable but hard and brittle, so any attempt to bend it will cause it to break and shatter.

When water deposits sediments in a layer, some water is left behind, trapped between the sediment grains. Clay particles may also be among the sediment grains. As other sedimentary layers are laid on top of the deposits, the pressure squeezes the sedimentary particles closer together and forces out much of the water. The earth's internal heat may also remove water from the sediment. As the sediment layer dries out, the chemicals that were in the water and between

solid rock breaks not bends (Figure 1)



When solid, hard rock is bent (or folded) it invariably fractures and breaks because it is brittle. Rock will bend only if it is still soft and pliable, like modeling clay. If clay is allowed to dry out, it is no longer pliable but hard and brittle, so any attempt to bend it will cause it to break and shatter.

examples of bent rock layers (Figures 2–4)

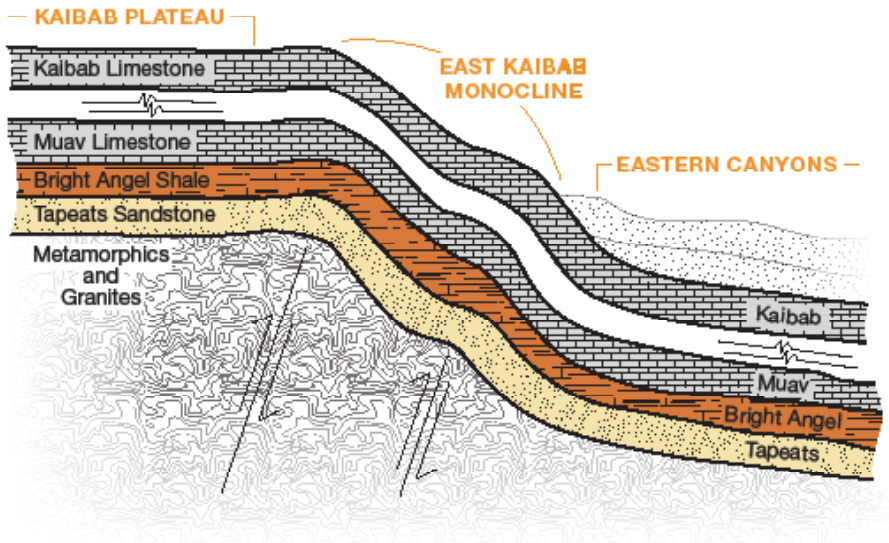


FIGURE 2 The boundary between the Kaibab Plateau and the less uplifted eastern canyons is marked by a large step-like fold, called the East Kaibab Monocline (above).

FIGURE 3 and 4 It is possible to see these folded sedimentary layers in several side canyons. All these layers had to be soft and pliable at the same time in order for these layers to be folded without fracturing. The folded Tapeats Sandstone can be seen in Carbon Canyon (below) and the folded Mauv and Redwall Limestone layers can be seen along Kwagunt Creek (bottom).

photos courtesy Dr. Andrew Snelling

the clay particles convert into a natural cement. This cement transforms the originally soft and wet sediment layer into a hard, brittle rock layer.

This process, known technically as diagenesis, can be exceedingly rapid.[2] It is known to occur within hours but generally takes days or months, depending on the prevailing conditions. It doesn't take millions of years, even under today's slow-and-gradual geologic conditions.

Folding a Whole Strata Sequence Without Fracturing

The 4,500-foot sequence of sedimentary layers in the walls of the Grand Canyon stands well above today's sea level. Earth movements in the past pushed up this sedimentary sequence to form the Kaibab Plateau. However, the eastern portion of the sequence (in the eastern Grand Canyon and Marble Canyon areas in northern Arizona) was not pushed up as much and is about 2,500 feet (762 m) lower than the height of the Kaibab Plateau. The boundary between the Kaibab Plateau and the less uplifted eastern canyons is marked by a large step-like fold, called the East Kaibab Monocline (Figure 2).

It's possible to see these folded sedimentary layers in several side canyons. For example, the folded Tapeats Sandstone can be seen in Carbon Canyon (Figure 3). Notice that these sandstone layers were bent 90° (a right angle), yet the rock was not fractured or broken at the hinge of the fold. Similarly, the folded Muav and Redwall Limestone layers can be seen along nearby Kwagunt Creek (Figure 4). The folding of these limestones did not cause them to fracture and break, either, as would be expected with ancient brittle rocks. The obvious conclusion is that these sandstone and limestone layers were all folded and bent while the sed-

iments were still soft and pliable, very soon after they were deposited.

Herein lies an insurmountable dilemma for uniformitarian geologists. They maintain that the Tapeats Sandstone and Muav Limestone were deposited 500–520 million years ago[3]; the Redwall Limestone, 330–340 million years ago[4]; then the Kaibab Limestone at the top of the sequence (Figure 2), 260 million years ago.[5] Lastly, the Kaibab Plateau was uplifted (about 60 million years ago), causing the folding.[6] That's a time span of about 440 million years between the first deposit and the folding. How could the Tapeats Sandstone and Muav Limestone still be soft and pliable, as though they had just been deposited? Wouldn't they fracture and shatter if folded 440 million years after deposition?

The conventional explanation is that under the pressure and heat of burial, the hardened sandstone and limestone layers were bent so slowly they behaved as though they were plastic and thus did not break.[7] However, pressure and heat would have caused detectable changes in the minerals of these rocks, tell-tale signs of metamorphism.[8] But such metamorphic minerals or recrystallization due to such plastic behavior[9] is not observed in these rocks. The sandstone and limestone in the folds are identical to sedimentary layers elsewhere.

The only logical conclusion is that the 440-million-year delay between deposition and folding never happened! Instead, the Tapeats-Kaibab strata sequence was laid down in rapid succession early during the year of the global cataclysmic Genesis Flood, followed by uplift of the Kaibab Plateau within the last months of the Flood. This alone explains the folding of the whole strata sequence without appreciable fracturing.

There is only one explanation for the folded rock layers in Grand Canyon—Noah's Flood. Uniformitarian explanations cannot adequately explain these features.

Conclusion

Uniformitarian geologists claim that tens of thousands of feet of fossiliferous sedimentary layers have been deposited over more than 500 million years. In contrast, the global cataclysmic Flood of Genesis 7–8 leads creation geologists to believe that most of these layers were deposited in just over one year. Thus during the Flood many different strata would have been laid down in rapid succession.

In the walls of the Grand Canyon, we can see that the whole horizontal sedimentary strata sequence was folded without fracturing, supposedly 440 million years after the Tapeats Sandstone and Muav Limestone were deposited, and 200 million years after the Kaibab Limestone was deposited. The only way to explain how these sandstone and limestone beds could be folded, as though still pliable, is to conclude they were deposited during the Genesis Flood, just months before they were folded.

In this special geology series we have documented that, when we accept the Flood of Genesis 7–8 as an actual event in earth history, then we find that the geologic evidence is absolutely in harmony with the Word of God. As the ocean waters flooded over the continents, they must have buried plants and animals in rapid succession. These rapidly deposited sediment layers were spread across vast areas, preserving fossils of sea creatures in layers that are high above the current (receded) sea level. The sand and other sediments in these layers were transported long distances from their original sources. We know that many of these sedimentary strata were laid down in rapid succession because we don't find evidence of slow erosion between the strata.

As expected, the evidence in God's world totally agrees with what we read in God's Word. "Thy word is true from the beginning," the psalmist tells us (Psalm 119:160). ■

NOTES

[1] E. S. Hills, "Physics of Deformation," Elements of Structural Geology (London: Methuen & Co., 1970), pp. 77–103; G. H. Davis and S. J. Reynolds, "Kinematic Analysis," Structural Geology of Rocks and Regions, 2nd ed. (New York: John Wiley & Sons, 1996), pp. 38–97.

[2] Z. L. Sujkowski, "Diagenesis," Bulletin of the American Association of Petroleum Geologists 42 (1958): 2694–2697; H. Blatt, Sedimentary Petrology, 2nd ed. (New York: W. H. Freeman and Company, 1992), pp. 125–159.

[3] L. T. Middleton and D. K. Elliott, "Tonto Group," in Grand Canyon Geology, 2nd ed., S. S. Beus and M. Morales, eds. (New York: Oxford University Press, 2003), pp. 90–106.

[4] S. S. Beus, "Redwall Limestone and Surprise Canyon Formation," in Grand Canyon Geology, 2nd ed., S. S. Beus and M. Morales, eds. (New York: Oxford University Press, 2003), pp. 115–135.

[5] R. L. Hopkins and K. L. Thompson, "Kaibab Formation," in Grand Canyon Geology, 2nd ed., S. S. Beus and M. Morales, eds. (New York: Oxford University Press, 2003), pp. 196–211.

[6] P. W. Huntoon, "Post-Precambrian Tectonism in the Grand Canyon Region," in Grand Canyon Geology, 2nd ed., S. S. Beus and M. Morales, eds. (New York: Oxford University Press, 2003), pp. 222–259.

[7] E. S. Hills, "Environment, Time and Material," Elements of Structural Geology (London: Methuen & Co., 1970), pp. 104–139; G. H. Davis and S. J. Reynolds, "Dynamic Analysis," Structural Geology of Rocks and Regions, 2nd ed. (New York: John Wiley & Sons, 1996), pp. 98–149.

[8] R. H. Vernon, Metamorphic Processes: Reactions and Microstructure Development (London: George Allen & Unwin, 1976); K. Bucher and M. Frey, Petrogenesis of Metamorphic Rocks, 7th ed. (Berlin: Springer-Verlag, 2002).

[9] Ref. 8; G. H. Davis and S. J. Reynolds, "Deformation Mechanisms and Microstructures," Structural Geology of Rocks and Regions, 2nd ed. (New York: John Wiley & Sons, 1996), pp. 150–202.

Dr. Andrew Snelling holds a PhD in geology from the University of Sydney and has worked as a consultant research geologist to organizations in both Australia and the U.S. Author of numerous scientific articles, Dr. Snelling is now the director of the research department at Answers in Genesis–USA.