Burdick's Pollen: Just Something to Sneeze At

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Beginning in 1965, young-Earth creationist (YEC) Clifford Burdick (1894-1992) claimed to have found "out-of-place" fossil angiosperm, gymnosperm and other plant pollen in the rocks of the Grand Canyon, including the Precambrian Hakatai Shale, the Permian Supai, the Cambrian Bright Angel Shale, and shaly layers in the Mississippian (Lower Carboniferous) Redwall Formation (Howe et al., 1988; Anonymous, 1981, p. 3; Howe, 1986, p. 100). As a YEC, Burdick believed that the pollen "proves" that angiosperms and other modern plants lived at the same time that the sediment precursors for the Precambrian and Paleozoic rocks were being deposited. If true, such conclusions would conflict with fossil data and current views of plant evolution (e.g., angiosperms). That is, according to paleontologists, many of these plants hadn't yet evolved during the Precambrian and Paleozoic.

During the 1970s and 1980s, Burdick's claims were frequently cited in the YEC literature (***e.g.,*** Kofahl and Segraves, 1975). Burdick's work is summarized in a 1981 article in the ***Bible-Science Newsletter*** (Anonymous, 1981) and Howe (1986). Field studies by YECs Lammerts and Howe (1987) expressed cautious optimism about Burdick's efforts. Later, Howe et al. (1988) supported Burdick's conclusions. On the other hand, other YECs were not impressed with Burdick's claims and his experimental techniques. Since his death in 1992, Burdick's pollen arguments have been largely forgotten by YECs. Howe (2003) is a brief exception. Also, some discussions of Burdick's and his allies' claims are still in the archives of "Answers" in Genesis (AiG), including a 1998 essay by YEC Don Batten.

There are several explanations that could resolve the origin of the pollen without rejecting the compelling evidence for plant evolution and the overwhelming support for the geologic time scale. Misidentified pollen species and pollen contamination during field collection and laboratory

work could explain some and perhaps many of the grains. However, after reviewing Burdick (1981) and the ***Creation Research Society Quarterly*** articles, a more likely hypothesis is that pollen-rich rain and river waters flowed into the subsurface through networks of fractures and contaminated the shales during the Cenozoic development and growth of the Grand Canyon.

By far the most noticeable mistake in the studies by Burdick and his supporters involved collecting samples within only a FEW INCHES of the surface. Certainly, during the history of the mighty Colorado River, river water and periodic precipitation could have easily infiltrated many meters into the subsurface and contaminated shales and other fractured rocks with pollen-rich waters. Although Howe et al. (1988) strongly reject the possibility of pollen contamination by groundwater, the descriptions in their paper and Anonymous (1981, p. 1-2) indicate that Burdick, Howe and associates could have easily sampled weathered and possibly pollen-contaminated shales. Specifically, Howe et al. (1988, p. 176) states that their samples were only collected at depths of 3 to 4 inches. Burdick also admits that his samples were collected only within a few inches of the surface (Howe, 1986, p. 100). Most shales are fissile, which means that they contain abundant fractures. Such fractures would provide excellent pathways for the subsurface transportation of pollen-laden waters.

The discussions in Anonymous (1981, p. 1-2) and Howe et al. (1988) suggest that the sample collectors only used macroscopic field observations to determine the "freshness" or lack of weathering in their samples. Because of the plasticity of shales, fractures can easily "heal" over time and become unnoticeable by macroscopic field observations long before Burdick, Howe and others collected their samples. From my experiences as a geologist, I know that visual inspections are often unreliable in evaluating weathering, especially with dark shales or if sample surfaces happen to be damp. Laboratory microscopic and analytical methods may be required to detect weathering and any healed, mineral-filled, or otherwise camouflaged fractures.

Burdick only found one small grain in the Precambrian Bass Limestone (Anonymous, 1981, p. 3). The pollen contamination hypothesis also

explains why few or no pollen grains were found in sandstones and limestones (Anonymous, 1981, p. 3-4). Sandstones and limestones are often more impermeable and less fractured than shales. Under the pollen contamination hypothesis, some pollen-rich waters could infiltrate into any fractures in limestones and sandstones. However, because limestones and sandstones are brittle, the fractures would not easily heal over time to the point of being undetectable. Because Burdick et al. would have realized that any visible fractures in limestones and sandstones could contain modern pollen, they would have avoided these features. Again, the healed, pollen-rich fractures in plastic shales might easily go unnoticed without detailed laboratory studies.

In response to the lack of pollen grains in limestones, Burdick argued that limy muds, which later lithify into the limestones, were probably marine, which would not normally contain gymnosperm and angiosperm pollen (Anonymous, 1981, p. 4). However, Anonymous (1981, p. 3) states that pine pollen may be transported by winds as far as 60 miles (100 kilometers) from its source. If this claim is correct, there is no reason why blown pollen would incorporate into Precambrian and Paleozoic marine siliceous muds that later formed shales, but not into associated limy muds that later became limestones or sands that formed sandstones. Furthermore, pollen could easily be washed into seas, transported over hundreds of kilometers, and finally deposited into siliceous muds, limy muds or sands.

The contamination hypothesis can also explain the origin of well-oxidized iron stains on some of the pollen in Burdick's samples (Anonymous, 1981, p. 1, 3). Iron stains (rust) would result from the weathering (oxidation) of iron minerals in the rocks by oxygen- and pollen-rich groundwaters. Burdick also claimed that pollen from recently extinct species is present in some of the Grand Canyon rocks (Anonymous, 1981, p. 1, 4). If true, the pollen of these extinct plants could have easily infiltrated into the shales thousands to several millions of years ago when they grew in the area.

The non-existence of Precambrian and Paleozoic angiosperms and gymnosperms cannot be proven. That is, negative hypotheses cannot

be conclusively tested. Nevertheless, the plausibility of the pollen contamination hypothesis might be further evaluated by performing a well-core profile study on the shales, which would extend from the surface to many meters deep. Microscopic and analytical techniques could then be used to determine the weathering conditions of the shales and look for pollen in sample cores that were collected away from modern rivers, joints, and faults. If the infiltrating pollen-laden water contamination hypothesis is correct, the pollen counts in the well-cores should decrease with depth and any pollen should concentrate along present and healed fractures.

Like the YEC fiasco at the Paluxy River, scientists want to see more convincing and larger fossils before they discard evolution and paeontology for YEC mythology. YECs need to find Precambrian tree trunks to support their agenda. Until then, YEC pollen claims are just something to sneeze at.

REFERENCES

Anonymous, 1981, "Five Minutes with the Bible and Science" (Burdick's pollen from the rocks of the Grand Canyon and related discussions), *Bible-Science Newsletter*, June, p. 1-6.

Howe, George F., 1986, "Creation Research Society Studies on Precambrian Pollen: Part I - A Review", *Creation Research Society Quarterly*, v. 23, December, p. 99-104.

Howe, George F.; Emmett L. Williams; George T. Matzko; and Walter E. Lammerts, 1988, "Creation Research Society Studies on Precambrian Pollen, Part III: A Pollen Analysis of Hakatai Shale and other Grand Canyon Rocks", *Creation Research Society Quarterly*, v. 24, March, p. 173-182.

Howe, G.F., 2003, "Lest We Forget: Precambrian Pollen in Hakatai Shale, Grand Canyon, Arizona", *Creation Research Society Quarterly*, v. 40, June, p.7.

Kofahl, Robert E. and Kelly L. Segraves, 1975, *The Creation Explanation: a Scientific Alternative to Evolution*, Harold Shaw Publishers, Wheaton, IL.

Lammerts, Walter E. and George F. Howe, 1987, "Creation Research Society Studies on Precambrian Pollen - Part II: Experiments on Atmospheric Pollen

Contamination of Microscope Slides", *Creation Research Society Quarterly*, v. 23, March, p. 151-153.