Young-Earth Creationist Distortions of the Paleoenvironments of the Clarkia Fossil Beds, Idaho, USA

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INTRODUCTION

In a web essay at "Answers in Genesis", young-Earth creationist (YEC) Michael J. Oard claims that well-preserved fossils in the Miocene Clarkia Beds of Idaho, USA, refute "uniformitarianism" and support "Flood geology". However, is the geology of the Clarkia Beds really consistent with Oard's claims? Is Oard properly quoting and representing the contents of the articles (for example, David* J. Batten et al., 1999) that he uses? I will show that the answers to these questions are resoundingly negative.

VARVES, STORM RHYTHMITES OR MAYBE BOTH IN THE CLARKIA BEDS?

Lacustrine (lake) and marine deposits may contain laminae, which are very thin, parallel layers of sediment or sedimentary rock. By definition, each laminar bed is less than one centimeter (cm) thick (Boggs, 1995, p. 109). Sometimes, hundreds of thousands or millions of laminae may be stacked on top of each other.

Some, but not all, laminae are varves. Varves consist of alternating light- and dark-colored layers (Boggs, 1995, p. 331-332). In temperate and glacial lakes, the light layers generally form from sediment runoff during the summers, whereas the dark layers represent organic matter that settled in quiet, ice-covered lakes during the winters. Varves may also develop from seasonal cycles in warm-climate lakes, such as the lake(s) that was associated with the Miocene Clarkia beds (Gray, 1985, p. 210). Because varves generally have regular depositions based on seasons or other cycles, the varves may be counted and depositional rates can be reasonably estimated (Fischer and Roberts, 1991; Ripepe et al., 1991).

Because varves may represent thousands or even several millions of years of sediment accumulation, YECs view them as serious threats to their "young Earth" and "Genesis Flood" doctrines. Not surprisingly, YECs will say just about anything to discredit the very existence of varves (see discussions in: "Green River Formation" in "More Errors on True.Origin: J. Sarfati's Support of Flood Geology" and "Creationist Misuse of the Green River Formation"). While YECs have committed themselves to denying the existence of a plausible natural phenomenon, actualism (modern geology) acknowledges that laminated rocks may contain varves, storm rhythmites (layers produced by random storms), or both. Actualism, which is based on the laws of chemistry and physics and not

ancient myths, recognizes that sediment deposits may form from NATURAL catastrophes (earthquakes, local storms, landslides, etc.) or slow and gradual processes (such as those that form varves). In contrast to legitimate science, YEC dogma forces its captives to only accept explanations that can be easily distorted to support "Noah's Flood". To achieve these distortions, YECs frequently misrepresent or ignore scientific information that refutes their agenda.

There is some controversy over whether the laminar features in Unit 2 of the Clarkia beds are varves or storm rhythmites. Charles J. Smiley, who has extensively studied and written about the Clarkia fossil beds, believes in the storm rhythmite hypothesis (David* J. Batten et al., 1999, p. 162). Because Oard feels that storm rhythmites can be harmonized with "Noah's Flood", he automatically embraces Smiley's opinions and ignores most of the evidence that disputes Smiley's claims. Although Smiley's ideas are respectable, they are not always definitive.

Not surprisingly, Oard does not discuss many of the critical details of Smiley's rhythmite hypothesis. For example, descriptions of the sedimentation rates of Smiley's proposed storm rhythmites are summarized in Smith and Elder (1985, p. 91):

"Whole, split-level leaves are interpreted by Smiley and Rember (1979) as evidence of rapid sedimentation rates; they suggest an average rate of up to 15 cm per year (but possibly as slow as approximately 1 cm per year)."

Clearly, sediment deposition rates of centimeters per year, which are considered "rapid" by Smiley and other researchers, are still orders of magnitude too slow to support Oard's "Genesis Superflood". So, why does Oard even bother citing Smiley? Whether the Clarkia beds contain varves or storm rhythmites, studies of the depositional rates of these beds are far too slow to support "Flood geology".

When citing Batten et al. (1999) and describing Smiley's support for storm rhythmites, Oard fails to mention that Batten et al. (1999) REJECT Smiley's claims and support the presence of varves in the unit. Batten et al. (1999, p. 162-163) states:

"The dinoflagellate cysts are present in pollen and spore-bearing Unit 2 at locality P-33...[reference to figure omitted] within a 5.5-m-succession of unoxidised, finely laminated silt, clay, ash, and organic couplets, interpreted as varves (Gray, 1985; Smith and Elder, 1985) or 'storm deposits' [Batten et al.'s quotation marks] ...[Smiley et al. references omitted]. An agent such as storms implies both rapid and haphazard deposition and not the accumulation of sediment couplets of demonstrably different composition (Gray, 1985). This distinctive organic and inorganic lamination SUGGESTS INPUT CO-ORDINATED WITH QUIESCENT, SEASONALLY STRATIFIED CONDITIONS, AND EVIDENCE ON RATES OF FISH DECAY INDICATE DELAYS OF AT LEAST SEVERAL MONTHS BETWEEN SEDIMENTARY EPISODES (Smith and Elder, 1985, p. 91)." [my emphasis]

Batten et al. (1999, p. 161) further describe the depositional environment for the dinoflagellate-bearing varves, which is hardly consistent with a quick and deep "Genesis Flood":

"They [dinoflagellates] are associated only with sediment-couplets considered to reflect accumulation in temperature-stratified water approximately 8-12 m deep that overturned periodically."

So, how can fast-moving "Flood waters" be temperature-stratified? How can they only have periodic overturning? How can the catastrophic waters of "Noah's Flood" only be 8-12 meters deep? Gray (1985, p. 210) also supports a seasonal (varve) origin for the laminae and provides additional evidence that is inconsistent with Oard's claims.

At location P-33, Clarkia Unit 1 was deposited on top of Precambrian rocks. Units 2 through 5 overlie Unit 1 (Batten et al., 1999, p. 162, 164). Batten et al. (1999, p. 162) cite a number of references (including some by C.J. Smiley) and come to the following conclusion:

"At P-33, the physical environment is interpreted as a temporary lake cycle that appears to have lasted for at least 760, but no longer than 1000 years…[numerous references omitted]."

Smiley and Rember (1985, p. 21) also endorsed this statement. Obviously, how could 760- to 1000-years worth of sediment be deposited in a "Genesis Flood", which supposedly only lasted about one year (Genesis 8)? If Oard rejects a depositional period of 760 to 1000 years for these sediments, what scientific evidence (the Bible doesn't count) does he have to support a "Flood" origin for the sediments? If a YEC wants to argue that the deposits at location P-33 formed in a millennium before or after the "Genesis Flood", where are the "Flood deposits" at P-33? Either way, Oard and his allies have a lot of explaining to do. Simply quoting the Bible is not going to get rid of these scientific data.

WARM WATERS AND QUICK BURIAL?

Oard quotes Williams (1985, p. 350) and claims that the presence of sponge fossils in the Clarkia beds indicates that the temperatures of the associated lake BOTTOM waters were unusually warm: about 26-30oC. According to Oard, such waters are too warm to be anoxic. He claims that these warm waters would be unable to preserve dead organisms through slow burial. Oard even refers to the "warm bottom" waters as "a paleoclimatic enigma". He then argues that the fossils had to have been quickly buried in these warm waters.

Contrary to Oard's claims, Williams (1985) is NOT referring to the temperatures of the ancient lake BOTTOM waters. As explained by Batten et al. (1999, p. 164), the warm temperatures are associated with the SURFACE waters of the lake and NOT the bottom

waters:

"The oxygenated, shallow, littoral [near shore] waters hypothesized as a suitable habitat for the fish (Smith and Elder, 1985), and the epilimnic [surface water layer of a lake] water in which the dinoflagellates lived, were doubtless CONSIDERABLY WARMER than that at depth. Sponge spicules at Oviatt Creek, locality P-35, south of the Clarkia Basin and about 32 km south of P-33 (Smiley and Rember, [1985], p. 16), indicate a water temperature of approximately 26-30oC (Williams, [1985], p. 349). [my emphasis]

Warm surface waters are expected in a warm-climate lake and do not provide any support for "Noah's Flood". Furthermore, based on studies of the fish fossils in the varves of Unit 2, Batten et al. (1999, p. 164) conclude that the bottom waters, at least during the deposition of the varves, were COOL; that is, LOWER than 15oC. Other references used by Oard (Giannasi and Niklas, 1985, p. 164; Smith and Elder, 1985, p. 85) also endorse the existence of cool or cold bottom waters. In particular, Smith and Elder (1985, p. 85) state:

"Stable, cold conditions in the hypolimnion [bottom waters] are indicated by fish fossils whose preservation is sufficiently perfect to indicate than the specimen rested permanently on the bottom after death, rather than floating as occurs when water temperatures are above 15oC."

Clearly, Oard has misrepresented and ignored critical information from these references. There is no evidence of warm bottom waters.

FISH PRESERVATION IN SLOW DEPOSITIONAL ENVIRONMENTS

Like other YECs, Oard claims that fossils don't preserve well in slowly deposited aquatic sediments. YECs feel that scavengers or oxygen would have destroyed the organisms before they could have been slowly buried and preserved. They insist that these fossils must have been catastrophically buried. However, science says otherwise. Clearly, some lakes and isolated seas are able to preserve and slowly bury dead organisms.

NATURAL landslides, storms and earthquakes can quickly bury and preserve organisms. However, contrary to Oard's insistence, dead organisms can also be preserved as fossils through slow burial in stagnant waters. Drever (1997, p. 166-169) states that the bottoms of deep-water (eutrophic) lakes may become very anaerobic if the cold bottom waters (the hypolimnion) remain dense and stagnant because of a lack of seasonal mixing. Bottom waters may be denser than overlying layers because of somewhat higher salinities (Drever, 1997, p. 169; Fisher and Roberts, 1991, p. 1147).

Not only are many deep and quiet waters too stagnant (low oxygen) and salty to support scavengers and aerobic decay-promoting bacteria, but stagnant waters can easily contain highly poisonous hydrogen sulfide (H_2S) that would kill scavengers, burrowing aquatic animals, most bacteria, and other organisms that would destroy organic remains and disrupt varve structures. Furthermore, because strong currents would not be expected in

stagnant water, fish corpses could remain essentially intact and undisturbed until burial.

When discussing the Clarkia beds, Oard complains that "trophy-sized" fish should not remain intact while "paper thin" varves are slowly being deposited around them. However, Oard's description of varve deposition does not resemble reality. The original varve sediments in the Clarkia beds were not "paper thin". Oard forgets about sediment compaction after burial. Smith and Elder (1985, p. 90) state:

"Laminae compressed to about 1 mm were originally as thick as 7 mm, based on the inference from layers that apparently filled spaces of known thickness such as the mouths and spaces between fins... [reference to figure omitted]."

Batten et al. (1999, p. 170) also conclude:

"Most of the fossils, with the exceptions noted below, are preserved in the varved sequence, Unit 2, that represents a DEEP-WATER, ANOXIC [low oxygen] environment." [my emphasis]

In their abstract, Batten et al. (1999, p. 161) further state:

"It is likely that the dinoflagellates inhabited the warm, epilimnic [surface], oxygenated layer above the COOL DEEP water in which oxygen levels were LOW, rendering this environment INHOSPITABLE TO BOTH ANIMALS AND PLANTS, BUT FAVOURING THE PRESERVATION OF ORGANIC MATTER." [my emphasis]

Contrary to what Oard wants us to believe, Batten et al. (1999, p. 161) argue that when the Clarkia organisms died, they sank to the bottom of the lake, where low oxygen and cool conditions preserved them from scavengers and other destructive processes. The presence of fossil fungi in the Clarkia beds confirms the existence of stagnant (low-oxygen) water conditions (Batten et al., 1999, p. 172). Clearly, Batten et al.'s (1999, p. 161) conclusions are totally inconsistent with a fast raging "Genesis Flood". As he often does with other references, Oard improperly quotes minor sections of Batten et al. (1999) and ignores their overall message that refutes his agenda.

"RAPIDLY" BURIED LEAVES?

Oard mentions that leaves in the Clarkia beds are so well preserved that their original fall colors are still present. Although many, but not all, of the leaves have preserved colors (Giannasi and Niklas, 1985, p. 163), the discussions in Giannasi and Niklas (1985), Smith and Elder (1985, p. 91), and related articles hardly support the following statements made by Oard:

"Furthermore, the leaves are not stacked one on top of another as expected with autumn leaves dropping into a quiet lake. Instead, the leaves are SEPARATED by sediments, an indication of very rapid deposition considering the degree of preservation and the colour of the leaves [Smith and Elder, 1985, p. 90-91]. Many leaves even cut through several

rhythmite layers with no physical damage, another sign of rapid deposition [Giannasi and Niklas, 1985, p. 164]." [Oard's emphasis]

As discussed above, Smiley and Rember (1979), as cited in Smith and Elder (1985, p. 91), describe the "rapid" deposition of the laminae as averaging 1-15 centimeters per year, which hardly supports Oard's "Genesis Flood". Smith and Elder (1985, p. 91) further criticize Smiley's depositional rates as being too fast:

"The rapid-sedimentation hypothesis is supported by the evidence presented by Smiley and Rember (1979, this volume [Smiley et al., 1985]) but is CONTRADICTED by occasional evidence from the fish skeletons. Minute, scale-like lepidotrichs are commonly seen displaced a few millimeters from their fin ray, but in the SAME PLANE of preservation...[reference to figure omitted]. Decay and detachment of these bony elements should take 8 weeks or more at LOW temperature. Transport was probably by SLOW currents; FAINT ripple marks are occasionally seen in the sediments. If transport occurred after initial deposition of sediments, the lepidotrichs would be unlikely to come to rest in the original plane. This evidence suggests a MINIMUM of 2 months of decay before burial by the next sedimentation episode." [my emphasis]

How are sedimentation rates of no more than a few centimeters per year consistent with the biblical catastrophe advocated by Oard and his allies? Clearly, Oard has misinterpreted and ignored relevant statements in Smith and Elder (1985) as he does many other references.

Oard also cites Giannasi and Niklas (1985, p. 164). However, in context, the statements in this reference also don't support Oard and his "Flood geology". Giannasi and Niklas (1985, p. 164) describe the depositional conditions of the leaves on the lake bottom:

"Thus, although the Clarkia compressions are preserved in a potentially 'extractive' lacustrine [lake] environment, deposition must have been rapid with little disturbance or extractive action, since many leaves appear three-dimensionally oriented through several layers of silt with no physical (i.e., shear) damage. The lack of bacterial decomposition in Zones 1 and 2 seems to support a 'gentle,' biotically sterile, preservational regime for both plant and animal remains, the fish often containing undigested stomach contents...[reference omitted]."

According to Giannasi and Niklas (1985, p. 164), the lake bottom was biologically sterile and stagnant, which flatly contradict the raging "Genesis Flood" promoted by Oard. Again, the term "rapid deposition" in Giannasi and Niklas (1985) must be taken in context, which Oard improperly ignores. "Rapid" meant one or several centimeters of sediment deposition per year, not a global "Flood".

In contrast, Gray (1985, p. 210) disagrees with the suggestion that leaves crossing laminae require "rapid deposition." He further notes that almost "perfectly" preserved modern seeds and fruits have been found in dredged sediments from the Puerto Rico Trench, which testifies to the ability of low-oxygen (stagnant) conditions to preserve

organic materials. "Noah's Flood" is clearly not needed to explain the excellent preservation of dead organisms.

THE DINOFLAGELLATE FOSSIL RECORD

Oard notes that a dinoflagellate species in the Miocene Clarkia beds is similar to only one other known variety, which lived in China during a different epoch (Oligocene). YECs generally believe that the presence of a rare species in diverse locations (such as Idaho and China) somehow suggests extensive mixing of biological remains from a "global Flood". However, Batten et al. (1999, p. 162) states that both MODERN and ancient dinoflagellate remains are relatively rare. Most of them do not form cysts that preserve well in the geologic record (Batten et al., 1999, p. 173-174). Furthermore, because of a lack of published paleoecological studies (Batten et al., 1999, p. 172, 175) and their extremely small size, the geographic and geologic distributions and speciation of dinoflagellates are currently poorly understood. Considering these factors, it is premature of Oard to hint that these organisms somehow support a "Genesis Flood".

A MIXED FRESHWATER AND MARINE "FLOOD" ENVIRONMENT IN IDAHO?

Oard states that dinoflagellates and sponge spicules are generally marine and rarely occur in freshwater environments. He then argues that the presence of these fossils in the Clarkia beds is consistent with a catastrophic mixing of fresh and marine environments during "Noah's Flood" rather than an ancient freshwater lake.

Although non-marine dinoflagellates are relatively rare (only about 220 species are known to exist, Batten et al., 1999, p. 173), they are not as rare as Oard indicates. Again, unlike their marine cousins, freshwater dinoflagellate cysts (including the examples from the Clarkia beds) tend to have thinner walls (Batten et al., 1999, p. 173, 174), which hinder preservation. Geologically recent (Holocene) examples of non-marine dinoflagellates have been found in New Zealand, south-western Australia, and Europe (Batten et al., 1999, p. 173, 175-176). They also occur in post-glacial lake muds in Minnesota, USA (Norris and McAndrews, 1970).

Although most sponges are marine, freshwater varieties are well-known. Modern freshwater sponges occur in the "Great Lakes" of the USA, the "Thirlmere Lakes of Australia" and even "Walden's Pond". Once more, Oard's arguments for "mixed" marine and freshwater environments in the Clarkia beds fall apart.

Commonly, the diatoms found in the Clarkia beds are well-known freshwater species (Batten et al., 1999, p. 171-172; Bradbury et al., 1985, p. 36-39). For example, freshwater species of Melosira are especially abundant in the beds (Bradbury et al., 1985, p. 36-39). Oard notes that one of the more common diatoms from the Clarkia beds (genus Actinocyclus, Batten et al., 1999, p. 172; Bradbury et al., 1985, p. 38-39) has living relatives that commonly inhabit marine and brackish environments. Again, Oard uses this observation to promote the "mixing" of marine and freshwater environments during

"Noah's Flood". However, Actinocyclus species can be found in freshwater lakes (Liukkonen et al., 1997, p. 359), including the eastern end of Lake Ontario (Bradbury et al., 1985, p. 39). The following websites also confirm that Actinocyclus may live in freshwater: "Great Lakes Water Life Photo Gallery" and "Australian Genera of Freshwater Algae - Full List". So, after carefully reviewing the data on sponge, fish, dinoflagellate and other fossils in the Clarkia beds, Oard really has no evidence for claiming that any exclusively marine organisms got "washed" into Idaho by a "violent Deluge".

UNIQUE PALEOENVIRONMENTS?

Oard claims that the Clarkia fossil beds represent a unique environment in northern Idaho. Of course, the Clarkia beds are brief "snapshots" of one area in geologic time and we wouldn't expect to find modern or ancient environments with EXACTLY the same plant and animal species. Nevertheless, Smiley and Rember (1985, p. 26) conclude:

"Most of the Clarkia conifers and angiosperms are clearly referable to modern genera."

Batten et al. (1999, p. 169, 171) also state that the flora, insects and fish of these Miocene deposits are similar to those currently living in the southern Appalachians. If Oard is right about extensive mixing during the "Flood", why aren't there any dinosaurs or trilobites in the Clarkia beds? Why are all of the Clarkia fish and other fossils very similar to modern species? This evidence clearly supports biological evolution and not young-Earth creationism.

Contrary to YEC misconceptions, the Earth's environment has radically varied over its long history, which ranged from exceptionally severe worldwide glaciations 700 million years ago to subtropical conditions extending almost to the poles 50 million years ago (Merritts et al., 1998, p. 388; McGeary et al., 2004, p. 495). The cause(s) of these climatic extremes are not yet well understood, but they are clearly real and incompatible with "Flood geology" and a creationist young Earth. The idea that the Miocene climates of Idaho were similar to those of modern Georgia (USA) is very reasonable, unlike the fantasies of young-Earth creationism. Indeed, some advocates of global warming might argue that Idaho will again have a Georgia-type climate in the coming centuries!

Oard also ignores many other important statements in Batten et al. (1999) and the papers in Smiley et al. (1985) that challenge his YEC agenda. For example, the dinoflagellate cysts are only located in the varves (Unit 2) and not overlying or underlying layers (Batten et al., 1999, p. 161). If a raging and mixing "worldwide Flood" deposited all of these layers at once, how did microfossils, such as dinoflagellates, get thoroughly segregated into this unit?

CONCLUSIONS

Contrary to Oard's claims, a detailed review of the geology and paleoenvironmental evidence from the Clarkia fossil beds supports actualism and utterly refutes a "Genesis

Flood" origin. There is no fossil, stratigraphic or other evidence in the Clarkia beds to support Oard's contention that the beds resulted from a catastrophic mixing of terrestrial freshwater and marine environments during "Noah's Flood". The claims of young-Earth creationism, and not actualism, are simplistic and unrealistic. As with his other essays, Oard has a chronic habit of misrepresenting the contents of scientific documents.

*The "D.J. Batten" in reference #3 of the bibliography in Oard's web paper mistakenly links to YEC Donald J. Batten's biography. No doubt this link is an innocent mistake, but it gives the false impression that Donald J. Batten was the primary author of this paper. The actual author is David J. Batten, a well-known palynologist at the Institute of Geography and Earth Sciences at the University of Wales. Because David J. Batten et al. (1999) contains consistent radiometric dates and outcrop descriptions that refute young-Earth creationism, it's doubtful that any of the authors were YECs.

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