

LATE CRETACEOUS EPEIRIC SEA OR RETREATING FLOODWATER?

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Received 27 June 1994; Revised 19 August 1994

Abstract

The uniformitarian Middle to Late Cretaceous seaway of North America serves as an interesting feature in earth's past. Much paleontological work has been performed and many environmental reconstructions have been attempted to determine conditions during this time. What does this period of time hold for young earth creationists? This paper examines the uniformitarian Cretaceous seaway within the young earth Creation/Flood model and suggests that this seaway did exist, but only as Flood waters slowly receded from the North American continent.

Introduction

Uniformitarian geologists have proposed that, during the Middle to Late Cretaceous Period, a relatively warm shallow epeiric** sea extended from the Gulf of Mexico across the western United States into Canada (Figure 1). This proposal is based on the fossil remains (micro and macro, invertebrate and vertebrate) which are found in sediments "dated" to the time the ancient seaway existed. This interval of geologic time is believed to have had a warm global climate, elevated atmospheric CO₂, and high sea-level (Jewell, 1993, p. 579).

Many of the Late Cretaceous sediments are believed to have been deposited during a transgressive sea-level time frame (Type 1 sequence boundary) with little to no terrigenous deposition. This resulted in the forma-

tion of sediment starved areas (i.e., condensed sections) and hardgrounds (i.e., omission surfaces). Many of these Cretaceous fossils reflect a nearshore to shallow marine type setting and are believed to have been buried with the rise of sea-level during this time. Puckett (1991) examined "sighted" ostracodes found in the chalk and marl sequences associated with the Cretaceous seaway. The results of the microfossil analysis approximates the seaway as being within the photic zone (i. e., less than 295 feet, but ranging between 114 to 213 feet) [Puckett, 1991, p. 452]. Additionally, the assemblage of uniformitarian Late Cretaceous fossils (i.e., bivalve mollusks, fish, turtles, sharks teeth, etc.) is consistent with what is viewed as a nearshore environment.

Cretaceous Fossils and Environment

Many different types of vertebrate and invertebrate fossils have been found in the sediments associated with this seaway (see Stephenson and Monroe, 1940; Richards, 1959, 1962; Frazier and Schwimmer, 1987). However, many more marine types of fossils have been found than terrestrial and this has led to the determination that this was a nearshore to shallow marine type of environment. Some fossils common to the Late Cretaceous include bivalve mollusks, shark's teeth, bony fish skeleton and teeth, marine reptiles (e. g., mosasaurs). Other large vertebrate fossils include turtles, crocodilian species and various terrestrial dinosaurs.

An interesting and curious assemblage of marine fossils has led to speculation as to the exact setting (i.e., shallow versus deep water) in which this seaway existed. For example, Schwimmer, Stewart and Williams (1994) report finding giant fossilized skeletal parts of an extinct coelacanth fish (*Megalocoelacanthus dobiei*) in outcrops of Late Cretaceous rocks in Alabama and western Georgia. Sharks teeth of the deep water goblin shark (*Mitsukurina*) along with teeth and skeletal parts of the Bulldog fish or Cretaceous giant tarpon (*Xiphactinus*) have also been reported (see Thurmond and Jones, 1981; Case and Schwimmer, 1988). These are believed to be deep water species of fish. What brought these creatures into what is commonly believed to represent nearshore conditions? These questions and many others remain unanswered.

Either and Diner (1985) have suggested that the seaway was of normal salinity, while others (Jewell, 1993, p. 579; Arthur, Dean, Pollastro, Claypool and Scholle, 1985; Glancy, Arthur, Barron and Kaufmann, 1991) have suggested that the seaway contained brackish-water as a result of the wet climate and the associated river inflow from the surrounding highlands. Jewell (1993, pp. 579-592) suggests that the influx of



Figure 1. Generalized diagram showing the epeiric seaway across the North American Continent during the Late Cretaceous (Maastriichtian) as proposed by uniformitarian scientists. The Mississippi embayment marks the boundary between the two distinct faunal provinces (i.e., eastern and western). Modified from Stanley, 1993, p. 395.

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**A sea on the continental shelf or within a continent. Syn: inland sea; epicontinental sea.

fresh water served to stratify the seaway thus causing the formation of anoxic bottom water conditions. Additionally, Jewell (1993, p. 579) believes that the anoxic conditions are manifested by a lack of benthic fauna and relatively high amounts of organic carbon and siliciclastic sediment.

Modern Analogy

Today, the Hudson Bay and Baltic Sea are generally recognized as being epeiric seas (Allaby and Allaby, 1990, p. 127). However, they compare poorly to the Cretaceous epeiric sea of earth's past. Hence, there are no epeiric seas on earth today which we can use to directly compare with those postulated as having occurred in the past. Any models used to reconstruct this Middle to Late Cretaceous sea (i.e., paleoecology, climate, depth of water, etc.) are based purely on conjecture using the fossil record as evidence. The lithologic units in which these fossils are found, date (via biostratigraphy) to the uniformitarian Middle to Late Cretaceous Period (circular reasoning).

Death of the Dinosaurs

Various causes have been suggested, by the uniformitarians, for the mass extinction "event" found at the Cretaceous-Tertiary boundary. They include extraterrestrial impacts (Alvarez, Alvarez, Asaro and Michel, 1980; Allaby and Lovelock, 1985; Sharpton and Ward, 1990), volcanic eruptions (Axelrod, 1981; Rice, 1990; Lockley, 1990) and sea-level changes (Tschudy, 1984, p. 333) which occurred as the Late Cretaceous seaway withdrew and exposed the continental land surface.

Uniformitarian Terrestrial Dinosaur Provinces

Study of the fossilized terrestrial vertebrate fauna contained within the Late Cretaceous sediments on the North American continent has revealed two totally distinct faunal provinces (i.e., eastern and western). This has lead the Uniformitarians to propose that two separate continental landmasses existed during the Late Cretaceous Period and that each landmass had a separate and distinct assemblage of terrestrial vertebrate fauna. A boundary separating the two provinces can be drawn along the approximate center of the Mississippi embayment. East of the embayment (i.e., Georgia to New Jersey) the same genera and sometimes species of dinosaurs have been found. The western U.S. (i.e., Texas to Western Canada) contains a different and unique dinosaur assemblage of its own as well.

Dinosaur remains found in the Late Cretaceous sediments, in the eastern U.S., indicate that the creatures died near the shoreline (typified as a backbay type of environment) and were carried out to sea where they bloated and floated (and were eaten by marine creatures). Eventually the dinosaurs returned to the near-shore and either were eaten, rotted or were buried. Many shark and crocodile bones are found in association with the dinosaur remains. Additionally, several dinosaur bones have been found containing shark teeth embedded in them. Sea turtle shells have also been found with what are believed to be shark teeth marks (i.e., scratches) and crocodile teeth holes. It is believed that the sharks and crocodiles gorged themselves on the floating remains of dead dinosaurs and sea turtles.

Flood Model Interpretation

The creationist geologist also has several models to explain why terrestrial and marine fossils are found in this "seaway." The author proposes that the epeiric seaway did in fact exist and that the terrestrial and marine sediments and fossils found reflect the middle to late Flood Event Time frame (after the rain had stopped and the Flood waters had started to recede from the continents [i.e., greater than 150 days after the beginning of the Flood event]). Additionally, it is interpreted that initially there was rapid run-off of Flood waters from the newly forming topographically high areas (due to orogenies, tectonic forces, etc.) on the continental landmasses. However, this run-off rate slowed as the accommodation space for the receding Flood waters decreased. The orogenic and tectonic events which occurred on the continent could have resulted in sea-level changes and the deposition of transgressive and regressive sequences of sediments as the Flood waters slowly receded from the North American continent.

The author suggests that, as the Flood waters slowly receded from the North American continent, shallow areas and possibly even exposed land surfaces could have formed. Marine communities (vertebrates and invertebrates) began to establish along these areas, hence forming the "epeiric seaway." Bloated and floating dinosaurs, drowned during the Flood event, drifted on the receding Flood waters and became grounded or sank onto the "Middle to Late Cretaceous shore" as the Flood waters receded. Marine communities (i.e., sharks, bony fish and crocodiles) fed on the decomposing "dinosaur" carcasses. Eventually, many of these creatures were subsequently buried as a result of orogenic events and deposition from various sediment sources (e.g., terrestrial sediments, volcanoclastics, etc.). This author believes that calcium carbonate rich seawater created lime mud conditions which coupled with volcanic eruptions contributed a significant amount of sedimentary material, orogenic uplift contributing secondarily. This is reflected in the limestone-marlstone cyclothems. It has been well documented that many of the Cretaceous sediments are composed of lime muds, chalks and altered volcanoclastics (Axelrod, 1981, pp. 13-20; Clarke, 1968, p. 14; Rice, 1990) which occur as cyclic rhythms believed to reflect changing environmental and climatic influences (Eicher and Diner, 1991; Einsele and Ricken, 1991).

Examples From The Eastern U.S. "Late Cretaceous" Deposits

Two specific areas in the eastern U.S., which reflect the author's interpretation using the creationist Flood model, are found in "Late Cretaceous" outcrops exposed in northeastern Mississippi and southwest Georgia. In Northeastern Mississippi, several excellent "Late Cretaceous" outcrops are exposed along various roadways (see Russell, Keady, Mancini and Smith, 1983). In Georgia, the best outcrops of the Late Cretaceous deposits are located in the western portion of the state and along feeder streams and tributaries of the Chattahoochee River (see Case and Schwimmer, 1988; Arden, Beck and Morrow, 1979; Marsalis and Friddell, 1975).

Fossils found in both areas include invertebrate and vertebrate micro and macro fossils. All of the fossils

tend to reflect a nearshore to shallow marine environment and many of the invertebrates suggest burial in their original life position. Many of the terrestrial vertebrate fossils are disarticulated and seem to indicate that they were not buried alive, but rather were dead and were subsequently buried (i.e., "bloat and float"). The author believes that the sharks and crocodiles living in the seaway were possibly buried alive, during the receding of the Flood waters from the continental landmass. This is because both shark and crocodile fossils (i.e., skeletons) are found relatively complete. However, the dinosaur and turtle remains are composed of bits and pieces of bone and bone fragments.

The Western U.S. "Late Cretaceous" Deposits

A very important piece of the puzzle in reconstructing the "Late Cretaceous" receding Floodwaters/epeiric sea lies with dinosaur eggs and nests found in the western U.S. In order to project the Flood as having drowned the dinosaurs, one then must consider the nests and clutches of dinosaur eggs found within the "Late Cretaceous" sediments (Horner and Gorman, 1988, pp. 34-36). In terms of size (all reptiles continue to grow until they eventually die) the larger dinosaurs reflect what this author believes is several hundreds of years of growth and hence were living in the Antediluvian timeframe (compare Antediluvian to Post-diluvian human lifespans). If the dinosaurs were drowned in the Flood then why are nests and clutches of eggs found nearby? How could dead dinosaurs produce nests of eggs? This paper will not attempt to address this western "Province," but merely raises what are viewed as serious questions to be resolved in reconstructing the Western U.S. "Late Cretaceous" conditions. Additional research and field work should be conducted to further develop the young earth Creation/Flood model for the Western U.S. "Late Cretaceous" deposits.

Conclusions

The author believes that the young earth Creation/Flood model provides a better explanation for the formation and existence of an "epeiric sea" across the North American continent using the slow receding of Flood waters. However, serious questions remain concerning the reconstruction of the original environment (paleoecology) and the climatic conditions during this time in earth's past. Further research and field work is required to better define and refine our model for both the Eastern and Western U.S. "Late Cretaceous" deposits. Many questions remain to be answered, such as where are the possible source areas for sediment influx (i.e., volcanic, biological, terrigenous, etc.) and what was the paleoecology of the exposed land surface (if one really existed!) and seaway.

Acknowledgments

The information presented in this note reflects field trips, made by the author, to various "Late Cretaceous" outcrops in the Eastern U.S. Additional information has been provided to me by uniformitarian specialists working in the study and reconstruction of the "Late Cretaceous" Thanks are due to Dr. E. L. Williams and the other reviewers who helped make this a better article. The author has learned, during the review

process of this article, that the Western U.S. Late Cretaceous deposits are being addressed in an article which will be published before this one. It is hoped that the questions raised here will be answered in that article. The author thanks that reviewer for much needed clarification on several issues regarding Western U.S. Cretaceous deposits. Additionally, I thank my wife Susan for giving me time to research and write this article. Glory to God in the highest (Pr 3:5-6).

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Quote: When will they ever learn?

When will scientists and others learn that naturalism is a philosophical point of view with no more claim to the status of science than any other philosophical viewpoint?

John C. Green. 1989. Afterword, in *History, Humanity and Evolution: Essays for John C. Green*. James R. Moore, Ed. Cambridge diversity Press. New York. p. 404.

BOOK REVIEWS

Diatoms to Dinosaurs: The Size and Scale of Living Things by Chris McGowan. 1994. Island Press. Washington, D.C. 288 pages. \$24.95.

Reviewed by Carl R. Froede, Jr.*

Chris McGowan, a vertebrate paleontologist with the Royal Ontario Museum, Canada, presents a fascinating account of the nature and intricacy of creatures, both living and extinct. His discussions on the variety and complexity of living things range quite literally, as the title reflects, from single celled protozoa to the little understood dinosaurs. Although McGowan openly credits evolutionary processes in explaining the complexity of nature, he readily admits that the design and variation seen among fauna are still not completely understood within the context of evolution.

Throughout the book McGowan presents evidence which reflects "Intelligent Design." Chapter after chapter document unique and innovative design in creatures either now extinct (e.g., dinosaurs, pterosaurs) or still on the planet (e.g. birds, giraffes, elephants, protozoa). Examples used to show life's complexity include: the "I-Beam" structure of dinosaur bone which provides strength despite its light weight, the amazing wing structure of various flying creatures, the aerodynamic design of marine life which can be measured by their Reynolds number, and the change in viscosity, of both air and water, in relationship to the size of the object in question. Serious questions are raised about the circulatory schemes of the large sauropod dinosaurs which are not resolved within the book. Many more interesting items are discussed between the covers of this most absorbing book. When read from a creationist's perspective, this book presents an excellent testament to the complexity and variety of life which is best explained within the framework of intelligent design.

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Biblical Creationism by Henry M. Morris. 1993. Baker Books. Grand Rapids. 276 pages. \$22.00.

Reviewed by Don B. DeYoung*

Every new book from Dr. Henry Morris is a delight. One can always count on original thinking in new areas of creation study. This volume shows what each Bible book teaches about creation and the Flood. Morris then goes further and also analyzes the Apocrypha, Pseudepigrapha, and the writings of Josephus. These writings include fanciful additions to biblical history, but they never compromise the creation and flood accounts or subtract from them.

Dr. Morris reveals a tremendous arsenal of creation/flood references throughout Scripture. Many are explicit; others are "possible poetic allusions," such as intimations of the Garden of Eden in the Song of Solomon (p. 109). Those critics who doubt the recent-creation history of Genesis also face problems with each of the remaining 65 Bible books. A flawed motivation for Scripture accommodation by Christians is uncovered: The hope to thereby appease their non-Christian academic colleagues (p. 214).

Dr. Morris presents many intriguing ideas for reader reflection. Six of them: Hebrew was probably the language of Adam (p. 27). The stars were made to be residences for angels (p. 74). The Law of Gravitation began on the second day (p. 106). The Flood occurred 1656 years after creation (p. 226). Creation must be included if we truly preach the gospel (p. 229). Some creationists are opinionated cranks and self-seeking charlatans (p. 270). Thanks, Dr. Morris, for speaking out!

There are some points of minor confusion. Josephus is credited with writing that Adam had both 30 sons (p. 29) and 33 sons (p. 246). A reference is left incomplete (p. 206). Subject and Scripture indexes also would have been valuable. Regardless, deep thanks is due to Henry Morris for this reference volume. He is uniquely qualified to write about creation and the Flood, and has succeeded once again.

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