

Watery catastrophe deduced from huge Ceratopsian dinosaur graveyard

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Ceratopsia (from Greek, *keras*, *kerat*=horn, *opsis*=face) is the suborder of large horned ornithiscian ('bird-hipped') dinosaurs of which Triceratops is the largest, commonest and most famous. Evolutionary paleontologists 'date' ceratopsians to the Cretaceous period. Their remains are common in Alberta, Canada. They are sometimes found abundantly in bone beds, defined as a stratigraphically and geographically constrained bed that contains more than one individual. Occasionally, bone beds contain hundreds of dinosaurs. *Centrosaurus* is one of the main types of ceratopsian dinosaurs with more than two dozen bone beds known in southern Alberta. (The taxonomic history of *Centrosaurus*, as well as other ceratopsians, is convoluted.¹ It is possible that ceratopsians represent one or very few Genesis kinds with a significant amount of variety.)

One large *Centrosaurus* bone bed, called BB43 has been known for a long time. The bed is located in the badlands along the Red Deer River of Dinosaur Provincial Park, about 50 km north of Brooks, Alberta. An early investigation of BB43 surmised that at least 38 *Centrosaurus* dinosaurs were killed in a 'yet-to-be-explained disaster'. It's believed likely that they were caught in a flood while trying to cross a river.² This bone bed has been extensively studied over the years, and a recent paper in the *Journal Palaios* adds much more detail.³

Catastrophic death by drowning

About 93% of the BB43 fossils are *Centrosaurus* ceratopsian dinosaurs. In other words, the bone bed is almost monospecific.⁴ An analysis of the bones

further indicates that the dinosaurs died elsewhere and were later transported into their final resting place. Much taphonomic information supports this deduction (taphonomy, from Greek *taphos*= death, is the study of how an organism or part thereof became a fossil). For instance, the fossils are typically concentrated along bedding planes and/or erosional unconformities with the suggestion of a 5-metre deep by 60-metre wide channel. The long bones are current aligned. Most of the remains are fragmentary, broken and fractured. The material represents a lag deposit with most small and light skeletal elements missing and being primarily composed of portions of large adult-sized skeletal elements. Carnivorous dinosaur teeth, especially from the theropod *Albertosaurus*, and very rare tooth marks on the bones have been found in the bone bed. Thus, the condition of the bones indicates modification by an external force, probably in a high-energy watery flow as the sedimentology of the contained sandstone indicates. The particular bone bed under discussion is found in water-laid sandstone with east-southeast directed paleocurrent indicators.

There is no evidence for prolonged weathering in the form of desiccation of the bones. No bacterial or fungal degradation nor insect borings have been found. Evidence for disease and drought are absent.⁵ Death, transport and burial seems to be very rapid. Transport was not far as bone abrasion by water was light. The authors suggest mass death by drowning upstream with subsequent reworking:

'The sedimentological evidence and taphonomic interpretations presented here indicate that the bonebed 43 fossil assemblage was re-

worked from an, as yet, unknown upstream position and facies. Although the initial and subsequent emplacement of the bones was rapid (taking place during the waning flood phase), the depositional context indicates a multi-phase reworking history for all the fossils.⁴

The idea of a waning flood phase is deduced from the fining upward sequence from the lag of dinosaur bones to fine sandstone.

The most amazing character of the bone bed is that it is very extensive. Based on the small portions excavated, it is likely the concentration of dinosaurs in the ground between excavation sites is evenly distributed. This suggests hundreds to thousands of dinosaurs in BB43. If another bone bed discovered 400 m upstream is included, the number of *Centrosaurus* dinosaurs in this area is estimated at *tens of thousands!*⁴ This dinosaur graveyard represents a huge watery catastrophe that rapidly buried tens of thousands of large dinosaurs:

'The data presented in this study support a catastrophic death for the original *Centrosaurus* assemblage ... a catastrophic death by drowning for the centrosaurs preserved in BB



Figure 1. One large *Centrosaurus* bone bed, called BB43, is located along the Red Deer River of Dinosaur Provincial Park, about 50 km north of Brooks, Alberta.



Figure 2. Postulated area of briefly exposed Flood sediments in western North America based on dinosaur eggs, tracks and bonebeds.

43 is a likely scenario.⁵ The authors add that other bonebeds in southern Alberta show the same pattern of preservation as BB43, indicating a number of large watery catastrophes. Large dinosaur graveyards in Montana, Wyoming, and other areas of the Earth also provide evidence for either a watery catastrophe or a waterborne mass flow.⁶ One exception to this conclusion was the Mongolian dinosaurs that were claimed to have died and been buried in a sand storm. On further analysis, these dinosaurs were likely buried in a waterborne mass flow.⁷ Uniformitarian scientists predictably interpret all these dinosaur graveyards as evidence of river flood processes. But the number of dinosaurs, the state of preservation indicating rapid burial, reworking and fossilization; the monospecific nature of many bone beds; and the lack of babies or young juveniles in practically all bone beds indicate a watery catastrophe larger than river floods.

Consistent with Genesis Flood

The evidence is more consistent with the Genesis Flood in which the catastrophe would cause dinosaurs of the same kind or species to herd up, like elk when the weather turns cold, and then to be killed together during

the onslaught of the Flood. These bone beds, generally found in the same geographical region as dinosaur eggs and tracks on thousands of feet of previously laid Flood sediments, imply areas of temporarily exposed sediments during the early Flood. Figure 2 shows the generalized area of exposed sediments or a series of shoals that contain many dinosaur bone beds plus the evidence of live dinosaurs in the form of eggs and tracks.^{8,9} Flood sediments could easily be exposed for relatively short periods by at least four mechanisms that would be operating during the Flood: 1) tides, sometimes with large amplitude; 2) tsunamis; 3) upward vertical tectonics after rapid deposition of sediments, and 4) the dynamics of ocean currents on shallow continents in a globally flooded Earth.¹⁰ The dead dinosaurs on this exposed sediment could be scavenged by carnivorous dinosaurs, since their teeth are often found in the bone beds of western North America. Other dinosaurs would lay eggs on these temporarily exposed Flood sediments. Dinosaur tracks would be expected also.

As the floodwaters returned, the dead dinosaurs would be catastrophically reworked into the bone beds we discover today. The lack of babies or young juveniles, except in nesting areas, can be explained by dinosaurs fleeing the encroaching floodwaters

and abandoning their young. Water current winnowing could explain the lack of young dinosaurs, as postulated in the *Centrosaurus* bone bed described in this article, but one would expect that the products of the winnowing would be found buried somewhere, but apparently no such bone bed has been found. If it were a river flood, there are always slackwater areas and eddies where the bones of young dinosaurs should have been deposited. It is more likely there were few if any young dinosaurs in the original death assemblage. Since fossilization, especially of a large dinosaur, not to speak of thousands of them in a bone bed, is a very rare event,⁴ the Genesis Flood provides a plausible mechanism for rapid fossilization.

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