A tropical reptile in the 'Cretaceous' Arctic: paleofauna challenge to uniformitarianism

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A century ago, a shock went through the scientific community when a whaling crew reported finding fossil wood on the Antarctic Peninsula. Since then, fossils of warm-climate fauna and flora have often been discovered within the Antarctic and Arctic circles.[1–4]

Just recently, fossilised remains of a tropical to subtropical champsosaur, as well as turtles, have been unearthed on Axel Heiberg Island at 79 °N in the Queen Elizabeth Islands of north-eastern Canada.[5] A champsosaur is an extinct crocodile-like reptile assumed to have lived in a habitat similar to the modern crocodile. The strata are dated as late Cretaceous within the uniformitarian geological time scale.

What is so perplexing to uniformitarian scientists is that the 2.4-metre-long champsosaur is **cold-blooded** (an ectotherm). Furthermore, it **cannot migrate or hibernate** during winter, as is thought possible for some polar dinosaurs and turtles. Uniformitarians therefore consider the champsosaur an ideal climatic indicator.

Climatic implications

According to uniformitarian presuppositions therefore, what are the climatic implications of this new fossil find? Using crocodiles as an analogue, the climate must have been tropical to subtropical. More specifically, the warm season temperatures very likely ranged from 25 °C to 35 °C with the coldest month mean temperature of about 5.5 °C.[6] Thus the annual mean temperature would have been greater than 14 °C. This compares with –20 °C for the present annual mean temperature for the area and –38 °C for the coldest month mean temperature. The lowest daily temperature during the coldest month would likely be around –45 °C with a record low of about –55 °C. You cannot get anymore of a climatic contrast between the present climate and the climate inferred from the fossils.

This is not an isolated incident. Other data indicate subtropical to tropical conditions in the Arctic and Antarctic during the Cretaceous, as well as the early Cainozoic.[1,6] For instance, oxygen isotope ratios of foraminifera from deep-sea cores at 59 °S indicate a surface temperature of 30 °C.[7] This result assumes that oxygen isotope ratios in foraminifera accurately record temperature, which probably isn't true.[8] Nevertheless, Huber is perplexed:

> *'Although tropical surface-water temperatures near the Antarctic Circle seem hard to believe for any period of Earth history, there are many reasons to trust the Site 511 [deep-sea core] data.'*[7]

Searching for answers

Uniformitarian scientists are working to understand the contradiction. Slow continental drift is no help, since uniformitarian geologists believe the paleolatitude of Axel Heiberg Island was only a little less than that of today.[6] Climate modellers are experimenting with every possible warmth-boosting mechanism for the polar regions, to explain such a stark contradiction. More accurate seasonal climate simulations have been run for the Cretaceous,[9] as well as for the similarly warm early Eocene.[10] For the Cretaceous simulation, adding more inland seas to the presumed geography did **not** make any difference to the polar temperatures. The Arctic was still bitterly cold in winter because, with less sunshine, not only did the polar ocean freeze over in winter, but the inland seas as well. Barron *et al*. explain:

> *'In the annual cycle experiments, however, low winter insolation causes the seaways to freeze. Under these conditions the continents of Asia, Europe, Greenland, and North America appear as one large supercontinent with little thermal inertia, yielding cold winter time temperatures.'*[11]

Manipulating Cretaceous CO_2 is another favourite modelling attempt. The modellers usually specify 2 to 8 times more CO_2 in the atmosphere in their simulations than today. Not surprisingly, these simulations do warm up the polar areas significantly. Initially the simulations just used mean annual temperatures and generally gave above-freezing polar temperatures in winter. However, it was recognised that such simulations are not accurate because they do not account for the seasonal cycle. When the more accurate seasonal cycle simulations were applied with boosted CO_2, the results were less dramatic. At 4 times the present CO_2, the continental winter temperatures at mid and high latitude using presumed Cretaceous geography were below –20 °C.[12] The 6 times CO_2 simulation was better, but still inadequate. The problem with cranking up the CO_2 is that the tropical atmosphere and oceans overheat.[13,14] The whole exercise is quite unrealistic.

What about increased poleward oceanic heat transport, which is a significant factor in warming winter temperatures at higher latitudes today? Modelling showed that a modest increase in poleward heat transport produced only a slight warming.[13] Sloan *et al.* concluded that there is no known mechanism to significantly boost the poleward oceanic heat transport,[10,14] and proposed instead increased atmospheric heat transport.[10] The problem with this idea, however, is that atmospheric poleward heat transport is proportional to the north-south temperature difference. Any mechanism to warm polar temperatures decreases the north-south temperature gradient and, hence, the higher latitude heat transport.

Barron *et al.* suggested that the Cretaceous climate can only be reproduced if all warmth-boosting mechanisms are invoked.[15] They presented the results for presumed Cretaceous geography with 4 times the CO_2 and a 30 % increase in poleward oceanic heat transport. Unfortunately, they did not show the cold season temperatures, just the mean annual temperature, which in the above simulation was still below freezing over north-east North America and northern Eurasia. This means that the average cold season temperatures would have ranged from –10 °C to –20 °C.

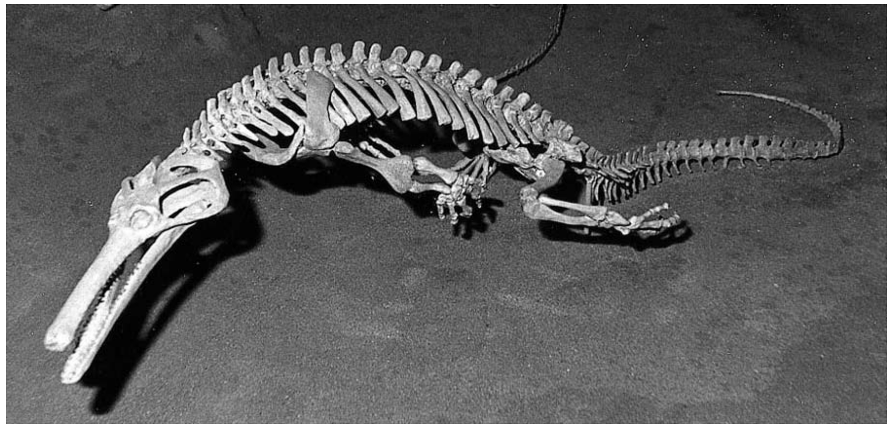
Even after all this manipulation, there is still no sign of a solution. The climate simulations provide no clue to why the polar climate was warm during the Cretaceous and early Tertiary. Furthermore, it is very likely that all climate models are unrealistically temperature sensitive to increased CO_2. Since the late 1800s, carbon dioxide and other greenhouse gasses have increased about 50 % in **equivalent** CO_2 units, but temperatures have warmed only about 0.5 °C, not including the likely warmth-biasing factors in the temperature records.[16] Climate simulations have predicted 2 to 5 °C warming for a doubling of CO_2. The simulations would predict a 1 to 2.5 °C boost for a 50 % increase in CO_2, if the effect were linear. It thus appears that climate models predict 2 to 5 times too much warming. Regardless, the finding of the champsosaur has now **exacerbated** the problem:

> *'The presence of reptiles at Arctic latitudes offers challenges for efforts to model Cretaceous climates. The high polar temperatures implied here exacerbate the problems of simulating warm polar conditions without also raising equatorial temperatures to unreasonably high values.'*[17]

The creation explanation

The contradiction between the paleofauna and the uniformitarian paleoclimate is so great that one wonders why scientists do not question the uniformitarian paradigm.

How would creationists explain such warm-climate paleofauna at high latitudes? I have previously presented several hypotheses.[3,18] The most likely explanation, I believe, is that during the world-wide Flood, the plants and animals, the animals sometimes alive, floated rapidly to high latitudes from lower latitudes on gigantic floating mats of vegetation. This is an extension of the floating mat model for the origin of coal and coal seams that several creationists have proposed.[19–22]



Skeleton of a champsosaur, an extinct crocodile-like reptile with sharp teeth and a long snout.

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