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### Southeastern Australia's Cretaceous polar tetrapods in a Greenhouse World

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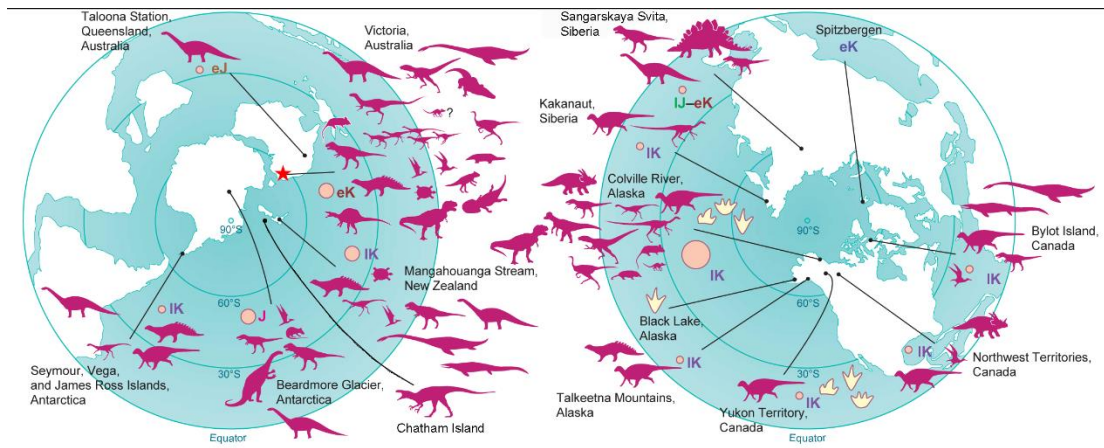
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Although most of the earth in the Cretaceous can be characterized as a "Greenhouse World", that was not the case in southeastern Australia in the late Early Cretaceous. In the shallow "Eromanga Sea" of northern South Australia and western Queensland, drop stones indicate the former presence of floating ice and glendonites suggest seawater temperatures close to 0°C.

To the southeast, Victoria was located either within the Antarctic Circle of the time or close to it. There cryoturbation structures indicative of the former presence of permafrost occur within 3 metres stratigraphically of one of the richest early Cretaceous tetrapod localities. Temnospondyl amphibians which had thrived from the Carboniferous to the end of the Triassic occur there, apparently having survived longer in that polar environment than elsewhere because their ecological equivalents, crocodylians, could not tolerate the frigid condition that these amphibians could.

Euornithomorphs or hypsilophodontids were more diverse in polar Victoria than at lower palaeolatitudes. An enlarged area of the brain that processed the visual signals from the eyes, the optic lobes, together with the enlarged eyes characteristic of this group suggest that they were well adapted to living in polar regions, able to forage through the cold winter darkness. This supports the hypothesis that this group of dinosaurs were endothermic or warm blooded.

Dinosaurs {13 genera minimum} and mammals {6 genera minimum} dominate the known late Early Cretaceous tetrapod biota of south eastern Australia. It is the most diverse assemblage of Mesozoic polar tetrapods known on earth.



Diversity of polar Jurassic and Cretaceous polar tetrapods. Note the large number in Victoria, Australia .

