

## The ecology of the dinosaurs of Alaska

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Dinosaurs were first recovered from Alaska in the early 1960s though recognition of these remains as dinosaurian did not occur for two more decades. Since these first specimens were collected, additional discoveries of both skeletal and ichnological dinosaurian remains have occurred in many places throughout the state, though by far most discoveries have been within the Upper Cretaceous Prince Creek Formation of the North Slope. Northern Alaska is now recognized as containing one of the richest dinosaur-bearing rock units in North America.

The recovery of dinosaur remains from the ancient arctic of northern Alaska has been problematic given current understanding of dinosaur physiology. To explain the occurrence of ancient high-latitude hadrosaurs, a model for long-distance migration based on modern caribou as an analog is evaluated. This model calls for long distance, seasonal, latitudinal movements by hadrosaurs living in northern Alaska during the Cretaceous.

Histological data suggest that the juvenile hadrosaurs from this region were greater than one year in age. In addition, comparison between relative size of juveniles to adults of caribou and hadrosaurs from the North Slope of Alaska suggests, based on qualitative energetics, that the latter were too small for long-distance migration. Therefore, if the “hadrosaurs as caribou” model proposed by others is accepted, then these North Slope hadrosaurs are reinterpreted as year-round residents of the Cretaceous high-latitudes.

Given the new model of dinosaurs as year-round residents of the high latitudes, an examination of the predatory dinosaur component of the fauna reveals faunal adaptations for life in the high latitudes. Theropod teeth are taxonomically diagnostic components of dinosaur assemblages. Seventy teeth have been recovered from six different localities in the Kogosukruk Tongue of the Prince Creek Formation (Upper Cretaceous) of the North Slope of Alaska. This assemblage of teeth shows slightly less diversity compared to well documented assemblages of teeth from the slightly older Judith River Formation of south-central Montana, the Aguja Formation of west Texas, and the Hell Creek Formation of eastern Montana. In addition, in contrast to the Judith River Formation assemblage of teeth in south-central Montana, the teeth assigned to *Troodon* dominated the Alaskan assemblage. The dominance of *Troodon* is attributed to adaptation by this theropod to low light conditions while over-wintering at a high paleolatitude.

Further, the average size of the teeth of *Troodon* from the North Slope is nearly twice that of teeth from this taxon found in southern Alberta and Montana. This size increase correlates with a decrease in relative abundance of other theropod taxa. The size increase in *Troodon* may be an example of character displacement, similar to the increase in body size by coyotes in the absence of wolves observed within the Greater Yellowstone Ecosystem.