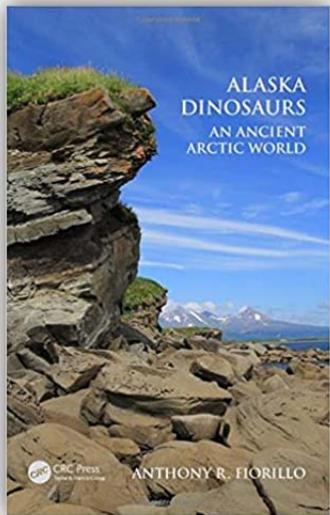


BOOK REVIEW

By Peter P. Flaig



Alaska Dinosaurs: An Ancient Arctic World

Anthony R. Fiorillo

CRC Press

Hardback, 240 p.

USD 101.00

2017

Dr. Anthony Fiorillo has spent the bulk of his career seeking out, unearthing, describing, and curating dinosaur bones and associated behavioral evidence (e.g., track sites) from the deep time Alaska rock record, a record that also fortuitously contains abundant evidence of the ecosystems that dinosaurs occupied. In *Alaska Dinosaurs: An Ancient Arctic World* Fiorillo presents us with a compelling and truly fascinating tour through ancient Arctic ecosystems, employing dinosaurs as our guide. This book is a must read for anyone seeking a journey through the deep time paleontologic record of Alaska, especially those who devour books on dinosaurs!

Fiorillo begins by walking us through the history of human exploration leading up to discoveries of Alaska Arctic dinosaurs. He takes us on expeditions through the eyes of explorers who organized voyages to remote Arctic lands and the artists who joined them, providing us a view of the sometimes harsh yet exhilarating and inspirational landscape. Fiorillo introduces us to the modern arctic ecosystem, reminding us of the unique light and climate regime of the high Arctic latitudes that control species diversity, productivity, adaptation, and survivability. Fiorillo follows with an in-depth discussion of the early work of paleontologists and geologists that led to numerous dinosaur discoveries across the state of

Alaska and the Arctic region, including the work of Charles Repenning who was the first to identify dinosaurs in Alaska. While reading this book one can actually feel the frustration of the early paleontologists who were absolutely convinced that there had to be dinosaur bones and footprints just waiting to be discovered somewhere in Alaska's roughly 660,000 square miles, an area approximately one fifth of the landmass of the contiguous United States (lower 48). Fiorillo also introduces us to the somewhat astounding diversity that existed at high latitudes during the Cretaceous greenhouse, detailing a warm, wet Arctic environment for which there is no modern analog.

Fiorillo continues by examining the basics of Alaska geology, injecting observations from his unique paleontological perspective. He summarizes the complex geologic and biologic evolution of Alaska, built by colliding terrains, uplifting mountains, and downwarping of basins to form the Alaska we see today. He then focuses on the specific rock units that contain dinosaurs, and the origin of these rocks, some of which began their journeys far from their modern resting place. Although Fiorillo walks us through many dinosaur-bearing rock layers of Alaska, he spends quite a bit of time discussing the Cantwell Formation (Fm) in Denali National park and the Prince Creek Fm on the North Slope of

Alaska. These two rock units are truly special because parts of the Cantwell and Prince Creek formations have been shown, through isotopic dating techniques, to be contemporaneous, with the Maastrichtian Cantwell Fm of central Alaska containing an unparalleled fossil footprint record, and the Prince Creek Fm containing a robust fossil bone record of the highest-latitude Maastrichtian dinosaur assemblage on earth. Fiorillo's comparison and contrast of the faunal (bones and footprints) and floral (leaves and pollen) evidence from these two localities gives a new perspective on Alaskan dinosaur species and behavior, latitudinal variability, and seasonality. Fiorillo enhances this with additional comparisons to similar aged dinosaur assemblages across Alaska, Canada, and the lower 48 states.

The real meat of this book are two chapters, "The Bones" and "The Footprints". This is Fiorillo's wheelhouse, and it shows. Fiorillo provides a detailed survey of all Arctic dinosaur discoveries in Alaska, which vastly outnumbers those of other Arctic regions such as Canada, Norway, and Russia. He discusses in exquisite detail Ornithischia and Saurischia including Theropod Dinosaurs, Ornithomimisuria, Thescelosaurids, Hadrosaurs, as well as non-Dinosaurian Cretaceous vertebrates including mammals and fishes. Fiorillo injects astute comparisons with habitats and habits of modern Arctic animals. He compares and contrasts the size of Arctic and non-Arctic dinosaurs, the significance of wear patterns on fossil teeth, and even the size of eye sockets, all of which may reflect adaptations to highly seasonal light, temperature, and rainfall regimes. There is an excellent discussion on the science of making and preserving footprints along with a section on dinosaur tracks in Alaska National Parks. Fiorillo focuses heavily on the astonishing record of tracks in the Cantwell Fm of Denali that includes pterosaurs. Numerous track sites are shown to reflect multigenerational herding and suggest that seasonal migration was unlikely.

Fiorillo also includes chapters on Cretaceous Plants from Alaska, Aspects of Paleobiology and

Paleoecology, and Paleoclimate, which serve to paint a broader picture of the landscape to help us better comprehend the diverse nature of these ancient Alaskan Arctic ecosystems, within which the dinosaurs roamed and soared. In these final chapters are a discussion of modern and ancient ecosystems across Alaska, the debate on migration versus overwintering of Arctic dinosaurs including discussions of the validity of the caribou model and dinosaur hibernation, niche partitioning, breeding, atmospheric and oceanic circulation, the role of methane, and fire dynamics. The book ends with a final chapter summarizing Dr. Fiorillo's take on the state of the Ancient Arctic World, a subject that Fiorillo is uniquely qualified to address.

Fiorillo's use of key references throughout text makes this book not only a fascinating and scientifically sound read, but provides a valuable resource that can be used by those interested in delving deeper into points made in the text through further readings. Fiorillo also furnishes numerous suggestions for logical further research.

As a sedimentologist and stratigrapher who has worked on Alaska clastic depositional systems and stratigraphy for the past 15 years, including the dinosaur-bearing Prince Creek Fm, I found Anthony Fiorillo's book to be fabulous. Not only did it give me a much broader perspective on Arctic dinosaurs as a whole, but it also provided focus with detailed descriptions of dinosaur bone collections, other ancient bones, bonebeds, inferred behaviors, and astute comparisons that I cannot image one could get elsewhere. It is a brilliant summary on Alaska Arctic Dinosaurs and ancient Arctic ecosystems.

If you love dinosaurs, Alaska, the Arctic, or just want to spend some time on a fascinating journey through geologic and paleontologic time crafted by a passionate writer I would highly recommend picking up a copy of *Alaska Dinosaurs: An Ancient Arctic World!* It will surely make you want to hop on a plane or a boat and discover Alaska. Happy fossil hunting!

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