

LATE MESOZOIC DINOSAURIAN BIOGEOGRAPHY AND DIVERSITY: LINEAGE-BASED APPROACHES

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The late Mesozoic (Late Jurassic-to-latest Cretaceous) is a time interval of particular interest in terrestrial paleobiogeography. The late Mesozoic was marked by increased terrestrial isolation due to continental drift and the rise of epicontinental seaways, unlike the late Paleozoic and the Cenozoic (in which continental collisions were at least as prevalent as isolation). For dinosaurs and other continental organisms, the interval from the Oxfordian through the Maastrichtian is predicted to have resulted in increasing isolation and divergence over time. Recent discoveries of new, primarily southern continent, faunas and new phylogenetic analyses allow a more detailed, lineage-based examination of dinosaurian paleobiogeography and diversity in this interval.

Parsimony and phenetic (dissimilarity) analyses of presence/absence lineage-based data for forty-five regionally- and stratigraphically-constrained assemblages were used to examine dinosaurian paleobiogeographic trends. With some variations, these analyses recognize four major clusters of late Mesozoic dinosaurian faunas. The diverse sauropod and stegosaur dominated faunas of the Late Jurassic form a cosmopolitan cluster, with the somewhat more endemic Chinese fauna clustering outside the African-North American-European group. The early Early Cretaceous Wealden faunas of Europe (and their North American equivalent) cluster with mid-Cretaceous assemblages from North America, Europe, and Australia. The poorly-known assemblage from New Zealand and Antarctica seems to represent a late survival of this iguanodontian-ankylosaurian-sauropod faunal group. The mid- to Late Cretaceous faunas of South America and Africa cluster with those of the Late Cretaceous of Europe, in an allosauroid-abelisaurid-titanosaurid Eurogondwanan faunal group. Finally, the very speciose, very diverse mid- to Late Cretaceous Asian and North American assemblages cluster in a coelurosaur-hadrosaurid-ankylosaurid-marginocephalian Asiamerican faunal group.

All tests reveal that these Asiamerican faunas are the most derived and most dissimilar of all assemblages. Thus, the best known of Late Cretaceous dinosaurian faunas are, unfortunately, samples from the most highly endemic known assemblages. Paleoecological scenarios which rely predominantly on North American faunal turnover (such as the alleged transition from "high browsing" to "low browsing" among dinosaurian herbivores) thus do not reflect global trends.

The use of "ghost taxa" (the inferred presence of a lineage between the earliest known representative of a taxon and the earliest known representative of its sister taxon) allows the estimation of dinosaurian diversity to include taxa not yet directly sampled from the fossil record. By including ghost taxa, the apparent "bottle-necks" of Cretaceous dinosaurian diversity in the mid-Early and mid-Late Cretaceous are reduced. Nevertheless, known data does not reject an hypothesis for an Santonian-Campanian radiation of coelurosaur, ankylosaurid, hadrosaurid, and marginocephalian clades.