Post-Eocene rhinocerotid dispersal via the North Atlantic

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Biotic interchange (i.e., the movement of organisms among regions and continents) among Europe, Asia and North America over the last 66 Ma shaped global mammal biodiversity. However, for most clades, the number and timing of dispersals remain poorly understood. Herein, we aim to reconstruct the biogeographic history of rhinocerotids, a clade with considerable past diversity and a geographic range that encompassed much of the globe. Using a fossilized birth-death approach, we estimated the largest time-calibrated phylogeny of Cenozoic rhinocerotids to date. We then used the maximum likelihood approach in BioGeoBEARS to fit an array of biogeographic models (e.g., Dispersal-Extinction Cladogenesis (DEC), DEC+jump dispersal) and stochastic character mapping to infer the number of biotic interchange events among Asia, Europe, North America, and Africa. We found that the highest rates of biotic interchange, unsurprisingly, occurred between Europe and Asia. However, the next highest number of exchanges occurred between Europe and North America. Furthermore, we show that dispersal between Europe and North America occurred during the Oligo-Miocene, suggesting that the North Atlantic route may have been passable for mammals millions of years longer than previously proposed; typically, the North Atlantic route has been considered passable for terrestrial vertebrates only from the Paleocene to early Eocene. Recent geological and palaeoclimatological evidence, however, suggests that waterways that now prevent terrestrial dispersal via the North Atlantic (e.g., the Fram Strait, Barents Sea) were shallow until the Miocene and, potentially, bridged by seasonal sea ice as early as the late Eocene. We therefore hypothesize that rhinocerotid dispersal between Europe and North America post-Eocene may have occurred via the North Atlantic. Our study reveals the complex history of a charismatic mammalian clade and provides insight into the importance of the Arctic as a persistent connector of otherwise geographically disparate faunas.

Diverse inner ear morphology in early Miocene Thryonomyoidea (Rodentia) from Napak, Uganda

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Rodents, specifically thryonomyoids, constitute the most abundant fossils found at the Miocene-aged sites of Napak, Uganda (20 Ma). The past diversity of thryonomyoids was much greater than current diversity, which is now limited to two extant species of cane rat (T*hryonomys gregorianus* and *Thryonomys swinderianus*). The Napak sites have yielded several thryonomyoid crania, in addition to numerous isolated auditory bullae that have not yet been described. Here, we present the first descriptions and shape analysis of the inner ear morphology of three fossil

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