

The giant horned crocodiles that ate our ancestors: complex interplay between environment and crocodylian diversity in the late Cenozoic of Kenya

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Abstract: The modern crocodylian fauna of the East African Rift System (EARS) is depauperate, with only one species of *Crocodylus* occurring at most localities, but as many as five may have co-occurred as recently as 7 million years ago. Historically, most were viewed as referable or ancestral to modern African species. Recent work on fossils from the Lake Victoria and Turkana Basins of Kenya reveals a complex history for the group. The record includes crocodylian-bearing deposits ranging in age from 19 to 15 million years (early and early middle Miocene) and from 7 million years almost to the present day (latest Miocene through Holocene). Early and middle Miocene sites preserve three or four species; none can be referred to *Crocodylus*, and most appear to be closely related to *Osteolaemus*, including *Euthecodon*. Others are gharials sharing derived features with both *Tomistoma* and *Gavialis*. Late Miocene sites preserve up to five forms – *Mecistops*, *Euthecodon*, a gharial, and two species of *Crocodylus*, neither of which is related to any extant species. Diversity diminishes thereafter, with only three remaining by the early Pliocene (~5 million years). Extant African *Crocodylus* did not appear until less than 200,000 years ago. Temperature is usually thought to be the primary driver of global crocodylian diversity, but the EARS remained within crocodylian thermal tolerances at low altitudes throughout this time. That early and middle Miocene forms might be related to *Osteolaemus* suggests a vegetational signal in crocodylid diversity – the continuous rain forests preferred by modern *Osteolaemus* gave way during the middle Miocene to grasslands and open savannahs. Loss of diversity during the Pliocene and Pleistocene presumably reflect regional xerification and loss of wetland habitats. The environmental factors controlling crocodylid diversity in the East African Rift Valley may be the same as those often invoked in the rise of humans.

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