

Northeast African Paleoenvironments and Niche Spacing Across the Afro-Eurasian Faunal Exchange

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The collision of the African and Eurasian plates ~29 Ma transformed the African landscape, introducing a diverse assemblage of northern immigrant fauna, while endemic African faunal diversity declined. This collision is captured by fossil-rich Oligocene deposits from the Topernawi Formation and later Miocene deposits of the Turkana Basin in the East Africa Rift, providing a unique opportunity to explore the role northern immigrants and changing environments played in the decreasing diversity of indigenous African fauna. We analyzed stable carbon ($\delta^{13}\text{C}$) and oxygen ($\delta^{18}\text{O}$) isotope values of Oligocene fossil enamel samples ($n = 45$) from the pre-collision Topernawi Formation with existing Eocene to Miocene isotope records ($n = 246$) from northeast Africa. At Topernawi, low $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ enamel values indicate a warm and wet environment in Turkana at 29 Ma, immediately prior to the exchange—especially in comparison to more arid Miocene conditions. Similar conditions at contemporaneous Chilga in Ethiopia suggest warm and wet conditions were prevalent in East Africa despite a global cool phase. Relative niche space in Turkana measured by $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ breadth decreased among indigenous fauna like hyraxes and proboscideans after the exchange. This suggests that not only drier conditions but competition and changed niche partitioning likely also played a role in observed decreases in diversity and subsequent extinctions of indigenous fauna.