Biogeographic Dynamics of Plio-Pleistocene Large Mammals in the Northern African Rift: Global Vs Local Factors

Haregwine Hailu*[1], Gildas Merceron[1], and Jean-Renaud Boisserie[1,2]

[1]Laboratoire de paléontologie, évolution, paléoécosystèmes, paléoprimatologie [UMR 7262] – Université de Poitiers = University of Poitiers, Centre National de la Recherche Scientifique – France
[2]Centre Français des Etudes Ethiopiennes – Éthiopie

Résumé

During the Plio-Pleistocene, the Turkana Depression was characterized by relatively open and continuous rift-floor environments with strong hydrological networks that may have facilitated faunal dispersals. In contrast, the Main Ethiopian Rift was more fragmented due to active faulting and volcanic activities, potentially leading to higher endemism and ecological isolation. Besides, the Afar Rift shifting landscape shaped by faulting, volcanism, and climatic variability caused oscillation between connectivity and isolation showing complex faunal exchange patterns. These regions, all part of the East African Rift System, represent key areas of hominin evolution and faunal diversification. These differences in the three regions (Turkana, Main Ethiopian Rift, Afra Rift) provide a unique natural laboratory to study how local tectonics and global climate impacted biogeography and ecology. Despite their geological proximity, they exhibit notable differences in faunal composition, landscape dynamics, and environmental histories. This project explores the biogeographic pattern by integrating taxonomic, ecological, and environmental data across the three regions. Dietary ecology will be reconstructed through Dental Microwear Texture Analysis (DMTA) and stable isotope analysis (δ^{13}C and δ^{1}O) on megaherbivores including Giraffidae, Hippopotamidae, and Elephantidae. These methods provide evidence of dietary resources and habitat types and possible seasonal variability, offering insights into niche breadth. Fossil data from Shungura, Konso and Bouri formations will be used to assess changes in species diversity and distribution over time. The project evaluates how faunal dispersal events are linked to geographical barriers (tectonic-driven habitat fragmentation, hydrogeographic networks) and to ecological differences between populations within megafaunal taxa. This research aims to clarify how local environmental pressures influenced large mammal biogeographic evolution, including endemism, and extinction. The findings will contribute to broader debates in African evolution, particularly regarding how ecological adaptation shaped the evolutionary context in which hominins emerged.

Mots-Clés: Biogeography, megaherbivores, diet, paleoenvironment, Plio, Pleistocene, Northern East African Rift

*Intervenant