PHYLOGENY OF AFRICAN CHARACIFORMS AND CENOZOIC RADIATION OF ALESTIDAE (TELEOSTEI: OSTARIOPHYSI)

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RESUMO

The Trans-Saharan Seaway connecting the Neotethys and South Atlantic along with the Cretaceous-Paleogene (K-Pg) boundary extinction had profound impact on fish diversification, but no study has investigated the effects on African freshwater fishes. Here we use phylogenomic data of ultraconserved elements (UCE) and time-calibrated analyses of 83 characiforms, as well as microcomputed tomography scans (µCT) of 117 characiforms to investigate character evolution. The phylogeny with 1,012 UCE loci reveals a newly recognized family-level clade containing two taxa: the Niger tetra *Arnoldichthys* from the lower Niger and Ogun rivers of Nigeria, and the dwarf jellybean tetra *Lepidarchus* from rivers of Côte d'Ivoire, Ghana, Guinea, Liberia, and Sierra Leone. Time-trees indicate that the Alestidae, Hepsetidae, and new clade originated during the Santonian-Campanian of the Late Cretaceous (84–77.5 million years ago). µCT scans provide three novel morphological characters supporting Hepsetidae + clade with *Arnoldichthys* and *Lepidarchus*, four characters for monophyly of the new clade, and five for Alestidae. The time-calibrated phylogeny indicates an increased Cenozoic diversification of fishes of the family Alestidae with species-rich clades appearing in the Paleogene, particularly *Alestopetersius*, *Brachyalestes*, and *Micralestes*. The Santonian-Campanian divergence indicates allopatric speciation processes influenced by the Trans-Saharan Seaway, which seemingly partitioned the African ichthyofauna in a west-east orientation, and early cladogenesis aligns with the Cenomanian fossil record and is *circa* 16–23 Ma younger than the earliest characiform-like fossils from Late Cretaceous outcrops of Morocco and Sudan. This study highlights the magnitude of Cretaceous transgression and K-Pg boundary events in shaping the freshwater biota and gaps in our understanding of the evolutionary history and paleobiogeography of ray-finned fishes across the African continent.

Palavras-chave: macroevolution, marine transgression, paleobiogeography, ultraconserved elements.

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