
Global biogeographical regions of freshwater fishes

Boris Leroy^{*1}, Murilo Dias, Emilien Giraud, Bernard Hugueny¹, Céline Jézéquel, Fabien Leprieur², Thierry Oberdorff³, and Pablo Tedesco³

¹Biologie des Organismes et Ecosystèmes Aquatiques (BOREA) – Muséum National d’Histoire Naturelle (MNHN), Université Pierre et Marie Curie (UPMC) - Paris VI, Institut de recherche pour le développement [IRD], CNRS : UMR7208 – 7, rue Cuvier, CP 32, 75231 Paris Cedex 05, France

²MARine Biodiversity Exploitation and Conservation (UMR MARBEC) – Institut de Recherche pour le Développement : UMR_D248, *Institut français de Recherche pour l’Exploitation de la Mer* : UMR9190, *Université de Montpellier* : UMR9190, *Centre National de la Recherche Scientifique* : UMR9190 – – *Montpellier, France*

³Laboratoire Evolution et Diversité Biologique, UMR 5174 – Université Paul Sabatier – Bat. 4R1, 118 route de Narbonne, 31062 Toulouse cedex 4, France

Abstract

Two centuries ago, early biogeographers outlined six major biogeographic regions (Nearctic, Neotropical, Palearctic, Ethiopian, Oriental and Australian) on the basis of the distributions of organisms across continents. During recent years, these major regions have been confirmed by an upsurge in bioregionalisation studies. However, this upsurge befell exclusively on terrestrial vertebrates, which represent but a fraction of continental organisms. Here, we propose to investigate global biogeographical regions for a group of organisms with very peculiar and limited dispersal abilities: freshwater fishes. We define for the first time the hierarchy of kingdoms, regions and subregions of freshwater fishes by applying network methods on the recently published global database on freshwater fish occurrence. We compare freshwater fish regions to the well-known regions of other groups and discuss the processes that generated the observed regions. Specifically, we investigate transition zones between regions in order to determine whether freshwater fish were subject to the same processes of vicariance-dispersal as other continental life forms. Our results suggest that freshwater fish regions were shaped by similar events of vicariance and geodispersal than other groups but with freshwater-specific processes of isolation that led to extremely high degrees of endemism, specific boundary locations, and limited extent of transition zones. The extremely high endemism and diversity of freshwater fish regions urges their high vulnerability, and we show here, by comparing the historical (excluding introduced species) versus current (including introduced species) regions the consequences of the current global and massive rates of species introductions.

*Speaker