

# Avian biogeography on western Indian Ocean islands: eustatic sea levels, geological events and anthropogenic changes

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Hume, J.P. Avian biogeography on western Indian Ocean islands: eustatic sea levels, geological events and anthropogenic changes. *Scripta Geologica*, **143** [supplement to **142**]: 185. Leiden, December 2011.

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The south-western Indian Ocean islands, excluding the microcontinent of Madagascar, are geologically complex and diverse. They have been subject to drastic sea level changes, volcanic events and anthropogenic changes, all of which have contributed to confuse understanding of their avian biogeography. An array of factors have affected these avifaunas, based on palaeontological, historical and molecular evidence, which together have shown that avian biogeography is not congruent with the relative age and size of the islands. The 65 million year old granitic Seychelles, which has virtually no fossil record, were once large, high islands that are now almost submerged and extremely reduced in size; their present avifauna is barely differentiated from younger coralline islands, which range in age from just 10,000 to a few 100,000 years. Of the latter, only Aldabra Atoll has a Pleistocene fossil record, but sea level changes have periodically inundated the island, so present bird diversity is also of recent origin. The Comoros Archipelago and the Mascarene Islands are both volcanic island groups of intermediate geological age, yet the former has no known fossil record whereas the Holocene fossil record of the latter is exceptional.

As a result of their excellent fossil and archival records, the original bird faunas of two of the three Mascarene islands, Mauritius and Rodrigues, are comparatively well known. The third Mascarene island, Réunion, which probably lost most or all of its original avifauna during the eruption of the Piton des Neiges volcano between 300,000 and 180,000 YBP, and, unfortunately, has a much poorer fossil record. The origins of the avifaunas of western Indian Ocean islands appear to be predominantly, but by no means exclusively, derived from southeast Asia, rather than Madagascar or Africa, which are closer geographically. This can potentially be explained by both eustatic and local sea level changes, which provided island stepping stones across otherwise vast expanses of water during sea level low stands. Finally, the impact of human colonisation must be considered. The Comoros have been occupied since the 6th century, which may have resulted in the early extinction of a large number of taxa, but has no historic record, whereas the Mascarenes remained comparatively pristine until the 17th century, so the original fauna is well documented. Therefore, as all of these Indian Oceanic islands have suffered severe anthropogenic changes, and the fossil record is far from complete, any conclusions based on present avian biogeography must be approached with caution.

