



## Gone with the wind: westward dispersal across the Indian Ocean and island speciation in *Hemicordulia* dragonflies (Odonata: Corduliidae)

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### Abstract

The taxonomy and biogeography of the western representatives of the largely Papuan-Australian genus *Hemicordulia* are discussed and compared with other alate fauna including butterflies, birds, bats and other dragonflies. Specimens from Malawi, Mozambique, Réunion, South Africa, Tanzania and Uganda were compared with Indian specimens of *H. asiatica*, with which they were previously regarded conspecific. They are found to be distinct and are described as the continental *H. africana* **n. sp.** and those from Réunion as *H. atrovirens* **n. sp.** The three species were compared with *H. similis* of Madagascar and *H. virens* of Mauritius. Insufficient material of the Seychelles taxon *H. similis delicata* was available; it may represent another insular endemic species. The distribution of *Hemicordulia* is discussed in the light of the dispersal capacity of Odonata and the biogeography of taxa with similar distributions in the region, with an emphasis on the survival of ‘oceanic’ species on the continent. Recent (i.e. in the last few million years) trans-oceanic airborne dispersal aided by westward storms, is the most likely explanation for the distribution of the genus in Africa and the Indian Ocean islands, as well as for other winged animals of Asian affinities in the region. The world range of *Hemicordulia* is largely insular, broadly excluding continents, and *H. africana* **n. sp.** demonstrates ‘inverted insularity’: all continental sites are in proximity to large water bodies, such as the great African lakes. This pattern may be related to the climatological instability of these sites, which offer suitable cool habitat where competition is (temporarily) reduced. *Hemicordulia* prefer cool conditions, but may be vulnerable to overheating and competition with more warm-adapted species.

**Key words:** Anisoptera, *Hemicordulia*, Africa, India, Indian Ocean islands, taxonomy, biogeography, key

### Introduction

“The [...] possibility can immediately be ruled out on good reasons: both the behavioural characteristics and habitat preference of this non-migrating, forest-dwelling [...] species are fully incompatible with long-range flight over open seas. Hypothetically, only natural disasters like volcanic eruptions or tidal waves could force survivors [...] to suddenly leave their habitats, and this too, only soon to reach the nearest safe forest habitat [...]. Neither are the prevailing systems of trade winds [...] in the Indian Ocean [...] in any way favourable to transport viable propagules [...] from the nearest landmass in the indo-malayan region to Madagascar.”

Farkas’s (1985) emphatic dismissal of westwards trans-oceanic dispersal of an alate forest animal, the passerine genus *Copsychus* in his case (Fig. 21), neatly summarises the opposition against the notion that eastern elements of the terrestrial fauna in the western Indian Ocean may have arrived airborne. Nonetheless, avian examples alone suggest that such dispersal from Asia towards Africa may be frequent (Keith 1980). Louette (1987) hypothesised that several overseas colonisations of the passerine genus *Hypsipetes* from India to Madagascar and surrounding islands gave rise to five similar species (Fig. 22). Phylogenetic reconstructions place Indian Ocean *Hypsipetes* and *Copsychus* within Asian radiations of their families (Farkas 1985; Jønsson & Fjeldså 2006; Moyle & Marks 2006). Thomassen *et al.* (2005) found the nearest relatives of Sey-