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A revision of *Pheidole* Westwood (Hymenoptera: Formicidae) in the islands of the Southwest Indian Ocean and designation of a neotype for the invasive *Pheidole megacephala*

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Abstract

The myrmicine genus *Pheidole* Westwood is revised for the smaller islands of the Southwest Indian Ocean: Comoros, Juan de Nova Island, Mauritius, Mayotte, Réunion, and the Seychelles. Descriptions and keys are provided for the thirteen species on these islands of which seven are newly described: *P. decepticon* sp. n., *P. dodo* sp. n., *P. komori* sp. n., *P. loki* sp. n., *P. megatron* sp. n., *P. ragnax* sp. n., *P. vulcan* sp. n.; and six were previously described: *P. braueri* Forel, *P. fervens* Smith, F., *P. jonas* Forel, *P. megacephala* (Fabricius), *P. parva* Forel, and *P. teneriffana* Forel. New synonymies (with the senior synonym listed first) include *P. parva* Mayr = *P. flavens* var. *farquharensis* Forel, *P. parva* Mayr = *P. tarda* Donisthorpe, *P. megacephala* (Fabricius) = *P. picata* Forel, *P. megacephala* (Fabricius) = *P. punctulata* r. *gietleni* Forel, 1905, *P. megacephala* (Fabricius) = *P. picata* var. *bernhardae* Emery, 1915, *P. megacephala* (Fabricius) = *P. megacephala* r. *scabrior* Forel, and *P. teneriffana* Forel = *P. voeltzkowii* Forel. Furthermore, lectotypes are designated from the syntypes of *P. braueri*, *P. fervens*, *P. jonas*, *P. parva*, and *P. teneriffana* in order to provide a single name-bearing specimen and to facilitate future taxonomic studies. Finally, a neotype is provided for the untraceable or possibly lost type of the cosmopolitan and invasive *P. megacephala*, which was originally described by Fabricius from Mauritius (the former ‘Ile de France’).

Key words: Myrmicinae, *Pheidole*, new species descriptions, taxonomic revision, introduced species, native fauna, Comoros, Juan de Nova Island, Mauritius, Mayotte, Réunion, Seychelles

Introduction

The Southwest Indian Ocean (SWIO) islands of Madagascar, Comoros, Europa, Juan de Nova, the Mascarenes (including Mauritius, Réunion, and Rodrigues), and the Seychelles contain one of the highest concentrations of endemic and threatened organisms on earth (Myers *et al.* 2000, Goodman & Bernstead 2003). Isolation, geographic placement, varied geological histories, and environmental heterogeneity have all contributed to the diversity of endemic species. With a greater age range than most other island systems, the SWIO island bioregion offers a unique opportunity to explore mechanisms driving the accumulation of restricted-range species at regional and local levels (Warren *et al.* 2003, Wilmé *et al.* 2006).

The Southwest Indian Ocean islands are composed of a set of recently-emerged coralline islands: the Aldabra group, Farquhars, and Amirantes, aged 15,000 years to 0.125 Ma (Radtkey 1996, Thompson & Walton 1972); relatively young volcanic islands (the Mascarenes and the Comoros) that range in age from 0.13–15 Ma (Ballestracci *et al.* 1985, Emerick & Duncan 1982, Montaggioni & Nougier 1981, 1982, Nougier *et al.* 1986); and the Seychelles and Madagascar, granitic remnants of the Gondwanan continental block that became isolated around 75–130 Ma (Ali & Aitchison 2008, Coffin & Rabinowitz 1987, Kingdon 1991, Rabinowitz *et al.* 1983).

To unravel the history and diversity of ants in the SWIO, inventories were conducted across the island systems by BLF and members of the Malagasy Arthropod team based at the Madagascar Biodiversity Center in Madagascar. Here we report on the diversity and taxonomy of the myrmicine genus *Pheidole* Westwood (1839) on the smaller islands in the region, excluding Madagascar. *Pheidole* is a priority for taxonomic study because of its local diversity and the threat of introduced species in the region. Small SWIO islands such as the Seychelles are under threat from invasive species such as *Pheidole megacephala* (Fabricius), deforestation, and urban growth (Louette *et al.* 2004) but have not received the same attention from biologists as Madagascar (Goodman & Bernstead 2003).

Background

Very little is known about *Pheidole* of the smaller islands of the SWIO apart from a number of general checklists for individual islands (Blard *et al.* 2003, Donisthorpe 1946, Dorow 1996, Forel 1895, 1897, 1907a & 1907c, Gerlach 1998a & 1998b, Madl 2006, Mamet 1954, Mühlenberg *et al.* 1977, Parnaudeau & Madl 2009). Wheeler (1922) gave a relatively detailed account of the ant fauna of the Malagasy region where he listed many of the already described species. Fisher (1997) provided a complete overview of the described species and their known distributions. Only 23 valid *Pheidole* taxa have been described so far from the SWIO islands including Madagascar, the last almost a century ago, in 1918 by A. Forel. Within the last two decades, however, an estimated one hundred or more undescribed *Pheidole* species have accumulated from the intensive inventories carried out in the region. Apart from the most basic ecological requirements inferred from occurrence data, little knowledge exists about the biology of virtually all of the new species and a majority of the previously described species from the SWIO islands.

Dubious records, misidentifications and new synonymies

Although a great effort was made to locate historical specimens in museums in Europe and to conduct exhaustive inventories, a few published species records from the region could not be verified. We classify them as dubious records and exclude them from the region's species list. One of the two dubious species records is *Pheidole anastasioi* var. *cellarum* Forel (junior synonym of *P. bilimeki* Mayr), recorded by Donisthorpe (1946) and based on a single collection by Mamet. Though Mamet's Mauritius collection was studied at Morrison Natural History Museum in Morrison, Colorado and at the The Natural History Museum in London, UK, specimens of *Pheidole bilimeki* were not found. No subsequent records have been published and this species was not found during the recent inventory work in Mauritius. This species is widespread from Mexico to northern South America and has been recorded in hothouses in Europe. The species record for Mauritius may represent either a misidentification or an introduction to the island that did not persist. The other unconfirmed record is *P. punctulata* Mayr. Two major workers from the Seychelles and Madagascar, identified by Forel (1897, 1907), are clearly specimens belonging to the new species *P. decepticon*. In addition, four species mentioned in the literature now become junior synonyms. Reported from the Seychelles and the Comoros (Wheeler 1922), and described from Madagascar, *Pheidole megacephala* r. *scabrior* Forel is a new synonym of *P. megacephala* (Fabricius). The same applies to *P. picata* Forel (and its two subspecies), which was described from Madagascar as a new variation of *P.*