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The ant genus *Tetramorium* Mayr (Hymenoptera: Formicidae) in the Malagasy region—taxonomy of the *T. bessonii*, *T. bonibony*, *T. dysalum*, *T. marginatum*, *T. tsingy*, and *T. weitzeckeri* species groups

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ABSTRACT

The taxonomy of the *T. bessonii*, *T. bonibony*, *T. dysalum*, *T. marginatum*, *T. tsingy*, and *T. weitzeckeri* species groups is revised. A total of 33 species is treated, of which 27 are newly described and one is raised to species status. The *T. weitzeckeri* group contains the single species *T. humbloti* Forel, which is of Afrotropical origin and the only representative of the group in the Malagasy region. The species *T. bessonii* Forel, *T. dysalum* Bolton, *T. marginatum* Forel, and *T. steinheili* Forel, which were originally members of the *T. weitzeckeri* group, are now placed in other groups. *Tetramorium bessonii* is the core species of the *T. bessonii* group, which also contains the four newly described species *T. artemis* sp. n., *T. malagasy* sp. n., *T. ryanphelanae* sp. n., *T. wardi* sp. n., and *T. orientale* Forel stat. n., which was a junior synonym of *T. bessonii* but is now raised to species rank. The *T. dysalum* group is a moderately-sized group with ten species, of which only *T. dysalum* and *T. steinheili* were previously known; the other eight species are all newly described. The newly described species in this group are: *T. ambatovy* sp. n., *T. macki* sp. n., *T. mallenseana* sp. n., *T. orc* sp. n., *T. robitika* sp. n.,

T. sargina sp. n., *T. yammer* sp. n., and *T. vohitra* sp. n. A lectotype and several paralectotypes of *T. steinheili* are designated. *Tetramorium marginatum* is the central species of the *T. marginatum* group, which also includes the five newly described species *T. valky* sp. n., *T. hector* sp. n., *T. norvigi* sp. n., *T. shamshir* sp. n., and *T. silvicola* sp. n. The *T. bonibony* and *T. tsingy* groups represent completely new groups that consist entirely of previously unknown, undescribed species. The first group holds the new species *T. bonibony* sp. n., *T. kali* sp. n., *T. sada* sp. n., *T. nosybe* sp. n., *T. olana* sp. n., *T. popell* sp. n., and *T. trafo* sp. n. and *T. vony* sp. n. The last group, the *T. tsingy* group, only contains the two species *T. tyrion* sp. n. and *T. tsingy* sp. n., both among the rarest *Tetramorium* species in Madagascar. All groups are fully revised with illustrated species-level identification keys, and all species are described/re-described and illustrated with high quality montage images. In addition, the current status of the Malagasy *Tetramorium* species groups is discussed and further modifications are proposed.

Keywords: Malagasy region; taxonomic revision; taxonomy; Tetramoriini; *Tetramorium*

INTRODUCTION

Madagascar is a unique place with an astonishing variety of landscapes and climates combined with extraordinarily diverse ecosystems. As one of earth's most important biodiversity hotspots, it harbours an incredibly rich fauna with an exceptionally high degree of endemism (Goodman & Benstead, 2003, 2005). The ant fauna of Madagascar has proven no exception, featuring more than 1,300 species of which more than 95% are endemics (Fisher, 2003, 2005; BLF, unpublished data). Despite being highly diverse and of extraordinary importance, Malagasy ants are only rarely used as a focal taxon in conservation ecology or biogeography studies (Fisher, 1997, 1999, 2000a). The primary reason for this oversight is approximately 60% of the Malagasy ant fauna consists of undescribed species (Fisher, 2003, 2005), a serious hindrance for the broader use of ants in such studies. Moreover, species of many genera cannot confidently be identified to species level due to the lack of taxonomic identification tools. As a consequence it is fairly difficult to obtain reliable data on the species composition of particular localities, species turnover between localities, or local endemism rates.

Several genera have already undergone a modern taxonomic revision, such as *Aptinoma* Fisher and *Ravavy* Fisher (Fisher, 2009), *Technomyrmex* Mayr (Bolton, 2007), *Metapone* Forel (Alpert, 2007), *Monomorium* Mayr (Heterick, 2006), *Paraparatrechina* Donisthorpe (LaPolla *et al.*, 2010), *Pilotrochus* Brown (Brown, 1978; Bolton, 1984), *Pyramica* Roger (Bolton, 2000), *Strumigenys* Smith, F. (Fisher, 2000b), *Terataner* Emery (Bolton, 1981), and *Anochetus* Mayr and *Odontomachus* Latreille (Fisher & Smith, 2008). Other genera have been partly revised, either on a subgenus or species group level as with *Tetraponera* Smith, F. (Ward, 2009) or *Crematogaster* Lund (Blaimer, 2010). The male-based taxonomy of Malagasy ants also has seen great improvements in recent years with the works of Yoshimura and Fisher (2007, 2009, 2011), which now allow the identification of male specimens to subfamily and genus level for Dolichoderinae, Ponerinae, and Proceratiinae. Despite all of these studies, more than 60% of all Malagasy species remain in need of a modern taxonomic revision. The hyper-diverse and ecologically important genera *Camponotus* Mayr, *Pheidole* Westwood, and *Tetramorium* Mayr, which comprise together more than 40% of the Malagasy ant species diversity, deserve particular taxonomic attention.

The ant genus *Tetramorium* in the Malagasy region was first revised by Bolton (1979), who recognised 36 species (29 endemics) from six species groups. Later, Bolton (1985) synonymised the genus *Triglyphothrix* Forel under *Tetramorium*, which added the tramp species *T. lanuginosum* Mayr from the *T. obesum* species group to the Malagasy *Tetramorium* fauna. In the last decade two more tramp species, this time belonging to the *T. bicarinatum* group, were reported from Mauritius and Reunion (Blard *et al.*, 2003; Roberts & McGlynn, 2004). This accounts for 39 species known from the region until 2011. Recently, Hita Garcia & Fisher (2011) revised the taxonomy of four smaller species groups with 12-segmented antennae: the *T. bicarinatum*, *T. obesum*, *T. sericeiventre*, and *T. tosii* groups. Within the *T. sericeiventre* group, *T. mahafaly* Hita Garcia & Fisher was newly described, but *T. quadrispinosum* Emery was proposed as junior synonym of *T. sericeiventre* Emery, which left the species count at 39. Hita Garcia and Fisher (2011) also provided the foundation for an ongoing revision of the whole genus in the Malagasy region, which probably numbers more than 100 undescribed species. In addition, the taxonomy of *Tetramorium* in the region was discussed, the number of species groups was raised from nine to 14, all species groups were diagnosed, and a preliminary illustrated species group key was presented.

In this study we revise the taxonomy of the *T. bessonii*, *T. bonibony*, *T. dysalum*, *T. marginatum*, *T. tsingy*, and *T. weitzackeri* species groups for the Malagasy zoogeographical region. These groups include all species formerly