Myrmecologische Nachrichten	8	99 - 110	Wien, September 2006

A morphological and molecular study of some species in the *Camponotus maculatus* group (Hymenoptera: Formicidae) in Australia and Africa, with a description of a new Australian species

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Abstract

Captain Cook is recognised as the collector of *Camponotus maculatus* (FABRICIUS, 1782) from Sierra Leone and since then many subspecies have been described, most of which are from Africa. One, *Camponotus maculatus humilior* FOREL, 1902 is common in northern Australia. We describe a morphological and molecular study aimed at determining the relationship of species of the *C. maculatus* group in Australia and Africa. From this we find no close relationship between the Australian and African species examined. We raise *Camponotus maculatus humilior* to species rank, synonymise *Camponotus villosus* CRAWLEY, 1915 with *Camponotus novaehollandiae* MAYR, 1870 and describe *Camponotus crozieri* sp.n. We indicate the need for more work in defining the boundaries of *Camponotus novaehollandiae*.

Key words: Ants, Formicinae, DNA, cryptic species, *Camponotus maculatus*, *C. novaehollandiae*, *C. humilior*, *C. crozieri*, new species.

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Introduction

There are over 1400 described species and subspecies of *Camponotus* MAYR, 1861 world wide (BOLTON 1995). Their taxonomy is complicated by the wide variation in shape and colour of worker castes within a species. These divide into major and minor workers for performing the tasks associated with maintenance of a colony. The minors are the food gatherers and may be only a third of the size of majors which possess an especially large head and powerful mandibles for defending the colony.

Camponotus maculatus (FABRICUS, 1782) has accumulated over 100 subspecies and although the major worker of the species type has been adequately described and re-described (DONISTHORPE 1922), the minor worker has not been. Characters of minor workers are most useful for defining species boundaries in *Camponotus*. A.J.M. has examined the type specimen in BMNH of a major worker. It was collected by Captain Cook and believed to be from Sierra Leone. Most of the described taxa of the *C. maculatus* group are from Africa and thirty-nine of them have been raised to species rank (BARONI URBANI 1972). It is assumed the species name derives from the Latin macula = blotch or stain because of patches of lighter colour on its mesosoma.

One subspecies, *C. maculatus humilior* FOREL, 1902 has been described from Australia and it and its relatives, *C. novaehollandiae* MAYR, 1870 and *C. villosus* CRAWLEY, 1915 are common ants of northern Australia.

These three species possess strikingly similar morphological characters to some specimens of *C. maculatus* subspecies collected from Africa and now in the Humboldt Museum, Berlin and in the Natural History Museum, Vienna.

This study has been prompted by two questions: (a) Is the visual similarity in morphological characters of some Australian and African ants suggestive of a close evolutionary relationship, and could it be supported by molecular analysis? (b) What is the status of brownish specimens apparently closely related to *C. novaehollandiae*, common in Australia, in relation to the consistently coloured yellowish types of *C. villosus* and *C. novaehollandiae*?

A key to Australian *Camponotus* based on morphological characters has been constructed to facilitate the identification of species from Australia (MCARTHUR in press). Boundaries of most of the 101 described Australian species are obvious but a few species lack distinct characters for their separation, in particular *C. novaehollandiae* and *C. villosus*. Previous studies on Australian *Camponotus* (MCARTHUR & ADAMS 1996, MCARTHUR & al. 1997) have shown that molecular analysis is useful in separating closely related species suggesting this procedure could be helpful in this present study.

The *Camponotus* species targeted for this study possess the following distinguishing characters and are loosely referred to as the *C. maculatus* group herein:

1. The most striking character is the distinct occipital carina in minor workers (Fig. 1). This forms a ridge externally and probably serves to strengthen the anterior parts of the head (SNODGRASS 1935), it is absent in major workers.

2. Strong dimorphism, i.e., workers encountered are mostly either major or minor, medium workers are non existent or very scarce.

3. The sides of the heads of major workers taper strongly to the front (Fig. 2) while in minor workers, the sides are mostly parallel and taper to the rear (Fig. 4).

4. The vertex in major workers is concave or flat, in minor workers it is convex.

5. The scape and tibiae have plentiful short setae, raised up, more so in Australian than in African species.

6. Biology: (a) mostly nocturnal, (b) nests are in clay soil, never in sand, (c) entrances to nests are well hidden, (c) strong attraction to honey bait at night, (d) domination