

SHORT COMMUNICATION

**Nest construction in the arboreal ant *Polyrhachis tubifex*
Karavaiev, 1926**

SIMON K.A ROBSON¹ & RUDOLF J. KOHOUT²

¹School of Marine & Tropical Biology, James Cook University,
QLD 4811 Australia

E-mail: Simon.Robson@jcu.edu.au

²Biodiversity Program, Queensland Museum, PO Box 3300, South Brisbane
Queensland, 4101, Australia

E-mail: rudolf.kohout@qm.qld.gov.au

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The ant genus *Polyrhachis* is considered to be one of the 'giant' ant genera (Bolton 1995). With over 500 described species divided into 12 subgenera it continues to attract significant interest from taxonomists (Bolton 1995; Dorow 1995; Kohout 2008) and behavioural ecologists alike (Maschwitz *et al.* 2004; Robson & Kohout 2005). Socioecological factors such as the presence of polyandry or polydomy (van Zweden *et al.* 2007), foraging habits (Liefke *et al.* 1998) and the presence or absence of larval cocoons are highly variable. Nesting locations within the genus range from arboreal, to lignicolous, subterranean and even intertidal locations, while nest material, when present, ranges from larval or spider silk to carton (reviewed in Robson & Kohout 2007). Confirming the type and source of nesting material, particularly silk, remains an important step in determining the evolution and organisation of nest weaving behaviour within the genus (Robson 2004).

Studies of *Polyrhachis* from Southeast Asia have played a particularly key role in advancing our understanding of the genus, as they form a significant component of the local ant fauna (Mohamed *et al.* 1996) and provide valuable input for ongoing taxonomic (Kohout 2007a, b, c), behavioural (Robson & Kohout 2007) and ecological studies (Yamane *et al.* 1996; Hashimoto *et al.* 1997; Brühl *et al.* 1999; Widodo *et al.* 2004). Almost one hundred years ago Karavaiev (1926)

described the structure of three nests of *Polyrhachis tubifex* Karavaiev located in the Bogor Botanic Gardens, Java. These unusual 'felt' nests on the sides of plant stems were described as being comprised of a combination of fine-fibres, plant-derived material and bird feathers, but whether any of these fibres represented larval silk was not reported. In this study we use scanning electron microscopy to examine in more detail the nesting material of this species.

A single nest of *P. tubifex* was observed on the trunk of a tree at the Danum Valley Field Station, Sabah, Malaysia during December 2007. The nest walls were comprised of a fluffy soft material approximately 2-3 mm thick. Scanning electron microscope (using gold sputtered samples and a JEOL JSM-5410LV Scanning Electron Microscope at magnifications of up to 1000 times) indicated that the nest walls consisted predominantly of fibres of many dimensions with occasional pieces of what appeared to be plant material (Figure 1a & b). At both the macroscopic and microscopic level the nest material therefore appeared very similar to those of *P. turneri* Forel, a lithicolous nesting species from Australia that constructs its nests predominantly from spider silk (Fig 1c, Robson 2004). Although it was not possible to conclusively determine the origin of the fibres observed in the *P. tubifex* nest (larval silk, spider silk, etc.), they are very different from the regularly

sized fibres typically laid down in flat sheets in the nests of those *Polyrhachis* species in which the use of larval silk for nest construction has been confirmed (Fig. 1d, Robson & Kohout 2005).

Our study confirms the construction of ‘felt’ arboreal nests by *P. tubifex* colonies, comprised predominantly of what appears to be plant-derived materials and fibres, and indicates that the inclusion of larval silk must be very minor at best. We found no record of the flat sheets typically produced by those *Polyrhachis* species that use

larval silk as the principal source of building material, and the conclusion that *P. tubifex* is a larval-silk weaving species (as reported in Robson & Kohout 2007, based on a summary provided in Karavaiev 1928), may need to be revised. Examination of the behaviour of individual workers during nest construction would be informative and is certainly achievable. Karavaiev (1926) noted that he observed workers rebuilding a nest in the Bogor Botanical Gardens, but unfortunately provided no details on the actual behaviours involved.

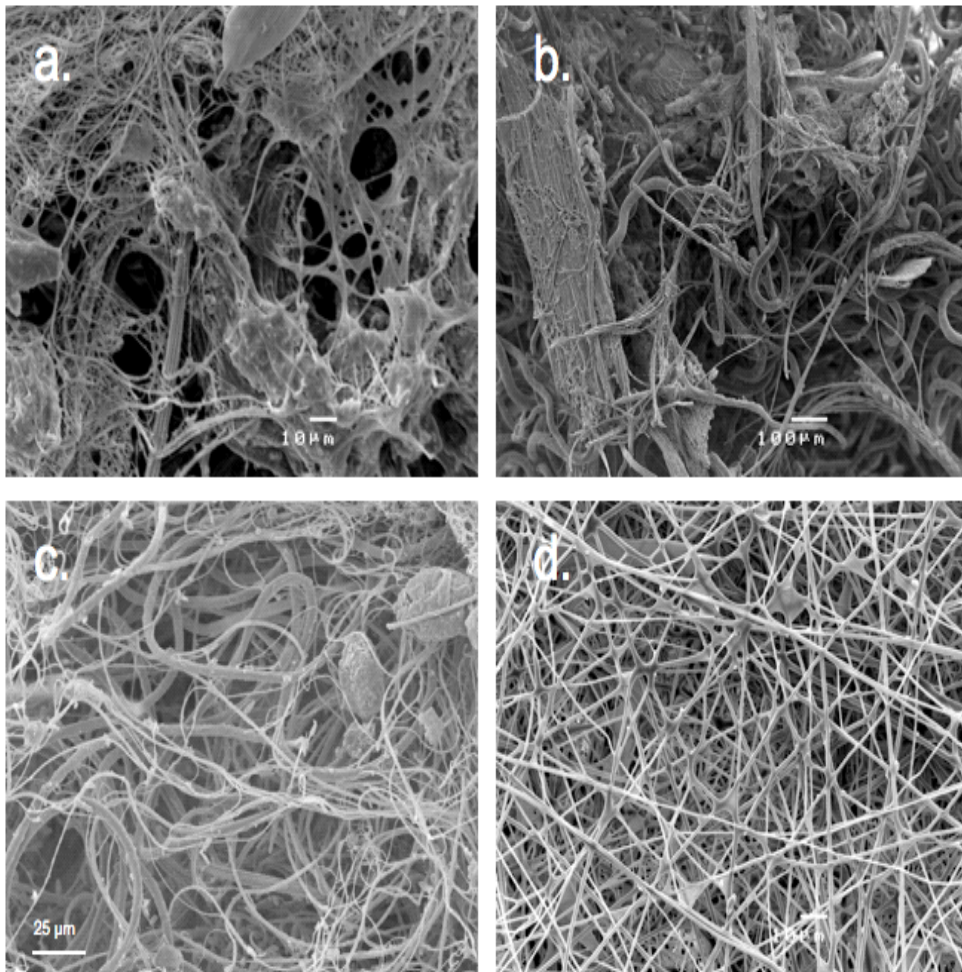


Fig. 1. Scanning electron microscope images of the material comprising the nest walls of a *Polyrhachis* species constructing nests from plant-material and fibre (*Polyrhachis tubifex* (a,b), spider silk (*Polyrhachis turneri* (c)) and larval silk *Polyrhachis australis* (d)).

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