



Myrmecodesmus hastatus (Schubart, 1945), a widespread Neotropical millipede (Diplopoda, Polydesmida, Pyrgodesmidae)

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Abstract: The distribution of the small-bodied millipede *Myrmecodesmus hastatus* (Schubart, 1945), which currently covers much of South America, is reviewed and refined with the first records from Peru and Mato Grosso state, Brazil. Generally, this species seems to be so strongly associated with ant and termite nests that synanthropization might have also contributed to the species' extensive range due to host range expansions.

Key words: *Diplopoda*, *Myrmecodesmus*, myrmecophily, termitophily, synanthropization, South America

INTRODUCTION

The millipede *Myrmecodesmus hastatus* was first described as the type, and sole constituent species of the genus *Gonographis* Schubart, 1945: *G. hastata* Schubart, 1945, from Distrito Federal, Brazil. A little later, the same species was again described as new: *Lophodesmus inquilinus* Silvestri, 1947, from one place in Argentina and two in Brazil (Silvestri 1947). Their formal synonymy was advanced by Schubart (1954).

Hoffman (1985) described another *Gonographis*, *G. adisi* Hoffman, 1985, a semiaquatic species from near Manaus, Amazonas, Brazil. Further two congeners, *G. minuscula* Golovatch, 1997 and *G. duodecimlobata* Golovatch, 1997, were added, both from near Manaus as well, and this genus was believed endemic to South America (Golovatch 1997). Finally, Golovatch (2000) has synonymized *Gonographis* with *Myrmecodesmus* Silvestri, 1910 and formally transferred all four erstwhile *Gonographis* species to *Myrmecodesmus*, i.e. *M. hastatus*, *M. adisi*, *M. minusculus*, and *M. duodecimlobatus*. These are still the only species of this genus known from South America proper.

As a result, *Myrmecodesmus* as currently accepted is a highly species-rich and variable genus with as many as 11 generic synonyms and more than 30 valid species (cf. Hoffman 1999). The distribution pattern of this genus is thus pan-Neotropical, ranging from Florida, Alabama, Mississippi, Louisiana and Texas in the U.S.A. (Shelley 2004) in the north to Argentina in the south. The bulk of *Myrmecodesmus* species diversity is confined to Central America together with the Caribbean, whereas both southern North America and entire South America seem to support depauperate faunas. However, in South America at least, in contrast to any other congener, one of the four currently described species appears to have attained a particularly vast distribution, a fact accounted for by its presumably particular ecological traits. This species is *M. hastatus*. Below is a review concerning its geography and ecology as based both on published records, and new material accumulated in recent years.

ZMUM stands for the collection of the Zoological Museum of the Moscow State University, Russia, while CA for Collection of Joachim Adis, Plön, Germany.

DISTRIBUTION

Myrmecodesmus hastatus (Schubart, 1945)

Material: 2 ♂♂, 1 ♀ (ZMUM), Peru, Dept. Loreto, 60 km W of Pucallpa, YVITA Research Station, pasture, *Pheidole* sp. anthill, 18.03.1986, leg. A.A. Zakharov. – numerous ♂♂, ♀♀ (CA, ZMUM), Brazil, Mato Grosso, Cuiaba, garden, 20.06.1999, leg. L. Wilck (see also Adis et al. 2003).

Remarks: This species appears to be extremely widespread over much of South America, being associated with human settlements, gardens, plantations as well as termitaria and ant nests. It has hitherto been encountered in the following places.

Brazil: Distrito Federal, Maciço da Tijuca, garden at Furnas (Schubart 1945); São Paulo, Mun. Pirassununga, Cachoeira de Emas, estates, gardens, banana plantations; Mun. Mogiguassú, Mogi-Guassú, estate and garden (Schubart 1944, 1947b, 1952); São Paulo City, Vila Mariana, “cupinseiro” and ant nests; Mun. Itanhaem, Santa Clélia Farm, banana plantation and in *Pheidole* anthills; Mun. Barretos, Colômbia, gardens (Schubart 1947b, 1954; Silvestri 1947); Pará, Mun. Belém, Aurá, under a tree downtown and in orchard (Schubart 1947a, 1947b); Bahia, Brotas, *Anoplotermes reconditus* termitarium (Silvestri 1947); Rio de Janeiro, Mun. São Gonzales, Fazenda Engenho Novo (Schubart 1954).

Argentina: Prov. Tucumán, Tucumán, in *Solenopsis* anthills (Silvestri 1947; Schubart 1954).

The above new samples represent the first formal records of *M. hastatus* in Peru and in Mato Grosso state, Brazil. Furthermore, based on the above evidence, one can readily presume that *M. hastatus* is actually much more common in Amazonia and other places in South America, Brazil first of all. The occurrence of this species in Paraguay and/or Bolivia, located in between Tucumán and the sites in Brazil, is also quite plausible. All currently known records are shown on Map. Future collecting efforts undertaken in various urban, agricultural and other disturbed habitats, especially in search for symphiles of anthills and termitaria, are certain to reveal this small pyrgodesmid species (5–6 mm in length) as being one of the most usual, widespread and characteristic myrmeco- and termitophiles in the Neotropics.

REVIEW OF *MYRMECODESMUS HASTATUS* ECOLOGY

The above records show clear-cut inclinations of *M. hastatus* to dwelling in open habitats, often if not always in association with ants and/or termites. Among *Myrmecodesmus*, as implied by the generic name alone, there are several species that can be termed as formicand/or termiticoles. Some of these, like numerous other examples of myrmeco- or termitophily, are indeed relatively widespread, especially when the host species of ant or termite occupies a wide geographical area (cf. Schubart 1947b). This concerns at least *M. formicarius* Silvestri, 1910, known from Vera Cruz, Mexico north and east through the Texas coastal plain as far as Louisiana, U.S.A. (Hoffman 1999, Shelley 2004). However, *M. hastatus* appears to be especially widely distributed, ranging over much of South America from Amazonia in the north to northern Argentina in the south (Fig. 1). Apparently, this can be accounted for not only by the symphily of *M. hastatus* with ants and termites but also by its presumably high-level tolerance to desiccation, implying a particularly hard exoskeleton and probably certain morphological modifications of the cuticula and spiracles. Yet, using SEM techniques, superficially no peculiar/meaningful traits have been found in *M. hastatus* vis-à-vis two such ecologically different congeners from Brazilian Amazonia as *M. duodecimlobatus* (Golovatch, 1997), from terra firme woodlands, and *M. adisi* (Hoffman, 1985), a semiaquatic species from whitewater inundation forest (Adis et al. 2003).



Fig. 1. Places of occurrence of *Myrmecodesmus hastatus* (Schubart, 1945).

Indeed, in the tropics, open terrain is known to be much drier than forest habitats. Also, like any deteriorated/secondary environment, open biotopes, including urbanized and agricultural ones, support disproportionately high numbers but fewer species of ants as compared to woodlands. This phenomenon of ant superdomination is the more impressive as ants generally dominate any tropical forest in terms of both animal population density and species richness (e.g., Holldobler & Wilson 1990). Keeping this in mind, it is hardly surprising that the millipede species *M. hastatus*, probably a facultative(?) symbiont of ants and termites, many of which are known to be adapted to disturbed to completely man-made environments, has successfully colonized, often if not always following their host(s), a very wide range of secondary habitats like grasslands, parks, gardens, orchards, plantations and urbanized places. This has been accompanied by a significant geographical range expansion as well, one that currently covers much of South America. The range is presently so extensive that it is virtually impossible to unequivocally outline a possible source/origin area for *M. hastatus*, though this seems more likely to have lain somewhere in northern South America, closer to Central America, the epicenter of *Myrmecodesmus* species diversity. In this connection, the above record of *M. hastatus* in the upper reaches of Amazon River within Peru is of particular interest.

In general, as both myrmeco- and termitophily amongst tropical Diplopoda are particularly characteristic of Pyrgodesmidae (Schubart 1947b, Silvestri 1947), one can easily suggest that the unique, pan-Neotropical distribution pattern of the genus *Myrmecodesmus* as a whole may have become realized, at least in part, through close association of some of its constituent species with ants and/or termites.

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STRESZCZENIE

[*Myrmecodesmus hastatus* (Schubart, 1945) – gatunek krocionoga (Diplopoda, Polydesmida, Pyrgodesmidae) szeroko rozprzestrzeniony w Neotropiku]

W pracy dokonano analizy i oceny rozmieszczenia niewielkiego krocionoga *Myrmecodesmus hastatus* (Schubart, 1945). Aktualnie, jego rozprzestrzenienie obejmuje większość kontynentu Ameryki Południowej. W analizie uwzględniono ostatnie dane z Peru i stanu Mato Grosso w Brazylii. Gatunek ten wydaje się być ściśle związany z gniazdami mrówek i termitów. Dlatego rozszerzenie zasięgu tych krocionogów może wynikać również z ekspansji gospodarzy związanej z ich synantropizacją.

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