



SHORT NOTE

Rediscovery of the morphologically remarkable social parasite *Pheidole acutidens* (Santschi, 1922), with the first records for Brazil

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Abstract

Pheidole acutidens is a social parasite of the congeneric species *P. nitidula*. Since its description, the species was considered native to Argentina. In this paper we report the first records of *P. acutidens* for Brazil in the southern states of Santa Catarina and Rio Grande do Sul. These records extend the known distribution of the species at least 1,000 km to the north. We suggest that the scarce representation of this species in entomological collections is due to its peculiar reproductive strategy, which renders the species inconspicuous and limits its dispersion.

Pheidole Westwood, 1839 (Formicidae: Myrmicinae) is considered one of the largest ant genera, with more than 1,000 valid names (Bolton, 2016). The species are generally known for being prevalent in all environmental strata making it a group of primordial ecological importance, especially in tropical forests (Wilson, 2003). Amongst the reproductive strategies found in *Pheidole*, social parasitism is certainly the most remarkable. Social parasites are exquisitely adapted to exploit their hosts, totally depending on them for food and brood care, since they do not produce workers (Wilson, 1971; Hölldobler & Wilson, 1990; Buschinger, 2009).

We currently recognize nine species of social parasites in *Pheidole*: *P. acutidens* (Santschi, 1922), *P. argentina* (Bruch, 1932), *P. symbiotica* (Kusnezov, 1951), *P. elecebra* (Wheeler, 1973), *P. inquilina* (Wheeler, 1965), *P. lanuginosa* Wilson (1984), *P. neokholi* Wilson (1984), *P. parasitica* Wilson (1984), and *P. kosnezovi* Wilson (2003).

Like other social parasites *P. acutidens* presents a morphological syndrome that includes reduced size,

lengthening of antennal scapes, reduction of the mandibles, smooth and shining body surface, and broadening of the postpetiole (Wilson, 1971). Also, queens of this species have a rounded head, falcate toothless mandibles ending in an extremely acute angle, antennae with 9-11 articles, a single pair of wings without venation, and a globose gaster, (Santschi, 1922; Bruch, 1931; Wilson, 1984) (Fig. 1). Male morphology is even more bizarre. Presenting a rounded head, 12 segmented antennae, and physiogastry. Also, according to Wilson (2003) the male also has vestigial or absent falcate mandibles, and pupiform body. In addition, males of *P. acutidens* are brachypterous (Bruch, 1931; Wilson, 1984).

The taxonomic history of *Pheidole acutidens* reflects its unique behavior and morphology. Santschi (1922) described the monotypic genus *Bruchomyrma* with *Bruchomyrma acutidens* as its type species based on a single dealate queen collected by Carlos Bruch (1869-1943) in 1916. He also characterized *Bruchomyrma* through an extensive diagnosis, and mentioned its morphological similarity to *Anergatides*



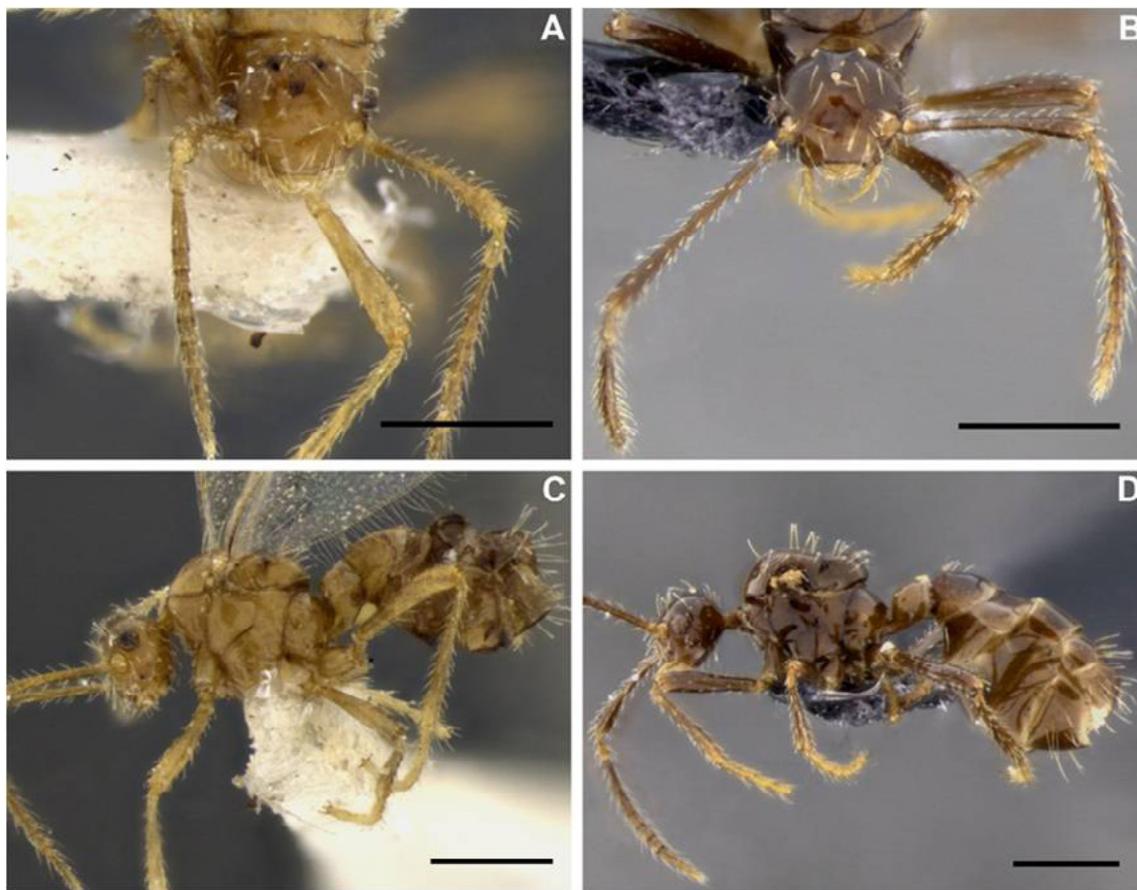


Fig 1. *Pheidole acutidens* queens from Caxias do Sul (A, C) and Otacilio Costa (B, D). A, B: full-face view; C, D: body in lateral view. Scale bars: 0,5mm.

kohli Wasmann, 1915, despite the “easily recognizable differential characters”. He also suggested that *B. acutidens* could be a social parasite of *Pheidole*, as reported for *A. kohli*.

Wilson (1984) performed a comprehensive study on social parasites of *Pheidole* and combined several genera under this genus, including *Anergatides* and *Bruchomyrma*. The combination made by Wilson for *P. acutidens* was mostly based on evidence mentioned by Brown (1973), which assumed that the different parasitic species of *Pheidole* evolved independently, with the parasitic syndrome arising convergently. In this context, the nomenclatural act proposed by Wilson (1984) may also be justified considering “Emery’s rule” (Emery, 1909) which states that social parasites are closely related to their host species.

Pheidole acutidens is currently known as a social parasite of *P. nitidula*. So far, the species distribution is restricted to Argentina, specifically to Las Flores (35°57’49.5’’S 58°56’20.4’’W) (Buenos Aires) and Alta Gracia (31°39’25.6’’S 64°26’05.1’’W) (Córdoba) (Bruch, 1931; Wilson, 2003). A hundred years after its discovery (Bruch, 1931), we rediscovered the species and present the first records for Brazil.

We examined two specimens, both queens. The first specimen is alate and was collected in Caxias do Sul (29°10’05’’S 51°10’46’’W), state of Rio Grande do Sul, on 21 March, 1988. There is no mention about the sampling method. The specimen is deposited in the myrmecological

collection of the Museu de Zoologia da Universidade de São Paulo (MZSP), São Paulo, Brazil.

The second specimen is a dealate queen from a pitfall sample collected in the municipality of Otacilio Costa (27°29’03.9’’S 49°54’14.4’’W), state of Santa Catarina, between December 2011 and January 2012 (Bartz et al., 2014; Rosa et al., 2015). The specimen was deposited in the Coleção Entomológica Padre Jesus Santiago Moure (DZUP) of the Universidade Federal de Paraná, Curitiba, Brazil.

The distribution map was generated by the program QGIS v.2.16.3 using data from geographic coordinates in Google Earth Pro 7.1.1.1580. Images of specimens were acquired with stereomicroscope Leica M205C coupled to a camera Leica DFC295 at Laboratório de Sistemática, Evolução e Biologia de Hymenoptera of MZSP. The images of the layers were aligned and combined in program Zerene Stacker v. 1.04, and posteriorly treated in Adobe Photoshop CS6 for brightness and contrast corrections.

These new records suggest the apparently restricted distribution of the species may be an artifact from lack of adequate sampling. Besides this collecting bias, the unique morphology and reproductive biology of *P. acutidens* may also explain the considerably low number of specimens in ant collections. Queens present an extremely enlarged mesosoma and have lost the hindwings, while males show extreme reduction in wing size and venation (brachyptery).

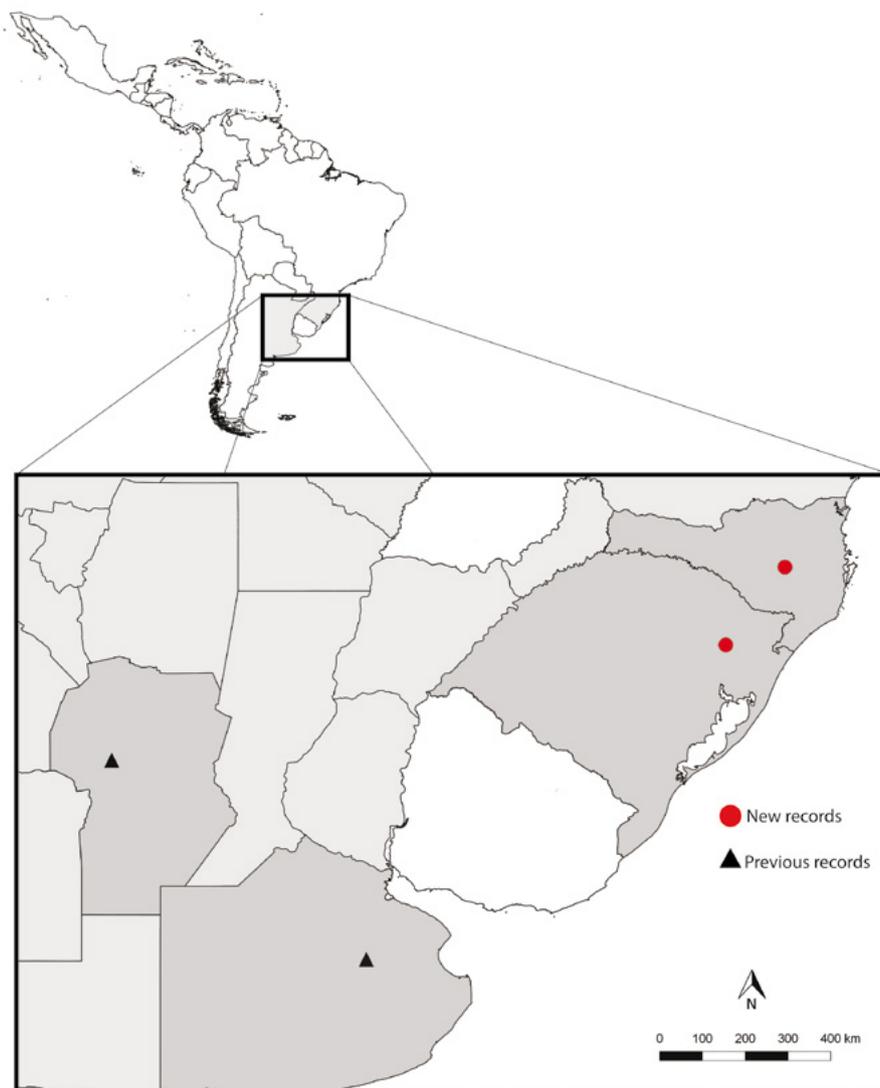


Fig 2. Distribution of *Pheidole acutidens* in Argentina and Brazil.

These unusual morphological features suggest limited flight capability and restricted dispersion rates in *P. acutidens*.

As described by Bruch (1931), *P. acutidens* queens are only accepted and adopted by *P. nitidula* workers in queenless nests. This limitation probably also restricts their dispersion, due the difficulty of finding suitable nests without host queens. However, once established, queens of *P. acutidens* can produce approximately 300 eggs and complete their life cycle in about three months (Bruch, 1931). This mass production of individuals may be linked to the trial and error way of infestation, with a great number of founding queens searching for queenless colonies of *P. nitidula*.

The intrinsic relationship between *P. acutidens* and *P. nitidula* can also be evidenced by the dependence of newly-hatched *P. acutidens* queens on *P. nitidula* workers to remove their cocoon and unfold their rudimentary wings after emergence. In addition, when invading a host colony, mated queens of *P. acutidens* rely entirely on the workers of *P. nitidula* to remove their wings and establish themselves in the new colony (Bruch, 1931). Considering the intrinsic

association between both species, *P. acutidens* probably occurs in the same range as *P. nitidula* - recorded from Argentina to the states of Rio de Janeiro, southeastern Brazil (Wilson, 2003). In this scenario, the records presented here represent the first step towards a more complete mapping of *P. acutidens* distribution.

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