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A new species and new records of minuta-group Gnamptogenys from Brazil (Hymenoptera: Formicidae)

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A B S T R A C T
We report new records of Gnamptogenys caelata Kempf (1967) and Gnamptogenys minuta (Emery, 1896) from Brazil. We also describe Gnamptogenys piei n. sp. from Southeast Brazil. This distinctive new species is known only from a single worker found in leaf litter from montane forests of the Mantiqueira mountains in Itatiaia National Park, Rio de Janeiro State, Brazil. The specimen was collected at 1991 m above sea level, an infrequent altitude for minuta-group ants, usually more common at lower altitudes. The new species is imaged, compared with other minuta-group species, and an updated identification key for all known species of the minuta-group is included.

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Introduction

The genus Gnamptogenys Roger is the most diverse of the Ectatomminae subfamily, with more than 130 species found in tropical and subtropical areas of Southeast Asia, Australasia, and the Americas (Lattke, 2004). This group is generally recognizable in the Americas by the usually costulate or striate integument, metacoxa with a dorsal tooth or spine, lack of a protibial apical seta, and the fused promesonotum. In the last twenty-five years, the New and Old World fauna were revised by Lattke (1995, 2004). Synopsis, keys and lists of species have been published by Wu and Wang (1995) and Xu and Zhang (1996) for Chinese species, Shattuck (1999) for the Australian fauna, Zhou (2001) for the Chinese Guangxi Province, Lattke et al. (2007) for the New World species, Lattke et al. (2008) for Colombian species, Lattke and Delsinne (2016) for minuta-group species, and Chen et al. (2017) for Chinese species.

The minuta-group comprises eight species found from Central America to southern Brazil. Some are widespread such as G. minuta (Emery, 1896) or G. caelata Kempf (1967), but most are known from either scant specimens or relatively restricted geographic distributions, such as G. falcifera Kempf (1967) or G. petiscapa Lattke (1990). Little is known about their biology but, in contrast with most Gnamptogenys that frequently nest in decomposing wood, these species probably nest in the soil. There are records of Gnamptogenys nests in decomposing wood, but the only minuta-group nest record is that of a G. minuta nest found in the soil under a stone (Lattke and Delsinne, 2016). The minuta-group is easily distinguished by having the frontal lobes completely covering the antennal insertions and the petiolar spiracle ventrally oriented and recessed in a pit (Lattke, 1992). Other Gnamptogenys have narrow frontal lobes that in a dorsal cephalic view leave the antennal basal condyle partially exposed and the petiolar spiracle opening is obliquely directed and at the same level as the surrounding cuticular surface (Lattke, 1992). The ever increasing amount of ant diversity studies and widespread adoption of leaf litter sampling has substantially enriched museum holdings of these ants. In this work we expand knowledge about distribution of two species: G. caelata and G. minuta, and describe G. piei n. sp., a very distinct new species of Gnamptogenys belonging to the G. minuta-group.

Materials and methods

The specimens under study were obtained during maintenance work in the ant collection of DZUP - Coleção Entomológica Padre Jesus Santiago Moura, Universidade Federal do Paraná, Curitiba, PR, Brazil.

The new species is described from a single worker collected during the “Projeto Altitudinal Mata Atlântica” in Itatiaia National Park in Mantiqueira Mountains, Rio de Janeiro, Brazil. During this project ants were collected with “mini-Winkler” extractors (Fisher, 1998) along an altitudinal gradient with eight sampling stations starting at 600 m and ending at 2457 m above sea level. In each station a 200 m transect was established with 10 sampling points separated

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20 m from each other, and 1 m² of leaf litter was sampled from each point (Lasmar, 2016). Despite this sampling effort (80 samples), just a single specimen of G. piei n. sp. was found. We compared it with specimens of G. striolata (Borgmeier, 1957) and G. caelata, which most resemble the new species, from DZUP and with digital images from Antweb.

In distribution list we consider records of municipalities and parks from Brazil. The new records correspond to the individual Brazilian states. The references of distribution were obtained from literature. In examined material we refer to the number of specimens in parentheses (1w = one worker). For all specimens we provided coordinates (in decimal degrees) and altitude (in meters). When these data were not available on the labels, we used Google Earth (2018) to estimate them. The coordinates and altitudes that were not directly obtained from the labels were written in parentheses.

Measurements of the ant were taken using a Leica KL300 LED stereomicroscope with an ocular micrometer (80x). The selection of measures and indices are based on Lattke and Delsinne (2016). All measurements are in millimeters.

**HL**: Head length: midline length of head proper, measured in full-face (dorsal) view, from the anterior clypeal margin to the midpoint of a line drawn across the vertexal margin.

**HW**: Head width: maximum width of head measured in full-face view, excluding the eyes.

**ED**: Eye diameter: measured along its long axis in lateral view.

**PL**: Petiole length: the maximum length of the petiole measured in lateral view.

**SL**: Scape length: length of the first antennal segment, excluding the neck and basal condyle.

**WL**: Weber’s length of the mesosoma: diagonal length measured in lateral view, from the anterior margin of the pronotum (excluding collar) to the posterior extremity of the metapleural lobe.

**CI**: Cephalic index: HW/HL × 100.

**OI**: Ocular index: ED/HW × 100.

**SI**: Scape index: SL/HW × 100.

Digital images were obtained with a Leica DFC 500 camera coupled to a Leica MZ216 stereomicroscope and Leica IM 50 software (Image Manager). Images were combined with the focus stacking software Leica Auto-Montage Pro. Additional edits were performed using GIMP 2.10.2.

**Results**

*Gnamptogenys caelata* Kempf (1967)

**Distribution in Brazil.** MARANHÃO: Açailândia (new record); MINAS GERAIS: Nova Lima (new record); PARÁ: Belém (Kempf and Brown, 1968); PARANÁ: Iguacu (Kempf, 1967); RONDÔNIA: Porto Velho (new record). Despite its widespread distribution in South America, the records are few and sparse, and these new records begin to fill in the significant gaps. Most records suggest a preference for lowland soils, although one is from 1400 m.


**Gnamptogenys minuta** (Emery, 1896)

**Distribution in Brazil.** ACRE: Senador Guiomard (new record). AMAZONAS: Manaos (Franken et al., 2013; Gomes et al., 2018); Meniconi (Lattke, 1992); Manaquiri (Souza et al., 2016). BAHIÁ: Ilhéus (Delabie and Fowler, 1995). GOIÁS: Jataí (new record). MARANHÃO: Estreito (new record). MINAS GERAIS: Viçosa (Sobrinho and Schoereder, 2007); Parque Estadual do Rio Doce (Castro et al., 2011). PARA: Iribova (Kempf and Brown, 1968); Alter do Chão, Santarém (Vasconcelos et al., 2006). RIO DE JANEIRO: Cítua Forest, Volta Redonda (Montine et al., 2014); Ilha Grande. SANTA CATARINA: Nova Teutônia (Borgmeier, 1957). SÃO PAULO: Biritiba-Mirim (Suguitur et al., 2013). These records fill in some gaps for the few Brazilian states where this species has not been recorded.


**Gnamptogenys piei** n. sp. (Fig. 1)

**Diagnosis.** Mesosomal dorsum mostly longitudinally costulate; anterior margin of clypeus with weak median lobe, clypeal lamella absent; metanotal groove absent; propodeum armed with small, distinct tooth; foretarsal base with seta opposite protubrial spur; dorsum of petiole with concentric rugulae; meso- and metatibiae with one apical spur each.

**Description.** Holotype measurements: HL 0.93; HW 0.84; SL 0.75; ED 0.13; WL 1.05; PL 0.43; CI 91; OI 16; SI 89. Head subquadrate in full-face view: posterior cephalic margin mostly straight with slight median concavity, lateral margin broadly convex. Eye convex, placed just anterad of cephalic mid-length; ommatidia relatively large, 7 ommatidia present along greatest diameter. Malar area with arched longitudinal carina extending from anterior clypeal margin to mid-distance between eye. Clypeal disk, frontal lobe, cephalic dorsum, and vertex with slightly sinuous longitudinal costulae; head punctate-rugulose laterally. Frontal lobe in full-face view expanded anterad, completely covering antennal insertion. Mandible triangular and elongate, dorsum longitudinally rugulose-punctate and shining, basal angle shaped as broad, blunt triangle; masticatory margin broadly concave with two preapical blunt teeth, largest situated close to mandibular mid-length and shortest closer to basal angle, some inconspicuous denticles found just apical of large tooth. Anterior margin of clypeus broadly convex, with weak median lobe, lamella absent; clypeal disk surface relatively flat. Surface level of both clypeal disk and most of frons interrupted by brief, depressed area between frontal lobes. Posterior clypeal margin at mid-length of frontal lobes shaped as obtuse angle posteriorly bordered by narrow parallel strip that slopes ventrally, defining anterior margin of depressed area. This area gradually slopes dorsal until reaching predomi- nant dorsal frons surface level just posterior to frontal lobes. Antennal scape surpasses posterior cephalic margin by less than one-fifth its length, shining, densely punctulate and densely covered by subrect whitish hairs. Cephalic ventrum with longitudinal to oblique rugulose costulae that diverge posteriorly. Palps not visible.

Mesosomal dorsal margin in profile forming single broad convexity; promesonotal suture and metanotal sulcus not impressed, mesosomal dorsum longitudinally costulate medi-
ally and rugulose-costulate laterally. Anterior pronotal surface with 6 transverse rugulose costae; lateral pronotum with low but distinct rugulose costae, progressively becoming smooth posterad; anepisternum smooth and katepisternum smooth with some longitudinal striae; mesometapleural suture well-impressed; metapleuron mostly smooth and shining, with transverse striae close to bulla. Metapleural gland opening forms transverse slit. Propodeal spiracle round, elevated on broad conical tumulus, surrounded by light brown ring; distance between spiracle and posterior margin of propodeum is approximately 3 spiracular openings. Propodeal denticle low but distinct. Propodeal declivity shining with lateral and dorsal rugosities and median oval smooth area. Coxae with transverse striae, protarsal base opposite spur with prominent setae and row of smaller setae; femora and tibiae punctulate; meso- and metatibiae with one apical spur each and no apical setae. Metacoxal dorsum with low, posterobasal denticle. Claws with preapical tooth.

Petiolar node rugulose-costulate to rugulose-punctate; anterior and dorsal margins in lateral view convex and continuous; posterior margin vertically straight; node with concentric rugosities in dorsal view, subpetiolar process subquadrate, anteriorly rounded, posteriorly shaped as short, blunt tooth. Petiolar spiracle within round depression. Ventral margin of abdominal sternite III in lateral view mostly broadly convex with slight concavity at prora; length of anterior margin of tergite III in lateral view approximately one-third that of dorsal margin, dorsal base margin straight to weakly convex. Abdominal segment IV arches posteroventrally with long and convex dorsal margin in lateral view and extremely short ventral margin, apex of segment faces ventrally; rest of abdominal segments mostly recessed. Abdominal tergite III laterally with scattered shallow piligerous punctae, dorsomedially with longitudinal costulae, progressively rugulose to punctate laterally. Abdominal tergite IV mostly longitudinally costulate, sternite roughly rugulose-punctate. Body mostly ferruginous, legs orange, antenna and mandible ferruginous brown; body with abundant white, decumbent hairs.


**Etymology.** This species is named in honor of Dr. Marcio Pie, professor of the Universidade Federal do Paraná, PR, Brazil, for his contributions in science, especially in myrmecology.

**Discussion**

*Gnamptogenys piei* n. sp. can be easily identified as a member of the *minuta*-group because it presents the petiolar spiracle within a ventral cavity, the antennal insertions completely covered by the frontal lobes, a curved longitudinal carina in the malar area, and a row of setae on the protarsal base opposite the spur. However, the new species differs from other *minuta*-group members by having a prominent seta on the protarsal base opposite the spur (*Lattke, 1992*). Another *minuta*-group character, the dorsomedian cephalic carina, is indistinct in this species on account of the costulate frons. *Gnamptogenys simulans* (Emery, 1896), *G. fieldi* Lattke (1990), and *G. falcifera* differ from *G. piei* n. sp. by not having their body covered with longitudinal costulae. In addition, *G. fieldi* and *G. falcifera* have falcate mandibles. *Gnamptogenys piei* n. sp. also may be easily separated from *G. petiscapa* and *G. vriesi* Brandão and Lattke (1990), which have the mesosomal dorsum separated into distinct convexities by a well-developed metanotal groove. *Gnamptogenys simulans*, *G. fieldi*, *G. falcifera*, and *G. petiscapa* have no records for Brazil, while *G. vriesi* has the closest record in Mato Grosso, Brazil, almost 2000 km away from the Itatiaia Mountains (*Vicente et al., 2015*). *Gnamptogenys piei* n. sp. possibly occurs in sympathy with *G. minuta*, known from the Atlantic Forest (*Silva and Brandão, 2014*), but the latter has a completely pruinose integument and it is thus not easily confused with *G. piei* n. sp. *Gnamptogenys piei* n. sp. may be confused with *G. caelata* and *G. striolata* on account of the longitudinal sculpturing, but *G. caelata* differs because of its smaller size (total body length less than 3 mm) and absence of meso- and metatibial spurs. *Gnamptogenys striolata* has the anterior margin of the clypeus with a lamella and a conspicuous median tooth, the mandible with at least eight distinct teeth and the dorsum of the petiole and abdominal tergite III is mostly foveolate. The morphological similarities of *Gnamptogenys piei* n. sp. with *G. caelata* and

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**Fig. 1.** *Gnamptogenys piei* n. sp. Holotype. (A) Dorsal view of head; (B) lateral view of body; (C) dorsal view of body.
Identification key for workers and gyne of the *Gnamptogenys minuta*-group

The new species *G. piei* is included in the identification key modified from Lattke and Delsine (2016):

1. Propodeum with a pair of denticles ............................. 7
   - Propodeum continuous, denticles absent ................... 2

2. Integument mostly opaque, sculpturing predominantly granulose with variable degrees of areole/foveolae .......................... 3
   - Integument mostly shiny or silky, sculpturing can be finely striolate or smooth with variable degrees of areole/foveolae .... 5

3. Mandibular falcate, masticatory margin edentate and concave (north-central Venezuela) .......................... *G. fieldi*
   - Mandibular triangular, masticatory margin fairly straight and denticulate or crenulate ............................. 4

4. Metanotal groove well-impressed; spiracles of abdominal segments I and II shining and conspicuous (northwestern Venezuela) .................. *G. petiscapa*
   - Metanotal groove absent; spiracles of abdominal segments I and II opaque and not conspicuous (southern Mexico - Brazil) ............................. *G. minuta*

5. Mandibular falcate (northern South America) ....... *G. falciata*
   - Mandibular triangular ..................................... 6

6. Eye not prominent, broadly convex; anterior clypeal margin broadly convex; occipital lobe rounded (southern Mexico - Costa Rica) .................. *G. simulans*
   - Eye prominent, semishperial; anterior clypeal margin medi ally concave; occipital lobe subangular (eastern Ecuador - central Brazil) ........................................... *G. vriesei*

7. Meso- and metatibial spurs absent (Colombia - southern Brazil) ........................... *G. caelata*
   - Meso- and metatibial spurs present ........................ 8

8. Clypeal lamella present; clypeus with a median tooth, postpetiolar tergite mostly with arched punctate-rugulae (southwestern Brazil) ......................... *G. striolata*
   - Clypeal lamella absent; clypeus with a median lobe; postpetiolar tergite with rough longitudinal costulae medially (southeast Brazil) ............................... *G. piei* n. sp.

Conflicts of interest

The authors declare no conflicts of interest.

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References


