A new species of the *Gnamptogenys Mordax* subgroup (Hymenoptera: Formicidae), with an Identification key to the species within the subgroup

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ABSTRACT

We describe, *Gnamptogenys rugimala* n. sp, a very distinct new species of the ectatommine genus *Gnamptogenys*, from specimens collected in forests of southeastern Brazil. We provide some data about *G. rugimala* n. sp occurrence and ecology as well as a species identification key for the *mordax* subgroup.

Introduction

The ectatommine ant genus *Gnamptogenys* Roger, 1863 has a distribution ranging from the Neotropics to the southern Nearctic and from Indomalaysia to Australia. They are usually found in the leaf litter of tropical and subtropical forests, commonly nesting in subterranean chambers or in rotten logs. In his revision of the New World *Gnamptogenys*, Lattke (1995) proposed six groups and eleven subgroups. One of these groups is the *mordax* group, which is divided into four subgroups. The *mordax* subgroup, which is currently represented by five species, is defined by the following suite of characters: subfalcate mandibles with a smooth and shining dorsal surface; a concave anterior clypeal margin with rounded lamellar sides; a well-impressed metanotal groove; a slightly pedunculate petiolar node; and a subpetiolar process that projects anterad (Lattke, 1995).

The species *G. boliviensis* Lattke, 1995; *G. continua* (Mayr, 1887); *G. interrupta* (Mayr, 1887); *G. mordax* (Smith, 1858) and *G. stellae* Lattke, 1995 considered collectively range from Veracruz (central Mexico) to southeastern Brazil (Guénard et al., 2017). Longino (1998) found consistent morphological differences within species determined as *G. mordax* and *G. interrupta*, a situation that suggests the presence of cryptic species within each nominal species. Little is known of their natural history except for their preference for nesting and foraging in the leaf litter and decomposing wood on the ground (Lattke, 1990). Midden contents from a few nests of *G. mordax* and *G. interrupta* in Venezuela suggest at least some preference for preying upon beetles (Lattke, 1990).

During the routine curation of *Gnamptogenys* samples in the Museu de Zoologia da Universidade de São Paulo (MZSP) we found two conspecific specimens from two different localities in southeast Brazil belonging to the *mordax* species subgroup with a unique combination of character states not seen in any of the known species. We describe this new species (Fig 1) and present an identification key to species of this subgroup.

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Material and methods

Morphological terms used follow Keller (2011) for general morphology, Harris (1979) for sculpturing, and Wilson (1955) for pilosity. Measurements were made using an ocular micrometer on a Zeiss® Stemi SV 6 stereo microscope and follow those of Lattke (1995).

HL (Head Length): Length of head capsule in full-face view, from mid-point of anterior clypeal margin to mid-point of posterior head margin.

HW (Head Width): Maximum width of head capsule in full-face view.

ML (Mandibular length): From anterior clypeal margin to apex of fully closed mandibles.

WL (Weber’s Length): The diagonal length of mesosoma in lateral view, from intersection point between pronotum and cervical shield to posteroventral angle of metapleuron.

SL (Scape Length): The maximum straight-line of the scape, excluding basal constriction.

EL (Eye Length): Maximum eye length measured along maximum diameter.

CI (Cephalic index): (HW/HL) x 100

SI (Scape Index): (SL/HW) x 100

MI (Mandibular index): (ML/HL) x 100

OI (Ocular index): (EL/HL) x 100

Examined Material

For comparative purposes, we examined workers of two mordax subgroup species with the following data. All specimens are deposited at Pe. Jesus Santiago Moure Collection (DZUP) of the Universidade Federal do Paraná, Curitiba, Brazil.

G. mordax: Peru, Cusco Amazónico, Villa Carmen Biol. Stn., 94km NE Cusco, 525m, -12.8940° -71.4038°, 7.viii.2013, J. Lattke, 2 workers; Brazil, Rio de Janeiro, Ilha Grande, Trilha Jarraraca, -23.1811° -44.3517°, Winkler, 01.xii.2009, J. M. Queiroz, 1 possible ergatoid; Brazil, São Paulo, São Paulo, Vila Mariana (Without date or collector), 1 worker.

G. continua: Brazil, Espirito Santo, Regência, 23.1.1994, J. H. C. Delabie, 1 worker; Brazil, Goiás, Jataí, Faz. Sertãozinho, 843m, -17.9206° -51.7569°, Winkler, 18.ii.2009, G. Santos, 10 workers; Brazil, Goiás, Jataí, Faz. Santa Lúcia, 793m, -17.8378° -51.6567°, Winkler, 11.x.2008, Gilmar G. Santos, 2 workers, 3 workers; Venezuela, NE Cerro El Copey, 680m, 11.0065° -63.8985°, 10.viii.2010, J. Lattke, 2 workers; Venezuela, Falcón, 950m, Cerro Los Caracoles, 10.8717° -69.0274°, 5.ix.2002, J. Lattke, 2 workers; Venezuela, Falcón, 935m, Cerro Los Caracoles, 54km ESE Yaracal, 10.8718° -69.0274°, 24.iii.2002, J. Lattke.

We also examined high-resolution pictures of the types of four species, as well as those of two workers of G. stellae, all available on AntWeb (2019). Specimen identifier numbers as follows: G. boliviensis, CASENT0900556 (Photo: Ryan Perry); G. continua, CASENT0178676 (Photo: April Nobile); G. interrupta, CASENT0915912 (Photo: Anna Pal); G. mordax, CASENT0907188 (Photo: Will Ericson), CASENT0900547 (Photo: Ryan Perry); G. stellae, CASENT0281227 (Photo: Estella Ortega), INB0003662341 (Photo: Estella Ortega).

Results

Gnamptogenys rugimala Marcineiro & Lattke, new species urn:lsid:zoobank.org:act:F06276EC-241A-40F6-BA3F-ED3F30E6574C

Type material. Holotype: Brazil, São Paulo, Salesópolis, E.B.B., 5-7.vii.1997, C. I. Yamamoto. Transect 1; Winkler 10. Specimen identifier DZUP 548842. One worker deposited in the MZSP collection, São Paulo, Brazil. Paratype: 1 worker, Brazil, Paraná, Tunas, Parque das Lauráceas.
Compared. Finally, are very similar to this species, but present costulae presents a great number of striae, while has the , differing from the . The anterior ventral margin broadly concave and posterior margin almost straight; with longest base attached to sclerite, anterior margin broadly convex, ventral margin broadly concave and posterior margin almost straight; surface irregularly areolate. Anterior face of abdominal tergite III mostly smooth, dorsal and lateral faces longitudinally costate; abdominal sternite III with slightly weakened costae laterally, smooth and shining centrally with sparse punctae; rest of gastral segments smooth and shining with sparse punctulae. Procoxa transversely costate in lateral view, meso and metacoxa rugose; metacoxa with low dorsal lobe. Tibiae and femora mostly smooth and shining with sparse punctulae; probasitarsal notch with dense row of hairs and single median seta.

Head, thorax, dorsum of petiolar and gaster without basal pubescence, with sparse erect to suberect yellow hairs, abundant pilosity on posterior gastral segments. Dorsum of antenal scape mostly devoid of pilosity except for posterior and anterior margins with subdecumbent hairs shorter than scape width. Antennae and legs yellowish brown to ferruginous; mandible brown; head, thorax and abdomen ferruginous brown to dark brown, sides lighter colored than dorsum, head dark brown to black.

**Geographic range**

This species is only known from the states of São Paulo and Paraná, southeastern Brazil.

**Biology**

Both ants were captured using Winkler extractors. Both of them came from an Atlantic forest region, classified as Cfb on Köppen climate classification, with annual rainfall of 1,550 mm and average temperature of 17°C through the year (Alvares et al., 2014). According to IBGE (2019), these areas are defined as *Floresta Ombrófila Densa* *Montana* in association with secondary vegetation. This vegetation is found in altitudes ranging from 400 to 1,000 m and generally has a thin soil layer, bearing trees of 20 meters height on average, with small leaves and thin trunks. Both specimens were found at an approximate altitude of 850 m

**Discussion**

*Gnamptogenys rugimala* is the only species in the subgroup with rugae on the mandibular dorso. *Gnamptogenys continua* and *G. boliviensis* are very similar to this species, but present costulae on the second gastral tergite, and both species have a relatively larger eye diameter when compared with *G. rugimala*. The anterior clypeal margin of *G. continua* is weakly sinuous compared with *G. rugimala*. *Gnamptogenys continua* has a smooth and shining vertex, while in *G. rugimala* it is costate. The anterior pronotal face is mostly smooth and shining in *G. continua*, differing from the rugose face present in *G. rugimala*. *Gnamptogenys continua* presents a reduced anepisternum, but it is distinct and does not present a broad pronotal-mesopleural suture, present in *G. rugimala*. Finally, *G. continua* bears a distinct anterolateral lobe on the propodeal declivity, poorly developed on *G. rugimala*. Compared with *G. boliviensis* the dorsal head sculpturing is very distinct, *G. boliviensis* presents a great number of striae, while *G. rugimala* presents thick costulae on its dorsum head. The pronotal-anepisternal suture in *G. rugimala* is broad, different from the narrow one present in *G. boliviensis*. *Gnamptogenys interrupta* and *G. stellae* do not have dorsal lobes on the metacoxa, readily separating them from *G. rugimala* before even considering other morphological
characters. *Gnamptogenys mordax* is easily distinguishable by the presence of a large cuticular projection on the metacoxal dorsum. Besides that, *G. mordax* has much larger compound eyes (OI > 18) placed slightly dorsolaterally on its head. *Gnamptogenys rugimala* presents smaller and laterally placed compound eyes that are hard to see in a full face view.

### Key to *mordax* subgroup species identification (Lattke et al., 2007 in part).

1. - Metacoxal dorsum unarmed, at most with a low tubercle or swelling; clypeal lamella laterally with blunt angles in dorsal view, medially anteriorly projecting and with a small median concavity... 2
   - Metacoxal dorsum with a lobe or tooth; clypeal lamella different from above ........................................... 3

2. - Mandible with lateral striae; petiole posterior margin with a central concavity in dorsal view ......................... *G. stellae*
   - Mandible laterally smooth and shining; petiole posterior margin straight ..................................................... *G. interrupta*

3. - Mandibular dorsum rugose on at least the basal one fourth of its length; pronotal-anepisternal suture broad, resembling a rugous low area ... *G. rugimala* n. sp.
   - Mandibular dorsum mostly smooth and shining with sparse punctures; pronotal-anepisternal suture narrow, not resembling a rugous low area ................................................................. 4

4. - Metacoxal dorsum with a slender and parallel-sided lobe or tooth; HL>1.12 mm; WL>1.81 mm ... *G. mordax*
   - Metacoxal dorsum with a low triangular lobe; HL<1.12 mm, WL<1.81 mm .................................................................................................................. 5

5. - Dorsum of head striate; procoxa transversely striate; propodeal declivity inclined and relatively straight in lateral view; with weakly developed lateral lobes ... *G. boliviensis*
   - Cephalic dorsum costate; procoxa smooth and shining; propodeal declivity with a posterior concavity formed by well-developed anterolateral lobes ........................................................................... *G. continua*

### Compliance with ethical standards

All applicable international, national, and/or institutional guidelines for care and use of animals were followed.

### Author contribution statement

The first author presented the first draft. The second author first recognized the new species. Both authors contributed equally on writing and reviewed the manuscript.

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