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## A NEW ANT SPECIES OF *OXYEPOECUS* (HYMENOPTERA: FORMICIDAE: MYRMICINAE), WITH THE DESCRIPTION OF *OXYEPOECUS BROWNI* GYNE AND NEW RECORDS FOR THE GENUS

MÔNICA A. ULYSSÉA<sup>1,2</sup>  
CARLOS R.F. BRANDÃO<sup>2</sup>

### ABSTRACT

We describe a new species of *Oxyepoecus Santschi*, 1926, *Oxyepoecus regularis* sp. nov., based on workers and a gyne collected in "Caatinga Arbórea" (Arboreal Shrubland) in Milagres and "Mata Seca" (Dry Forest) in Boa Vista do Tupim, both in the state of Bahia, Brazil. The gyne of *Oxyepoecus browni* Albuquerque & Brandão, 2004, collected in the same leaf litter ant survey, is also described. In addition, we present new records for *Oxyepoecus* species in Northeastern Brazil.

KEY-WORDS: Formicidae; Hymenoptera; *Oxyepoecus regularis* sp. nov.; Northeastern Brazil; *Oxyepoecus browni* gyne; Caatinga.

### INTRODUCTION

The exclusively Neotropical ant genus *Oxyepoecus* belongs to the Myrmicinae and to the Solenopsideini tribe. Myrmicinae is a cosmopolite subfamily with the highest local and global species richness, especially in the Neotropical and Indo-Australian regions (Albuquerque & Brandão, 2004, 2009). The Solenopsideini currently includes 20 genera (two *incertae sedis*) and 840 recognized species (133 subspecies) (Bolton, 1995, 2003; Albuquerque & Brandão, 2004, 2009; Delsinne *et al.*, 2012). Workers of *Oxyepoecus* can be distinguished from all other solenopsidines by the 11-segmented antennae and the three funicular segments at the apical club (Kempf, 1974; Bolton, 2003).

The last reviews of the genus *Oxyepoecus* added seven species (Albuquerque & Brandão, 2004, 2009). The recent description of two new *Oxyepoecus* species

from Paraguay (Delsinne *et al.*, 2012) takes the number of known species in the genus to 20. The genus can be separated into two informal species groups (Albuquerque & Brandão, 2004, 2009) recognized by the following combination of character's states:

*Vezenyii* group – smooth and shining cephalic dorsum; sculpture, if present, restricted to the anterior portion of genae and between the frontal carinae, where the costulae may prolong caudad into two patches, always separated by a smooth median stripe. This group includes *Oxyepoecus browni* Albuquerque & Brandão, 2004; *O. bruchi* Santschi, 1926; *O. crassinodus* Kempf, 1974; *O. ephippiatus* Albuquerque & Brandão, 2004; *O. inquilinus* (Kusnezov, 1952); *O. kempfi* Albuquerque & Brandão, 2004; *O. longicephalus* Albuquerque & Brandão, 2004; *O. punctifrons* (Borgmeier, 1928); *O. quadratus* Albuquerque & Brandão, 2004;

1. Programa de Pós-Graduação em Zoologia da Universidade Estadual de Feira de Santana. E-mail: monicaulyssea@gmail.com

2. Laboratório de Hymenoptera, Museu de Zoologia, Universidade de São Paulo. Caixa Postal 42.494, 04218-970, São Paulo, SP, Brasil. E-mail: crfbrand@usp.br

*O. striatus* Mackay & Delsinne, 2012; *O. vezenyii* (Forel, 1907); and *O. vivax* Kempf, 1974.

*Rastratus* group – cephalic dorsum entirely costulate or, in case of sculpture covers only partially the head dorsum, the area between the frontal carinae is always sculptured. It includes *Oxyepoecus bidentatus* Delsinne & Mackay, 2012; *O. daguerrei* (Santschi, 1933); *O. mandibularis* (Emery, 1913); *O. myops* Albuquerque & Brandão, 2009; *O. plaumanni* Kempf, 1974; *O. rastratus* (Mayr, 1887); *O. reticulatus* Kempf, 1974; and *O. rosai* Albuquerque & Brandão, 2009.

All individuals of *Oxyepoecus* so far known in collections were obtained either by casual discoveries or by specialized collecting techniques (Kempf, 1974). Most of the species described by Albuquerque and Brandão (2004, 2009) were collected from 1 m<sup>2</sup> of litter samples submitted to Winkler extractor – an efficient technique to obtain relatively small ants that inhabit the interstices of the leaf litter (Agosti *et al.*, 2000).

We describe here an *Oxyepoecus* species sampled in two localities, one covered by “Caatinga Arbórea” in Milagres and the other by a “Mata Seca” in Boa Vista do Tupim, both in the state of Bahia, Brazil. Some comments are made to the key for *Oxyepoecus* species based on workers (Albuquerque & Brandão, 2009) in order to afford identification of *O. regularis*. We describe for the first time the gyne of *O. browni*, and make some remarks on the collection of other *Oxyepoecus* species hitherto not registered in Northeastern Brazil.

## MATERIAL AND METHODS

The terms used to appoint the external morphology follow Bolton (1994, 2000) and terminology of surface sculpturing follows Harris (1979). Costulae and striae are special types of superficial sculpture; these terms are used in agreement with Albuquerque (1999) and mean respectively “continuous and long ridges on the integument that are rectilinear or undulated” and “small, sub-parallel, rectilinear and fine depressions on the integument”. The reproductive females are called gynes, as suggested by Andrade and Baroni-Urbani (1999).

Morphometric measures follow Kempf (1974) and Bolton (2000) and were obtained using a micrometric reticule in a Leica S6E® stereomicroscope with 10X ocular lens; all measures are given in millimeters. Below we present the abbreviations and explanations of the measures taken.

- t.l.: total length – summed length of head length (h.l.), mandibular length (m.l.), Weber’s length (w.l.), longitudinal axis length of the petiole and postpetiole taken together (p.p.p.l.) and longitudinal axis length of gaster (g.l.), taken separately.
- h.w.: maximum head width – measured at the transversal line that touches the posterior margin of both compound eyes (full-face view).
- h.l.: maximum head length – taken in a straight line from the mid-point of the anterior clypeal margin to the mid-point of the vertexal margin, excluding mandibles (full-face view).
- e.l.: maximum length of compound eyes – through the major axis of the compound eyes, often midway between inferior and superior margins (lateral view of the head).
- s.l.: antennal scape length – chord length of the antennal scape, excluding the basal condyle and its neck (full-face view).
- m.l.: mandibular length – length of closed mandibles, from the apices of the mandibles to the anterior clypeal margin (full-face view).
- w.l.: Weber’s length – diagonal length of mesosoma, from the base of the anterior pronotal slope to the distal edge of the propodeal plate (lateral view).
- m.w.pr.: maximum width of pronotum – at the maximum width through the transversal axis of pronotum, perpendicular to the longitudinal axis of body (dorsal view).
- m.w.p.: maximum width of petiole – through the transversal axis of petiole, perpendicular to the longitudinal axis of body (dorsal view).
- m.w.p.p.: maximum width of postpetiole – through the transversal axis of postpetiole, perpendicular to the longitudinal axis of body (dorsal view).
- h.f.l.: hind femur length – chord length of the hind femur, excluding the trochanter.
- p.p.p.l.: longitudinal length of the petiole and postpetiole – length of the petiole and postpetiole taken together (dorsal view).
- g.l.: length of gaster – from the meeting of the postpetiole and the first segment of gaster until the extremity of the pygidium (lateral view).
- c.i.: cephalic index – ratio between head width (h.w.) and length (h.l.), multiplied by 100.

### Depositories

- BMNH: The Natural History Museum, London, United Kingdom.
- CPDC: Centro de Pesquisas do Cacau, Itabuna, Bahia, Brazil.
- MCZC: Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA.
- MZSP: Museu de Zoologia da Universidade de São Paulo, Brazil.
- MZFS: Museu de Zoologia da Universidade Estadual de Feira de Santana, Bahia, Brazil.
- USNM: National Museum of Natural History, Smithsonian Institute, Washington D.C., USA.

### RESULTS

#### *Oxyepoecus regularis* sp. nov. Ulysséa & Brandão

*Holotype*: Worker, Brazil: Bahia: Milagres [12°54.542'S, 39°51.279'W], 23.x.2010, M.A. Ulysséa, A.M. Medina & E.M. Campos leg., extracted from 1 m<sup>2</sup> samples of Caatinga leaf litter submitted to the Winkler extractor for 48 hours (MZSP).

*Paratypes*: seventy workers and one gyne extracted from 1 m<sup>2</sup> leaf litter samples submitted to Winkler apparatus, from Brazil: Bahia: Milagres: 68 workers and 01 gyne sampled in different dates and areas in the municipality of Milagres: 06 workers, 29.vii.2010 (MZFS), 07 workers, 09.xi.2010 (MZSP), 19 workers, 17.i.2011 (MZSP) [12°54.411'S, 39°50.863'W]; 09 workers, 13.vii.2010 (03 in CPDC, 03 in BMNH and 03 in MCZC), 07 workers, 23.x.2010 (MZFS) and 12 workers, 10.i.2011 (MZSP) [12°54.542'S, 39°51.279'W]; 03 workers, 24.x.2010 (USNM), 05 workers and 01 gyne (MZSP), 10.i.2011 [12°54.294'S, 39°52.083'W]; M.A. Ulysséa, A.M. Medina & E.M. Campos leg.; Boa Vista do Tupim: 02 workers sampled in different dates and areas: 01 worker, 25.i.2011 (MZSP) [12°39'36"S, 40°36'32"W], L.S.S.R. Macêdo, J.J. Resende, C.B.S. Galheigo & E. da C. Menezes leg.; 01 worker, 27.i.2011 (MZFS) [12°39'36"S, 40°36'32"W], L.S.S.R. Macêdo & E. da C. Menezes leg.

*Etymology*: The specific name refers to the regular sculpture covering the whole body, which is mostly re-covered by sub-parallel longitudinal costulae. This combination of sculpture is not found in any another *Oxyepoecus* species described until now.

*Diagnosis*: The exclusive character of *Oxyepoecus regularis* sp. nov. workers in relation to the other species of the *Rastratus* group is the presence of sub-parallel longitudinal, regularly spaced costulae, which are thick and well marked on the dorsum and lateral areas of the head, extending until the vertexal margin, on the gena and on the ventral face of the head.

*Workers (holotype and variation of 70 paratypes within brackets)*: t.l. = 2.06 (1.99-2.23), h.w. = 0.46 (0.43-0.48), h.l. = 0.51 (0.49-0.55), e.l. = 0.05 (0.05-0.08), s.l. = 0.30 (0.28-0.34), m.l. = 0.09 (0.06-0.11), w.l. = 0.60 (0.52-0.65), m.w.pr. = 0.35 (0.30-0.36), m.w.p. = 0.15 (0.14-0.18), m.w.p.p. = 0.21 (0.19-0.24), h.f.l. = 0.30 (0.28-0.33), c.i. = 90.20 (82.93-95).

*Description*: With characters and states present in other *Oxyepoecus* species of the *Rastratus* group (Albuquerque & Brandão, 2009:293) and body color black, mandibles, antennae and legs yellowish, gaster dark brown. Integument, when observed under the stereomicroscope, sculptured with thick, well marked, regularly spaced and sub-parallel costulae, with the exceptions of the nuchal region and gaster, which are smooth; dorsum of head with longitudinal costulae, prolonged posteriorly, reaching the occipital margin and laterally surpassing the compound eyes region, covering the ventral face of the head; genae, dorsum and laterals of pronotum, mesonotum, mesopleura and metapleuron (including bulla) with longitudinal costulae; in the genae the costulae reach the superior margin of the lateral portion of clypeus; anterior inclination of pronotum, propodeum, petiole (including the ventral face) and postpetiole with well marked transversal costulae.

Long, suberect to subdecumbent hairs with varied orientations on head, mesosoma, petiole, postpetiole and gaster; antennae and legs with short and decumbent hairs.

Mandibles (Fig. 1a) relatively short and striate in its basal portion, basal tooth not separated from the sub-basal by a broad or a relatively shallow diastema; frontal carinae short, not surpassing the level of the superior margins of the compound eyes, gently convex and sub-parallel, the maximum width between their outer edges always less than one third of the head width; compound eyes convex, with about 3-4 ommatidia in a row across the greatest diameter, total number of ommatidia less than 12.

Mesosoma with convex promesonotum in lateral view (Fig. 1b) and weakly marginate in front and laterally in dorsal view (Fig. 1c); well marked shoulders; metanotal groove absent; metanotal suture indistinct; propodeal spines long, acute and oriented backwards.

Petiolar node higher than that of the postpetiole in lateral view (Fig. 1b), subquadrate in dorsal view (Fig. 1c), not compressed antero-posteriorly neither laterally expanded; in lateral view, subpetiolar process in the form of a subquadrate denticle whose height is approximately equivalent to the half of the height of the anterior region of the peduncle. Postpetiolar node broader than long, antero-posteriorly compressed and laterally expanded; subpostpetiolar process conspicuous and developed as two small and transverse crests when seen from the side.

*Gyne (dealate, N = 1)*: t.l. = 2.47, h.w. = 0.50, h.l. = 0.55, e.l. = 0.13, s.l. = 0.34, m.l. = 0.15, w.l. = 0.70, m.w.pr. = 0.38, m.w.p. = 0.19, m.w.p.p. = 0.25, h.f.l. = 0.35, c.i. = 90.91. Resembling worker, with the appropriate caste modifications. Integument, when observed under the stereomicroscope, sculptured with thick, well marked, regularly spaced and sub-parallel costulae, with the exceptions of the nuchal region and gaster (Fig. 2c), which are smooth; dorsum of pronotum and propodeum with transversal costulae; sides of pronotum and bulla covered by oblique costulae (Fig. 2b); mesopleura, metapleuron and sides of propodeum with longitudinal costulae in the inferior region and oblique costulae in the superior region; scutum and scutellum longitudinally costulate. Compound eyes with about 10-12 ommatidia in a row across the greatest diameter (Fig. 2a). Three ocelli equal in size, diameter equal to minimum antennal scape width. Remaining characters as in workers.

*Male*: Unknown.

*Comments*: *O. regularis* is known from three localities in Northeastern Brazil, all in the state of Bahia – Milagres, Boa Vista do Tupim and Vitória da Conquista. The sampled place in Milagres is covered by “Caatinga Arbórea”, while in Boa Vista do Tupim it corresponds to a “Mata Seca”, both areas are located within the “Caatinga” biome. The specimens sampled in Vitória da Conquista were collected in areas covered by Atlantic Forest (M.L. Oliveira, personal communication). As we had no opportunity to actually study these latter specimens, only by photographs, they were not considered as paratypes.

*Oxyepoecus regularis* will run with *O. rastratus* in couplet 15 of the identification key for *Oxyepoecus* workers published by Albuquerque and Brandão (2009). As said before, it can be easily distinct from *O. rastratus* by the presence of thick, sub-parallel, regularly spaced and well marked costulae; laterals of pronotum longitudinally costulate and anterior pronotal inclination transversally costulate.

#### New records of *Oxyepoecus* species

Before the samplings in Milagres and Boa Vista do Tupim, only two workers of *Oxyepoecus kempfi* were registered in Northeastern Brazil, collected in 23-27.



FIGURE 1: Worker of *Oxyepoecus regularis* sp. nov.: a) head in full-face view; b) body in lateral view; c) body in dorsal view.



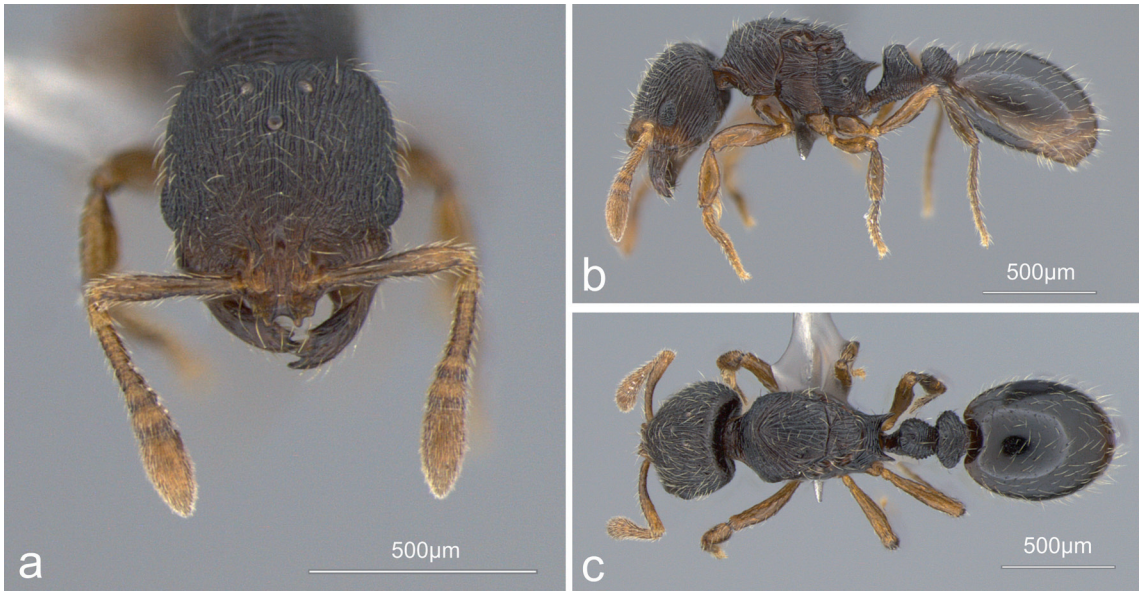


FIGURE 2: Gyne of *Oxyepoecus regularis* sp. nov.: a) head in full-face view; b) body in lateral view; c) body in dorsal view.

xi.1991 in Corrente, state of Piauí (Albuquerque & Brandão, 2004); for the state of Bahia no species of *Oxyepoecus* was then recognized.

Besides the species that we describe here, *O. regularis*, we collected also *O. vezenyii* and *O. browni* in pitfall traps and samples of 1 m<sup>2</sup> of leaf litter submitted to Winkler extractor, in different dates and different points in the municipality of Milagres.

*Oxyepoecus vezenyii* has a known distribution restricted to Paraguay and Brazil (Albuquerque & Brandão, 2004, 2009; Antweb). Only three specimens are known from Paraguay and some fifty workers and two gynes are known from Brazil, recorded in the states of Santa Catarina, Rio Grande do Sul, São Paulo, Goiás, Mato Grosso and Tocantins (Albuquerque & Brandão, 2004, 2009; Antweb). In Milagres,

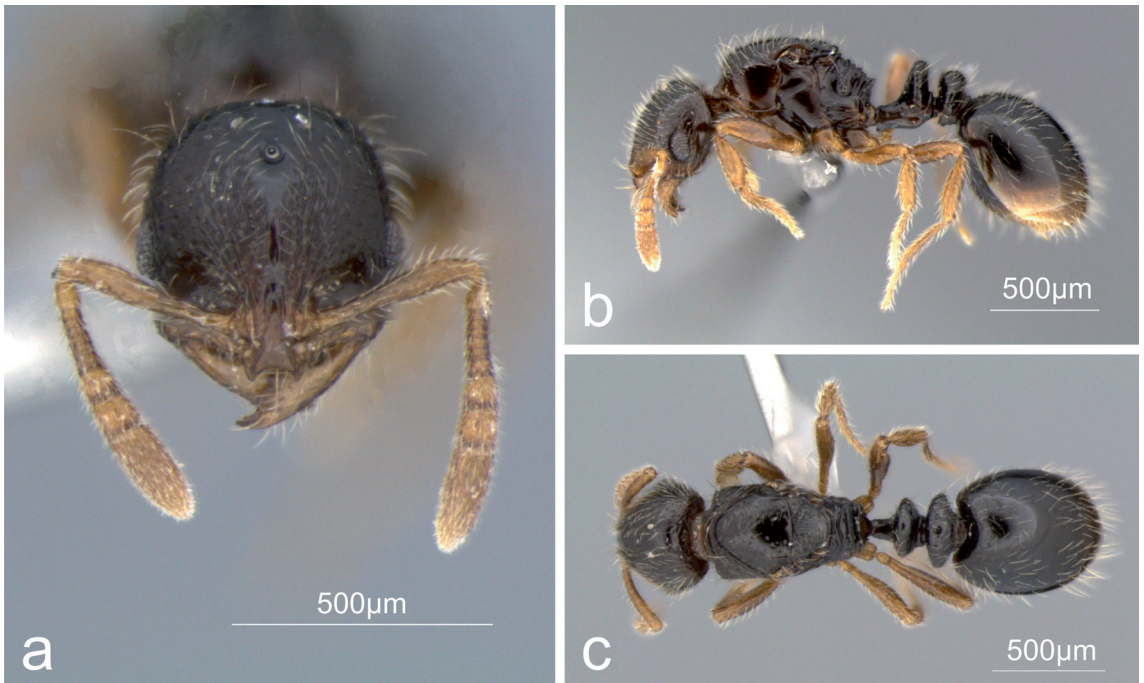


FIGURE 3: Gyne of *Oxyepoecus browni*: a) head in full-face view; b) body in lateral view; c) body in dorsal view.

we collected *O. vezenyii* from two non-contiguous samples of 1 m<sup>2</sup> of leaf litter submitted to Winkler extractor (M.A. Ulysséa, A.M. Medina & E.M. Campos leg.) two workers (in 11.i.2011 [12°54.542'S, 39°51.279'W], one deposited in the MZSP and one in MZFS) and one gyne (in 17.i.2011 [12°54.411'S, 39°50.863'W], deposited in the MZSP).

*Oxyepoecus browni* was known from nine workers only, two specimens collected in 27.i.1994 in Atalaia, Minas Gerais from leaf litter submitted to Berlese-Tullgren Funnels and seven in 14-15.v.2002 in Sooretama Biological Reserve, Espírito Santo (Albuquerque & Brandão, 2004, 2009). In Milagres, we collected seventeen workers and one gyne of *O. browni* from eleven scattered samples of 1 m<sup>2</sup> of leaf litter submitted to Winkler extractor, out of one hundred and fifty samples used in this survey. Four workers were collected in 13.vii.2010, four workers and one gyne in 11.i.2011 [12°54.542'S, 39°51.279'W] (MZSP); one worker in 29.vii.2010 and four workers in 17.i.2011 [12°54.411'S, 39°50.863'W] (MZFS); three workers in 13.vii.2010 [12°54.294'S, 39°52.083'W] (MZSP); with pitfall trap we sampled one worker in 07.i.2011 [12°54.542'S, 39°51.279'W] (MZFS). In the Coleção Entomológica Prof. Johann Becker of the Museu de Zoologia da Universidade Estadual de Feira de Santana (MZFS) we located one gyne of *O. browni* (reference number #53179) collected with pitfall trap in "Caatinga Arbustiva", also in Milagres, Bahia [12°54'232"S, 39°51'309"W] in 11.xii.2009 by E. Silva and A.F. Brito.

We describe below, for the first time and in comparison with gynes of described other species, that of *O. browni*.

*Oxyepoecus browni* Gyne (dealate, N = 2): c.t. = 2.56-2.57, l.c. = 0.48-0.47, c.c. = 0.50-0.52, c.o. = 0.16-0.16, c.e. = 0.34-0.34, c.m. = 0.16-0.14, w.l. = 0.78-0.78, m.w.pr. = 0.41-0.41, m.w.p. = 0.27-0.23, m.w.p.p. = 0.33-0.31, h.f.l. = 0.41-0.41, c.i. = 96-90.38. Resembling the con-specific worker with the modifications appropriate to the caste. Body color dark brown; mandibles, antennae, legs and posterior extremity of gaster yellowish. Integument, when observed under the stereomicroscope, smooth and shining, with the exceptions of frontal carinae with has regular and sub-parallel longitudinal costulae reaching the ocelli; these carinae diverge posteriorly separated by a smooth median region; genae with few longitudinal rugae that reaches the inferior margin of the compound eyes; promesonotum with superficial, fine and longitudinal costulae; scutellum with few fine and longitudinal rugae; propodeum with well marked transversal costulae, regularly and sub-parallel; metapleuron covered by longitudinal irregular costulae, the costulae prolonged over the metapleural gland region.

Hairs moderately abundant, long, suberect to subdecumbent with varied orientation on head, mesosoma, petiole, postpetiole and gaster; antennae and legs with short and decumbent hairs.

Head (Fig. 3a) with relatively elongate mandibles, basal tooth not separated from the sub-basal by a broad or a relatively shallow diastema; frontal carinae gently convex over the antennal sockets, short and not surpassing the level of the superior margins of the compound eyes, prolonged posteriorly but diverging caudad – the maximum width between their outer edges always less than one fourth of the head width; compound eyes with about 11-13 ommatidia in a row across the greatest diameter, length of compound eyes bigger than those of the workers, greater than the distance between the inferior margin of compound eye and the mandibular insertion; the three ocelli with similar size, their diameter equal to minimum antennal scape width; funicular segment I longer than II-V together, segments II-VIII combined, distinctly broader than long and segments IX and X longer than broad.

Mesosoma with promesonotum marginated laterally; scutum shining; propodeum with a well marked angle between the dorsal and slope faces in lateral view (Fig. 3b).

Petiolar node higher than that of the postpetiolar node, compressed antero-posteriorly and little expanded laterally (Fig. 3c); in lateral view, subpetiolar process with the shape of a sinusoid curve, with an expansion in the anterior extremity similar to a keel. Postpetiolar node broader than long, compressed antero-posteriorly and with a conspicuous subpostpetiolar process.

## DISCUSSION

*Oxyepoecus* includes relatively small and cryptic ant species which were previously considered rare in collections (Kempf, 1974; Albuquerque & Brandão, 2004, 2009). Its known distribution was restricted to the Center-South region of South America, with south limits in the Northwestern Argentina; east in Northeastern Bolivia; north in Anápolis, Goiás, Center-West of Brazil; and west in Pedra Azul, Minas Gerais, South-eastern Brazil (Kempf, 1974).

The application of the status of rarity is questionable for the species of *Oxyepoecus* in particular and for many other minutes ants as well; it is important to notice that they can be really rare or else be represented by relatively low numbers in collections (Brandão *et al.*, 1999) as a result of the lack of samples or the application of inadequate sampling techniques for determined species. The application of specialized

techniques of collection, such as Winkler extractors or Berlese-Tullgren Funnels, has assisted in the confirmation of this status in certain cases. Contrariwise ants considered rare before are being now more easily and frequently sampled (Albuquerque & Brandão, 2004); this is the case of *Oxyepoecus*.

However, the application of specialized techniques in distinct biomes increased the number of registered specimens, and as a result the distribution limits are being extended for this genus as well for other genera. *Oxyepoecus* species have been recently registered in Paraguay (Canindeyú, Nueva Asunción, Teniente Enciso National Park, Garrapatal, Río Verde, Puerto Max, Reserva Natural del Bosque Mbaracayú, San Lorenzo, Luque, Santa María and Pastoreo) (Delsinne *et al.*, 2012), Ecuador (Cuyabeno), Peru (Panguana) and in all Brazilian regions (Albuquerque & Brandão, 2004, 2009).

In short, the leaf litter survey in “Caatinga Arbórea” in Bahia, Brazil has resulted in an undescribed *Oxyepoecus* species, some individuals of *O. browni* (including the so far undescribed gyne) and three specimens of *O. vezenyii*, extending the distribution of these species previously unknown for the Northeastern Brazil. *Oxyepoecus regularis* sp. nov., known from 70 individuals sampled in Milagres, two from Boa Vista do Tupim and specimens from Vitória da Conquista (Bahia), shows a very peculiar body sculpture, that easily distinguish it from all other species of the genus.

## RESUMO

*Descrivemos uma espécie nova de Oxyepoecus Santschi, 1926, Oxyepoecus regularis sp. nov., com base em operárias e uma gine coletadas em áreas de Caatinga Arbórea no município de Milagres e de Mata Seca no município de Boa Vista do Tupim, ambos localizados na Bahia, Brasil, além da gine de Oxyepoecus browni Albuquerque & Brandão, 2004, proveniente do levantamento de fauna de formigas de serapilheira em Milagres. Apresentamos e discutimos novos registros de espécies de Oxyepoecus para o Nordeste do Brasil.*

PALAVRAS-CHAVE: Formicidae; Hymenoptera; *Oxyepoecus regularis* sp. nov.; Nordeste do Brasil; gine *Oxyepoecus browni*; Caatinga.

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## REFERENCES

- AGOSTI, D.; MAJER, J.D.; ALONSO, L.E. & SCHULZ, T.R. (Eds.). 2000. *Ants: Standard methods for measuring and monitoring biodiversity*. Smithsonian Institution, Washington DC. 280p.
- ALBUQUERQUE, N.L. 1999. *Um estudo sobre Oxyepoecus, Santschi, 1926 (Hymenoptera: Formicidae: Myrmicinae: Solenopsidini)*. Dissertação de Mestrado, Programa de Pós-graduação em Zoologia, Instituto de Biociências da Universidade de São Paulo, São Paulo. 107p.
- ALBUQUERQUE, N.L. DE & BRANDÃO, C.R.F. 2004. A revision of the Neotropical Solenopsidini ant genus *Oxyepoecus* Santschi, 1926 (Hymenoptera: Formicidae: Myrmicinae). 1. The *Vezenyii* species-group. *Papéis Avulsos de Zoologia*, 44(4):55-80.
- ALBUQUERQUE, N.L. DE & BRANDÃO, C.R.F. 2009. A revision of the Neotropical Solenopsidini ant genus *Oxyepoecus* Santschi, 1926 (Hymenoptera: Formicidae: Myrmicinae). 2. Final. Key for species and revision of the *Rastratus* species-group. *Papéis Avulsos de Zoologia*, 49(23):289-309.
- ANTWEB. *Bolton World Catalog Ants*. Available at <www.antweb.org>. Access in May, 2011.
- BOLTON, B. 1994. *Identification Guide to the Ant Genera of the World*. Harvard University Press, Cambridge, Mass. 222p.
- BOLTON, B. 1995. A taxonomic and zoogeographical census of the extant ant taxa (Hymenoptera: Formicidae). *Journal of Natural History*, 29:1037-1056.
- BOLTON, B. 2000. The ant tribe Dacetini. *Memoirs of the American Entomological Institute*, 65:1-1028.
- BOLTON, B. 2003. Synopsis and classification of Formicidae. *Memoirs of the American Entomological Institute*, 71:1-370.
- BRANDÃO, C.R.F.; DINIZ, J.L.M.; AGOSTI, D. & DELABIE, J. 1999. Revision of the neotropical ant subfamily Leptanilloidinae. *Systematic Entomology*, 24:17-36.
- DE ANDRADE, M.L. & BARONI URBANI, C. 1999. Diversity and adaptation in the ant genus *Cephalotes*, past and present. *Stuttgarter Beitrage zur Naturkunde, Series B, Geologie und Paläontologie*, 271:1-889.
- DELSINNE, T.; MACKAY, W.; WILD, A.; ROISIN, Y. & LEPONCE, M. 2012. Distribution and diversity of the cryptic ant Genus *Oxyepoecus* (Hymenoptera: Formicidae: Myrmicinae) in Paraguay with descriptions of two new species. *Psyche*, Article ID 594302, 8 pages, doi:10.1155/2012/594302.
- HARRIS, R.A. 1979. A glossary of surface sculpture. *Occasional Papers of the Bureau of Entomology of the California Department of Agriculture*, 28:1-31.
- KEMPF, W.W. 1974. A review of the neotropical ant genus *Oxyepoecus* Santschi (Hym., Formicidae). *Studia Entomologica*, 17:471-512.

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