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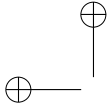
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Two new species of *Phalangopsis* Serville, 1831 (Orthoptera: Grylloidea: Phalangopsidae) from Brazilian Amazon Forest

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ABSTRACT

We describe here two new species of the genus *Phalangopsis* Serville, 1831 from the Brazilian Amazon Forest. The male genitalia and the female copulatory papilla were described, and a combination of diagnostic characteristics was given to separate both new species from the other described species. The principal morphological characteristics of this genus were discussed.

Key words: neotropical region, Brazil, crickets, Phalangopsini.

INTRODUCTION

The Phalangopsinae is represented in Brazil by six tribes and 11 genera (Eades et al. 2007). The genus *Phalangopsis* Serville 1831 (Grylloidea, Phalangopsidae, Phalangopsini) has six described species (Eades et al. 2007): *P. longipes* Serville 1831, *P. gaudichaudi* Saussure 1874, *P. speluncae* (Melo-Leitão 1937), *P. carvalhoi* Costa-Lima and Costa Leite 1953, *P. aureopubescens* (Wiendl 1970) and *P. flavilongipes* Desutter-Grandcolas 1992.

The genus is characterized by large individuals with a spider-like form, with very long palpi, tarsomeres and legs. The phallic complex has developed median lobes, dorsally elevated, hook-shaped lateral lobes, long endophallic sclerite and reduced endophallic apodeme and rami (Desutter 1990, Desutter-Grandcolas 1992).

These crickets live in the forest litter and are active at night, hiding during the day in caves or other natural cavities (Desutter 1990, Desutter-Grandcolas 1992).

The genus *Phalangopsis* was considered close to

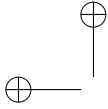
description of *Philippopsis* Desutter-Grandcolas 1992. The group classification and phylogenetic relationships became questionable and still need to be re-established. The state of knowledge of this group is still incipient due to the lack of information on Phalangopsini hinders analysis.

In the present work we describe two new species of *Phalangopsis* from the Brazilian Amazon Forest, providing information on male and female genitalia.

MATERIALS AND METHODS

Six specimens of *P. arenita* sp. nov., and three specimens of *P. bauxitica* sp. nov. conserved in 70% ethanol were lent to the Orthopterology laboratory (Department of Biology, University of Viçosa) by the Entomological Collection of INPA (National Institute of Amazonian Research).

Analyses, comparisons and descriptions of the external morphology were made under a Leica stereomicroscope. Measurements were taken under an MBS-9 stereomicroscope.



proposed by Otte (1992) was used. For the male genitalia and the female copulatory papilla of *Phalangopsis* species, the nomenclature proposed by Desutter (1987, 1988) was used, with the modifications by Desutter-Grandcolas (2003). *P. arenita* sp. nov. and *P. bauxitica* sp. nov. specimens were compared with published descriptions (Serville 1931, Saussure 1874, Melo-Leitão 1937, Costa-Lima and Costa-Leite 1953, Wiendl 1970, Desutter-Grandcolas 1992) and drawings of the *Phalangopsis* species (Desutter-Grandcolas 1992).

***Phalangopsis arenita* Mews and Sperber sp. nov.**
(Figs. 1–3)

Holotype. 1 male: vi. 1987, Gruta do Maroaga, Estrada de Balbina, Presidente Figueiredo, AM, Brasil (A.L. Henriques leg), INPA.

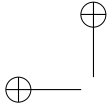
Etymology. The specific epithet is derived from the Latin word “arena”; which means arenite, the typical geological formation of the Maroaga cave.

Diagnosis. This species can be distinguished from the other *Phalangopsis* through the following combination of characteristics: (i) ocelli present, forming an equilateral triangle; (ii) a rounded fore wing covering the first abdominal tergite (Fig. 1C); (iii) stridulatory vein and *pars stridens* (24 teeth) present; (iv) tympanum present on the outer face of the fore tibia. Male genitalia: (v) pseudepiphallallic lateral lobes bent to the frontal face, hook-shaped, with small hairs at the base of the pseudepiphallallic lateral lobes (Fig. 2C); (vi) pseudepiphallallic parameres wide, reaching the apex of the lateral lobes (Fig. 2B); (vii) pseudepiphallallic median lobes forming a 30° angle with the lateral lobe (Fig. 2C); (viii) ectophallic fold internal to the medium lobe, narrow and straight. Female genitalia: (ix) copulatory papilla elongated and sub-angular (Fig. 3A-C).

Male. Measurements (mm) (n= 4): body length 15.40–16.90; maximum eye width 3.40–3.60; pronotal length 2.70–2.80; pronotal width 4.50–4.60; hind femur length 17.50–19.40; hind tibia length 22.60–23.00; wing width 3.20–3.50; wing length 2.50–2.80. Head light brown coloring. The top of the head dark brown, vertex light

a whitish light yellow color. Elongated face in frontal view (Fig. 1B). Three reduced ocelli present, forming an equilateral triangle. Light brown scape. Antennae uniformly yellowish light brown. Body yellowish light brown. Pronotum dark brown with a lighter colored median depression; pronotum narrow with prominent lateral lobes. Fore wing covering the first abdominal tergite (Fig. 1A), brown coloring except for the border, which is white; round-shaped (Fig. 1C). Sc, Cu₁ and Cu₂ (stridulatory vein) of fore wing present, *pars stridens* with 24 teeth, a Sc vein separates the dorsal champ from the lateral field, and Cu₁ outlines the wing (Fig. 1C). Posterior border of the wing is intumescenced, glandular and pubescent (Fig. 1A – stippled area). Tympanum reduced on the outer face of the anterior tibia, drop-shaped. Fore and median femur yellowish light brown; fore and median tibiae yellowish light brown; fore and median tarsomeres yellowish light brown. Hind femur light brown, with a lighter colored strip in the middle, observed from an external lateral view, and darker transversal stripes on the superior dorsum. Hind tibia with four pairs of sub-apical spurs, the external always larger than the internal, 23 spines on the inner margin between the sub-apical spurs and 34 on the outer margin. Apical spurs: external smaller than internal. Supra-anal plate rounded at the apex (Fig. 1D). Subgenital plate wider than long (Fig. 1E). Male genitalia: pseudepiphallallic lateral lobes with the same diameter along all extension, bent at the apex, forming a hook (Fig. 2A), with small hairs at the base of the pseudepiphallallic lateral lobes (Fig. 2C); pseudepiphallallic parameres wide, reaching the apex of the pseudepiphallallic median lobe (Fig. 2B); pseudepiphallallic median lobes forming a 30° angle with the lateral lobe (Fig. 2C); base of the pseudepiphallus laterally narrow; ectophallic arc in anterior position (Fig. 2A-C); ectophallic fold internal to the medium lobe, narrow and straight (Fig. 2A). Ectophallic apodeme basal, short and wide. Endophallic sclerite small, as a simple “guiding rod” (Fig. 2A-C).

Female. Measurements (mm) (n= 2): body length 17.00–17.10; maximum eye width 2.90–3.00; pronotal length 2.85–2.90; pronotal width 4.40–4.80; hind fe-



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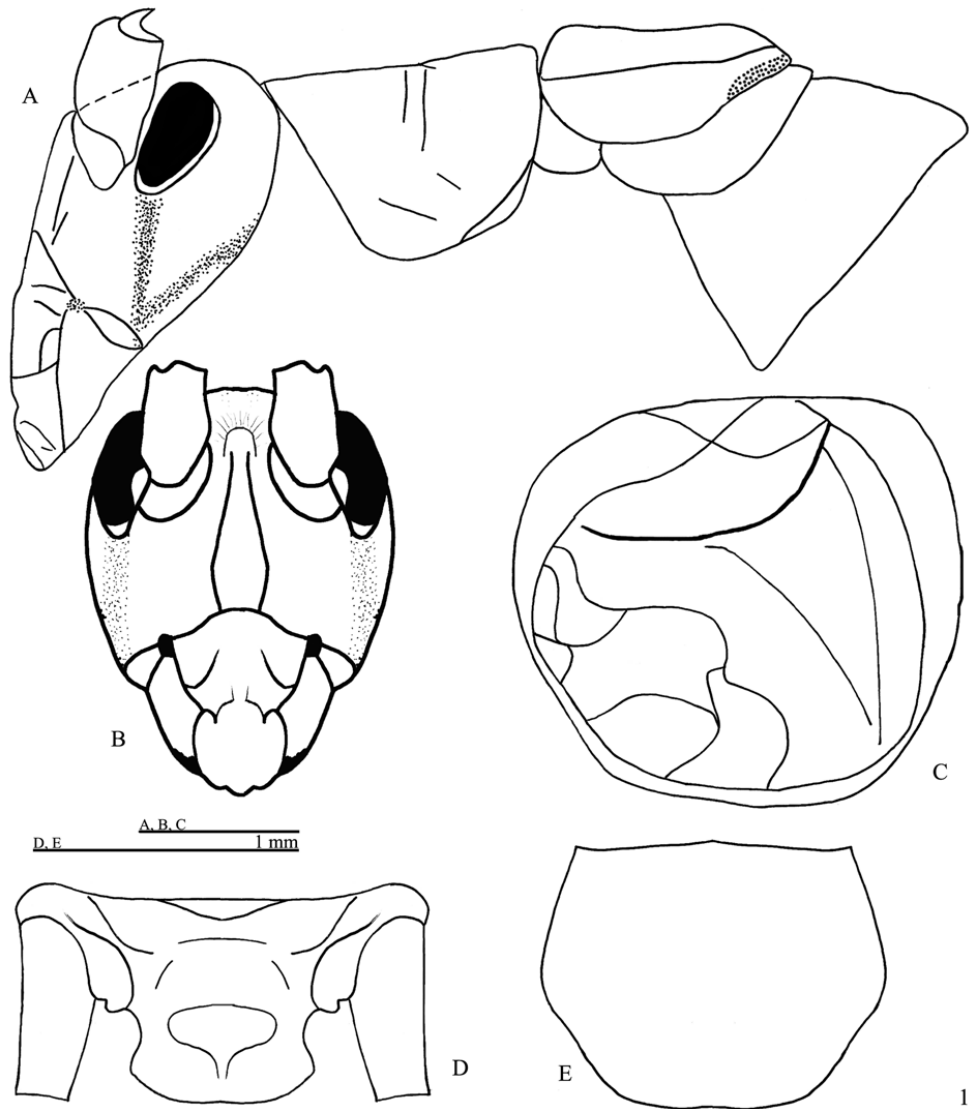


Fig. 1 – Male of *Phalangopsis arenita* sp. nov. **A.** Lateral view of the head and pronotum. **B.** Frontal view of the head. **C.** Dorsal view of the forewing. **D.** Supra-anal plate. **E.** Subgenital plate.

on the hind tibia displayed as follows: three on the inner margin and four on the outer margin (3 pairs + one sub-apical spur), the external always larger than the internal, 23 spines on the inner margin between the sub-apical spurs, and 31 on the outer margin. Seven apical spurs, being the external smaller than the internal. Copula-

Remarks. Some specimens are darker than the type. On tibia III of one male paratype, the sub-apical spurs are displayed as follows: three on the inner margin and five on the outer margin.

Material examined. Holotype, allotype, four paratypes.

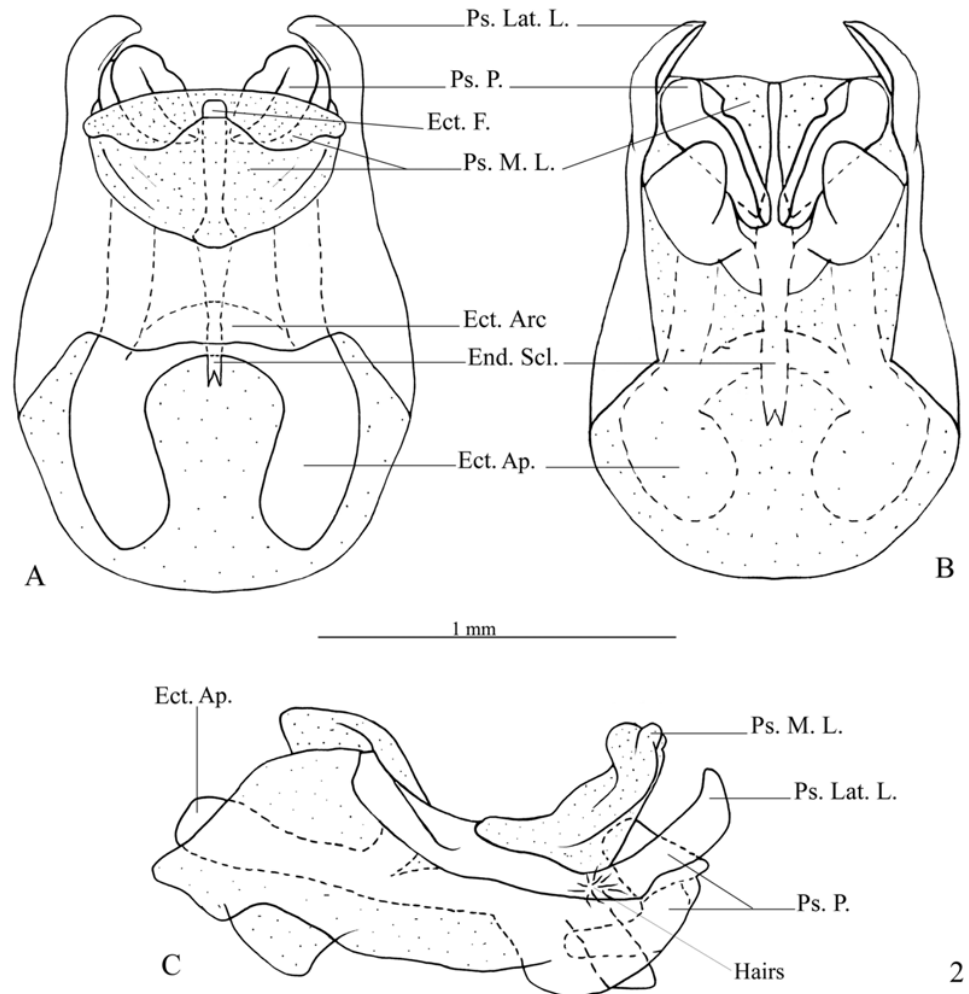
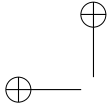


Fig. 2 – Male genitalia of *P. arenita* sp. nov. in **A**, dorsal, **B**, ventral and **C**, lateral view. Abbreviations: Ps. Lat. L.: pseudepiphallic lateral lobes / Ps. P.: pseudepiphallic paramere / Ps. M. L.: pseudepiphallic median lobe / Ect. F.: ectophallic fold / Ect. Arc: ectophallic arc / Ect. Scl.: ectophallic sclerite / End. Ap.: endophallic sclerite.

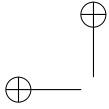
***Phalangopsis bauxitica* Mews and Sperber sp. nov.**

(Figs. 4–5)

Holotype. 1 male: 04.ix. 1983, Gruta do Piriá, Viséu, PA, Brasil, (01°12'10"S 46°17'36"W), (A.L. Henriques and W. de Souza leg.), INPA.

Etymology. The specific epithet was derived from the word “Bauxite”, which is the typical geological forma-

combination of characteristics: (i) Ocelli absent; (ii) a quadrangular fore wing covering the first abdominal tergite (Fig. 4C), (iii) stridulatory vein and *pars stridens* absent; (iv) tympanum absent on the outer face of the fore tibia. Male genitalia: (v) pseudepiphallic lateral lobes slightly curved towards the center, one towards the other, with small hairs at the apex of the pseudepiphallic lateral lobes (Fig. 5C); (vi) pseudepiphallic parameres nar-



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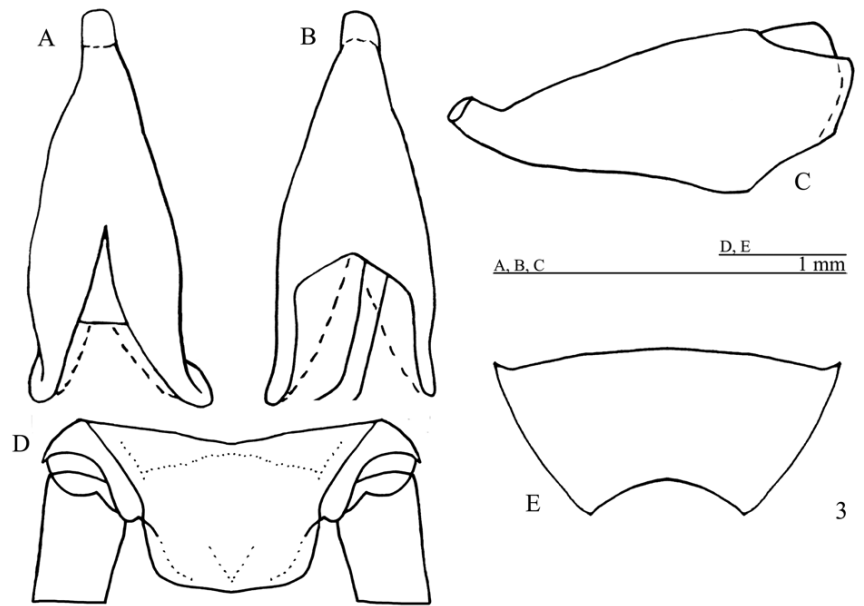


Fig. 3 – *P. arenita* sp. nov. Female copulatory papilla. **A.** dorsal, **B.** ventral and **C.** lateral views. **D.** Female supra-anal plate. **E.** Female subgenital plate.

(viii) ectophallic fold external to the medium lobe, curved to the dorsum, accompanying the medium lobe along all extension. Female unknown.

Male. Measurements (mm) (n= 1): body length 19.00; maximum eye width 3.80; pronotal length 3.50; pronotal width 5.45; wing width 2.10; wing length 1.90. Head with light brown coloring. Top of the head dark brown, vertex and fastigium light brown. Gena as in Figure 4A. Tuft of hairs between compound eyes. White clypeus, labium and palpi. Maxillary palpi rounded on the apex, with a yellowish light brown color. Rounded face in frontal view (Fig. 4B). Ocelli absent. Dark brown scape. Flagellum uniformly brown. Body dark brown. Pronotum dark brown, with a yellowish light brown deep median depression, narrow, with prominent lateral lobes. Fore wing covering the first abdominal tergite (Fig. 4A), dark brown coloring except for the border white. Quadrangular shaped (Fig. 4C). Sc, R, M and A1 veins of fore wing present. stridulatory vein and *pars stridens* ab-

(Fig. 4A – stippled area). Tympanum absent on the face of the fore tibia, drop-shaped. Fore and femur light brown; fore and median tibiae light brown; fore and median tarsomeres light brown. Hind tibia light brown; hind tibia light brown with a light yellow base and a light colored strip in the middle. Oblique from an external lateral view, darker transversal on the superior dorsum of hind tibia. Hind tibia with four pairs of sub-apical spurs, the external always longer than the internal; 23 spines on the inner margin, between sub-apical spurs, and 34 on the outer margin. Pseudepiphallic spurs, with the external being smaller than the internal. Supra-anal plate straight at the apex (Fig. 4D). Subgenital plate as long as broad, with rounded corners, convex shaped (Fig. 4E). Pseudepiphallic lateral lobes with the same diameter in all extension, slightly curved towards the center, one towards the other, with hairs at the apex of the pseudepiphallic media (Fig. 5C); pseudepiphallic parameres narrow, rounded at the base of the lateral lobes (Fig. 5B); pseudepiphallic

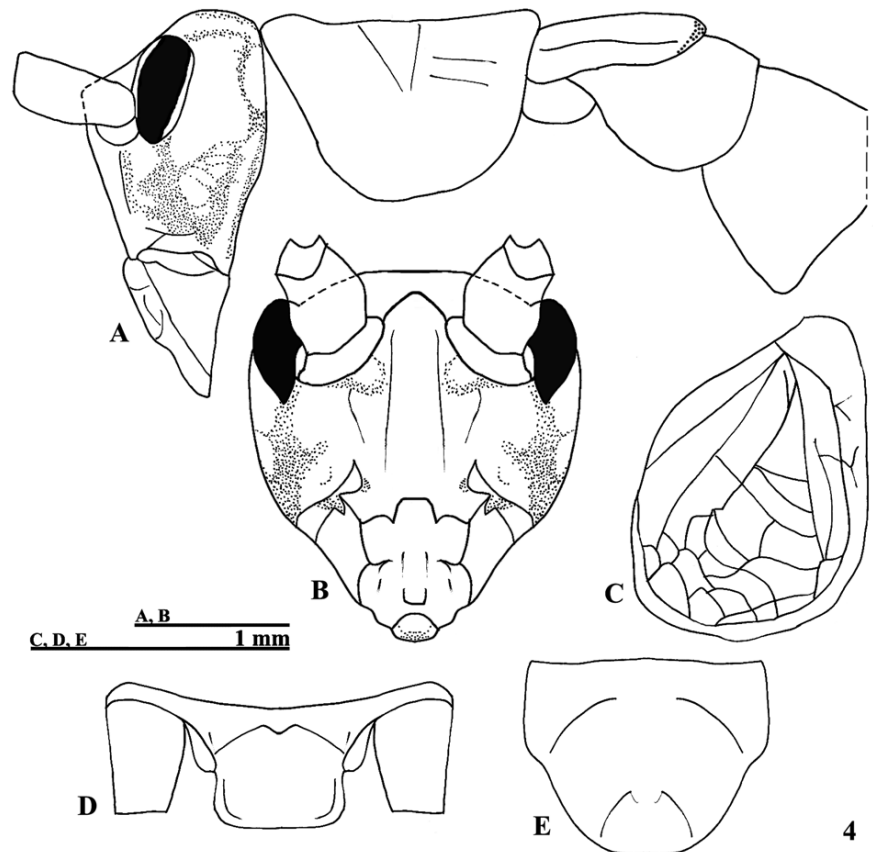
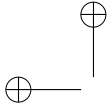


Fig. 4 – Male of *Phalangopsis bauxitica* sp. nov. **A.** Lateral view of the head and pronotum. **B.** Frontal view of the head. **C.** Dorsal view of the forewing. **D.** Supra-anal plate. **E.** Subgenital plate.

ectophallic arc in posterior position; ectophallic fold external to the medium lobe, curved towards the dorsum, accompanying the medium lobe along all extension; ectophallic apodeme basal, long and narrow; endophallic sclerite small, as simple “guiding rod” (Fig. 5A-C).

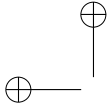
Material examined. One male holotype: 04.ix. 1983, Gruta do Piriá, Viseu, PA, Brazil, (01°12'10"S 46°17'36"W), (A.L. Henriques and W. de Souza leg.), INPA.

DISCUSSION

The crickets *Phalangopsis arenita* sp. nov. were collected in the Maroaga cave, Presidente Figueiredo

bauxitica sp. nov. was found in the Piriá cave located in Viseu, Pará State (1°12'10"S 46°17'36"W). The Piriá cave is a bauxitic formation described by Pinheiro et al. (2001).

The *P. arenita* sp. nov. and *P. bauxitica* sp. nov. are different from *P. longipes* by their posterior border of pronotum, metanotum and first tergite dark brown. Fore wing reduced, not crossing the metanotum. *Pars stridens* with 18-22 teeth and supra-anal plate pubescent. They differ from *P. flavilongipes* by the presence of a pale yellow uniform coloration, third apical internal spur longer than the second. Fore wing without stridulatory vein. Apical border of fore wing rounded and pos-



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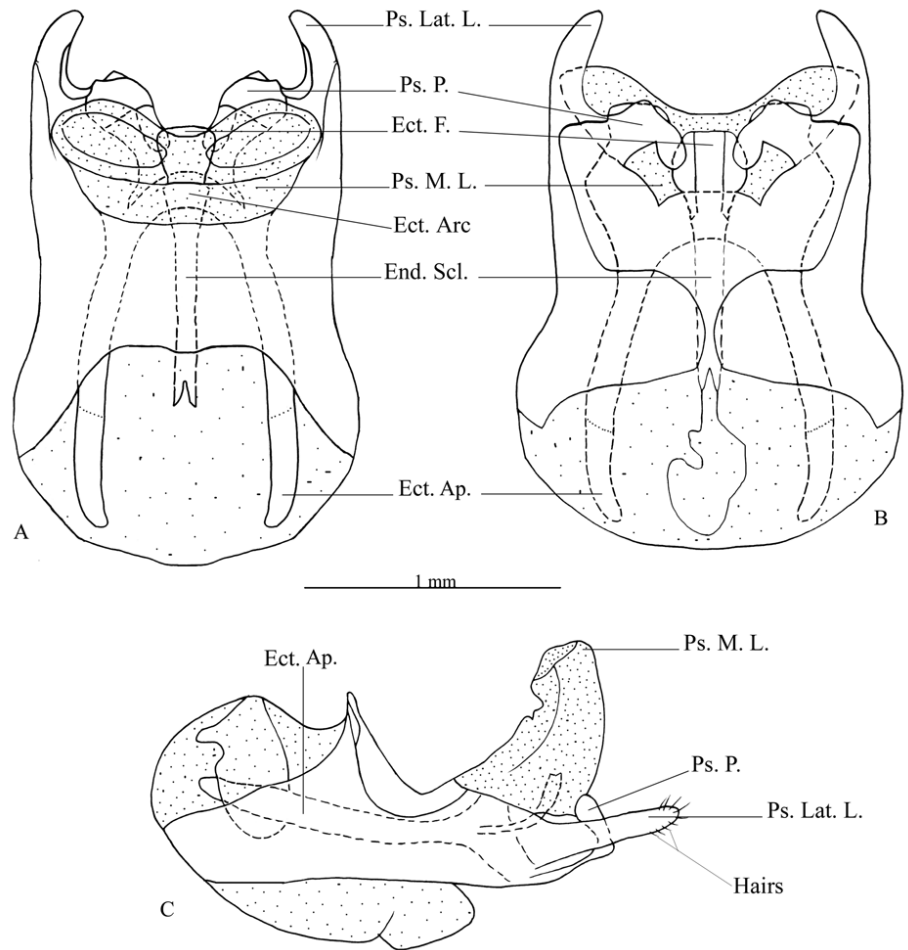
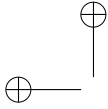


Fig. 5 – Male genitalia of *P. bauxitica* sp. nov. **A.** dorsal, **B.** ventral and **C.** lateral view. Abbreviations: Ps. Lat. L.: pseudepiphallic lateral lobes / Ps. P.: pseudepiphallic paramere / Ps. M. L.: pseudepiphallic median lobe / Ect. F.: ectophallic fold / Ect. Arc: ectophallic arc / Ect. Scl.: ectophallic sclerite / End. Ap.: endophallic sclerite.

the vertex and the fastigium there is unevenness. Tympanum absent. They differ from *P. speluncae* by the presence of three pairs of sub-apical spurs (contrasting with the other species that have four pairs of sub-apical spurs) and bilobed subgenital plate. They differ from *P. carvalhoi* by the presence of the second apical spur (medium) three times larger than the first apical spur (internal), and the first largest than the third apical spur (external).

and the other four described species occur in Brazil: *P. carvalhoi* in Tapeuá, Rio Paru do Leste, Amazonia; *P. speluncae* in Santa Bárbara, Minas Gerais State; *P. aureopubescens* in Lençóis Paulista, São Paulo State. The original description of *P. gaudichaudi* does not contain any information on type-locality, just quoting “France”. The lack of this information makes it impossible to draw an accurate map of the genus’ geographical distribution, since it records only the Brazilian species distributed



forest and are active at night, hiding during the day in caves or other natural cavities (Desutter 1990, Desutter-Grandcolas 1992). Hence, *Phalangopsis* could comprise cavicolous (*P. longipes*), troglophilous (*P. carvalhoi* and *P. speluncae*) and straminicolous (*P. gaudichaudi* and *P. flavilongipes*) species (Desutter-Grandcolas 1998). This genus as well as *Endecous* Saussure 1878, constitutes a group with diverse habits, suitable for comparative studies on the evolution of troglobiomorphic features (Christiansen 1962, 1992, Ahearn and Howarth 2005).

Some genera of Phalangopsidae crickets present analogous ventral glands in the apical border of the fore wing, which are inflated and present secretion. It is the case of some species of *Eidmanacris* Chopard 1956 (Luzarinae), of the ventral hair of the wing of *Guabamima* De Mello 1992 (Luzarinae) and of *Phalangopsis* (Phalangopsinae). The appearance of this character seems to be independent (or with no homology), because it appears in different subfamilies. Besides, the *Eidmanacris* and *Guabamima* glands probably produce volatile pheromones to attract co-specific females for the copula, since in these genera there is no production of calling sounds.

ACKNOWLEDGMENTS

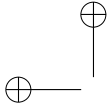
Thanks are due to Augusto L. Henriques, curator of the Collection of Invertebrates of the Instituto Nacional de Pesquisas da Amazônia/Coordenação de Pesquisas em Entomologia (INPA/CPEn), for lending the biological material; Dr. Edward Brede (Max-Planck-Institut für Limnologie, Plön, Germany) for English revision; Brigittie Lechner (Max-Planck-Institut für Limnologie, Plön, Germany) was extremely helpful providing the literature. This work was financed by “Conselho Nacional de Desenvolvimento e Tecnologia” (CNPq), “Coordenação de Aperfeiçoamento de Pessoal de Nível Superior” (CAPES), and “Fundação de Amparo à Pesquisa do Estado de Minas Gerais” (FAPEMIG), and was partially elaborated during a period of scientific training of CFS at the Max-Planck-Institute for Limnology, Plön, Germany.

A genitália masculina e a papila copulatória feminina são descritas, bem como uma combinação de características diagnósticas para separar ambas as novas espécies das outras espécies descritas. As principais características morfológicas foram discutidas.

Palavras-chave: região neotropical, Brasil, grilos, Phalangopsini.

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