



Revisiting the Brazilian fauna of masarine wasps: new records, an illustrated key to species and a description of the male of *Trimeria rubra* Hermes & Melo (Hymenoptera: Vespidae: Masarinae)¹

MARCEL G. HERMES & BOLÍVAR R. GARCETE-BARRETT

Laboratório de Biologia Comparada de Hymenoptera, Departamento de Zoologia, Universidade Federal do Paraná, Cx. Postal 19020, 81531-980 Curitiba, PR, Brasil

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Abstract

An overview of the Brazilian fauna of pollen wasps (Hymenoptera: Vespidae: Masarinae) is made: an illustrated key for all species recorded or potentially occurring in the country is provided; the male of *Trimeria rubra* Hermes & Melo is described; two species (*Ceramiopsis paraguayensis* Bertoni and *T. bequaerti* Willink) are newly recorded for Brazil; three species (*Paramasaris richardsi* (Giordani Soika), *T. rubra* and *T. robusta* Hermes & Melo) are newly recorded for Brazilian states and flower records are given for *T. rubra* for the first time.

Key words: Brazil, *Ceramiopsis*, New records, Neotropical, *Paramasaris*, pollen wasps, *Trimeria*

Introduction

The vespids are primarily predators but, contrastingly, masarines provide their nests with pollen and nectar (they are commonly known as pollen wasps) (Gess 1996). With approximately 300 described species, the masarines are notorious for their disjunct xeric and mainly austral distribution (Carpenter 1993), with a “hot spot” diversity in the Southern portion of the African continent. In the Neotropics, however, the subfamily is not rich, with 23 species described in four genera (Carpenter *et al.* 2006). Currently two tribes are recognized within the subfamily: the Masarini, with a wide distribution and represented in the Neotropics by the genera *Ceramiopsis* Zavattari and *Trimeria* de Saussure, and the Gayellini, endemic to South America and containing the genera *Gayella* Spinola and *Paramasaris* Cameron.

Recent taxonomic work on the Neotropical fauna has been accomplished by Carpenter (1989), Garcete-Barrett & Carpenter (2000) and Hermes & Melo (2006). Until recently, it was assumed that the Brazilian fauna of Masarinae was composed by no more than five species [Carpenter & Marques (2001) cited six species for Brazil, but Carpenter’s (2001) record of *T. neotropica* Mocsáry was not confirmed]. Hermes & Melo (2006) described two new *Trimeria* for Brazil, and because surveys are lacking for almost all biomas found in the country, it is not surprisingly that the number of species would increase in the intervening years.

We here provide an illustrated key to the identification for all species occurring in Brazil. Also, three additional species are included in the key: *T. rhachiphora* and *T. neotropica*, found in Paraguay not far away from the Brazilian border, and *P. cupreus*, which is known from places in the upper Amazonia of Colombia and Peru and could eventually be found in the Brazilian Amazonia. New records, floral information and the description of the male of *T. rubra* are also provided.

Material and methods

During field trips conducted on December 2008 and February/March 2009 to the state of Mato Grosso do Sul, colleagues collected masarines, among which there were two species newly recorded for Brazil, as well as new records for the state. Also, additional specimens of *T. rubra* were returned to Curitiba, giving new distributional data as well as flower records. These specimens are now deposited at Coleção de Entomologia Pe. Jesus Santiago Moure, Curitiba, Paraná, Brazil (DZUP).

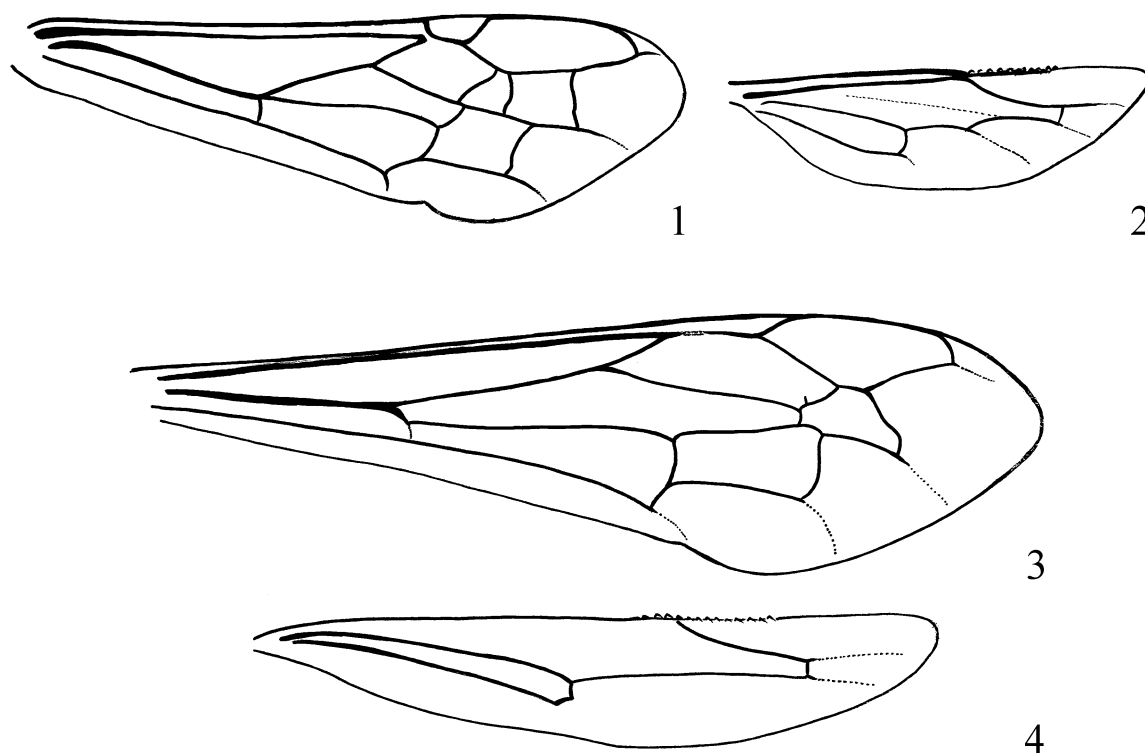
In addition, specimens of *T. robusta* Hermes & Melo from new localities were received by the junior author when still living in Paraguay. These are now deposited at the invertebrates collection of the Museo Nacional de Historia Natural del Paraguay (IBNPY).

Abbreviations used in the text are T (metasomal tergum) and S (metasomal sternum), referred to as T1-T7 and S1-S8 respectively.

Results

The Brazilian fauna of Masarinae now is composed of nine species: *Ceramiopsis gestroi* Zavattari, *C. paraguayensis* Bertoni, *Paramasaris brasiliensis* Giordani Soika, *P. richardsi* (Giordani Soika), *Trimeria americana* (de Saussure), *T. bequaerti* Willink, *T. howardi* Bertoni, *T. robusta*, and *T. rubra*.

The Neotropical Masarinae may be easily recognized and differentiated from other vespids by the unfolded fore wings at rest, the truncate apical margin of the marginal cell of the fore wings (acute in other subfamilies), and the discal cell of the forewings shorter than the sub-basal cell (except on *Ceramiopsis* where the discal cell is elongated) (Sarmiento & Carpenter 2006).



FIGURES 1–4. Figs. 1 and 2. *Paramasaris richardsi* female: 1, fore wing; 2, hind wing. Figs. 3 and 4. *Ceramiopsis gestroi* female: 3, fore wing; 4, hind wing. Scale bar = 1 mm.



FIGURES 5–10. Figs. 5, 8 and 10. *Paramasaris brasiliensis*, female: 5, habitus; 8, pronotum in lateral view; 10, head in frontal view. Fig. 6. *Ceramiopsis gestroi*, female habitus. Figs. 7 and 9. *P. richardsi*, female: 7, pronotum in lateral view; 9, head in frontal view. Scale bars for figs. 5 and 6 = 2 mm; figs. 7–10 = 1 mm.

Key to the species of Masarinae occurring or prone to be found in Brazil

[Adapted and modified from Carpenter (1989), Garcete-Barrett & Carpenter (2000), Hermes & Melo (2006) and Sarmiento & Carpenter (2006). Species not found in Brazil are marked with an asterisk]

- 1 Fore wing usually with three submarginal cells (Fig. 1). Cu1 of hind wing distant from cu-a (Fig. 2). T1 clearly pedunculate (Fig. 5). Scutellum not projected backwards above metanotum (Fig. 5). T3–T6 retractile (tribe Gayell-

- ini) 2
- Fore wing with two submarginal cells (Fig. 3). Cu1 of hind wing forming an acute angle with cu-a (Fig. 4). T1 not pedunculate (Fig. 6). Scutellum projected backwards above metanotum (Fig. 6). T3-T6 not retractile (tribe Masarini) 4
 - 2 Pronotum with posterior carina weak and extending no further dorsad than anterior carina (Fig. 7). Head with carina not extending from vertex to mandibular base. Clypeal apex closely bidentulate, almost single pointed (Fig. 9). Propodeum without oblique carinae (Paraguay and Brazil: Goiás, Mato Grosso and Mato Grosso do Sul) *Paramasaris richardsi* (Giordani Soika)
 - Pronotum with posterior carina strong and extending much further dorsad than anterior carina (Fig. 8). Head with carina extending from vertex to mandibular base. Clypeal apex truncate (Fig. 10). Propodeum with oblique carinae 3
 - 3 Pronotum with posterior carina interrupted dorsally. Female clypeus without lateral carinae (Argentina and Brazil: Rio Grande do Sul and Santa Catarina) *Paramasaris brasiliensis* Giordani Soika
 - Pronotum with posterior carina continuous dorsally. Female clypeus with lateral carinae (subandean Colombia and Peruvian Amazonia) **Paramasaris cupreus* Giordani Soika
 - 4 Clypeus truncate and obtusely narrowed (Fig. 11). Labrum transversely truncate, hidden (Fig. 11). T1 forming a nodular petiole (Figs. 13, 14, 15 and 16). Labial palpi with six palpomeres. Occipital carina absent. Glossa bifid closest to its base (Genus *Ceramiopsis*) 5
 - Clypeus emarginate (Figs. 12 and 22). Labrum apically rounded to pointed, not hidden (Figs. 12 and 22). T1 not forming a nodular petiole (Fig. 46). Labial palpi with three palpomeres. Occipital carina present. Glossa bifid closest to its apex (Genus *Trimeria*) 6
 - 5 T1 finely punctate and evenly convex in profile (Figs. 13 and 14). Posteromedial depression of mesoscutum without longitudinal carina. Propodeum with a short upper horizontal surface (Fig. 17) and the concavity well-defined, deep and narrow, medially-raised and transversely striate. Glossa about as long as half the body length, with ventral processes spoon-shaped, basally dark (some bifid). Mesoscutum with three broad yellow markings (Fig. 17). Mesepisternum with upper and lower yellow spots (Fig. 17). Propodeum with a pair of yellow spots (Fig. 17). T2 brown basally (Figs. 13 and 14). Apical yellow marking of male T2 not broader laterally than medially. Male antenna with a dorsal subapical white spot (Argentina, Bolivia, Paraguay and Brazil: Mato Grosso do Sul) *Ceramiopsis gestroi* Zavattari
 - T1 coarsely punctate and angular in profile (Figs. 15 and 16). Posteromedial depression of mesoscutum with a median longitudinal carina. Propodeum without a dorsal horizontal surface (Fig. 18) and concavity ill-defined, shallow, wide, flat and without transverse striae. Glossa longer than the length of the entire body, with ventral processes knife-shaped, translucent and simple. Mesoscutum black (Fig. 18) or at most with a very faint posterior yellow line. Mesopleuron with only upper yellow spot (Fig. 18). Propodeum entirely black (Fig. 18). T2 black basally (Figs. 15 and 16). Apical yellow marking of male T2 broader laterally than medially. Male antenna without white spot (Argentina, Bolivia, Paraguay and Brazil: Mato Grosso do Sul) *Ceramiopsis paraguayensis* Bertoni
 - 6 Epicnemial carina absent (Fig. 19). Meso-metapleural carina absent. Gena simply flat (Fig. 19). Occipital carina not reaching the base of mandible. Eyes setose. Mid tibia with two apical spurs. Labrum clearly (about a third) narrower than apex of clypeus. Clypeus nearly as wide as long (Fig. 20). Head with indistinct macropunctures (Fig. 20). Male flagellum hooked apically. Male S8 distinctly convex in lateral view. Male S2 with a projection (Brazil: Bahia, Minas Gerais and Rio Grande do Norte) *Trimeria robusta* Hermes & Melo
 - Epicnemial carina present (Fig. 21). Meso-metapleural carina present at least dorsally. Gena depressed to excavated (Figs. 21, 23 and 25). Occipital carina reaching base of mandible. Eyes bare. Mid tibia with one or (male of *T. rhachiphora*) no apical spur. Labrum at least half as wide as apex of clypeus, commonly equally wide. Clypeus nearly one and a half times as wide as long (Fig. 22). Head with distinct macropunctures (Fig. 22). Male flagellum not hooked apically. Male S8 flat in lateral view. Male S2 simple in most species 7
 - 7 Propodeum with lateral angle produced into a spine and deeply emarginate below it (Fig. 21). Tegula rounded posteriorly. Female occipital carina not raised into a translucent lamella (Fig. 21). Meso-metapleural carina not reaching mid coxa. Fore basitarsal setae curled (Fig. 22). Labrum little more than half as wide as apex of clypeus (Fig. 22) (widespread in dry/open areas of Paraguay, Argentina and Uruguay) **Trimeria rhachiphora* (Schletterer)
 - Propodeum with lateral angle lobate and shallowly emarginate below it (Figs. 24 and 26). Tegula pointed posteriorly. Female occipital carina raised into a translucent lamella below (Figs. 23 and 25). Meso-metapleural carina reaching the level of mid coxa (Fig. 23). Fore basitarsal setae straight. Labrum as wide as apex of clypeus 8
 - 8 Mesepisternum with indistinct macropunctures (Figs. 23 and 24). Metasomal terga with shallow macropunctures. Genal depression behind the lower half of eye (Fig. 23). Male S2 with a projection. Small (wing length of about 4 mm) black and richly whitish spotted species with metasomal apex reddish (Argentina, Bolivia, Paraguay and Brazil: Mato Grosso do Sul) *Trimeria bequaerti* Willink
 - Mesepisternum with well marked macropunctures (Fig. 26). Metasomal terga with deep macropunctures. Genal depression behind the lower two thirds of eye (Fig. 25). Male S2 without a projection. Medium sized (wing length of

- about 6 mm) species with a different general pattern: reddish on metasoma (if present) mainly restricted to basal segments 9
- 9 Ventral face of mid coxa without a central tooth-like carina (Fig. 27); male with a broad rounded lobe in the corresponding place (Fig. 28). Fore femur with its base rounded off and slightly broader than apex (Figs. 31 and 32). Female scutellar disc coarsely vermiculate behind a relatively thin anterior elevated band (Fig. 37). Male S7 flat, not emarginate posteriorly (Fig. 43). Male S8 broadly notched at sides and single lipped apically (Fig. 43). (Argentina, Paraguay, Uruguay and Brazil: Goiás, Mato Grosso do Sul, Minas Gerais, Paraná, Rio Grande do Sul, São Paulo) ..
..... *Trimeria howardi* Bertoni
- Ventral face of mid coxa with a small tooth like carina which is quite small in the female and definitely projected in the male (Figs. 29 and 30). Fore femur with its base slightly to markedly truncate and definitely broader than apex (Figs. 33, 34, 35 and 36). Female scutellar disc variable, sculpture mostly coarse but rarely extensively vermiculate and with or without an elevated basal band (Figs. 38, 39 and 40). Male S7 depressed and emarginate posteriorly (Figs. 44 and 45). Male S8 straight at sides and double lipped apically (Figs 44 and 45) 10
- 10 Fore femur base slightly truncate in both sexes, not angular in the male (Figs. 33 and 34). Pronotum extensively yellowish red in females and some males and with complete anterior and posterior pale bands. Male S8 with enlarged lobelike inner (subapical) lips, almost touching each other and hiding the apical introverted section (Fig. 44) (Brazil: Rondônia and Mato Grosso) *Trimeria rubra* Hermes & Melo
- Fore femur base definitely truncate in both sexes, forming a ventral tooth in the male (Figs. 35 and 36). Pronotum never reddish, with a complete anterior yellow band but at most with just lateral traces of a posterior one. Male S8 with reduced, well separated inner (subapical) lips which do not hide the apical introverted section (Fig. 45) 11
- 11 Female scutellar disc wholly elevated, with a pair of discrete hairy irregularly punctured rounded depressions (Fig. 39); surrounding carina obsolete. Male scutellar disc and medial carina in side view distinctly elevated above the level of the surrounding carina which is markedly reduced and surmounted by very coarse lateral crenation posteriorly (Fig. 41) (Argentina, Paraguay and Brazil: Goiás, Mato Grosso do Sul, Minas Gerais, Paraná, São Paulo)
..... *Trimeria americana* (de Saussure)
- Female scutellar disc regularly convex and macropunctate, without discrete rounded hairy depressions and surrounded by a sharp carina (Fig. 40). Male scutellar disc surface and medial carina in side view gently inclined backwards to the level of the surrounding carina which is hardly reduced and hardly surmounted by the coarse lateral crenation posteriorly (Fig. 42) (Eastern Paraguay and Argentinean Mesopotamia).. **Trimeria neotropica* (Mocsáry)

New information on the Masarinae occurring in Brazil

Below we provide information regarding collecting sites and floral records for some Masarinae species occurring in Brazil. Also, a large set of specimens was examined, whose information is available in a database that may be accessed at <http://www.taxonline.ufpr.br/links/colecoes/PeJesus/historico.htm>.

Trimeria rubra Hermes & Melo, 2006

(Figs. 12, 29, 33, 34, 38, 44 and 46)

Description of male. Coloration. Integument black extensively marked with yellow, as follows: mandibles, labrum and clypeus entirely; inner face of scape; large quadrangular mark on frons right above clypeus; broad band on emargination and upper inner orbit of compound eye; band on upper gena; broad band on anterior and dorsal surfaces of pronotum adjacent to the pronotal carina, and thin band on posterior margin of pronotum; most of upper mesepisternum; tegula anteriorly and posteriorly; apical half of disc and lateral bands of scutellum entirely; spot on dorso-lateral surface and lateral processes of propodeum entirely; most of fore trochanter; posterior and outer surfaces of fore femur; anterior and outer surfaces of fore, mid and hind tibiae; spot on pointed projection of mid coxa; inner surface of mid femur; small apical spot on outer surface of hind femur; large lateral spots on T1; broad band on disc of T2 interrupted medially and complete on T3-T5; lateral and central spots on T6; central small spots on S4-S7. Dorsal surface of pronotum mostly and T1 reddish ferruginous. Metasoma dark brown except for yellow and ferruginous marked portions as indicated above. Flagellum beneath light chestnut. Middle of tegula and legs (except for yellow marked portions as indicated above) dark brown to chestnut. Wings and venation ambarine.



FIGURES 11–16. Figs. 11, 13 and 14. *Ceramiopsis gestroi*: 11, female head in frontal view; 13, female T1 in lateral view; 14, male T1 in lateral view. Fig. 12. *Trimeria rubra*, female head in frontal view. Figs. 15 and 16. *C. paraguayensis*: 15, female T1 in lateral view; 16, male T1 in lateral view. Scale bars = 1 mm.

Structure. Body mostly covered by appressed pale short setae, more conspicuous on head, pronotum and mesoscutum and somewhat longer and erect on metasomal sterna. Clypeus with undefined shallow punctation and with slightly concave apex; gena depressed; occipital carina developed, reaching base of mandibles; flagellum of antenna club-like; frons and vertex with coarse punctures intermixed with well-defined micropunctures; anterior surface of pronotum somewhat shiny, at most reticulate; pronotal carina developed, somewhat raised and produced into a translucent lamella on lateral portions; punctures of dorsal surface of pronotum as on frons and vertex, but shallower; mesepisternum produced laterally, clearly divided into anterior, lateral and posterior surfaces—anterior and posterior surfaces devoid of punctures, at most reticulate,



FIGURES 17–22. Fig. 17. *Ceramiopsis gestroi*, female mesosoma in dorso-lateral view. Fig. 18. *C. paraguayensis*, female mesosoma in dorso-lateral view. Figs. 19 and 20. *Trimeria robusta*, female: 19, mesosoma in lateral view; 20, head in frontal view. Figs. 21 and 22. *T. rachiphora*, female: 21, mesosoma in lateral view; 22, head in frontal view. Scale bars for figs. 17 and 18 = 2 mm; figs. 19–22 = 1 mm.

lateral surface coarsely punctate with micropunctures shallow to obsolete; epicnemial carina undefined, mesepisternal posterior carina sharp; mesoscutum coarsely punctate with intermixed micropunctures; tegula rounded on outer margin and emarginate posteriorly, with fine punctures most evident on middle; disc of scutellum strongly punctate, with punctures delimited by somewhat careniform striae, margined laterally and posteriorly by a sharp and lamelliform carina; vertical depression beneath scutellum strongly crenate, intermediated by a sharp transversal carina; dorsal surface of propodeum coarsely punctate, posterior surface with a median carina and oblique lateral striae, at most with sparse punctures; lateral processes of propodeum

developed, with a translucent apical margin; propodeal valvula rounded beneath and pointed right below lateral process of propodeum; fore trochanter produced into a rectangular spatula; mid coxa with a strong median pointed projection; T1 coarsely punctate; anterior surfaces of T2-T6 finely micropunctate, disc of corresponding terga coarsely punctate with fine apical band of weak crenation; T7 shiny and finely punctate on basal half, and strongly punctate and setose on apical half; metasomal sterna finely punctate.

Variation. Some males may present a reduction on the ferruginous coloration on dorsal surface of pronotum, some lacking it at all; others may present it extensively ferruginous and even a very lighter metasoma.

Remarks. Hermes & Melo (2006) described *T. tubra* based solely on females. They mentioned that this species could be closely related to *T. americana*, *T. howardi* and *T. neotropica*, a condition that is prone to be corroborated by ongoing cladistic analysis (Carpenter & Garcete-Barrett, in prep.). It may be differentiated from the other species by the characters mentioned in the present key and by the key provided by Hermes & Melo (2006). The male of *T. rubra* is described for the first time. It may be associated to the female by the general color pattern, with reddish suffusion on the pronotum and extensive yellow markings along entire body; and the fore femur is definitely wider but slightly truncate basally.

Distribution: Brazil (Mato Grosso and Rondônia).

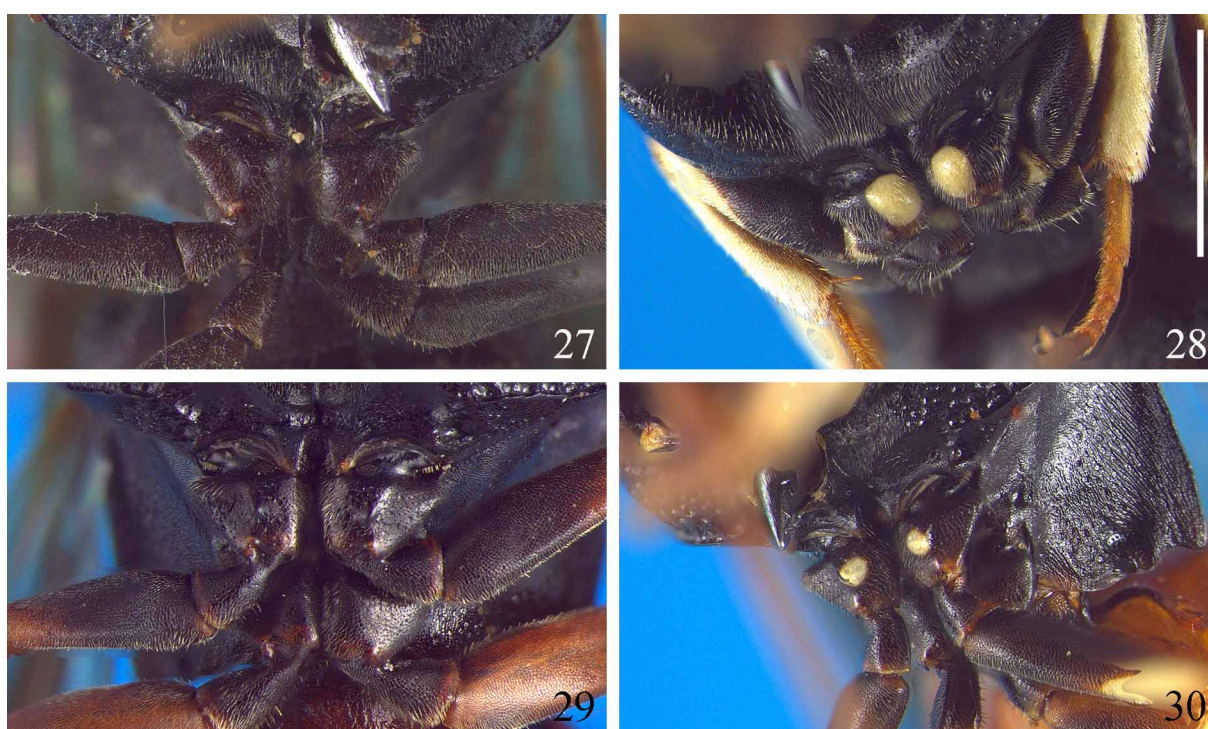


FIGURES 23–26. Figs. 23 and 24. *Trimeria bequaerti*, female: 23, head in lateral view; 24, mesosoma in lateral view. Figs. 25 and 26. *T. howardi*, female: 25, head in lateral view; 26, mesosoma in lateral view. Scale bars = 1 mm.

Examined material. *New records:* 1 female from Mato Grosso (MT): 2.xi.1961, F.M. Oliveira; 5 females and 3 males from MT: Cáceres, Polonoroeste, 12-18.xi.1984, C. Elias col.; 5 females with the same data but

21.xi.1984; 4 females and 1 male with the same data but 28.xi.1984; 8 females with the same data but 5.xii.1984; 1 female with the same data but 17.xii.1984; 5 females and 2 males with the same data but 9.i.1985; 5 females and 6 males with the same data but 16.i.1985; 3 females with the same data but 28.i.1985; 1 female and 2 males with the same data but 7.ii.1985; 2 females with the same data but 12.ii.1985; 2 females with the same data but 3.iii.1985; 1 male with the same data but 10.iii.1985; 2 females with the same data but 19.iii.1985; 2 females with the same data but 22.iii.1985; 1 female with the same data but 26.iii.1985; 25 females and 7 males with the same data but 27.iii.1985; 1 female with the same data but 2.iv.1985; 1 male with the same data but 3.iv.1985; 3 females with the same data but 4.iv.1985; 2 females from MT: Rio Manso, 12.x.1986, A. Raw col.; 1 female with the same data but 12.x.1988; 4 females with the same data but 13.x.1988; 4 females with the same data but 14.x.1988 (DZUP).

Floral records. 6 females from Rio Manso were collected while visiting flowers of a species of *Stachytarpheta* (Verbenaceae), and one additional female bears a label indicating it was collected on flowers of *Stachytarpheta cayennensis* (Rich.) Vahl.



FIGURES 27–30. Figs. 27 and 28. *Trimeria howardi*, mid coxae in frontal view: 27, female; 28, male. Figs. 29 and 30. *T. americana*, mid coxae in frontal view: 29, female; 30, male. Scale bar = 1 mm.

***Ceramiopsis paraguayensis* Bertoni, 1921**

(Figs. 15, 16 and 18)

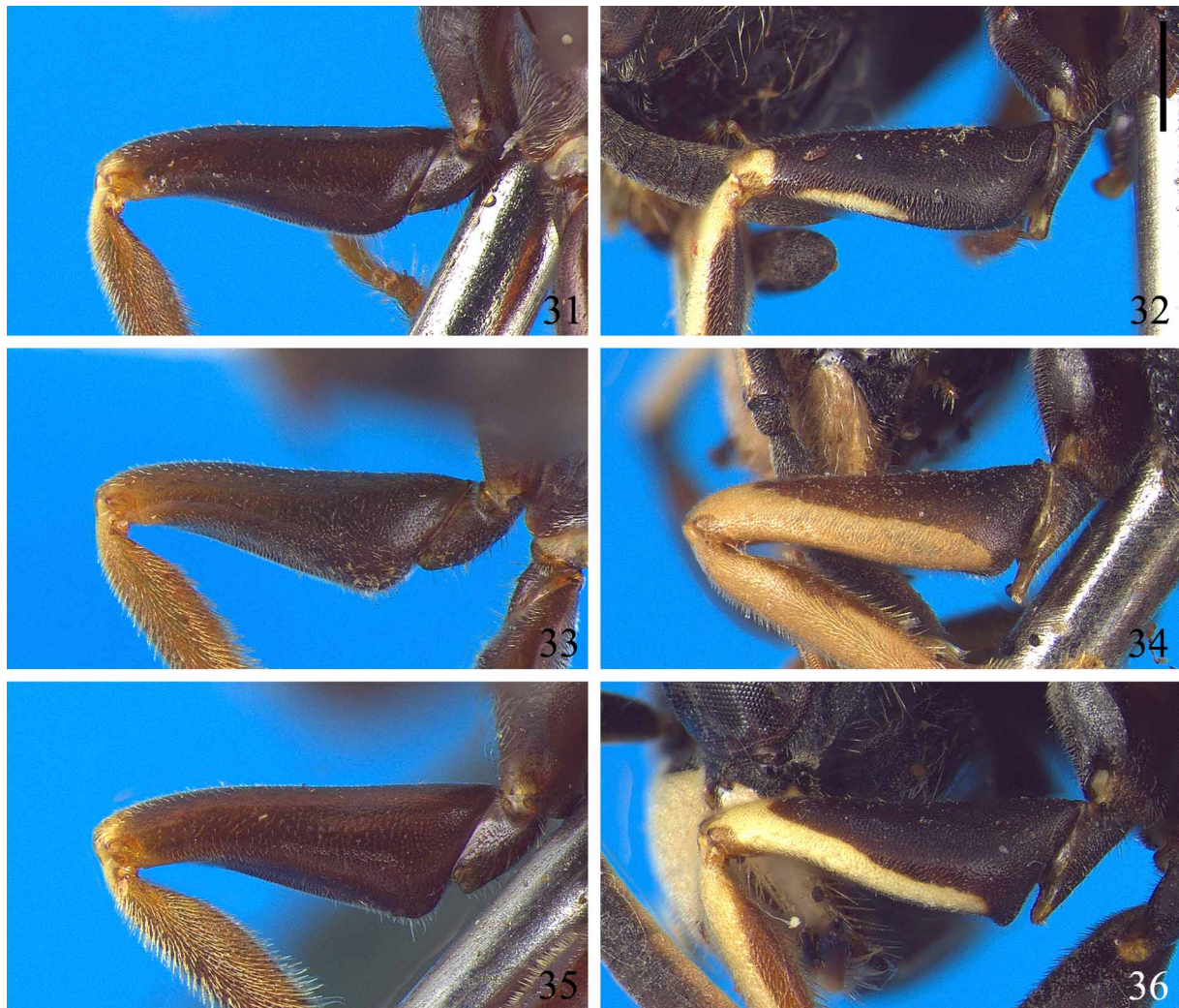
Examined material. *New records:* 1 female and 1 male from MS: Porto Murтинho, 22.ii.2009, 21°32'46"S 57°45'26"W, 83 m, P. Grossi & D. Parizotto cols.; 1 female with the same data but 23.ii.2009 (DZUP).

***Paramasaris richardsi* (Giordani Soika, 1974)**

(Figs. 1, 2, 7 and 9)

Examined material. *New records:* 1 male from MS: Porto Murтинho, 23.ii.2009, 21°32'46"S 57°45'26"W, 83

m, P. Grossi & D. Parizotto cols (DZUP). The specimen is similar to those found in Paraguay (Garcete-Barrett 2001).



FIGURES 31–36. Figs. 31 and 32. *Trimeria howardi*: 31, inner face of female fore femur; 32, outer face of male fore femur. Figs. 33 and 34. *T. rubra*: 33, inner face of female fore femur; 34, outer face of male fore femur. Fig. 35. *T. americana*, inner face of female fore femur. Fig. 36. *T. neotropica*, outer face of male fore femur. Scale bar = 0,5 mm.

***Trimeria bequaerti* Willink, 1951**

(Figs. 23 and 24)

Examined material. *New records*: 2 females from MS: Porto Murтинho, Estrada para Fazenda Pirizal, 10-11.xii.2008, K.S. Ramos & V. Kanamura cols. (DZUP).

***Trimeria robusta* Hermes & Melo, 2006**

(Figs. 19 and 20)

Examined material. *New records*: 1 female from RN: Serra Negra do Norte, ESEC Seridó, 20.vii.2005, F. Zanella col.; 1 female with the same data but 19.vii.2005 (IBNPY).



FIGURES 37–42. Fig. 37. *Trimeria howardi*, female scutellum in dorsal view. Fig. 38. *T. rubra*, female scutellum in dorsal view. Figs. 39 and 41. *T. americana*: 39, female scutellum in dorsal view; 41, male scutellum in lateral view. Figs. 40 and 42. *T. neotropica*: 40, female scutellum in dorsal view; 42, male scutellum in lateral view. Scale bar for figs. 37–40 = 1 mm; figs. 41 and 42 = 0,5 mm.

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FIGURES 43–46. Fig. 43. *Trimeria howardi*, male S6-S8 in ventral view. Figs. 44 and 46. *T. rubra*: 44, male S6-S8 in ventral view; 46, male habitus. Fig. 45. *T. americana*, male S6-S8 in ventral view. Scale bars for figs. 43–45 = 0,5 mm; fig. 46 = 2 mm.

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key to Brazilian taxa (Hymenoptera, Vespidae, Masarinae). *Zootaxa*, 1155, 61–68.

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