



## Phylogenetic revision and the origin of *Polyphrix* Townes (Hymenoptera, Ichneumonidae, Cryptinae), with description of a new species

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### Abstract

*Polyphrix stellata* **sp. nov.**, from the Brazilian Amazon Forest, is described and illustrated. The validity of the genus is cladistically tested using implied weighting, in a matrix with 26 species and 75 morphological characters. Concavity constants (*K*) from 1 to 6 were tested. All analyses recovered all known *Polyphrix* species as a monophyletic group. The preferred results, with *K*2–6, suggest (*Prosthopor**us* *nigrifemur* Gupta + *Lagarosoma* *assitum* Gupta) + *Messatoporus* sp. as the sister group of the genus; with *K*1, this group also included two species of Gabuniina. The results with *K*1–5 suggest an Amazonian origin of the genus, with species from northern Brazil appearing basally in the clade, while both Atlantic Forest species appear as sister groups. A redescription of *Polyphrix* is presented, combining the original definition with recently published additions and original information. An updated key to species is presented, and new morphometric data is provided for *P. varians* and *P. cristata*. *Prosthopor**us* *mexicanus* **comb. nov.** is proposed as a new combination for *Polyphrix* *mexicanus* Kasparyan & Ruíz, representing the first record of *Prosthopor**us* from North America. Seven new distribution records are provided for *Polyphrix*, expanding its known range to 29°51' of latitude, from Guyana to Paraná (southern Brazil).

**Key words:** Lymeonina, Cryptini, implied weighting, Phygadeuontinae, Caxiuanã

### Introduction

Townes (1970) erected *Polyphrix* to include a single species from the Brazilian Amazon Basin, *P. varians*. Nogueira & Aguiar (2005) expanded and consolidated the original description of the genus, described two additional species, *P. atlantica* and *P. cristata*, and presented a key to the species and new distribution records for *P. varians*. Kasparyan & Ruíz (2008) described a new species from Mexico, *P. mexicanus*, with many differences from the generic definition. The genus is characterized by many unusual features, such as the propodeum with a series of stout, straight, transverse wrinkles behind the anterior transverse carina, absence of posterior transverse carina and apophyses; notaulus faint; mesoscutum smooth and shiny; and transverse furrow at the base of the propodeum very wide, smooth and polished. The phylogenetic relationships of the genus remained essentially unknown until now. It was placed by Townes in the Lymeonina, but the subtribal arrangement of cryptine genera is known to be highly artificial (Laurenne *et al.*, 2006); besides, the general morphology of *Polyphrix* is not particularly similar to any other known group of Cryptinae.

The species of the genus seem to be rare. Townes (1970) examined only three specimens, and Nogueira & Aguiar (*op. cit.*) reported only six more. The two Atlantic Forest species are known only from one locality each, and *P. varians* only from three localities, in the states of Pará and Goiás, northern and central Brazil.

This work represents the first cladistic assessment of *Polyphrix* and its species, and aims also to describe a new species, update and improve the key to the species, and redescribe the genus combining information from Townes (1970), Nogueira & Aguiar (*op. cit.*), and original data.

## Material and methods

Where available, acronyms for collections follow Arnett *et al.* (1993); additional acronyms are UATM – Museo de Insectos de la UAM Agronomía y Ciencias-UAT (Mexico); UFMG – Universidade Federal de Minas Gerais, collection of Dr. Rogério P. Martins (Brazil); and UFES – Insect Collection of the Universidade Federal do Espírito Santo (Brazil). Material sorted for *Polyphrix* included over 23,000 specimens of Neotropical Cryptinae from AMNH, BMNH, CNCI, MZSP, UFES, and UFMG.

Measurements and images were generated using the extended-focus system EntoVision (GTVision, Hagerstown, Maryland). Biometric ratios used in descriptions are as follows: CWH, clypeus maximum width/maximum height; CWW, clypeus maximum width/minimum width; MLW, mandible maximum length/maximum width; MWW, mandible minimum width/maximum width; MSM, malar space maximum width/basal width of mandible; FLW, hind femur maximum length/maximum width; SWL, propodeal spiracle maximum width/maximum length; APH, fore wing cell 1+2Rs (areolet) height/pterostigma maximum width; AWH, 1+2Rs maximum width/maximum height; HW1C, hind wing vein Cua/cu-a length; T1LW, first metasomal tergite maximum length/maximum width (dorsal view); T1WW, first metasomal tergite maximum width/minimum width (dorsal view); T2LW, second metasomal tergite maximum length/maximum width (dorsal view); T2WW, second metasomal tergite maximum width/minimum width (dorsal view); OST, ovipositor sheath length/hind tibia length.

Morphological terminology follows Gauld *et al.* (1997), except that face and frons are called supra-clypeal area and supra-antennal area, respectively; wing venation was interpreted as in Sharkey & Wharton (1997). Surface sculpture terminology follows Harris (1979). When potentially ambiguous, color names are followed by their respective RGB formula, in the format (XXX, XXX, XXX), as determined from digital pictures of the studied specimens, according to procedures described by Aguiar (2005).

Cladistic analyses were performed to provide an objective evaluation of the validity and relationships of *Polyphrix*, as well as the origin of each of its species. Preliminary analyses performed as part of a major, ongoing project on the phylogeny of Cryptini, were used to define appropriate outgroups for the analysis of *Polyphrix*. The complete cladistic analysis lies beyond the scope of the present work, and will be published elsewhere. The selected subset of the main matrix, used for the present study, includes all *Polyphrix* species (except “*P. mexicanus*” — see below), plus representative species for 9 genera of Lymeonina, and 13 genera in 8 other Cryptini subtribes (of 15 listed by Wahl, 1999). All taxa were determined by the authors, and coded directly from the specimens. Vouchers are listed below. *Melanocryptus* Cameron, apparently a basal taxon among Cryptini (Aguiar *et al.*, in preparation), was used to root the tree.

Tree searching was performed with heuristic analyses in TNT 1.1 (Goloboff *et al.* 2003), aided by the ratchet (Nixon, 1999a), with 10,000 iterations each run. Implied weighting was tested for all concavity constant values (*K*), without decimals. The selected trees, as well as the discussions on the recovered synapomorphies, considered only unambiguous optimizations, to limit the focus on most stable characters. Tree drawing and manipulation was performed with Winclada v.1.00.08 (Nixon, 1999b) and CorelDraw v.12. The approach proposed by Bremer (1992) was used to infer the most parsimonious hypothesis for the ancestral areas of *Polyphrix* and its species.

Voucher specimens (all females) for this study are as follows. *Acerastes* sp.: Brazil, ES, Domingos Martins, Mata Pico do Eldorado, 20°22'17"S 40°39'29"W, 3–10.XII.2004, Malaise trap, T2, MTTavares *et al. leg.* (UFES). *Anacis* sp.: Argentina, Largo Puelo Chubut, 01.I.1964, AKovacs *leg.*, at AMNH. *Basileucus* sp.: Brazil, GO, Parque Nacional Chapada dos Veadeiros, 14–16.IX.2005, YPT Pt. 18, APAguiar *et al. leg.* (UFES). *Bathyzonus* sp.: Brazil, ES, Santa Maria de Jetibá, 20°04'27.9"S 40°44'51.3"W, 29.XI–06.XII.2002, Malaise B6, MTTavares *et al. leg.* (UFES). *Bicryptella* sp.: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 21–30.X.2005, Malaise trap Pt. 16, APAguiar *et al. leg.* (UFES). *Cryptanura quadrimaculata*: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, 20°16'21"S 40°28'40"W, 01–02.V.2005, YPT Pt. 10, APAguiar *et al. leg.* (UFES). *Digonocryptus crassipes*: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, 20°16'21"S 40°28'40"W, 30.IV–01.V.2005, YPT Pt. 07, APAguiar *et al. leg.*

(UFES). *Distictus tibialis*: Brazil, ES, Conceição do Castelo, Propriedade Ribeirão do Meio 17–24.III.2007, Malaise trap in coffee plantation, APAGuiar *et al. leg.* (UFES). *Golbachella* sp.: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 21–30.X.2005, Malaise trap Pt. 11, APAGuiar *et al. leg.* (UFES). *Joppidium* sp.: Brazil, SP, Serra do Japi, 28.IV.1988, in vegetation, RPMartins *leg.* (UFMG). *Lagarosoma assitum*: Brazil, ES, Santa Maria de Jetibá, Fazenda Paulo Seick, Área 1, 20°02'31.1"S 40°41'51.3"W, 28.XI–06.XII.2002, Malaise trap Pt. B3, MTTavares *et al. leg.*, UFES. *Lamprocryptus* sp.: Brazil, ES, Santa Maria de Jetibá, Fazenda Paulo Seick 20°02'31.1"S 40°41'51.3"W, 06–13.XII.2002, Malaise trap Pt. B4, MTTavares *et al. leg.* (UFES). *Latosculum* sp.: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 25–27.X.2005, YPT Pt. 12, APAGuiar *et al. leg.* (UFES). *Loxopus australis*: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, 20°16'21"S 40°28'40"W, 29–30.IV.2005, YPT Pt. 01, APAGuiar *et al. leg.* (UFES). *Melanocryptus* sp.: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 23–25.X.2005, YPT Pt. 4, APAGuiar *et al. leg.* (UFES). *Messatoporus* sp.: Brazil, ES, Guarapari, Parque Estadual Paulo César Vinha, 20°36'S 40°25'W, 8–15.V.2006, Malaise trap, RKawada *et al. leg.* (UFES). *Nematocryptus* sp.: Congo, Sanleyville, 0°30'N 25°10'E, 2.IV.1915, Lang & Chapin *leg.* (AMNH). *Pachysomoides* sp.: Brazil, SP, Rio Claro, *ex. Polistes lanio* nest, 25.VI.1987, EGianotti *leg.* (UFES). *Priotomis* sp.: Brazil, ES, Guarapari, Parque Estadual Paulo César Vinha, 20°36'S 40°25'W, 4 m, 02–09.XI.2006, Malaise trap, Pt. Mata 8, BAraujo & MSantos *leg.* (UFES). *Prosthoporos nigrifemur*: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 27–29.X.2005, YPT Pt. 15, APAGuiar *et al. leg.* (UFES). *Rhinium* sp.: Brazil, ES, Cariacica, Reserva Biológica de Duas Bocas, Pau Amarelo, 25–27.X.2005, YPT Pt. 15, APAGuiar *et al. leg.* (UFES). *Whymperia* sp.: Brazil, PA, Melgaço, Floresta Nacional de Caxiuanã, Trilha Igarapé Curua, 17–20.XI.2003, YPT P05065, APAGuiar *et al. leg.* (MPEG).

## Results and discussion

### Phylogeny and Distribution

Searches with all tested *K* values yielded only one most parsimonious tree in each case, with CI 0.23–0.24 and RI 0.39–0.42. Table 1 lists the number of rearrangements tried, fit values, and CI and RI values for each search. All searches recovered *Polyphrix* as a monophyletic group, in a clade supported by 4–7 synapomorphies. Four synapomorphies were shared by all trees, including the best diagnostic feature of the genus (character 52: state 3; area behind anterior transverse carina of propodeum with strong and widely spaced transverse wrinkles, Fig. 11).

Figures 1–3 show the clades containing the species of *Polyphrix* for each analysis. In trees with *K*2–6 (Figs 2, 3), the sister group of *Polyphrix* was a clade including *Prosthoporos nigrifemur* Gupta, *Lagarosoma assitum* Gupta and a *Messatoporus* sp. This clade was supported by 6–8 synapomorphies, one of those non-homoplasious (11:2, occipital carina ending before hypostomal carina). These genera share with *Polyphrix* many features which are uncommon in Cryptini, such as incomplete sternaulus (except *Messatoporus* Cushman) and occipital carina, strongly convex mesoscutum, transverse furrow at base of propodeum very wide, shallow, and almost completely smooth, and hind coxa unusually long and robust. Besides this, species of *Prosthoporos* Porter and *Messatoporus* have the area behind the anterior transverse carina of propodeum covered with close, weak and slightly curved transverse wrinkles that possibly represent an intermediate state (75:2) in relation to the strong and straight wrinkles of *Polyphrix* (75:3).

In the analysis with *K*1 (Fig. 1), the sister-group of *Polyphrix* included also *Digonocryptus crassipes* (Brullé) and *Distictus tibialis* (Brullé). These two genera, as well as *Prosthoporos* and *Lagarosoma* Gupta & Gupta are currently classified as Gabuniina, apparently a monophyletic group (see Aguiar 2005b, Laurenne *et al.* 2006). Still, the features that link the latter two genera to Gabuniina may represent convergences, since some of these do not exactly correspond to the character states observed in Gabuniina. In fact, the slender body, ovipositor thin and cylindrical and the absence of the characteristic inflated gena suggest that *Prosthoporos* and *Lagarosoma*, along with *Messatoporus*, may represent a different lineage, with characters which are similar, but not exactly the same presented by Gabuniina.

**TABLE 1.** Character coding for the present study. Credits: A, characters taken from Aguiar (2005b); S, characters taken from Santos & Aguiar (2008); Z, characters which also appear in Tedesco & Aguiar (2009); \*, new characters exclusively presented in this work. Abbreviation: n/a, non-applicable.

N <sup>o</sup>	Description
1 <sup>Z</sup>	Clypeus overall shape: [0] almost triangular, base much narrower than apex; [1] rectangular or slight trapezoidal; base wide, with 0.6 or more the width of apex.
2 <sup>Z</sup>	Shape of apical portion of clypeus: [0] flattened or slightly concave; [1] convex, broadly emarginated.
3 <sup>A</sup>	Clypeal margin, number of median teeth: [0] 0; [1] 1; [2] 2, even if small.
4 <sup>Z</sup>	Mandible length: [0] short to medium sized, the length 1.5–3.5 the middle width; [1] very long, the length more than 4.0 its middle width.
5 <sup>Z</sup>	Width of mandible apex: [0] wide, about 0.5 as wide as base; [1] much narrower than base, mandible strongly triangular.
6 <sup>A</sup>	Mandible teeth relative size: [0] ventral tooth longer than dorsal one; [1] teeth of equal length; [2] ventral tooth shorter than dorsal.
7 <sup>*</sup>	Width of female flagellum subapically: [0] regular, uniform; [1] greater than rest of flagellum.
8 <sup>Z</sup>	Surface sculpturing of supra-antennal area: [0] uniformly smooth or punctate; [1] median longitudinal line smoother than rest of supra-antennal area; [2] with a low, not continuous, suture-like longitudinal; [3] with a weak to distinct median longitudinal carina.
9 <sup>Z</sup>	Supra-antennal area, number of horns or tubercles: [0] zero; [1] with a median horn or tubercle; [2] with a pair of median horns, usually emerging from a common base.
10 <sup>S</sup>	Aspect of temple and gena: [0] swollen, head in frontal view subspherical; [1] narrow, head in frontal view somewhat triangular.
11 <sup>Z</sup>	Occipital carina, vental differentiation: [0] meeting hypostomal carina above base of mandible; [1] meeting hypostomal carina near base of mandible; [2] not reaching hypostomal carina.
12 <sup>Z</sup>	Curvature of occipital carina: [0] uniform; [1] angled or sinuous at dorso-lateral portion.
13 <sup>Z</sup>	Pronotal margin dorso-laterally, shape: [0] regular or only slightly produced; [1] strongly swollen, often generating a tubercle near dorsal end of epomia.
14 <sup>A</sup>	Epomia, differentiation: [0] short and weak; [1] long and strong; [2] represented by a group of wrinkles, rather than a single carina; [3] absent.
15 <sup>Z</sup>	Notaulus length: [0] very short to short, not reaching middle of mesoscutum; [1] long, reaching past middle of mesoscutum; [2] completely absent.
16 <sup>Z</sup>	Scuto-scutellar groove sculpturing: [0] groove with distinct wrinkles; [1] groove smooth.
17 <sup>S</sup>	Epicnemial carina, length: [0] complete or nearly so, reaching height of mesopleuron; [1] reaching only 0.6–0.7 of the height of mesopleuron; [2] reaching at most 0.5 of the height of mesopleuron.
18 <sup>Z</sup>	Sternaulus, differentiation: [0] complete but weak at least on its posterior 0.35; [1] fully complete and strong, reaching mid coxa; [2] weak and incomplete, reaching 0.45–0.65 of the distance to mid coxa.
19 <sup>Z</sup>	Sternaulus sculpturing: [0] same as mesopleuron, uniformly smooth or punctate; [1] with distinct transverse wrinkles.
20 <sup>Z</sup>	Differentiation of central portion of pospectal carina: [0] absent; [1] present, even if vestigial.
21 <sup>Z</sup>	Shape of central portion of pospectal carina: [0] straight or slightly arched backwards; [1] V-shaped [-] n/a (absent).
22 <sup>Z</sup>	Teeth-like projections at hind margin of metanotum: [0] present; [1] absent.
23 <sup>S</sup>	Shape of transverse furrow at base of propodeum: [0] very deep to moderately shallow; [1] very wide and shallow, sometimes almost indistinct.
24 <sup>Z</sup>	Sculpturing of transverse furrow at base of propodeum: [0] furrow smooth, without wrinkles; [1] furrow distinctly with longitudinal wrinkles.

continued next page.

**TABLE 1.** (continued)

N°	Description
25 <sup>A</sup>	Differentiation of a short vein projection (ramellus) at meeting of fore wing veins 1m-cu and Rs+M: [0] ramellus absent; [1] present.
26 <sup>A</sup>	Length of fore wing vein 2-Cu: [0] distinctly longer than crossvein 2cu-a; [1] nearly of the same length of 2cu-a or 2cu-a slightly longer; [2] much shorter than crossvein 2cu-a; [3] 2-Cu entirely absent.
27 <sup>A</sup>	Relative position of fore wing veins 2-Cu and 2cu-a: [0] aligned, linear; [1] angled, even if slightly; [-] n/a (2-Cu entirely absent).
28 <sup>A</sup>	Shape of fore wing vein 4-Rs: [0] uniformly curved; [1] sinuous or irregular.
29 <sup>A</sup>	Position of bulla on fore wing crossvein 2m-cu: [0] mostly central to mostly ventral; [1] placed entirely or mostly on anterior 0.5; [2] nearly reaching or reaching cell 1+2Rs.
30 <sup>A</sup>	Fore wing cell 1+2Rs (areolet) size, even if open: [0] small; [1] large, about as tall as width of pterostigma; [-] not differentiated.
31 <sup>A</sup>	Relative position of fore wing crossveins 2r-m and 3r-m: [0] parallel or nearly so; [1] distinctly but slightly or moderately convergent towards anterior margin of wing; [2] strongly convergent, anterior portion of cell 1+2Rs less than 0.7 its maximum width; [-] n/a (areolate open or not differentiated).
32 <sup>Z</sup>	Length of fore wing crossvein 2r-m: [0] about as long as crossvein 3r-m; [1] distinctly longer than crossvein 3r-m; [2] distinctly shorter than crossvein 3r-m [-] n/a (crossvein 3r-m not differentiated).
33 <sup>A</sup>	Length of fore wing vein 2-M: [0] approximately the same length of 3-M, or one slightly shorter than the other; [1] distinctly shorter than 3-M; [2] distinctly longer than 3-M; [-] n/a.
34 <sup>A</sup>	Sclerotization of fore wing crossvein 3r-m: [0] tubular, normal; [1] entirely or partly nebulous or spectral, including “with bulla”; [2] not differentiated, cell 1+2Rs open; [-] n/a (cell 1+2Rs not developed).
35 <sup>A</sup>	Shape of fore wing cell 1+2Rs: [0] pentagonal, or nearly square or circular, even if slightly taller than wide or if open; [1] transversely elongated.
36 <sup>Z</sup>	Sclerotization of fore wing veins 3-M and 4-M: [0] tubular or nebulous, distinct until wing margin or almost; [1] mostly or entirely spectral.
37 <sup>A</sup>	Shape of hind wing vein M+Cu: [0] uniformly and weakly convex, or straight; [1] strongly convex; [2] concave.
38 <sup>A</sup>	Length of hind wing vein 1-Cu: [0] nearly as long as crossvein cu-a; [1] 1-Cu distinctly longer; [2] 1-Cu distinctly shorter.
39 <sup>A</sup>	Sclerotization of hind wing vein 2-Rs: [0] entirely tubular; [1] apical half or more nebulous or spectral.
40 <sup>S</sup>	Sclerotization of hind wing crossvein 1r-m: [0] entirely tubular; [1] with one bulla.
41 <sup>S</sup>	Shape of hind wing vein Cub: [0] apical 0.5 concave, straight or only very slightly convex; [1] distinctly convex, even if sinuous; [-] not differentiated.
42 <sup>Z</sup>	Length of hind wing vein 2-1A: [0] short, reaching less than 0.3 the way to wing margin, or absent; [1] complete or reaching more than 0.5 the way to wing margin.
43 <sup>A</sup>	Shape of fore tibia of female: [0] regular-looking; [1] apical half or more swollen, even if slightly, and basally constricted.
44 <sup>S</sup>	Position of greatest swelling portion of fore tibia: [0] central, tibia with oval aspect; [1] subapical, tibia somewhat conic; [-] n/a (tibia not swollen).
45 <sup>S</sup>	Relative length of mesal and lateral lobes of female fourth tarsomere (all legs): [0] approximately of equal length [1] unequal, mesal lobe at least 1.5 as long as lateral lobe; [2] fourth tarsomere (all legs) not bilobed.
46 <sup>S</sup>	Differentiation of juxtacoxal carina: [0] carina present, even if incomplete; [1] completely absent.
47 <sup>A</sup>	Differentiation of pleural carina: [0] absent; [1] distinct and complete; [2] distinct but weak and incomplete.
48 <sup>Z</sup>	Shape of anterior margin of propodeum: [0] straight; [1] convex; [2] concave.

continued next page.

**TABLE 1.** (continued)

N°	Description
49 <sup>z</sup>	Shape of spiracle of propodeum: [0] rounded or almost so; [1] distinctly elliptic, about 2.0 its maximum width; [2] very elongate, length distinctly more than 2.5 its maximum width.
50 <sup>z</sup>	Distance between anterior margin of propodeum and anterior transverse carina: [0] approximately the same or slightly less as distance between anterior and posterior transverse carinae; [1] much shorter than distance between anterior and posterior transverse carinae; [2] greater than distance between anterior and posterior transverse carinae; [-] n/a (posterior or anterior carina absent).
51 <sup>A</sup>	Shape of anterior transverse carina of propodeum: [0] straight or weakly and uniformly curved; [1] strongly curved at median portion; [2] fused with posterior transverse carina.
52 <sup>z</sup>	Surface sculpturing behind anterior transverse carina of propodeum: [0] smooth to alutaceous, with fine to coarse punctures; [1] irregular, coriaceous, with strong rugulosity; [2] with numerous and close transverse wrinkles; [3] with strong and widely spaced transverse wrinkles.
53 <sup>A</sup>	Shape of posterior transverse carina of propodeum: [0] uniformly convex, weakly or strongly, even if briefly interrupted centrally; [1] distinctly bell-shaped or trapezoidal; [-] n/a (present only as sublateral crests or absent).
54 <sup>A</sup>	Differentiation of posterior transverse carina of propodeum: [0] complete, either with or without sublateral crests; [1] interrupted medially, between sublateral crests or apophyses; [2] absent except for crests or apophyses; [3] completely absent.
55 <sup>z</sup>	Structure of sublateral portions of posterior transverse carina of propodeum: [0] not forming crests or apophyses; [1] forming distinct, flange-like crests; [2] forming low, conical apophyses; [3] forming high, thorn-like apophyses; [-] n/a (posterior carina absent).
56 <sup>z</sup>	Vertical carinae between anterior and posterior transverse carinae, differentiation: [0] complete; [1] absent; [2] vestigial or partially developed.
57 <sup>z</sup>	Vertical carinae behind posterior transverse carina, differentiation: [0] complete; [1] absent; [2] vestigial or partially developed.
58 <sup>A</sup>	Shape of first metasomal tergite: [0] short and triangular, length/(maximum width - minimum width) less than 4.0; [1] regular, somewhat elongate, $\lg/(w_{\max} - w_{\min})$ 4.0–6.0; [2] long and slender, $\lg/(w_{\max} - w_{\min})$ over 6.0.
59 <sup>z</sup>	Ventrolateral outline of petiole of first metasomal segment: [0] somewhat angled; [1] approximately rounded.
60 <sup>A</sup>	Tooth at base of first metasomal tergite, presence: [0] absent; [1] present, even if vestigial.
61 <sup>A</sup>	Position of spiracle of first metasomal tergite: [0] beyond middle; [1] at middle or nearly so.
62 <sup>z</sup>	Projection of spiracle of first metasomal tergite: [0] not prominent; [1] prominent in dorsal view.
63 <sup>A</sup>	Dorsolateral carina of first metasomal tergite, differentiation: [0] complete, even if basal portion much weaker than apical portion; [1] very weak or distinct only near base or above the spiracle; [2] completely absent.
64 <sup>z</sup>	Median dorsal carina of first metasomal tergite, differentiation: [0] distinct to spiracle; [1] represented only by a weak and often incomplete longitudinal ridge; [2] completely absent.
65 <sup>z</sup>	Shape of thyridium: [0] subcircular; [1] distinctly longer than wide; [2] distinctly wider than long.
66 <sup>A</sup>	T7–8 width in lateral view: [0] of similar size or narrower than T5–6; [1] distinctly wider than T5–6.
67 <sup>s</sup>	Ovipositor thickness: [0] thick, stout, distinctly taller than wide; [1] moderately slender, linear; [2] very slender, hair-like.
68 <sup>A</sup>	Ovipositor shape apically: [0] straight or nearly so; [1] distinctly downcurved; [2] distinctly upcurved.
69 <sup>z</sup>	Ovipositor tip shape in posterior view: [0] strongly compressed; [1] approximately cylindrical [2] distinctly depressed.
70 <sup>A</sup>	Differentiation of nodus on tip of dorsal valve of ovipositor: [0] with distinct nodus at dorsal valve, giving triangular aspect to apex; [1] nodus weak or not evident, apex not triangular.

continued next page.

**TABLE 1.** (continued)

N°	Description
71 <sup>A</sup>	Notch of dorsal valve of ovipositor, presence: [0] present; [1] absent; [2] presence of a modified structure instead of a preapical notch.
72 <sup>A</sup>	Shape of ovipositor tip: [0] blunt or only moderately pointed; [1] ending in a long and narrow point.
73 <sup>A</sup>	Apical serrations at dorsal valve of ovipositor, presence: [0] absent; [1] present.
74 <sup>A</sup>	Structure of apical lobe at ventral valve of ovipositor [0] absent, ventral valve not dilated; [1] present, ventral valve dilated and overlapping dorsal valve; [2] apically expanded to cover entire tip as a sheath.
75 <sup>A</sup>	Serrations of ventral valve tip, differentiation: [0] present along entire tip; [1] weak and restricted to the very tip, or serrations absent.

**TABLE 2.** Character state matrix for *Polyphrix* species and outgroup taxa, used in the analyses discussed in the text. Polymorphisms are expressed as follows: a, 01; b, 02; c, 03; d, 12.

Species	Characters				
	1	10	20	30	40
<i>Acerastes</i> sp.	0100200001	0011110001	0101021100	--12001011	
<i>Anacis</i> sp.	1100210300	0000010001	1100110011	1010001111	
<i>Basileucus</i> sp.	0000210301	0000010001	0101010101	1-11011101	
<i>Bathyzonus</i> sp.	0100110001	0011100111	011102-011	0-22001101	
<i>Bicryptella</i> sp.	1100201201	1001010111	0101011011	1-02011101	
<i>Cryptanura quadrimaculata</i>	0000110321	0101100211	1001011100	0221100101	
<i>Digonocryptus crassipes</i>	1020000200	000c010210	-100011011	0001001100	
<i>Distictus tibialis</i>	1010110200	0000000010	-100010111	1001001101	
<i>Golbachiella</i> viz.	1000210101	1003000200	-111011010	1-02001101	
<i>Joppidium</i> sp.	1000211001	0111102200	-000001001	0-01000101	
<i>Lagarosoma assitum</i>	0100210001	0003111100	-111021101	1221101100	
<i>Lamprocryptus</i> sp.	0000201301	0002101111	0000011101	3121100101	
<i>Latosculum</i> sp.	0000200001	0000001210	-100010101	0001000101	
<i>Loxopus australis</i>	0000211101	0000011011	0001012000	--12011101	
<i>Melanocryptus niger</i>	0000101300	0101011211	0111021100	1001001101	
<i>Messatoporus</i> sp.	0001210301	2000110011	0110021100	0021001201	
<i>Nematocryptus</i> sp.	100021?301	1111101011	0111021100	--2211101?	
<i>Pachysomoides</i> sp.	1100110201	1011110011	1101012010	1-02011101	
<i>Polyphrix atlantica</i>	0100000301	2003011200	-110021?10	-bb1001001	
<i>Polyphrix cristata</i>	0100000301	2003011200	-110021100	-b21101201	
<i>Polyphrix stellata</i> sp. nov.	1100100301	2003010201	0110021111	0221101001	
<i>Polyphrix varians</i>	0000000301	2103010200	-110021110	0221101001	
<i>Priotomis</i> sp.	1000200201	0003201210	-100021110	--120?1001	
<i>Prosthoporus nigrifemur</i>	0000200101	2000101200	-110021111	0201101201	
<i>Rhinium</i> sp.	0000200201	0012010111	1100021111	--02011111	
<i>Whymperia</i> sp.	1100211301	0003211200	-000010011	0111000001	

continued next page.

**TABLE 2.** (continued)

Species	Characters				
	41	50	60	70	75
<i>Acerastes</i> sp.	010-002010		10-3-00110	1112001100	01001
<i>Anacis</i> sp.	000-010001		11-1110100	0002201100	00000
<i>Basileucus</i> sp.	100-010201		01-2200100	0012001000	00000
<i>Bathyzonus</i> sp.	000-212002		0010000010	1112001010	01001
<i>Bicryptella</i> sp.	110-002200		1130302010	0011?01???	?????
<i>Cryptanura quadrimaculata</i>	010-0a2010		1000300101	0a22211100	11000
<i>Digonocryptus crassipes</i>	a11000121a		1202a00011	1011210011	10010
<i>Distictus tibialis</i>	0111012202		0222-00011	1011010001	00010
<i>Golbachiella</i> viz.	000-212000		00-3-00000	0010001111	10001
<i>Joppidium</i> sp.	010-000221		10-2200210	1022101210	01000
<i>Lagarosoma assitum</i>	011101020-		01-3-00100	1122012011	10010
<i>Lamprocryptus</i> sp.	110-001011		1211100210	0022001000	11100
<i>Latosculum</i> sp.	110-001021		00-3-00100	0122001000	00000
<i>Loxopus australis</i>	000-100000		0000100011	0002000000	00000
<i>Melanocryptus niger</i>	010-012120		01-a122100	1a12100000	00000
<i>Messatoporus</i> sp.	111011002-		02-3-00100	1122012021	11000
<i>Nematocryptus</i> sp.	100-01021-		03-3-00211	1112101000	00000
<i>Pachysomoides</i> sp.	010-201200		10d0122000	0012?01110	01001
<i>Polyphrix atlantica</i>	110-01021-		03-3-00110	1122101001	00000
<i>Polyphrix cristata</i>	110-01011-		03-3-00110	1122101000	01000
<i>Polyphrix stellata</i> <b>sp. nov.</b>	010-01021-		03-3-00110	1022101010	01000
<i>Polyphrix varians</i>	0010-01021		-03-3-0020	1022101010	01000
<i>Priotomis</i> sp.	010-?1000-		02-3-00000	0012201000	01100
<i>Prosthoporus nigrifemur</i>	000101000-		02-3-00110	1012002011	10001
<i>Rhinium</i> sp.	010-000211		0132300110	0112001000	10001
<i>Whymperia</i> sp.	100-011020		1010100211	0022201011	00100

**TABLE 3.** Numerical data for each cladistic analysis. *R*, Rearrangements tried in millions (M); *Fit*, fit for characters, calculated as  $K/(e+K)$ , where *e* = extra steps, and *K* = constant of concavity; *CI*, consistency index. *RI*, retention index.

-	<i>K</i> =1	<i>K</i> =2	<i>K</i> =3	<i>K</i> =4	<i>K</i> =5	<i>K</i> =6
R	611.6 M	641.7 M	632.0 M	630.4 M	617.9 M	624.0 M
Fit	51.25913	43.03961	37.13355	32.76908	29.33258	26.57256
CI	0.23	0.23	0.23	0.23	0.23	0.24
RI	0.39	0.41	0.41	0.41	0.41	0.42

For that reason, the trees calculated with *K*2–6 are here preferred in relation to that with *K*1. A phylogenetic analysis of *Prosthoporus* and *Lagarosoma* will be presented elsewhere. It is also relevant to note that both these genera, as well as *Polyphrix*, are rather rare taxa, known predominantly from South America.

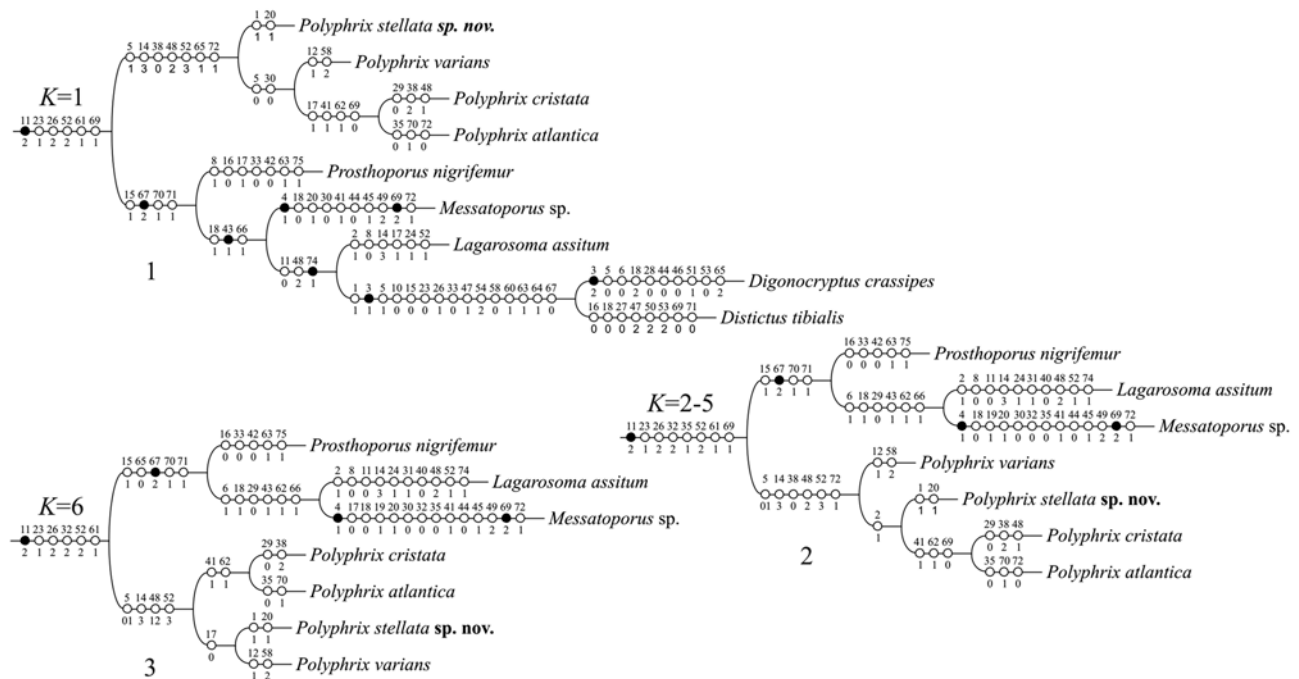


In trees from *K*2–5, *Polyphrix stellata* **sp. nov.** was recovered as basal to the clade *P. varians* + (*P. atlantica* + *P. cristata*) (Fig. 2), while in the tree obtained with *K*1, *P. varians* occupied the basalmost position (Fig. 1). With *K*6, *P. varians* and *P. stellata* **sp. nov.** were recovered as sister groups (Fig. 3). Considering that higher values of *K* will weigh less strongly against characters which are most homoplasious, then the extremely high level of homoplasy observed for Cryptini helps to justify the preference for results obtained with lower values of *K*. This approach, combined to the discussion presented in the previous paragraph, suggests that the trees obtained here for *K*2–5 should be preferred.

The two Atlantic Forest species, *P. atlantica* and *P. cristata*, were always recovered as sister taxa, with 2–3 autapomorphies. Although generally quite similar, these two species can be recognized by clearly distinct features, as compiled in the key to species presented further below.

The results suggest an Amazonian origin of the genus, with the basalmost species known only from the Amazon Forest, and more apical species progressively radiating towards southern Brazil. This is the most parsimonious hypothesis, treating each biome as a single character, as suggested by Bremer (1992): considering the recovered trees, a single transition is needed from the Amazon to the Atlantic Forest, while an origin in the Atlantic Forest would require two changes of ancestral areas. *Polyphrix varians* is known from the Amazon Forest and from the Brazilian Cerrado, but no specimens were collected in the Atlantic Forest after several major field trips in this biome. *Polyphrix cristata*, previously known only from one locality in the state of Espírito Santo, has its distribution record expanded to 3°10'39" latitude degrees in the present work (see below), suggesting that it may occur in a significant portion of the Atlantic Forest.

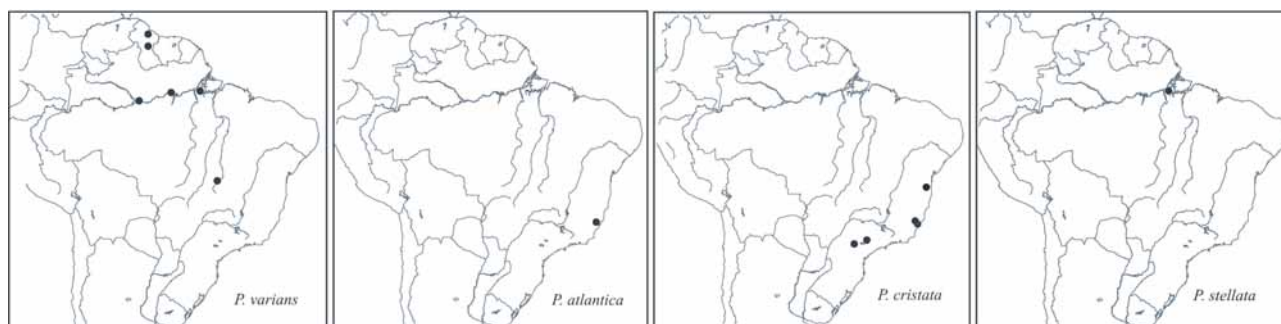
Albeit originally known and proposed from a single species, *Polyphrix* Townes was well supported and only slightly redefined by the cladistic analysis. It now securely encompasses three published species plus a new one, described below.



**FIGURES 1–3.** Summary of clades containing the species of *Polyphrix* obtained with implied weighting searches, under different values for the concavity constant, *K*. 1, Clade from tree obtained with *K*1. 2, Clade from trees obtained with *K*2–5 (all identical). 3, Clade from tree obtained with *K*6.

## Taxonomy

The following description combines the original description of Townes, new features observed by Nogueira & Aguiar (2005), and substantial original information.



**FIGURE 4.** Diagram with distribution records for all known species of *Polyphrix*.

### *Polyphrix* Townes

*Polyphrix* Townes, 1970:282–283, 482. Description, figure. Type species: *Polyphrix varians* Townes, by monotypy and original designation.

*Polyphrix*: Nogueira & Aguiar, 2005:26. Redefinition, description, figure, new taxa, key to species.

**Redescription.** Fore wing 7.9–9.9 mm. Body slender, shiny, scarcely punctate and sparsely pilose. *Head*: clypeus strongly convex; CHW 1.63–1.84, rectangular to almost triangular, CWW 1.48–2.02; apical margin convex, without teeth; mandible moderately long, MLW 1.57–2.02, apex slightly to distinctly narrower than base, MWW 0.53–0.72; ventral tooth slightly longer than dorsal tooth; malar space very narrow, MSM 0.40–0.50; subapical flagellomeres as wide as basal ones, not flattened; supra-antennal area ventrally slightly concave, near ocelli slightly convex, dorsally with distinct longitudinal carina; occipital carina ending relatively far from hypostomal carina, at distance of 0.63–1.00 the width of mandible base; temple and gena very narrow. *Thorax*: dorsal margin of pronotum not swollen, but sometimes with elongate tubercle or lamellar protuberance; epomia absent; mesoscutum strongly convex, circular; mesoscutum and scutellum glabrous, polished, shiny; notaulus faint, from almost completely absent to distinct on anterior 0.3 of mesoscutum; scuto-scutellar groove smooth, polished, moderately deep; lateral carina of scutellum near scuto-scutellar groove with circular perforation; epicnemial carina restricted to ventral 0.7 of mesopleuron, sinuous to almost straight; sternaulus weak, incomplete, reaching at most half the distance to mid coxa, strongly upcurved; mesopleural fovea very shallow; median portion of postpectal carina absent or weak and short; hind margin of metanotum without teeth-like projections; transverse furrow at base of propodeum very wide and shallow, usually smooth, sometimes with very faint oblique striation; pleural carina absent; justacoxal carina absent or vestigial. *Legs*. Fore tibia of female regular, not swollen; all tibiae with numerous bristles; pre-apical tarsi usually slightly bilobed, fore lobe slightly longer than hind one. *Propodeum*: smooth, shiny; scarcely pilose; anterior margin laterally slightly prominent, centrally concave; spiracle elliptic, SWL 1.83–2.70; anterior transverse carina strong, straight or slightly arched forwards, complete, area in front of it smooth, shiny, with sparse hairs, area behind it with distinct straight, strong, widely spaced transverse wrinkles, either complete or incomplete; posterior transverse carina and apophyses absent. *Wings*: hyaline; fore wing crossvein 1cu-a basad of 1M+Rs by 0.25–0.27 its own length; vein 2-Cu 0.20–0.26 as long as crossvein 2cu-a, veins angled; ramellus absent; 4-Rs somewhat irregular, apically distinctly upcurved, about same size or slightly shorter than vein 4-M, which is slightly arched; bulla of crossvein 2m-cu short, placed at posterior half of vein; cell 1+2Rs (areolet) of moderate size, APH 0.61–0.67, pentagonal or rectangular,

usually much wider than high, AWH 1.17–2.40; crossveins 2r-m and 3r-m subparallel, of equal size, or 3r-m distinctly longer; 3r-m spectral; vein 2-M much longer than 3-M, or rarely the same length; hind wing vein M+Cu strongly convex apically; HW1C 0.80–1.00; vein 2-1A reaching 0.70–0.85 of distance to posterior wing margin. *Metasoma*: first tergite long, T1LW 3.35–3.93, very slender, T1WW 1.57–1.66, ventro-laterally round, very sparsely pilose, without basolateral tooth; spiracle at center, prominent; all longitudinal carinae absent; T2LW 1.07–1.48, T2WW 2.2–2.5; thyridium slightly longer than wide; OST 0.72–0.83.; ovipositor from slender to thick, straight, laterally slightly to distinctly compressed, apex from blunt to acute; dorsal valve nodus sharply defined, except vestigial or absent in *P. atlantica*; ventral valve apex with 6–12 teeth, 1st and 2nd widely spaced, except all teeth regularly spaced in *P. atlantica*.

**Comments.** The highly uniform and particular morphological structure of *Polyphrix* is characteristic. The transverse wrinkles of the propodeum, though uncommon, also occur in some other Cryptini, particularly *Messatoporus* Cushman, *Prosthoporus* Porter, and in some *Digonocryptus* Viereck, but never so stout, straight, and widely spaced as in *Polyphrix*. *Nematocryptus* Roman, a genus of the Oriental and Ethiopian regions, also shows such strong and widely spaced wrinkles, though slightly different than in *Polyphrix*. One species of *Nematocryptus* was coded and included in the analysis, but was not recovered as closely related to *Polyphrix*. Furthermore, it can be distinguished from the latter genus by the ventral tooth of mandible shorter than dorsal one (vs. longer), dorsal margin of pronotum strongly and uniformly swollen (vs. only weakly swollen, sometimes with a lamellar protuberance), body surface strongly sculptured (vs. smooth), mesoscutum somewhat flattened (vs. strongly convex) and notaulus very long and deeply impressed (vs. very short and faint), among other features. As pointed out by Nogueira & Aguiar (2005), the lamellar protuberance of the pronotum in *P. cristata* can be mistaken with the “upper margin of pronotum strongly swollen” mentioned by Townes (1970) in couplet eight of his key to Lymeonina genera, but other features will eventually lead to the correct determination of the genus. Albeit quite similar structurally, the four known species can be easily distinguished from each other through differences in their color pattern.

**Biology.** Unknown.

**Distribution records.** Recorded from twelve localities, including the Amazon Basin of Guyana and Brazil (states of Pará and Amazonas), the Brazilian Cerrado (state of Goiás), and the highlands of southern and southeastern Brazil (states of Bahia, Espírito Santo, São Paulo and Paraná). These records range 29°51' latitude degrees. Figure 5 shows all geographic records of the four species of *Polyphrix*. See section “Phylogeny and Distribution” for more information.

### Key to the species of *Polyphrix* Townes

1. Propodeum with one or two pairs of somewhat oval dark spots; hind trochanter, trochantellus and femur dark brown; mesoscutum completely black ..... 2
  - Propodeum uniformly orange, without dark spots (Fig. 12); hind trochanter, trochantellus and femur entirely yellowish (Fig. 7); mesoscutum not completely black (Fig. 9) ..... 3
2. Paraocular stripe complete (Fig. 9); pronotum with strong and distinct submarginal lamellar protuberance; anterior margin of propodeum centrally distinctly concave; ovipositor slender, dorsal valve with nodus, ventral valve with nine apical teeth, apical 3–4 faint..... *Polyphrix cristata* Nogueira & Aguiar
  - Paraocular stripe interrupted from supraclipeal area to posterior orbit; pronotum with very weak submarginal protuberance; anterior margin of propodeum weakly sinuous; ovipositor thick, dorsal valve without nodus, ventral valve with seven apical teeth ..... *Polyphrix atlantica* Nogueira & Aguiar
3. Pronotum and mesoscutum completely orange; metasomal tergites 2–8 black with apical white stripe; transverse furrow at base of propodeum, measured centrally, about 1.2 as wide as basal area of propodeum ..... *Polyphrix varians* Townes
  - Pronotum and mesoscutum mostly black, with small yellow marks (Figs. 7,9); metasomal tergites 2–8 entirely orange (Figs. 7,9); transverse furrow at base of propodeum, measured centrally, about 0.7 as wide as basal area of propodeum ..... *Polyphrix stellata* Tedesco & Santos, **sp. nov.**

### ***Polyphrix varians* Townes**

*Polyphrix varians* Townes, 1970:283. Description, figure, distribution (corrected by Nogueira & Aguiar 2005). Holotype ♀ AEIC.

*Polyphrix varians*: Carrasco, 1972:328. Listed.

*Polyphrix varians*: Yu & Horstmann, 1997:284. Listed.

*Polyphrix varians*: Nogueira & Aguiar, 2005:33. Morphology, taxonomy, distribution, keyed, figure.

*Polyphrix varians*: Yu *et al.*, 2005: Listed.

The morphometric ratios provided below are mostly original information which complement the information provided by Townes (1970) and Nogueira & Aguiar (2005): CWH 1.77; CWW 1.63; MLW 2.02; MWW 0.72; MSM 0.48; FLW 6.08; SWL 1.87; APH 0.61; AWH 1.80–2.40; HW1C 0.80; T1LW 3.83; T1WW 1.66; T2LW 1.48; T2WW 2.20; OST 0.77.

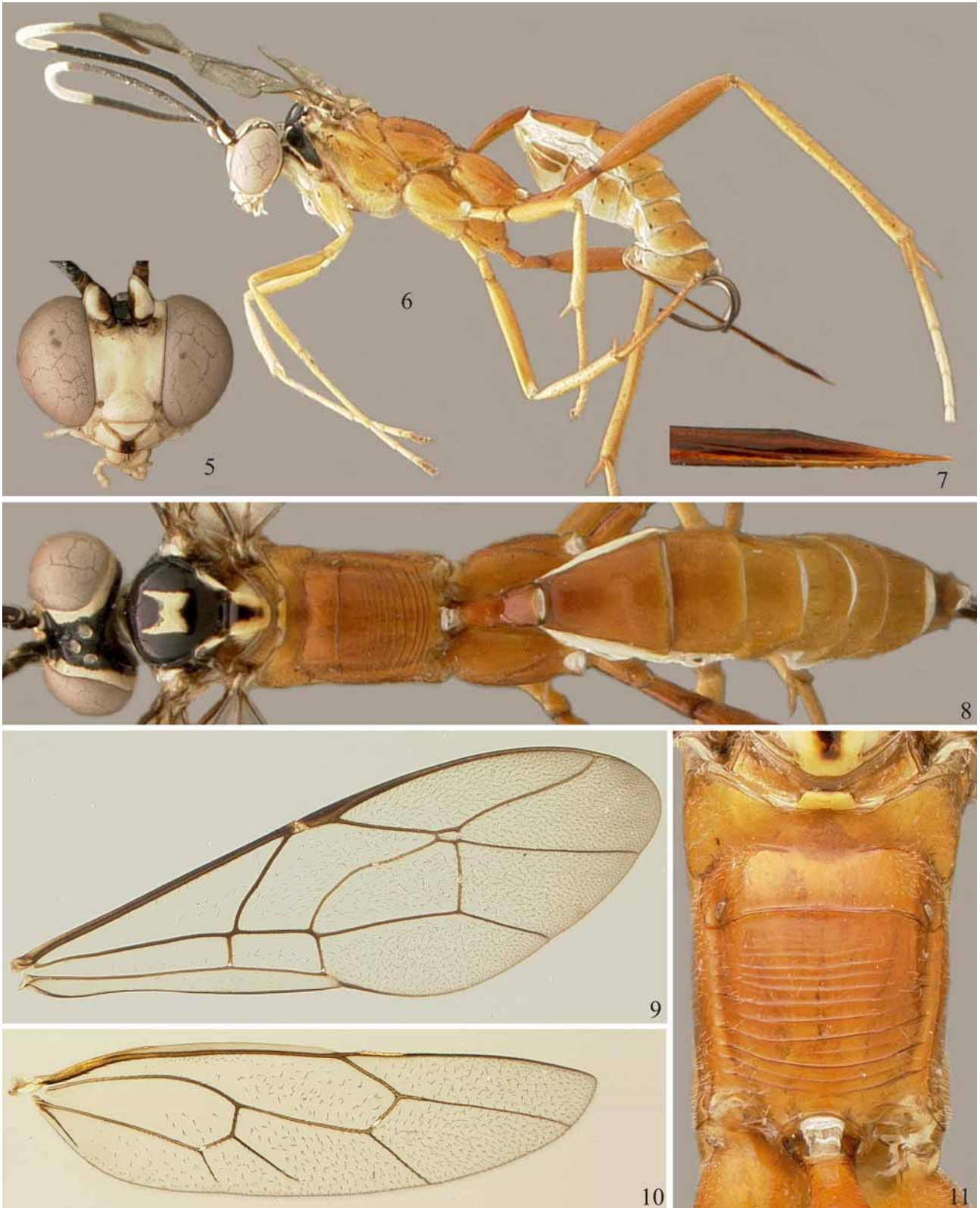
**Distribution records.** The original description recorded the species from Óbidos, State of Pará, northern Brazil (1°54'07"S, 55°31'10"W); two other geographic records were reported by Nogueira & Aguiar (2005), from Caxiuanã, also in Pará, at about 460 km from the type locality, and from Uruaçu, state of Goiás, central Brazil (14°17.0'S 48°54.8'W). Three new records are provided here: one from Reserva Florestal Adolfo Ducke, at Manaus, Amazonas (3°00'16"S 59°56'37"W), Brazil; one from Kalacoon, Cuyuni-Mazaruni ("Bartica District" on the label), Guyana (6°24'00"N, 58°39'00"W); and one from Iwokrama Forest Reserve, Region 8, Guyana (4°40'19"N 58°41'04"W). Most distribution records, including possibly also Kalacoon, are from dense, well preserved equatorial forests, while Uruaçu is in an area of open, savannah-like vegetation, the Brazilian Cerrado.

**Material examined.** UFES: 1 ♀ from BRASIL, Amazonas, Manaus, Reserva Florestal Adolpho Ducke, 1–3.X.2005, yellow pans, APAguiar. AMNH: 1 ♂ from GUYANA, Bartica District, Kalacoon, 20.X.1920. CNCI: 1 ♀ from GUYANA, Region 8, Iwokrama Forest Reserve, 4°40'19"N 58°41'04"W, 100–200m, VI–VI.2001, FIT, R. Brooks & Z. Falin.

### ***Polyphrix cristata* Nogueira & Aguiar**

*Polyphrix cristata* Nogueira & Aguiar 2005; 30–31. Description, figure, distribution. Holotype ♀ UFES (currently at MZSP).

The examined specimens have most of the features described by Nogueira & Aguiar (2005) for the species, except for the following additions or differences: Length of fore wing 7.88–9.57 mm. Antenna with 30–33 flagellomeres; CWW 2.02; MLW 1.90; MWW 0.66; occipital carina sometimes almost reaching hypostomal carina; lamellar protuberance at pronotum sometimes rather weak; SWL 1.84; anterior carina of propodeum sometimes weak laterally, area behind it with 10–13 complete or incomplete transverse wrinkles; APH 0.67; fore wing vein 3-rs sometimes slightly longer than 2-rs; hind wing vein 2-1A reaching up to 0.84 the distance to posterior margin of wing; T1LW 3.93; T1WW 1.57; T2LW 1.36; last 3–4 teeth of ventral valve of ovipositor sometimes conspicuous. Color: white band on flagellum from flagellomeres 8–9, to 16–17, basal and last ones usually only partially marked with white; para-ocular stripe sometimes interrupted from posterior orbit to gena; collar white to yellow, sometimes marked with dark brown; 0.3–0.7 of tegula sometimes blackish; about 0.8 of post-scutellum sometimes yellow; brown area in front of anterior carina of propodeum sometimes restricted to antero-lateral portions; area behind anterior carina sometimes without distinct brown spots, anterior 0.6 usually dark orange; hind tarsi pale yellow to white apically; first metasomal tergite sometimes with basal 0.1–0.2 orange; tergite 8 usually with posterior margin white; margin of tergites 5–6 sometimes very narrow, tergite 7 sometimes without white margin.



**FIGURES 5–11.** *Polyphrix stellata* sp. nov. Holotype ♀. 5, Head, frontal. 6, Lateral view. 7, Tip of ovipositor. 8, Head, mesosoma and metasoma, dorsal. 9, Right fore wing. 10, Right hind wing. 11, Propodeum, dorsal. Illustrations not to scale.

**Distribution records.** The original description recorded the species only from Santa Maria de Jetibá, at Espírito Santo highlands, southeastern Brazil (20°01'33"S, 40°44'30"W); Four new records are provided here: one from Itororó, Bahia (15°03'45"S, 39°06'24"W); one from Reserva Biológica de Duas Bocas, at Cariacica, Espírito Santo (20°16'21"S, 40°28'40"W), Brazil; one from Botucatu, São Paulo (22°53'09"S, 48°26'42"W); and one from Jundiá do Sul, Paraná (23°27'00"S, 50°17'00"W). These four records comprise a total latitude of 8°23'15".

**Material examined.** **UFES:** 1 ♀ from BRAZIL, Bahia, Itororó, Fazenda Guanabara, 15°03'45"S, 39°06'24"W, 25.XI.2002, Malaise trap, pt. 8, J. Cardoso & J. Maia; 1 ♀ from BRAZIL, Espírito Santo, Cariacica, Reserva Biológica de Duas Bocas, 20°16'21"S, 40°28'40"W, 2–3.V.2005, yellow pans, pt. 11, APAGUIAR *et al.*; 1 ♀ from BRAZIL, São Paulo, Botucatu, Fazenda Jaciobá, 5–7.II.2005, yellow pans, E.F. Santos & C.P. Scott-Santos. **DZUP:** 1 ♀ from BRAZIL, Paraná, Jundiá do Sul, Fazenda Monte Verde, 19.I.1987, Lev. Ent. PROFAUPAR, Malaise trap.

### *Polyphrix stellata* sp. nov. Tedesco & Santos

**Etymology.** From the Latin, meaning “spotted”; in reference to the W-shaped whitish spot on the mesoscutum, unique for the genus.

**Description.** Fore wing 8.55 mm. Body entirely shiny, scarcely punctate and very sparsely pilose. *Head* (Figs 6–7, 9): antenna with 31 flagellomeres; clypeus scarcely punctate, CWH 1.84, CWW 1.49 apex slightly convex; mandible and palpi sparsely pilose; mandible moderately long, MLW 1.57, MWW 0.53, ventral tooth slightly longer and more robust than dorsal tooth; occipital carina moderately high, sharp, uniformly curved, ending far from hypostomal carina, at distance as large as basal width of mandible; MSM 0.49. *Thorax* (Figs 7, 9): pronotum with weak and short wrinkles at posterior margin of collar centrally; dorsal margin regular, neither swollen nor prominent; mesoscutum subcircular; notaulus almost completely absent, traceable only in tangent anterior view; lateral carina of scutellum weak, distinct only on anterior 0.2; epicnemial carina restricted to ventral 0.70 of mesopleuron, almost straight, mesopleuron dorsad of carina giving rise to short and very weak transverse strigulation; mesopleural fovea shallow; mesopleural suture straight, narrow and crenulate; median portion of postpectal carina very weak, short and slightly arched forward; metapleuron smooth, shiny, with sparse hairs; justacoxal carina present only as very short subvertical ridge; transverse furrow at base of propodeum centrally 0.69 as long as distance anterior transverse carina to anterior margin of propodeum, measured centrally. *Legs:* hind pre-apical tarsomere not distinctly bilobed; FLW 6.50. *Propodeum* (Figs 7, 9, 12): anterior margin centrally concave; SWL 2.70; anterior transverse carina straight, area behind it with 11 distinct straight transverse wrinkles, either complete or incomplete, posterior ones stronger and sharper. *Wings* (Figs 10–11): fore wing vein 1-Rs+M distinctly sinuous, with bulla placed at basal 0.25; crossvein 1m-cu uniformly arched, slightly shorter than 1-Rs+M; vein 1M+Rs anteriorly straight, posteriorly arched; crossvein 1cu-a straight, forming straight angle with M+Cu, ending basad of vein 1M+Rs by about 0.2 its own length; crossvein 2cu-a 0.22 as long as vein 2-Cu; cell 1+2Rs (areolet) of moderate size, APH 0.62, transversely rectangular, AWH 2.14; crossvein 3r-m spectral, distinctly longer than 2r-m; hind wing vein M+Cu forming straight angle with vein M; HW1C 0.97; vein 2-Rs entirely tubular; crossvein 1r-m with bulla at ventral 0.3; veins 1-Rs and 2-Rs distinctly angled; vein Cub straight, reaching about 0.8 of distance to wing margin; vein 2-1A reaching about 0.85 of distance to wing margin. *Metasoma* (Figs 7, 9): first tergite elongate, slender, T1LW 3.35, T1WW 1.60; spiracle at center, weakly prominent; T2LW 1.20, T2WW 2.20; tergites 3–8 smooth, shiny, pilose; OST 0.72; ovipositor moderately slender, straight, scarcely punctate, laterally strongly compressed; dorsal valve with nodus and notch, ventral valve with nine apical teeth; apex moderately long, pointed.

*Color* (Figs 6–9, 12). Head, pronotum and mesoscutum mostly black, remainder of mesosoma and metasoma from deep yellow (227,187,088) to deep orange (162,100,028). Head: scape dorsally dark brown, ventrally pale yellow; pedicel and flagellum dark brown, lighter apically, except most of flagellomeres 6 and



17 and 7–16, white; supra-clypeal area, clypeus, mouth parts, base of mandible, malar space and para-ocular stripe pale yellow (213,196,155); apex of mandible dark brown; supra-antennal area, occiput, temple and gena except orbital band, black. Mesosoma: pronotum black, except for continuous stripe from its upper to lower margin, pale yellow; prosternum pale yellow; mesoscutum black, centrally with large W-shaped pale yellow mark; scutellum anteriorly and dorso-centrally; scutellum apex and lateral 0.3, axillar carina, postscutellum, and tegula, pale yellow; mesopleuron deep yellow (212,163,078), dorsally lighter; metapleuron light orange (203,141,064); fore coxa, first trochantellus, tibia, and tarsus, pale yellow; femur and second trochantellus deep yellow; mid leg deep yellow, darker toward apex; hind coxa, trochantelli and femur, orange (203,127,054), tibia yellow, basitarsus from basally pale yellow to apically white, remaining of tarsi white. Propodeum: uniformly orange (211,130,056). Metasoma: T1 orange; T2–3 basally orange, apically lightest; T4–7 deep yellow, T7 with apical white stripe; T8 ferruginous (174,122,054); ovipositor dark red (102,048,024), sheaths dark brown; wings hyaline.

**Comments.** Readily differentiated from all other species of the genus by the entirely orange metasoma, presence of a W-shaped yellow mark on the mesoscutum and presence of the median portion of the postpectal carina, though short. *Polyphrix stellata* **sp. nov.** can be additionally isolated from the sympatric species *P. varians* by the mostly black pronotum and mesonotum (vs. orange). The new species shares color pattern similarities with both Atlantic Forest species, such as the black areas on the pronotum, mesoscutum and scutellum, and with *P. varians*, such as the orange tone of propodeum and legs entirely yellow or orange.

**Male.** Unknown.

**Host.** Unknown.

**Material examined.** Holotype female (MPEG) from Brazil, PA, Melgaço, Floresta Nacional de Caxiuanã, Trilha Igarapé Tijucaquara, 21–25.XI.2003, yellow pans, APAGuiar & JDias, P05132 (field point). Meso- and metapleuron partially translucent due to ethil acetate treatment; otherwise in good shape.

**Distribution record.** Amazon Basin, Brazil, PA (Fig. 5).

### ***Prosthopor* *mexicanus* (Kasparyan & Ruíz), comb. nov.**

*Polyphrix mexicanus* Kasparyan & Ruíz 2008:157–158, 366. Description, figure. Holotype ♀ at UATM.

**Comments.** This species was originally described under *Polyphrix*. However, it shows many features that disagree with the generic definition, such as ventral tooth of mandible shorter than dorsal one (vs. longer), occipital carina meeting hypostomal carina (vs. not meeting), deep notaulus (vs. faint), epomia present (vs., absent), transverse wrinkles of propodeum very close (vs. widely spaced) and metasomal tergites 1 and 2 polished. All of these characters are, however, typical of *Prosthopor*, as are the absence of hind wing vein 2-1A, metasomal tergites 7 and 8 longer than 5-6, and the ventral valve of the ovipositor slightly overlapping the dorsal valve.

*Prosthopor* and *Polyphrix* are, indeed, generally similar and probably related, as stressed in the present work. The description and figures of *P. mexicanus*, altogether with the generic definition of *Polyphrix* as revised herein, support accurately its placement in *Prosthopor*.

With the new status, *P. mexicanus* represents the first record of *Prosthopor* for North America, in an area often considered as part of the Nearctic region.

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