The New World species of *Leucospis* Fabricius, 1775 (Hymenoptera, Chalcidoidea, Leucospidae): an update of Bouček’s revision with description of two new species from Brazil

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Abstract

The revision of *Leucospis* Fabricius (Hymenoptera: Leucospidae) by Bouček (1974a) is updated for the New World species based on material deposited in Brazilian collections. We provide a key to the New World species including all species described after Bouček, describe two new Brazilian species, *Leucospis copepucu* sp. nov. and *L. muru* sp. nov. describe the male of *Leucospis opalescens* Weld, 1922, and provide diagnoses and illustrations for ten other Brazilian species and one Argentinian species and comments on new geographic records for Brazilian species, with maps.

Key words: taxonomy, key, Minas Gerais, bee parasitoid

Introduction

Leucospidae (Hymenoptera: Chalcidoidea) is a small cosmopolitan family of ectoparasitoids of bees and aculeate wasps. They are mostly recognisable by individuals having the wings folded longitudinally (similar to some Vespidae), a robust body, 4 to 17 mm in length, quite robust posterior femur with a row of well-developed teeth on the ventral margin (similar to Chalcididae), an arched posterior tibia, and a small prepectus.

The family consists of 141 species distributed in four genera—*Neleucospis* Bouček (1 sp. from West Africa), *Micrapion* Kriechbaumer (12 spp. from South Africa), *Polistomorpha* Westwood (7 spp. from South and Central America) and *Leucospis* Fabricius (121 spp., cosmopolitan). According to Noyes (2017), there are 47 leucospid species recorded from the New World, one of which is a fossil. In Brazil there are 23 species in two genera, *Polistomorpha* (5 spp.) and *Leucospis* (18 spp.). The monophyly of Leucospidae was recovered by Munro *et al.* (2011) and Heraty *et al.* (2013) using molecular and combined molecular-morphology results, respectively, but the phylogenetic relationships within the family and within Chalcidoidea remain poorly resolved and need more attention (Darling & Cardinal 2005; Munro *et al.* 2011; Heraty *et al.* 2013).

The most recent and comprehensive taxonomic revision of Leucospidae was by Bouček (1974a), who examined material from all regions, and recognized and keyed 42 *Leucospis* species from the New World, of which 14 were newly described. Since Bouček (1974a) four extant species of *Leucospis* have been described from the Neotropical region, *L. leptomera* Bouček, 1974b (Bolivia), *L. pinna* Grissell & Cameron, 2002 (Ecuador), *L. vallicaucaensis* Pujade-Villar & Caicedo, 2010 (Colombia), and *L. gomezi* Genaro, 2012 (Dominican Republic).

Here we describe two new Brazilian species of *Leucospis* and the male of *L. opalescens* Weld, 1922, and present a dichotomous key to all species occurring in the New World. Diagnoses and images are also provided for the 12 Brazilian species examined, with comments on distribution.

Material and methods

The abbreviations used for listed collections are:
All specimens were identified using the key of Bouček (1974a) and/or compared with original descriptions. Morphological terms (Figs 1, 2) are based on Bouček (1974a) and Heraty et al. (2013). The dichotomous key was modified from Bouček (1974a), with the addition of the subsequently described species. Some images used in Bouček (1974a, b) and Grissell & Cameron (2002) were modified and redrawn here to facilitate future use. Maps with the geographic records of the species were generated using the software QGIS version 2.8.6 (QGIS, 2017). Collecting sites indicated on maps are based on previous taxonomic papers, Universal Chalcidoidea Database (Noyes 2017), and examined specimen labels. New province records are bolded on Distribution section. All drawings were done and processed using a vector editing free software, Inkscape version 0.91. Photographs of morphological structures were captured using a LEICA DFC 295 digital camera attached to a LEICA M205C stereomicroscope. The images were processed using digital image processing software Leica Application Suite LAS V.3.8. Left fore and hind wings of the photographed specimens were removed and mounted temporarily between slides in ethanol. After study all wings were dried and put into gelatin capsule vials pinned with the respective specimen. Measurements were taken using a micrometric ocular lens coupled to a LEICA M125 stereomicroscope. For each magnification, the measurement of the ocular lens was multiplied by a correction factor obtained by comparison with a micrometer slide, WILD Heerbrugg 310345. The morphological measurements were standardized as follows.

**HEAD:**

Post-ocellar length (POL): distance between the inner margins of the lateral ocelli (Fig. 1B).
Ocellar-ocular length (OOL): distance from the outer margin of the lateral ocellus to the eye margin (Fig. 1B).
Ocellar triangle length: distance between the outer margins of the lateral ocelli (Fig. 1B).
Ocellar triangle height: distance between the anterior margin of the median ocellus and a line through the posterior margins of the lateral ocelli (Fig. 1B).
Frontovertex width: minimum distance between the inner margins of the eyes, at the level of the median ocellus (Fig. 1B).
Compound eye width: maximum width, with head in lateral view (Fig. 1A).
Compound eye height: maximum height, with head in lateral view (Fig. 1A).
Malar space: distance between the lower extremity of the eye and the base of mandible, in a vertical line (Fig. 1A).
Head length: maximum length, with head in dorsal view (Fig. 1B).
Head width: distance between the outer margins of the eyes (excluding pubescence), with head in dorsal view (Fig. 1B).
Head height: distance between the uppermost point of vertex, usually on the occipital carina, and the lowermost point of the apical margin of the clypeus, with head in frontal view (Fig. 1C).
Scrobe width: maximum distance between the outer scrobal carinae, with head in frontal view (Fig. 1C).
Scrobe height: distance between the upper scrobal carina (at the ocellus) and the lower edge of the antennal toruli, with head in frontal view (Fig. 1C).
Lower face width: minimum distance between the eyes below level of the antennal insertions (Fig. 1C).
Lower face height: distance between the lower margins of the toruli and the lowest point of the clypeus (Fig. 1C).
Mouth width: distance between its lateral corners, usually easy to see in a ventro-facial view, outside of the mandibles (Fig. 1C).
Keel (in center of scrobe) height: distance from the lower margins of the toruli to the uppermost point of the keel between the scapes (Fig. 1C).
Clypeus width: maximum width of the clypeus, with head in frontal view (Fig. 1C).
FIGURE 1. *Leucospis* morphology and measurements, modified from Bouček (1974a). A. Head, lateral view. B. Head, dorsal view. C. Head, frontal view. D. Hind leg, lateral view. E. Meso and metasoma, female, lateral view. F. Meso and metasoma, female, dorsal view. Abbreviations: ax, axilla; c, clava of antenna; ca, propodeal callus; ce, cercus; ceh, compound eye height; cew, compound eye width; ch, clypeus height; cw, clypeus width; cx, coxa; dc, discal carina; dep, mesopleural depression; dr, dorsellum; em, mesepimeron; ep, epipygium; es, mesepisternum; fl–8, flagellomeres 1 to 8; fl, femur length; fm, femur; fv, frontovertex; fw, femur width; gh, gaster height; gl, gaster length; gw, gaster width; hh, head height; hl, head length; hw, head width; hy, hypopygium; kh, keel height; la, lateral panel of pronotum; lw, lower face width; lh, lower face height; mc, median carina; mls, malar space; mpl, metapleuron; ms, mesoscutum; mw, mouth width; nt, notauli; of, ovipositor furrow; OOL, ocell-ocular length; oth, ocell triangle height; otl, ocell triangle length; ov, ovipositor; pc, premarginal carina; pe, prepectus; pj, projection of sixth tergite; pl, plicae; pn, pronotum; POL, post-ocellar length; ppp, parapsidal furrow; pr, propodeum; sc, scutellum; sh, scrobe height; sk, scape keel; sp, spiracle; su, subalar area; sw, scrobes width; tI–VI, tergites; tb, tibia; te, tegula.

Clypeus height: distance between the fronto-clypeal suture and the lowermost point of the clypeus (Fig. 1C). Scape length: distance from proximal to distal ends. Scapeal length: length from base to apex of the keel, on inner surface of scape (Fig. 1A). Antennal length: the total length of the antenna, including scape, pedicel and flagellum, including flagellomeres (f1–f8) and clava (c).

![Diagram of Fore Wing Venation](image)

**FIGURE 2.** Fore wing venation (*Leucospis ignota*). Abbreviations: A, anal vein; astv, apical process of stigmal vein; bc, basal cell; bpl, basal posterior lobe; cc, Costal cell; Cu, cubital vein; hB, hyaline break; M, medial vein; mv, marginal vein; pmv, premarginal vein; R, radial vein; Rs, radial sector; Sc, subcosta vein; smb, submarginal break; smv, submarginal vein; stv, stigmal vein; un, uncus.

**MESOSOMA:**

Pronotum width: maximum distance between the lateral surfaces of the pronotum, in dorsal view. Scutellum length: maximum distance between the anterior and posterior margins of the scutellum, in dorsal view. Scutellum width: maximum width, excluding axillae, in dorsal view. Dorsellum length: maximum distance between the anterior and posterior margins of the dorsellum, in dorsal view. Dorsellum width: maximum width of the dorsellum, in dorsal view. Propodeum length: distance between the anterior and posterior margins of the propodeum, dorsally, in a medial line. Fore wing length: maximum length, measured from proximal to distal ends. Hind wing length: maximum length, measured from proximal to distal ends. LEG:

Hind femur length: distance from proximal to distal ends (Fig. 1D). Hind femur width: maximum width measured along external surface, excluding teeth (Fig. 1D).
Hind femur, teeth number: number of the pointed projections on the external ventral margin of the hind femur. In the description it is given for both legs, separated by "/" (left / right).

**METASOMA:**
- Hind femur, teeth number: number of the pointed projections on the external ventral margin of the hind femur.
- Hind femur extremely stout, on ventral margin with small basal tooth and only 4 or 5 long slender teeth (figs 3A, 5A); body robust, ovipositor extremely short (fig. 3A).
- Hind femur less stout, on ventral margin with broad basal tooth followed by 7 or more smaller teeth (figs 3B, 5B); body often not very robust, ovipositor never unusually short (except L. pinna).

**Results**
A total of 81 specimens of Leucospidae were examined: ROM (1 sp.); BMNH (2 spp.); MfN (5 spp.); CCT–UFMG (70 spp.); UNESP (2 spp.); and PUC–MG (1 sp.). These specimens represent 13 species of *Leucospis*, of which 2 are here described as new species. Of the six species groups proposed by Bouček (1974a) for the New World species, four are represented by species examined herein, the CAYENENSIS, EGAIA, HOPEI and SPEIFERA species-groups. Both the TEXANA and AFFINIS species-groups are absent from South America. The dichotomous key contains all species with reliable records from the New World. The species treatments are organized by species group, with diagnoses, images and pertinent comments.

**Key to New World species of Leucospis**
(modified from Bouček 1974a)

1. Hind femur extremely stout, on ventral margin with small basal tooth and only 4 or 5 long slender teeth (figs 3A, 5A); body robust, ovipositor extremely short (fig. 3A).

2. Hind femur less stout, on ventral margin with broad basal tooth followed by 7 or more smaller teeth (figs 3B, 5B); body often not very robust, ovipositor never unusually short (except *L. pinna*).

2.2. Gaster posteriorly black, with orange cross-bands on broadest part and on tergite I (Fig. 3D); fore wing mostly dark brown; pilosity on mesosoma whitish, rather short, on gaster laterally each hair hardly reaching beyond next puncture.

2.2.3. Tergite I extensively yellow; pronotum posteriorly with broad yellow band, its sides red; mesosoma laterally mostly reddish brown; gaster dense, interspaces usually narrow; hairs on black part of pronotum and on anterior part of gaster brown; wings brownish; epipygium in female black, tergite IV in female medially with punctures in about 4 cross-rows; male scape partly yellow.

3.3. Tergite I black; pronotum posteriorly with narrow yellow band reduced at sides; mesosoma laterally mostly black; hind femur apart from upper pale line mainly black but often reddish brown above teeth and at base; punctuation on disc of gaster dense, interspaces usually narrow; hairs on black part of pronotum and on anterior part of gaster brown; wings brownish; epipygium in female with yellow streaks; tergite IV in female with punctures medially in about 6 cross-rows; male apex of gaster laterad median depression broadly yellow, scape black.

4.4. Lower tooth of mandibles long, separated from upper edge by a broad semicircular gap, visible even when mandibles closed (Figs 9F, 10E, 11F, 12E, 13F); propodeum often unusually densely pilose (Figs 9B, 10B, 11B, 13B, 13H); body often with vivid metallic tinge; pronotum without premarginal carina.

5.5. Upper part of hind coxal depression with broad smooth area which extends to base and upper edge (Figs 6C, 9H, 10F); ovipositor long, reaching mesosoma (Fig. 9A); dorsellum not carinate (Figs 9B, 10B).

6.6. Apex of gaster brown-golden, with unusually long thick pilosity; smooth area of hind coxa confined to upper half of depression (Fig. 6C); dorsellum weakly convex; hind femur near ventral edge rather densely punctate.
Apex of gaster dark, obscurely metallic, with mainly greysih pilosity which is not thicker than elsewhere on gaster (Figs 9A, 10A); smooth area of hind coxa extending over two-thirds of depression (Figs 9H, 10F); dorsellum short but strongly convex (Figs 9B, 10F); hind femur beneath coarsely and sparsely punctate (Figs 9J, 10F).  

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Median carina of propodeum various, but not raised into a hook-like lamella.  

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Dorsellum flat, thickly covered with rather adpressed white pubescence; hind tibia (Fig. 5C) mainly whitish, externally smooth, sparsely beset with coarse punctures; ovipositor reaching middle of tergite I; in female posterior tergites dark metallic.  

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Median carina of propodeum various, but not raised into a hook-like lamella.  

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Dorsellum bare or with a few inconspicuous hairs, often not flat; hind tibia either not whitish or with dense punctation externally (Figs 12E, 13I); ovipositor shorter than above (in species where female known) (Figs 11A, 13A).  

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Hind femur unusually slender, more than twice as long as broad (Figs 6E, 11H, 12F); malar space at least two-thirds as long as scape (Figs 11F, 12E); gaster in both sexes ovate, broad (Figs 11B, 12B); ovipositor reaching at least to base of tergite IV (Fig. 11A).  

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Hind femur broader, less than twice as long as broad (Fig. 13I); malar space at most 0.57 length of scape, mostly much shorter (Fig. 12F); gaster in both sexes (where known) clavate, unusually narrowed towards base (Figs 4B, 12A, 12B); ovipositor much shorter than above (Fig. 13A).  

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Hind coxal depression densely punctate (Fig. 6E); mesoscutum and gaster very finely punctate, gaster with uniform greyish pubescence; longest hairs on face as long as pedicel; malar space two-thirds as long as scape.  

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Hind coxal depression with dorsal edge and with a broad impunctate streak extending nearly to base of coxa (Figs 11H, 12E); mesoscutum and gaster coarsely punctate (Figs 11B, 12B, 12C), gaster posteriorly with unusual golden pubescence (Figs 11A, 11B, 12A, 12B); pubescence on face very short; malar space about as long as scape (Figs 11F, 12E).  

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Propodeum in both sexes with very dense silvery pubescence covering the flat finely punctate surface (Fig. 13H); in female, ovipositor not reaching base of tergite V (Figs 13A, 13B); in male, tergite I broader than long but only about 0.6 as broad as gaster posteriorly (Fig. 4A).  

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Propodeum not densely hairy, its surface very uneven, coarsely punctate and at least anteriorly with some coarse rugae; female unknown, in male gaster otherwise.  

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Tergite I in male elongate, less than half as broad as gaster posteriorly which has no unusual pubescence (Fig. 4B); posterior margins of tergites straight; tergite VI without median keel, spiracles minute.  

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Tergite I in male strongly transverse, only slightly narrower (0.75) than gaster posteriorly, this with thick golden pubescence; posterior margins of tergites IV and V angularly excised (Fig. 4C); tergite VI with median keel and rather large spiracles.  

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Pronotum with premarginal carina or at least with distinct bare raised cross-line; dorsellum with or without carinate at margins.  

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Pronotum regularly punctate posteriorly, without premarginal carina or raised line; dorsellum always with carinate lateral and posterior margins (Figs 14H, 24H).  

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Body deep black, non-metallic, with white bands on pronotum, hind coxa, usually also on gaster and scutellum, contrasting with bright red flagellum, tibiae and apex of hind femur; hind coxal depression extensively smooth (Fig. 5H).  

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Body colour different, never black with contrasting white and red markings; hind coxal depression often punctate.  

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Dorsellum convex, punctate or alveolate, but its lateral margin not distinctly carinate (Figs 21H, 22H); in female ovipositor often long and tergite I mostly with median ovipositorial furrow smooth on bottom, rarely with smooth ridge.  

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Dorsellum carinate laterally and posteriorly (Figs 14H, 16H, 24H), or with distinct cross-carina (if this removed from margin); in female, if with long ovipositor, tergite I with median ridge and diverging broad furrows which are at least partly sculptured on bottom (Figs 14B, 16B).  

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Fore wing in proximal two-thirds blackish (Figs 21C, 22C); body mainly black or dark brown (Fig. 21A), mostly with weak pale markings (Fig. 22A).  

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Fore wing brownish, yellowish or subhyaline, not blackish in basal two-thirds (Figs 14C, 16C); body usually otherwise.  

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Dorsellum longer than propodeum at middle; ovipositor reaching at least to dorsellum (Fig. 21A); scutellum in female usually more than 1.5× as broad as long (axilla excluded) (Figs 21B, 21H).  

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Dorsellum equal or shorter than propodeum at middle; ovipositor much shorter than above (Fig. 13A) and posterior margins of tergites straight; tergite VI without median keel, spiracles minute.  

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Hind coxal depression with a conspicuous posterior smooth area, variable in length; in female, ovipositor reaching at most to anterior quarter of tergite I; tergite I usually slightly broader than long; tergite VI without latero-posterior triangular projection.  

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Hind coxal depression completely punctate (Fig. 22I); in female, ovipositor reaching to base of first tergite (Figs 22A, 22B); tergite I usually slightly longer than broad; tergite VI with a latero-posterior triangular projection, above spiracle level (Fig. 22K).  

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Hind tibia ending in a distinct solid spine (Figs 5B, 5J); hind coxa dorso-posteriorly with inner carina which often forms a thin, partially translucent lobe (Fig. 5J), but no narrow tooth, part below lobe usually extensively smooth; hind femur very densely and rather coarsely punctate.
19’ Hind tibia apically truncate (Figs 5D, 5E, 5G); hind coxa dorsally with a slender tooth which may be reduced to a tubercle in dwarf specimens, never with broad thin lobe; hind femur usually not very densely punctate. .......................... 26
20(19) Body very short and broad (Fig. 4D); gaster in female at most twice as long as broad, tergite I strongly transverse, little narrower than rest of gaster; malar space at least 0.9 x the length of scape .......................... 21
20’ Body much less robust; gaster in female at least 2.5 x as long as broad, tergite I oblong or only slightly transverse (Fig. 4F), but always distinctly narrower than rest of gaster; malar space shorter than above .......................... 22
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21’ Mesosoma with richer yellow markings, also tergite I mostly with yellow; ovipositor longer, reaching at least base of gaster (Fig. 4D); in male posterior margin of sternite IV slightly emarginate, sternite V much more transverse and shorter than the VI. L. antibrichoides Westwood, 1874
22(20) Dorsellum raised in two tubercles; pubescence extremely short; hind coxal depression with extensive smooth area nearly or quite reaching base of coxa (Fig. 5F); ovipositor short, not reaching base of tergite V (Fig. 4H) .......................... L. pityopryga Bouček, 1974
22’ Dorsellum regularly convex; pubescence longer than above; smooth area of hind coxal depression smaller; ovipositor longer, reaching at least middle of tergite I .......................... 23
23(22) Ovipositor reaching at least dorsellum (male unknown) (Fig. 4G) .......................... 24
24(23) Ovipositor not reaching base of gaster (Figs 4E, 4F) .......................... 25
23(22’) Ovipositor reaching at least dorsellum (male unknown) (Fig. 4G) .......................... 24
24(23’) Ovipositor not reaching base of gaster (Figs 4E, 4F) .......................... 25
24(23) Posterior margin of dorsellum subcarinate at middle; propodeum medially shorter than dorsellum (female); median ocellus separated from scrobal carina by fine groove .......................... L. santarenae Walker, 1862
24’ Posterior margin of dorsellum smooth, not subcarinate; propodeum medially subequal or longer than dorsellum; median ocellus and scrobal carina contiguous .......................... L. vallicauscaensis Pujade-Vilari & Caicedo, 2010
25(23) Occipital carina reaching distinctly behind eyes; gaster relatively slender (Fig. 4E), with narrow yellow cross-bands on tergite I basally, on tergite IV, on the V posteriorly, on VI and epipygium .......................... L. brasiliensis Bouček, 1974
25’ Occipital carina disappearing beyond ocelli; gaster broad, anteriorly black, extensively yellow only on posterior half of tergite V (Fig. 4F). .......................... 26
26(19) Hind coxal depression with dense punctuation along middle and long hairs which converge conspicuously towards median line of depression (Fig. 5G), dorsal edge with long pilosity; in female, tergite I with a smooth median crest rising from submedian depression; posterior pronotum with pale transverse line .......................... L. latifrons Schletterer, 1890
26’ Hind coxal depression and dorsal edge rather regularly punctate and clothed with short hairs which are directed uniformly caudal; in female, tergite I mostly otherwise; pale pattern on pronotum mostly different .......................... 27
27(26) Yellow on pronotum strongly expanding lateral but leaving median part anteriorly black or reddish; propodeum posteriorly yellow; hind tibia basally in lateral view almost straight (Fig. 5D) .......................... L. poeyi Guerin-Meneville, 1844
27’ Pale (yellow, white or red) markings on pronotum different, posterior band not expanding lateral and if connected with lateral streak, then another cross-band present anteriorly; propodeum usually black; hind tibia arched in basal half (Fig. 5E). .......................... 28
28(27) Tergite I in female with well delimited median ovipositor furrow subdivided by low median ridge; hind femur mostly rather sparsely punctate (Fig. 5E) .......................... L. affinis Say, 1824
28’ Tergite I in female with smooth median crest delimited by very shallow submedian depressions (as in L. latifrons); hind femur densely punctate .......................... 29
29(28’) Pronotum with anterior band and mostly bordered with whitish on sides; tergite I in female dorsally with a slender glabrous crest; apex of gaster in female predominantly black .......................... L. gomezi Genaro, 2012
29’ Pronotum with just a posterior yellow transverse line; tergite I in female with smooth median glabrous crest, delimited by very shallow submedian depressions; apex of gaster (in female) predominantly yellow .......................... L. azteca Cresson, 1872
30(13/15) Hind basitarus dorsally much shorter than breadth of apex of hind tibia which is slightly obliquely truncate (Figs 6F, 6H); occipital carina interrupted or obliterated sublaterally before reaching eye (Figs 3G, 3H) .......................... 31
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32(31) Apex of gaster, in female including hind part of tergite V, golden, with abundant golden pubescence; dorsellum non-metallic, its marginal carina narrow, laminate; pronotum more than twice as broad as long, its yellow premarginal band broadest in the middle .......................... L. auripyga Bouček, 1974
32’ Apex of gaster not conspicuously golden; dorsellum metallic, short, its marginal carina not laminate; pronotum at most twice as broad as long, premarginal yellow narrowed or interrupted medially .......................... L. desantisii Bouček, 1974
33(30) Hind tibia truncate at apex, outer spur long (Fig. 4L); median carina of propodeum usually strong, often high or even tooth-like (Figs 23A, 23A) (exception: L. sumichrastii, Fig. 3B) .......................... 34
Hind coxa broadly smooth on its upper half, including dorsal edge (Fig. 6B); hind femur also very sparsely punctate, mainly pale yellow with dark median streak; ovipositor reaching mesosoma. L. speifera Walker, 1862

Hind coxa at least laterally on dorsal edge with abundant punctures; hind femur otherwise; ovipositor length variable. L. simichrasti Cresson, 1872

Basal half of fore wing blackish, apex whitish; body very slender, including hind legs (hind femur around 2.3× as long as broad); ovipositor reaching base of gaster; tergite I in female with diverging dorsal furrows. L. initiatus Bouček, 1974

Fore wing otherwise; never so dark; body not very slender, hind legs much broader (hind femur less than 2.3× as long as broad); ovipositor not reaching middle of tergite I; tergite I in female without dorsal furrows. L. nigripypa Bouček, 1974

Propodeum with unusually dense pilosity (Fig. 3C), hairs on median area directed mainly caudad; broad apex of gaster clothed with thick golden pubescence; ovipositor barely half as long as hind tibia, not reaching middle of the strongly convex tergite V (Figs 3B, 3C). L. versicolor Bouček, 1974

Propodeum with sparser pilosity, hairs medially directed towards head or, if median carina high, sidewards; ovipositor usually not broadly golden-clothed; ovipositor longer than half the hind tibia, tergite V in female convex only basally. L. versicolor Bouček, 1974

Pronotum with premarginal carina indicated by bare line; mesoscutum not very densely punctate; hind coxal depression with narrow smooth streak; malar space long, around 0.4× as height as eye (Fig. 24F). L. punctipennis Cresson, 1872

Pronotum without a trace of premarginal carina; mesoscutum densely punctate; hind coxal depression regularly densely punctate; malar space short, around 0.15× as height as eye (Fig. 23F). L. punctipennis Cresson, 1872

Head bright cupreous; malar space slightly shorter than scape; tergite I in female with scattered punctures even in basal half; posteriorly regularly punctate and pilose; posterior margin of tergite IV angulate; tergite V strongly swollen, ovipositor not reaching its base (Fig. 4L). L. nigrigynna Cresson, 1909

Head dark purplish; malar space virtually as long as scape; tergite I in anterior two-thirds almost without punctures, with two sublateral depressions, submedially at apex with patches of dense white hairs (Fig. 24B); posterior margin of tergite IV (female) virtually straight (Fig. 24B); tergite V weakly swollen, dark purplish, ovipositor reaching its base (Fig. 24A). L. versicolor Bouček, 1974

Ovipositor reaching posterior margin of tergite I; interantennal area with distinct median keel; fore wing intensively infumate. L. robertsoni Cresson, 1872

Ovipositor not reaching anterior third of tergite IV; interantennal area without keel; fore wing weakly infumate (Fig. 23C). L. enderleini Ashmead, 1904

Hind coxa dorso-posteriorly with a broad obnute-angular thin lobe (Figs 5J, 6D, 17I); scutellum (as far as known) without yellow colour (Fig. 17I); known males with petiolate gaster (Figs 4I–K); female with unusual hairy fascia on gaster (Figs 4G, 17B). L. bulbiventris Cresson, 1872

Hind coxa with a conspicuous tooth instead of lobe (Figs 6A, 7A, 7C, 8H, 8K, 16I), which may be less distinct in small specimens (under 6 mm); scutellum usually at least posteriorly yellow; male and female not as above (Figs 7, 8, 14, 15, 16). L. bulbiventris Cresson, 1872

Known only from male which has gaster usually petiolate (Figs 4I–K), tergite I 1.5× as long as broad; hind femur with interspaces nearly as broad as punctures (Fig. 6D). L. bulbiventris Cresson, 1872

Known only from female which has tergite IV with thick hairs that converge to middle cross-line of tergite (Figs 4G, 17B); posterior margin of tergite V and sometimes also apex of gaster with denser pilosity (Fig. 17B); gaster without yellow markings (Figs 17A, 17B). L. bulbiventris Cresson, 1872

Dorsellum bare, subtriangular, 2.0–2.3× as broad as long, with deep and broad crenulate furrow along margin (Figs 8B, 8I); hind femur very broad, 1.7–1.8× as long as broad excluding teeth (Figs 7A, 7C, 8A, 8I, 16I) (except L. copepus sp. nov. around 2.2× as long as broad, Figs 14K, 14L) and interspaces of punctures on upper mesepimeron dull, obliquely striose (Figs 7B, 7D); ovipositor sometimes not reaching base of gaster. L. bulbiventris Cresson, 1872

Dorsellum at least sparsely hairy, admedian groove shallow; hind femur mostly much more slender (Figs 18I, 20I) and, if about as broad as above (in pulchriceps), then interspaces of punctures on upper mesepimeron smooth and shiny; ovipositor always reaching mesosoma (Figs 18A, 20A). L. copepus sp. nov.

Plicae absent; hind femur slender, 2.22–2.25× as long as broad, excluding teeth (Fig. 14K); in males, propodeum medially around 2× as long as dorsellum; gaster, in lateral view, with tergite VI oblique relative to V (Fig. 15A); in females, propodeum medially at least as long as dorsellum, tergite VI with a latero-posterior small spine, above spiracle level (Figs 15M, 15N). L. copepus sp. nov. Roman, 1920

Plicae present; hind femur enlarged, 1.7–1.8× as long as broad, excluding teeth (Figs 7A, 7C, 8A, 8I, 8K, 16I); in males, propodeum medially around 1.4× as long as dorsellum, gaster, in lateral view, with tergite VI not oblique relative to V (Figs 7A, 7C); in females, propodeum medially shorter than dorsellum, tergite VI without latero-posterior spine (Figs 8A, 8H, 16I). L. copepus sp. nov.

Apical process of stigmal vein as long as uncus (Figs 8D, 8J); ovipositor not reaching basal third of tergite I (Figs 8A, 8B, 8H, 8I); tergite I in female without yellow spots (Figs 8B, 8I); in male, dorsal mesepistemum covered with very broad punctuation, interspaced with small punctuation and strong diagonal rugae (Figs 7C, 7D). L. coxalis Kirby, 1885

Apical process of stigmal vein shorter than uncus (Fig. 16D); ovipositor nearly reaching base of gaster or even more anterior (Figs 16A, 16B); tergite I in female usually with two yellow spots posteriorly (Fig. 16B); in male, dorsal mesepistemum covered with very broad punctuation, interspaced weak diagonal striae (Figs 7A, 7B). L. coxalis Kirby, 1885

Interspaces of punctures on convex upper mesepimeron quite or virtually smooth, shiny and hind femur relatively broad, excluding teeth at most twice as long as broad (mostly broader).
Interspaces on meseepimeron dull, distinctly subhorizontally striate; hind femur at least 2.1× as long as broad, excluding teeth (Figs 18I, 20I).

Interspaces of punctures on meseepimeron quite smooth; hind femur broader, mostly 1.80–1.86× as long as broad; pronotum and scutellum with narrow yellow line on posterior margin; in female, gaster with tergite V black but a yellow band connecting both halves of tergite VI across epipygium dorsally.

Interspaces of punctures on meseepimeron shallowly striate; hind femur about twice as long as broad; pronotum with short anterior and long posterior band, scutellum with broad yellow band (Fig. 3I); in female, tergite V and epipygium dorsally mainly black.

Interspaces of punctures on meseepimeron shallowly striate; hind femur about twice as long as broad; pronotum with short anterior and long posterior band, scutellum with broad yellow band (Fig. 3I); in female, tergite V and epipygium dorsally mainly black.

Leucospis cayennensis Westwood, 1839

This group is widely distributed in the New World, occurring from Argentina to Mexico, with 9 valid species (Bouček 1974a, b; Grissell & Cameron 2002; Darling & Cardinal 2005): *L. addenda*, *L. cayennensis*, *L. clavigaster*, *L. genalis*, *L. ignota*, *L. leptomera*, *L. metatibialis*, *L. mexicana*, and *L. pinna*. Of the four species recorded from Brazil (*), only *L. addenda* was not observed.

**Diagnosis.** Mandible with lower tooth strongly curved and separated from upper margin by broad semicircular gap; metallic-coloured, quite vividly so in parts, with extremely short pubescence on head and mesosoma; pronotum without premarginal carina; clypeal margin usually with a median tooth (indistinct in *L. clavigaster* and *L. pinna*); in males, exposed sculptured parts of sternites very broad (Bouček 1974a).

**Leucospis cayennensis** Westwood, 1839

(Figs 9, 10)

Leucospis (Metallopsis) cayennensis Westwood, 1839: 264–265, pl. 4, fig. 4. Lectotype ♂: French Guiana: Cayenne (MNHU, Berlin); Bouček 1974a: 92; Noyes 2017 (online catalog).

Leucospis cayennensis Westwood, 1839; Weld 1922: 15, Figs 1a, 17, 24 (Leucospidae revision); Bouček 1974a: 92–93, figs 107–110; Chandler et al. 1985: 170–174 (hosts); Cooperband et al. 1999: 162, fig. 6 (hosts); Grissell & Cameron 2002: 277, fig. 10 (compared *L. pinna*); Noyes 2017 (online catalog).

Leucospis cayennensis Westwood, 1839; Burks 1961: 540 (misspelling, compared *L. xylocopae*); De Santis 1980: 272 (catalog—misspelling); Noyes 2017 (online catalog).


**Diagnosis.** Occipital carina complete; POL about 1.0–1.3× OOL; inner margin of eyes not emarginate; clypeus apically bilobate, with a conspicuous median tooth; dorsellum not carinate, short but strongly convex; propodeum densely pilose, median carina present, plicae present; hind coxa with smooth area extending over two-thirds of depression, without translucent lobe dorso-laterally; hind femur beneath coarsely and sparsely punctate; fore wing ambar, with apical fifth infuscate, and apical process of stigmal vein short, about 0.5× as long as uncus; in females, ovipositor long, reaching at least to dorsellum, small spiniform projection on posterior margin of the tergite VI slightly lower than spiracle level.

**Distribution.** Brazil (Acre, Amazonas, Minas Gerais, Pará, Rio de Janeiro, Santa Catarina, São Paulo), Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Peru, St. Thomas, Trinidad, Venezuela.

**Comments.** This species has records widely distributed throughout South America and Brazil (Figs 25, 26), which suggests that it occurs at intermediate points where it has not yet been found. However, the record presented here for the state of Acre deserves to be highlighted as the first record of Leucospidae in this still poorly-sampled region of the Brazilian Amazon.

**Biology.** Previously recorded as a parasitoid of the solitary bees *Centris tarsata* Smith, 1874 (Chandler et al. 1985), *C. bicornuta* Mocsáry, 1899, *C. nitida* Smith, 1874, *C. vittata* Lepeletier, 1841 (Cooperband et al. 1999), and *C. analis* (Fabricius, 1804) (Cooperband et al. 1999; Gazola & Garófalo 2003).


*Leucospis genalis* Bouček, 1974
(Figs 11, 12)


**Diagnosis.** Occipital carina conspicuous only behind ocellar triangle; POL about 0.9–1.0 × OOL; inner margin of eyes not emarginate; clypeus apically bilobate, with a conspicuous median tooth; mandible with lower tooth long, separated from upper edge by a broad semicircular gap; pronotum without premarginal carina; dorsellum subtriangular, bare, coarsely alveolate, its margin with raised sublamellate carina; propodeum densely pilose,
median carina present, plicae present; hind coxal depression with coarse punctuation dorsally and a broad impunctate streak extending nearly to base, without translucent lobe dorso-laterally; hind femur unusually slender, more than twice as long as broad excluding teeth; fore wing light brown, apical third infuscate, stigma clavate, apical process of stigmal vein about as long as uncus; tergite I without ovipositor sulcus; gaster posteriorly with golden pubescence; ovipositor reaching base of tergite IV; in female, tergite VI without spiniform projection at posterior margin; in male, tergite II dorsally not only visible, but very heavily sculptured.


**Distribution.** Brazil (Minas Gerais, São Paulo), Paraguay.

**Comments.** *Leucospis genalis* was previously recorded from Paraguay and Brazil (state of São Paulo) (Figs 25, 26). This is the first record from the state of Minas Gerais, which represents the northern most record of this species.

**Biology.** Previously recorded as a parasitoid of the solitary bees *Diadasina distincta* (Holmberg, 1903) (Martins & Antonini 1994) and *Ptilothrix plumata* Smith, 1853 (Martins et al. 1996).

NEW LEUCOSPIS FABRICIUS FROM BRAZIL


Leucospis ignota Walker, 1862
(Fig. 13)

Leucospis ignota Walker, 1862: 22. Lectotype ♂: Colombia (BMNH); Bouček 1974a: 99–100, figs 115–117; De Santis 1980: 273 (catalog); Grissell & Cameron 2002: 277, fig. 11 (compared L. pinna); Noyes 2017 (online catalog).

Leucospis tolteca Cresson, 1872: 34. Lectotype ♀: Mexico (ANS, Philadelphia); Schletterer 1890: 171, 173, 263; Bouček 1974a: 99, (syn. L. ignota); Noyes 2017 (online catalog).

Leucospis cupreo-viridis Westwood, 1874: 135, pl. 25, fig. 5. Lectotype ♀: Colombia: Santa Martha (UM, Oxford); Schletterer 1890: 261; Bouček 1974a: 99, (syn. L. ignota); Noyes 2017 (online catalog).
**Diagnosis.** Occipital carina complete; POL about 1.4× OOL; inner margin of eyes slightly emarginate; clypeus apically bilobate, with a conspicuous median tooth; dorsellum carinate and glabrous; propodeum densely pilose, median carina present, plicae present; hind coxa punctate in depression, without translucent lobe dorso-laterally; hind femur broad, with teeth distinctly less than twice as long as broad; fore wing subhyaline, with apical fifth infuscate and apical process of stigmal vein as long as uncus; ovipositor not reaching base of tergite V; in male, tergite I broader than long but only about 0.6× as broad as gaster posteriorly.

**Distribution.** Argentina, Brazil (Bahia, Minas Gerais), Colombia, Guyana, Honduras, Mexico, Peru, Trinidad, Venezuela.

**Comments.** Despite its distribution from Mexico to Argentina, this is only the second record of this species from Brazil, where it was previously reported from the state of Bahia (Figs 25, 26).

**Biology.** Unknown.

**Material examined.** (1♀) Brazil, Minas Gerais, Nova Porteirinha, 1° CIG, CODEVASF, 15°48'55.1"S; 43°16'26.8"W, 6–13.ix.2013, N. G. Fonseca leg. Malaise trap [UFMG–IHY–1611610].

**EGAIA species-group**

This group is widely distributed in the New World, occurring from Argentina to Mexico, with nine previously recognized species: *L. aliena*, *L. bulbiventris*, *L. colombiana*, *L. coxalis*, *L. egaia*, *L. manaica*, *L. opalescens*, *L. pulchriceps*, *L. signifera*, and *L. copepucu* sp. nov. From the ten species in the group, we examined the Argentinian *L. coxalis* and all species recorded from Brazil (*), except *L. aliena*.

**Diagnosis.** Body color non-metallic but with iridescent reflections; lower margin of clypeus usually without median tooth; lower tooth of mandible separated from upper margin by a triangular notch; occipital carina strong, distinctly extended past eye margin; pronotum mostly without premarginal carina, with marginal carina; dorsellum at posterior margin distinctly carinate, more or less flat; fore femur and tibia with distinct dorsal carina; hind femur with strong basal tooth followed by many small ones; hind tibia apically distinctly produced into a spine, with outer spur either rudimentary or simply forming apex of the spine; gaster in both sexes slender, narrowed anteriorly, ovipositor mostly long, tergite I in female with strongly diverging ovipositor furrows (Bouček 1974a; Darling & Cardinal 2005)

**Leucospis copepucu** sp. nov.

LSID:urn:lsid:zoobank.org:act:7F0831C5-6BB0-457D-8462-2A0D7AF47478

(Figs 14, 15)

**Type locality.** Brazil, Minas Gerais, Belo Horizonte.

**Diagnosis.** POL about 1.4× OOL; inner margin of eyes slightly emarginate; clypeus apically bilobate, without a conspicuous median tooth; pronotum without premarginal carina; dorsellum subtriangular, with deep and broad crenulate furrow along margin, glabrous; propodeum moderately pilose, median carina present, plicae present; hind coxal depression uniformly punctate, with a conspicuous tooth-like translucent projection dorso-laterally; hind femur 2.2× as long as broad, excluding teeth; fore wing hyaline, with apical quarter infuscate, and apical process of stigmal vein broader than and as long as uncus; in female, tergite I with two yellow spots posteriorly; tergite VI with spiniform projection at posterior margin; ovipositor reaching base of gaster; in male, gaster petiolate, tergite I with subapical yellow band, three yellow bands indicates tergites IV–VI; in lateral view, tergite VI oblique relative to tergite V.

**Description** (Holotype female, pinned). **Head** 1.06× as broad as pronotum posteriorly, dorsally 3.87× as broad as long (Fig. 14J); temples very short, less than one third as long as maximum width of median ocellus. Occipital carina high at ocellar region, dorsally complete (Fig. 14J), extending laterally to apical third of eye height, in lateral view. POL about 1.37× OOL, ocellar triangle 2.13 : 1 (length : height); sharp carina raised behind median ocellus, laterally reaching less than half distance between median and lateral ocelli; lateral ocelli touching occipital carina (Fig. 14J). Vertex densely punctate-reticulate, except for a smooth depression between posterior margin of median ocellus and scrobes (Fig. 14J). Scrobal carina dorsally raised, centrally pointed forward. Flagellum slightly clavate (Fig. 14F), f1 about 1.17, f5 1.28 and f8 0.9× as long as maximum width. In frontal view, head 1.28× as broad as
high; face densely punctate-reticulate, with dense white pubescence (Fig. 14F). Malar space 0.29× eye height, in lateral view; finely vertically rugulose-punctate. Clypeus in frontal view 0.9× as high as broad, 0.5 as broad as mouth, apically bilobate, without a median tooth, finely vertically rugulose-punctate (Fig. 14F). Mandible with slender tooth separated from upper edge by deep triangular notch (Fig. 14I). Occiput in posterior view concentrically rugulose-punctate.

**Mesosoma** dorsally with short pubescence. Pronotum and mesoscutum punctate-reticulate, with punctation very dense (Fig. 14G), with transverse microsculpture that is more evident on pronotum; scutellum punctate, with very subtle longitudinal microsculpture. Pronotum without discal and premarginal carinae (Fig. 14G); posterior margin slightly concave, weakly carinate; lateral panel concave, its lower corner broadly rounded. Mesoscutum in lateral view bowed; notaulus absent (Fig. 14G). Tegula mostly smooth, with pale yellowish pubescence. Scutellum evenly convex (lateral view), 0.8× as long as maximum breadth, in dorsal view (Fig. 14H). Dorsellum 2.5× as broad as long medially, margined with narrow upturned carina, alveolate along margin (Fig. 14H). Propodeum medially as long as dorsellum; punctate-reticulate, median carina low and wide posteriorly, plica absent (Fig. 14H). Subalar area and mesepisternum obliquely rugulose-punctate-reticulate; mesepisternum punctulate with longitudinal microsculpture; mesopleural depression deep and smooth except finely punctate at anterior border. Metapleuron punctate-reticulate with pilosity as long as propodeal pilosity.

**Wings.** (Figs 14C–E). Fore wing hyaline; moderately infuscate posterior to R1 and at apex. Fore wing uniformly pilose except glabrous region posterior to mediocubital fold, reaching the posterior margin. Stigmal vein slightly clavate, forming an angle of about 40° to R1. Stigmal vein 1.65× as long as marginal vein. Uncus slightly convex to anterior margin. Apical process of stigmal vein broader than and as long as uncus. Hind wing hyaline, pilose with glabrous regions basally.

**Gaster.** 2.6× as long as maximum width in dorsal view (Fig. 14B); densely punctate-reticulate, except tergite I punctate. Tergite I dorsally with a slender glabrous crest slightly carinate, separating broad ovipositorial furrows that diverge anteriorly, reaching at sides level slightly below the short lateral keels at base of tergite; basal fovea triangular (Fig. 14B). Tergite II not visible. Tergite IV medially with a very narrow groove; densely covered with white downwards directed hairs. Tergite V medially with a very narrow groove; densely covered with white obliquely directed hairs. Tergite VI with a latero-posterior small spine, below spiralke level (Figs 14M, N). Ovipositor virtually straight, reaching to base of tergite I (Figs 14A, B).

**Color.** Mainly black, except head cupreus with metallic tinge violaceous and green more evident on mesopleuron. Yellow on: scape (pale yellow); pronotum with small mark centrally on anterior margin and subparallel narrow band on posterior margin (pale yellow); narrow band on posterior margin of mesoscutum, almost reaching the parapsidal furrow; narrow band on posterior margin of scutellum; dorsellum (pale yellow); posterior dorsal half of meseptemeron; dorsal edge and maculae postero-ventral on hind coxa; external and internal ventral edge on hind femur; subparallel band on posterior margin of tergite I, interrupted centrally by ovipositorial furrows; subparallel band on posterior margin of tergite V; band on posterior margin of tergite VI; semilunar mark subparallel to posterior margin of epipygium. Teeth of hind femur black. Fore wing subhyaline, except apical sixth infuscate. Hind wing subhyaline.

**MALE.** **Head** dorsally 2.53× as broad as long. POL about 1.44× OOL, ocellar triangle 2.5 : 1 (length : height). Frontal view, head 1.33× as broad as high. Malar space 0.25× eye height, in lateral view. Dorsellum 3.15× as broad as long medially

**Mesosoma** with propodeum medially 2.4× as long as dorsellum; median carina high and uniform.

**Gaster.** 2.23× as long as maximum width in dorsal view (Fig. 15B); tergites III to VI fused into a carapace; tergite III with posterior margin impunctate; tergites IV to VI indicate each one by posterior yellow band. Tergite I dorsally 1.35× as broad as long, 0.40× width of gaster; sides subparallel; sparsely punctate with long white pilosity, impunctate apically; basal fovea small and irregular. Tergite II wider than long, impunctate except punctate near submedian transverse band. Tergite VI, in lateral view, oblique relative to tergite V (Fig. 16A) in dorsal view, with postero-lateral corners slightly projecting but not expanded into auricles. Epipygium with supracercal keel.

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NEW **LEUCOSPIS** FABRICIUS FROM BRAZIL.

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conspicuous, downwards projected after cercus. Posterior margins of sternites II and III visible in lateral view (Fig. 15A). Sternites laterally impunctate, ventrally punctate with white pilosity, the coarse punctation decreasing caudad (Fig. 15C). Sternites II and III convex, IV and V flat, VI and VII concave.

**Color.** Mainly black, except: violaceous and green metallic tinge on mesopleuron and hind coxa; yellow marks as in female except: pale yellow on tergite I, except two narrow bands, one submedian and another subapical, light brown. Yellow band posteriorly on tergites IV to VI.

**Measurements.** See Table I.

**Holotype condition.** There is a hole in the mesoscutum, caused by an old pin that has been removed. Antennal flagellum pharate, covered by a translucent chitinous membrane from pupal stage.

**Etymology.** From Brazilian Tupi *copé* (back) and *pucú* (long), in reference to the propodeum as long as or longer than dorsellum.

**Comments.** We classify *Leucospis copepucu* in the EGAIA-Group because it has all the characters proposed by Bouček (1974a) and Darling & Cardinal (2005) for this species-group, as shown previously. Inside the group, *L. copepucu* resembles *L. manaica* in having the hind femur around 2.2× as long as broad and females with the dorsellum as long as the propodeum medially. But it is easily differentiated by having a yellow band on the scutellum, hind coxa with translucent tooth-like projection on the postero-dorsal edge, fewer teeth on the hind femur (9 versus 10–14) and with a different shape (rhomboid apex versus acuminate apex in *L. manaica*), fore wing with uncus as long as the apical process of stigmal vein (versus uncus longer than apical process) and ovipositor relatively shorter, reaching base of gaster (versus reaching scutellum). It also resembles *L. egaia* due to similarity of the hind coxa (punctuation and tooth-like projection), ovipositor length and yellow band on scutellum, but *L. copepucu* possesses the dorsellum as long as the propodeum medially (versus propodeum shorter than dorsellum), hind femur 2.2× as long as broad (versus around 1.7× as long as broad), and fore wing with uncus as long as the apical process of stigmal vein (versus uncus longer than apical process).

*Leucospis copepucu* also lacks plicae, females have a small, latero-posterior translucent spine below the spiracle level on tergite VI, and in lateral view the male gaster has tergite VI oblique relative to tergite V. These unique features differ from those of the related species *L. coxalis*, *L. egaia*, and *L. manaica*.

**Biology.** Unknown.

**Material examined.** (1♀, 1♂) Holotype Brazil, Minas Gerais, Belo Horizonte, Campus da UFMG, Projeto Quarteirão 9.x.1996, Ninho armadilha [1♀ UFMG–IHY–1305656] Paratype. Same data as Holotype [1♂ UFMG–IHY–1305655]

**FIGURE 15.** *Leucospis copepucu* sp. nov. Paratype ♂ A. Habitus, lateral view. B. Habitus, dorsal view. C. Metasoma, ventral view. Scale bar = 1 mm. UFMG-IHY-1305655
**Leucospis egaia** Walker, 1862
(Figs 7A–B, 16)

*Leucospis egaia* Walker, 1862: 20. Lectotype ♀: Brazil: Amazonas, Tafe (=Ega) (BMNH); Roman 1920: 8–9, fig. 1b; Weld 1922: 18 (Leucospidae revision); Burks 1961: 540 (compared *L. xylocopae*); Bouček 1974a: 72–73, figs 73–74; De Santis 1980: 273 (catalog); Grissell & Cameron 2002: 278 (compared *L. pinna*); Noyes 2017 (online catalog).

*Leucospis egaia* Walker, 1862. Dalla Torre 1898: 402 (unjustified emendation); Noyes 2017 (online catalog).


**Diagnosis.** POL about 1.6–1.8× OOL; inner margin of the eyes conspicuously emarginate; clypeus apically bilobate, without a conspicuous median tooth; lower tooth of mandibles separated from the upper edge by a triangular excision; dorsellum subtriangular, with deep and broad crenulate furrow along margin, glabrous; propodeum slightly pilose, median carina present, plicae present; hind coxal depression uniformly punctate, with a conspicuous lobe dorso-laterally; hind femur very broad, 2–2.1× as long as broad, excluding teeth; fore wing with apical quarter infuscate and apical process of stigmal vein shorter than uncus; in female, tergite I usually with two yellow spots posteriorly; tergite VI without spiniform projection at posterior margin; ovipositor reaching the base of gaster; in male, gaster in lateral view with dorsal margin of tergite VI not oblique relative to tergite V.

**Distribution.** Argentina, Brazil (Amazonas, Pará, Minas Gerais, São Paulo, Santa Catarina), Bolivia, Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Mexico, Panama, Peru, Trinidad, Venezuela.

**Comments.** *Leucospis egaia* was previously recorded from northern, southern and southwestern Brazil (Figs 25, 26). The new records presented here extends its occurrence southwestward in the Brazilian Savannah.

*Leucospis coxalis*, from Argentina, is morphologically very similar to *L. egaia*. Bouček (1974a) used the ovipositor length as a way to distinguish between these species, but for males he used some overlapping measurements that are not as effective for identification. Here we present two characters to distinguish these species. The fore wing of *L. coxalis* has the apical process of the stigmal vein as long as the uncus (Figs 8D, 8J), as opposed to an apical process shorter than the uncus in *L. egaia* (Fig. 16D). Specifically for males, *L. coxalis* has the dorsal mesepisternum with very broad punctation, interspersed with small punctations, and very strong diagonal rugae (Fig. 7C, D), while *L. egaia* has the dorsal mesepisternum with very broad punctation, interspersed with very smooth diagonal striae (Fig. 7A, B).

**Biology.** Unknown. According to Noyes (2017), *L. egaia* parasitises *Polybia*, a record attributed to Grissell & Cameron (2002), but the latter authors do not mention either of these names. Since the origin of this observation was not found, it is better to consider the biology as unknown.

Leucospis manaica Roman, 1920

(Fig. 17)

Leucospis manaica Roman 1920: 9–10, fig. la. Holotype ♀: Brazil, Manaus (NR, Stockholm); Burks 1961: 540 (compared L. xylocopae); Bouček 1974a: 69–71, figs 68–71; De Santis 1980: 273 (catalog); Noyes 2017 (online catalog).

**Diagnosis.** Occipital carina complete; POL about 1.4–1.9× OOL; inner margin of the eyes slightly emarginate; dorsellum margined with narrow upturned carina, alveolate along margin; propodeum slightly pilose, median carina present, plicae absent; hind coxal depression uniformly punctate, with a translucent lobe dorso-laterally; hind femur 2× as long as broad, teeth excluded; fore wing ambar, with apical quarter infuscate, and apical process of stigmal vein short, about 0.5× as long as uncus; in female, tergite I slightly carinate medially, ovipositor furrows diverging anteriorly; spiniform projection at posterior margin on tergite VI absent; ovipositor reaching scutellum. Male unknown.

**Distribution.** Brazil (Amazonas, Minas Gerais, Santa Catarina), Venezuela.

**Comments.** The notch separating the lower mandibular tooth is quite unusual. At first sight, it is difficult to determine if the notch is triangular or semi-circular, as observed in the CAYENNENSIS-Group. It is so difficult that for a time we supposed that the *L. manaica* specimens was a new species of the CAYENNENSIS-Group. In one specimen there is variation between the right and left mandible. In one of them, the notch is narrower and sharply triangular, well angulated, while in the other the notch is larger and similar to a semi-circular notch. Both Bouček (1974a) and Cooperband et al. (1999) speculated that *L. manaica* and *L. bulbiventris* Cresson, 1872 were female and male, respectively, of a single species, i.e., synonyms. In this case, by the principle of priority, the name *L. bulbiventris* would be the valid one. Unfortunately, none of the authors formally proposed the synonym, and since we did not have access to the type material of these species, nor male specimens, we retain these species separately in the identification key.

**Biology.** Unknown.


Leucospis opalescens Weld, 1922

(Figs 18, 19)

Leucospis opalescens Weld 1922: 15–17, fig. 9. Holotype ♀: Brazil, Chapada (USNM); Burks 1961: 540 (compared L. xylocopae); Bouček 1974a: 77; figs 75, 81–86; De Santis 1980: 273 (catalog); Noyes 2017 (online catalog).

**Diagnosis.** Mesoscutum and scutellum posteriorly with yellow bands, pronotum often with anterior band weakly indicated in middle. POL about 1.3–1.4× OOL; inner margin of the eyes emarginate; clypeus apically bilobate, without a conspicuous median tooth; pronotum without premarginal carina; dorsellum convex, margin carinate, moderately pilose; propodeum pilose, median carina present, plicae absent; hind coxal depression uniformly punctate, with a conspicuous translucent lobe dorso-laterally; hind femur about 2.2× as long as broad, teeth excluded; fore wing with apical fifth infuscate and apical process of stigmal vein about 0.8× as long as uncus; in female, tergite I with median ridge and diverging broad furrows; tergite VI with spiniform projection at posterior margin, below spiracle level; ovipositor reaching the dorsellum; in male, gaster petiolate, tergite I with yellow band, and two more narrow yellow bands on the carapace in dorsal view; in lateral view, tergite VI oblique relative to tergite V.

**Description** (Male, pinned). **Head** as broad as pronotum posteriorly, dorsally 2.5× as broad as long; temples half the longest breadth of median ocellus. Occipital carina high at ocellar region, dorsally complete, extending laterally to apical third of eyes height in lateral view. POL about 1.34× OOL, ocellar triangle 2.85 : 1 (length : height); lateral ocelli touching occipital carina. Vertex densely punctate-reticulate, except for a smooth depression from posterior margin of median ocellus to scrobes. Scrobles not touching median ocellus; scrobal carina dorsally slightly raised. Frontal view, head 1.38× as broad as high; face finely vertically rugulose-punctate, with sparse white

Pubescence. Malar space 0.26× eye height in lateral view; glabrous adjacent to eye, vertically aciculate, with few sparse hairs. Clypeus in frontal view 0.85× as high as broad, 0.5 as broad as mouth, apically bilobate, without a median tooth. Mandibles with slender tooth separated from the upper border by narrow and shallow triangular notch. Occiput in posterior view concentrically rugulose-punctate.

**Mesosoma** dorsally with short pubescence. Pronotum and mesoscutum punctate-reticulate, with punctuation very dense and transversely confluent, with transverse microsculpture, which is more evident on mesoscutum; scutellum punctate-reticulate, with very subtle longitudinal microsculpture. Pronotum without discal and premarginal carinae; posterior margin slightly concave, carinate centrally; lateral panel concave, its lower corner broadly rounded. Mesoscutum, in lateral view, bowed; notaulus absent. Tegula broadly smooth, with pale yellowish pubescence. Scutellum evenly convex in lateral view, 0.8× as long as maximum breadth in dorsal view. Dorsellum 3× as broad as long medially, margined with narrow upturned carina, alveolate along margin.
Propodeum medially 2.24× as long as dorsellum; punctate-reticulate, posterior margin alveolate; median carina raised and thin, plicae present only anteriorly. Mesepisternum rugulose-punctate; subalar area and mesepimeron punctate, the latter with oblique microsculpture; mesopleural depression smooth, except for punctate antero-ventral region; anterior border with sparse pilosity.

**Legs.** Upper edges of fore femur and tibia strongly carinate. Hind coxa uniformly punctate; upper edge evenly convex, posteriorly with a large triangular translucent lobe; with dense white pilosity directed to meso-external edge. Hind femur 2.17× as long as broad, excluding teeth; densely regularly punctate, with short dense white pubescence directed to ventral edge which has a basal tooth (basally broader than long) and 11 other teeth (Fig. 19E). Hind tibia densely finely punctate, apically oblique with a long sharp outer spur.

**Wings.** Fore wing hyaline; slightly infumate along anterior and apical borders; uniformly pilose; veins light brown. Stigmal vein almost straight, forming an angle about 42° to R1; about as long as marginal vein. Uncus straight, directed towards apex of R1. Apical process of stigmal vein as long as uncus (Fig. 18D), rounded. Hind wing hyaline, sparsely pilose with glabrous regions basally; veins light brown.

**Gaster.** 2.5× as long as maximum width in dorsal view; punctuation sparse on sternites and almost inconspicuous on tergite II. All tergites distinct, though third to sixth fused into a carapace, but indicated by much sparser punctuation at posterior margins. Tergite I 0.8× as broad as long; 0.4× as broad as maximum breadth of metasoma; dorsally with deep small triangular basal fovea. Epipygium slightly convex in lateral view, with distal margin convex; densely punctate; no longitudinal keels. Last two sternites shallowly depressed in the midline; last one apically rounded.

**Color.** Body extensively black. Light brown on: scape, tegula, legs except tarsomeres. Yellow on: pronotum with tiny central spot and narrow transverse band posteriorly, interrupted centrally; posterior margin of mesoscutum; posterior margin of scutellum; entire dorsellum; posterior half of mesepisternum; dorsal edge and postero-ventral maculae on hind coxa; hind femur dorsal edge externally, ventral edge external and internally; posterior half of tergite I; entire sternite II; two lateral spots on sternite III; two yellow bands on carapace, at middle of tergites IV and V; two lateral spots on tergite VI, above the level of spiracle; green purple metallic shine scattered over entire body, although more evident in the face, mesopleuron and propodeum.

**Measurements.** See table I.

**Distribution.** Brazil (Pará, Mato Grosso, Mato Grosso do Sul, Minas Gerais)

**Comments.** *Leucospis opalescens* is an endemic Brazilian species, which was previously recorded from the Amazon and Pantanal. The new records presented here extends its distribution southwestward to the Brazilian Savannah (Figs 25, 26). The presence of the lateral posterior projection of tergite VI in *L. opalescens* females (Fig. 18J) is a valuable character for differentiating it from females of *L. signifera*, a separation that was previously difficult (Bouček, 1974a).

**Biology.** Unknown.

**Material examined.** (1♀, 1♂) Brasil, Minas Gerais, Paraopeba, Estação Florestal de Experimentação, 19°20'S, 44°20'W, 734m–750m, 14.x.1993, H.R. Pimenta leg. [1♀ UFMG–IHY–1305651; 1♂, UFMG–IHY–1305653].

*Leucospis signifera* Bouček, 1974

(Fig. 20)

*Leucospis signifera* Bouček 1974a: 76–77, fig. 77. Holotype ♀: Brazil, Santa Catarina, Nova Teutônia (BMNH); Perioto & Lara 2002: 1294–1295 (new locality to Brazil).

**Diagnosis.** Mesoscutum all dark metallic but scutellum extensively yellow except for narrow dark anterior margin extending along median line backwards; pronotum at most with posterior yellow band; POL about 1.2× OOL; inner margin of the eyes emarginate; clypeus apically bilobate, without a conspicuous median tooth; pronotum without premarginal carina; dorsellum convex, margin carinate, moderately pilose; propodeum pilose, median carina present, plicae absent; hind coxal depression uniformly punctate, with a conspicuous translucent lobe dorso-laterally; hind femur 2.2× as long as broad, teeth excluded; fore wing with apical fifth infuscate and apical process of stigmal vein about 1.25× as long as uncus; in female, tergite I with median ridge and diverging broad furrows; tergite VI without spiniform projection at posterior margin; ovipositor reaching dorsellum. Male gaster without yellow marks.
Distribution. Brazil (Minas Gerais, São Paulo, Santa Catarina), Paraguay, Argentina.

Comments. Leucospis signifera was previously recorded from Paraguay, Argentina and Brazil (states of Santa Catarina and São Paulo). This is its first record from the state of Minas Gerais, which represents the northern most record of this species (Figs 25, 26). Although the identification key differentiates L. signifera and L. opalescens, it is worth noting that only the females of the last species have tergite VI with a spiniform projection on the posterior margin.

Biology. Unknown.


HOPEI species-group

This group is widely distributed in the New World, occurring from Argentina to Mexico, with 11 valid species: *L. anthidioides, *L. brasiliensis, L. hopei, L. klugii, *L. leucotelus, L. pictipyga, *L. propinqua, *L. santarema, L. vallicaucaensis, *L. xylocopa, and *L. murr sp. nov. From the six species previously recorded for Brazil (*), only L. leucotelus was examined.

Diagnosis. Body color non-metallic, without iridescent reflections; hind tibia extended, adtarsal margin concave, with indistinct outer spur (Darling & Cardinal 2005). Clypeus with a median tooth (sometimes weak); mandible with a small triangular notch; pronotum with premarginal carina; dorsellum not distinctly or not carinate; hind coxa dorso-posteriorly thin, sharp, but never with a narrow tooth; hind femur externally rather coarsely punctate; in female, if the ovipositor long, tergite I has a single median groove (Bouček 1974a).

Leucospis leucotelus Walker, 1852

(Fig. 21)

Leucospis leucotelus Walker, 1852: 41. Lectotype ♀: Brazil: Pará (BMNH); Burks 1961: 540 (compared L. xylocopa); Bouček 1974a: 48, 50; De Santis 1980: 273 (catalog); Noyes 2017 (online catalog).

Leucospis apicalis Cresson, 1872: 30. Lectotype ♀: Mexico (ANS, Philadelphia); Bouček 1974a: 48 (syn. L. leucotelus); Noyes 2017 (online catalog).

Diagnosis. Occipital carina conspicuous only behind ocellar triangle; POL about 1.0–1.3× OOL; inner margin of the eyes almost straight; dorsellum convex, its lateral margin not distinctly carinate; propodeum pilose, median carina present but not evident, plicae present but not evident; hind coxal depression punctate, dorso-laterally thin, sharp; hind femur very broad, 1.72–1.84× as long as broad, teeth excluded; fore wing in proximal two-thirds blackish and apical third subhyaline, with apical process of stigmal vein very short, about 0.25× as long as uncus; in female, tergite I with median furrow smooth; tergite VI without spiniform projection at posterior margin; ovipositor reaching dorsellum.

Distribution. Mexico, Guatemala, Panama, Colombia, Ecuador, Peru, Guyana, French Guiana, Brazil (Amazonas, Pará, Goiás, Mato Grosso, Minas Gerais, Santa Catarina).

Comments. This species is widely distributed throughout Brazil (Figs 25, 26). This is the first record from the state of Minas Gerais.

Biology. Unknown.

**Leucospis muru** sp. nov.
LSID urn:lsid:zoobank.org:act:97B660A5-F6E1-4B2F-B95C-71448DB3A39A
(Fig. 22)

**Type locality.** Brazil, Minas Gerais, Brumadinho

**Diagnosis.** Occipital carina conspicuous only behind ocellar triangle; POL about 1.1–1.3× OOL; inner margin of the eye almost straight; dorsellum convex, its lateral margin not distinctly carinate; pronotum with small discal carina, premarginal carina slightly raised as an impunctate line; propodeum pilose, median carina present, plicae present; hind coxa uniformly punctate; upper edge evenly convex, posteriorly with a low translucent very small lobe; hind femur broad, 2.1–2.2× as long as broad, teeth excluded; fore wing blackish, with apical quarter hyaline and apical process of stigmal vein very short, about 0.25× as long as uncus; in female, tergite I with deep median furrow; tergite VI with latero-posterior triangular, above spiracle level; ovipositor reaching propodeum.

**Description** (Holotype female, pinned). **Head** as broad as pronotum posteriorly, dorsally 2.3× as broad as long (Fig. 22G); temple two thirds the greatest breadth of median ocellus. Occipital carina high at ocular region, extending laterally to half distance between lateral ocellus and eye, in dorsal view (Fig. 22G). POL about 1.13× OOL, ocellar triangle 2.4 : 1 (length : height); lateral ocelli touching occipital carina. Vertex rather regularly punctate, with indication of rugae radiating from lateral ocellus laterally. Scrobes touching median ocellus; scrobal carina dorsally not raised (Fig. 22G). Flagellum clavate (Fig. 22A), f1 about 1.6, f5 1.05 and f8 0.9× as long as maximum width. Frontal view (Fig. 22F), head 1.16× as broad as high; face finely vertically rugulose-punctate, with dense white pubescence. Malar space 0.45× eye height in lateral view; glabrous adjacent to eye, vertically aciculate, with few sparse hairs. Clypeus in frontal view 1.15× as high as broad, 0.5× as broad as mouth, slightly convex, pointed at middle (Fig. 22F). Mandibles with slender tooth separated from upper edge by deep triangular notch (Fig. 22F). Occiput in posterior view concentrically rugulose-punctate.

**Mesosoma** dorsally with short pubescence. Pronotum and mesoscutum punctate-reticulate (Fig. 22G), with punctuation very dense and transversally confluent, with a transverse microsculpture, which is more evident on mesoscutum; scutellum punctate, punctuation closer centrlally. Pronotum with discal carina centrally, straight, as long as POL; premarginal carina indicated by slightly raised impunctate line; posterior margin slightly concave, not carinate; lateral panel flat, its lower corner broadly rounded. Mesoscutum in lateral view bowed; notaulus 0.6× as long as its distance from lateral margin. Tegula broadly smooth, with pale yellowish pubescence. Scutellum evenly convex (lateral view), 0.65× as long as maximum breadth in dorsal view (Fig. 22H). Dorsellum 3× as broad as long medially, not carinate, sparsely punctate, smooth along margin (Fig. 22H). Propodeum medially 1.14× as long as dorsellum; punctate-reticulate, posterior margin alveolate; median carina low and wide posteriorly, plicae present (Fig. 22H). Subalar area, mesepimeron and mesepisternum punctate, the latter with oblique microsculpture; mesopleural depression smooth, except the obliquely rugulose antero-dorsal region and the transversely striate postero-dorsal region, anterior border with sparse pilosity.

**Legs.** Upper edges of fore femur and tibia not carinate. Hind coxa uniformly punctate; upper edge evenly convex, posteriorly with a low translucent very small lobe; with dense white pilosity directed to meso-external edge (Fig. 22I). Hind femur 2.2× as long as broad, excluding teeth; densely regularly punctate, with short dense white pubescence directed to ventral edge which has a basal tooth (basally broader than long) and 10/11 other teeth (Fig. 22J). Hind tibia densely finely punctate, apically produced into long spine with sharp outer spur on top (Fig. 22J).

**Wings** (Figs 22C–E). Fore wing blackish; apical quarter hyaline; uniformly pilose. Stigmal vein almost straight, forming an angle about 55° to R1; as long as marginal vein. Uncus straight, directed towards apex of R1. Apical process of stigmal vein short, rounded, about 0.25× as long as uncus. Hind wing blackish, pilose with glabrous regions basally.

**Gaster** 2.6× as long as maximum width in dorsal view (Fig. 22B); punctate-reticulate, except tergite I laterally which is sparsely punctate. Tergite I dorsally with deep and rather smooth narrow parallel sided groove that reaches basal fovea (Fig. 22B). Tergite II not visible. Tergite IV medially with a very narrow groove; densely covered with white posteriorly directed hairs. Tergite V medially with a very narrow groove. Tergite VI with a latero-posterior triangular projection, above spiracle level (Fig. 22K). Ovipositor virtually straight, reaching propodeum (Fig. 22A).
**Color.** Body extensively black. Light brown on: mandible, tegula, tibia and tarsomeres, hind coxa and trochanter, ovipositor sheath. Dark brown on: femur, fore coxa. Propodeum light to dark brown. Yellow on: external side of scape; apex of antennal clava; pronotum with narrow subparallel band centrally interrupted on anterior margin and narrow band on premarginal carina; lateral margins of mesoscutum, not reaching anterior margin; subparallel band centrally interrupted on posterior margin of scutellum; two marks sublatero-posteriory on dorsellum; posterior half of metapleuron; dorsal edge and postero-ventral maculae on hind coxa; external dorsal edge, external and internal ventral edge on hind femur; in dorsal view, two divergent stripes on antero-dorsal region from base of dorsal groove towards posterior margin on tergite I; in dorsal view, two dull maculae on postero-dorsal region of tergite V; oblique stripe subparallel to posterior margin of epipygium, below level of tergite VI spiracle. Fore wing light brown, except apical third hyaline. Hind wing lighter than fore wing, uniformly light brown.

**Variation.** Head dorsally 2.48× as broad as long. POL about 1.29× OOL, ocellar triangle 2.5:1 (length: height). Flagellum clavate, f1 about 1.48, f5 1.02 and f8 0.86× as long as maximum width. Clypeus (frontal view) 0.96× as high as broad. Dorsellum 2.62× as broad as long medially. Propodeum medially as long as dorsellum. Hind femur 2.1× as long as broad, excluding teeth; 9/9 other teeth. Ovipositor reaching base of dorsellum. Yellow narrow band medially on tergite IV.

**Male.** unknown.

**Holotype condition.** In good condition, left wings inside a gelatin capsule vial, pinned with specimen.

**Etymology.** From Brazilian Tupi *murú* (spine), in reference to the latero-posterior triangular spine on tergite VI.

**Measurements.** See Table I.

**Comments.** *Leucospis murú* resembles *L. propingua* and *L. leucotelus* but these species can be differentiated by the characters in the key and additionally by: the median carina and plicae on the propodeum inconspicuous in *L. propingua* and *L. leucotelus* versus conspicuous in *L. murú*; the hind coxa in *L. propingua* and *L. leucotelus* has a glabrous area on the posterior depression (Fig. 21I) while in *L. murú* the hind coxa is uniformly punctate (Fig. 22I); and tergite VI of female with a latero-posterior triangular projection above spiracle level in *L. murú*, absent in the other two species.

**Biology.** Unknown. The two specimens were collected in a bee's nest but there is no information about the bee species or type of nest where they were collected.


**SPEIFERA species-group**

This group is the most widely distributed in the New World, occurring from Argentina to USA, with ten valid species: *L. auripyga*, *L. birkmani*, *L. desantisi*, *L. enderleini*, *L. imitans*, *L. nigripypga*, *L. robertsoni*, *L. speifera*, *L. sumichrastii*, and *L. versicolor*. Only three species of this group were recorded from Brazil(*), of which *L. enderleini* and *L. versicolor* were examined.

**Diagnosis.** Body color non-metallic but with iridescent reflections; clypeus without a median tooth; mandible with triangular emargination; pronotum without carinae; fore tibia not carinate dorsally; hind tibia apex truncate to slightly extended (Bouček 1974a; Darling & Cardinal 2005).

**Leucospis enderleini** Ashmead, 1904

(Fig. 23)

*Leucospis enderleini* Ashmead 1904: 405, pl. 31, fig. 1. Holotype ♀: Brazil: Santarém (USNM); Burks 1961: 540 (compared *L. xylocopae*); Bouček, 1974a: 90–91, figs 103, 104 (description of male); De Santis 1980: 273 (catalog); Arias-Penna 2008: 165 (Colombia register); Noyes 2017 (online catalog).

*Leucospis metallica* Weld 1922: 13–14, figs 2a,b. Holotype ♀: Brazil: São Paulo (USNM); Burks 1961: 541 (syn. *L. enderleini*).
Diagnosis. Occipital carina complete; POL about 1.6–1.8× OOL; inner margin of the eye shallowly emarginate; clypeus apically bilobate, without median tooth; pronotum without premarginal carina; dorsellum bare, semicircular, margin carinate; propodeum about 2–2.5× longer than dorsellum at middle; propodeum pilose, median carina present, keel-like, plicae present; hind coxa punctate in depression; hind tibia with outer spur smaller than inner spur; apical process of stigmal vein very long, about 2.7× as long as uncus; in female, tergite I without ovipositor furrow, ovipositor not reaching anterior third of tergite V. Male gaster, in lateral view, with dorsal margin of tergite VI contiguous with tergite V.

Distribution. Argentina, Brazil (Pará, Pernambuco, Bahia, São Paulo), Colombia.

Comments. This is only the second species recorded from Bahia, the largest state in the northeastern region. Together with L. ignota, these are the only two Leucospis species recorded from the entire region.

Biology. Unknown.

Material examined. (1♂) Brazil, Bahia, Rio de Contas, Brumadinho, 13°30'29.0"S, 41°53'36.2"W, 1145m, Malaise, 14–20.i.2016, L.N.Perillo leg. [UFMG–IHY–1706263].

Leucospis versicolor Bouček, 1974

(Fig. 24)


Diagnosis. Occipital carina complete; POL about 1.4× OOL; inner margin of the eye shallowly emarginate; clypeus apically bilobate, with a weak median tooth; pronotum with premarginal carina indicated by bare line; dorsellum bare, margin sublaminate; propodeum 1.5× longer than dorsellum at middle; propodeum pilose, median carina present, keel-like, plicae present; wings infuscate along anterior margin; hind coxa on dorsal edge with abundant punctures, in depression with narrow smooth streak; apical process of stigmal vein very short, about 0.15× as long as uncus; in female, tergite I without punctures over basal two-thirds; tergite VI with spiniform projection at posterior margin, below spiracle level; ovipositor reaching base of tergite V.

Distribution. Brazil (Amazonas, Minas Gerais), French Guiana.

Comments. Leucospis versicolor was previously recorded from northern South America (French Guiana and Brazil, state of Amazonas). These new records from the state of Minas Gerais, in the Brazilian southeast, represent a considerable southern range extension for the species (Figs 25, 26).

Biology. Unknown.


Discussion

The revision of Leucospidae by Bouček (1974a) is a monumental work, which contributed greatly to clarifying and organizing the taxonomy of this family, with several lectotypes designated, revalidations, and synonyms. Thanks to his outstanding work, it was possible to recognize and identify the large Leucospis diversity deposited in CCT–UFMG. Understandably, not all species observed by Bouček have been illustrated and only a few have been properly redescribed (5 of the 28 species previously described and recognized by Bouček for the New World). In an attempt to provide additional data on species recognition, we updated the identification key correcting some inconsistencies and including the species described after Bouček (1974a). Unfortunately, some couplets that could be improved were not because we did not have access to all the species. We also provide images of all species identified in this study and a complete list and illustrations of morphological structures, and morphometric measures for more complete descriptions, including some characters previously ignored. For example, the fore wing of Leucospis is one of the most complete among the Chalcidoidea (Heraty et al. 2013). Unfortunately, almost all the previous descriptions limited the information on the wings to the total length and color. Here, we describe and illustrate the wings in detail. These characters allowed us to solve some of the more problematic questions in the differentiation of the species in the EGAIA-Group, as discussed previously (comments on L. egaia). We also describe for the first time the projection on the posterior border of tergite VI of females. This projection was observed in two of the new species, L. muru (Fig. 22K) and L. copepucu (Figs 15M, 15N), and additionally in three known species, L. cayennensis (Figs 9J, 9K), L. opalescens (Fig. 19J), and L. versicolor (Figs 24J, 24K). The structure is not identical in all species, and varies in position relative to the level of the spiracle (above or below it),
in sclerotization (from translucent and thin to very opaque projections, as sclerotized as the tergite), and in form (apex pointed or rhomboid, tangent or perpendicular to the lateral surface of the tergite). We suppose that it was not previously mentioned because it is often difficult to observe due to its small size and sometimes translucent structure, which is easily overshadowed by the reflection of light of the extremely shiny bodies of some Leucospis species. The distribution of this character within the genus is difficult to explain with the limited number of species we observed. From the species-groups represented herein, all have at least one species where this projection was observed. It will probably require a robust analysis to understand its origin and evolution, as well as its value to the phylogenetic understanding of Leucospis. However, independent of its phylogenetic usefulness, this structure is useful for taxonomy. The simple observation of this projection can differentiate between females of L. opalescens and L. signifera, improving the delimitation of these two species as given in Bouček (1974a).

FIGURE 25. Geographic records of Leucospis in Brazil, based on literature.
FIGURE 26. New geographic records of *Leucospis* in Brazil A. Detail of the state of Minas Gerais. B. New records in Brazil.

With the exception of the new record of *L. signifera* from the state of São Paulo (Perioto & Lara 2012), no formal research has been published concerning the Brazilian fauna of Leucospidae since the revision of Bouček (1974a). Nevertheless, A. O. Menezes Jr. carried out comprehensive research of Brazilian species of *Leucospis* and *Polistomorpha* as a thesis for his Masters degree, completed in 1992. In his thesis, many new geographical records were presented, along with accurate descriptions of the species examined, including four new species of *Leucospis*, three from Brazil and one from Argentina. These species are not valid, as they were not published as defined by the International Code of Zoological Nomenclature, and therefore their names are not mentioned here, to avoid authorship and nomenclatural problems. Unfortunately, we did not have access to the specimens cited in his thesis,
### TABLE 1. Measurements of three species of *Leucospis*

<table>
<thead>
<tr>
<th>Measurements (mm)</th>
<th>Leucospis copepucu sp. nov.</th>
<th>L. opalescens</th>
<th>Leucospis muru sp. nov.</th>
</tr>
</thead>
<tbody>
<tr>
<td>HOLOTYPE</td>
<td>UFMG–IHY–130565</td>
<td></td>
<td>UFMG–IHY–1317252</td>
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<td>POL</td>
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<td>OOL</td>
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<td>Ocellar triangle length</td>
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<tr>
<td>Ocellar triangle height</td>
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<td>1.187</td>
</tr>
<tr>
<td>Scape length</td>
<td>0.600</td>
<td>0.800</td>
<td>0.850</td>
</tr>
<tr>
<td>Scape keel</td>
<td>0.390</td>
<td>Not visible</td>
<td>0.250</td>
</tr>
<tr>
<td>Antennal length</td>
<td>3.855</td>
<td>3.440</td>
<td>4.300</td>
</tr>
<tr>
<td>f1 - length/width</td>
<td>0.240/0.204</td>
<td>Pharate</td>
<td>0.360/0.228</td>
</tr>
<tr>
<td>f5 - length/width</td>
<td>0.270/0.210</td>
<td>Pharate</td>
<td>0.350/0.300</td>
</tr>
<tr>
<td>f8 - length/width</td>
<td>0.270/0.300</td>
<td>Pharate</td>
<td>0.300/0.350</td>
</tr>
<tr>
<td>Pronotum width</td>
<td>2.635</td>
<td>2.759</td>
<td>2.976</td>
</tr>
<tr>
<td>Dorsellum length</td>
<td>0.280</td>
<td>0.250</td>
<td>0.475</td>
</tr>
<tr>
<td>Dorsellum width</td>
<td>0.760</td>
<td>0.760</td>
<td>1.050</td>
</tr>
<tr>
<td>Propodeum length</td>
<td>0.355</td>
<td>0.560</td>
<td>0.437</td>
</tr>
<tr>
<td>Scutellum length</td>
<td>1.250</td>
<td>1.237</td>
<td>1.280</td>
</tr>
<tr>
<td>Scutellum width</td>
<td>1.534</td>
<td>1.519</td>
<td>2.000</td>
</tr>
<tr>
<td>Fore wing length</td>
<td>9.009</td>
<td>8.184</td>
<td>9.424</td>
</tr>
<tr>
<td>Hind wing length</td>
<td>5.704</td>
<td>5.580</td>
<td>6.882</td>
</tr>
<tr>
<td>Hind femur length</td>
<td>2.250</td>
<td>2.250</td>
<td>3.100</td>
</tr>
<tr>
<td>Hind femur width</td>
<td>1.025</td>
<td>1.037</td>
<td>1.395</td>
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<tr>
<td>Hind femur, teeth number</td>
<td>10 / 9</td>
<td>11 / 11</td>
<td>10 / 10</td>
</tr>
<tr>
<td>Gaster length</td>
<td>5.456</td>
<td>5.580</td>
<td>6.758</td>
</tr>
<tr>
<td>Gaster height</td>
<td>2.759</td>
<td>1.900</td>
<td>3.278</td>
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<td>Gaster width</td>
<td>2.075</td>
<td>2.225</td>
<td>2.686</td>
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<tr>
<td>Tergite I length</td>
<td>1.875</td>
<td>1.162</td>
<td>2.375</td>
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so the records presented therein were not incorporated here. Despite all this, none of the new species proposed here matches the descriptions presented in his thesis. So it is possible to say that there are at least four more undescribed species of *Leucopis* in the New World. The publication of A.O. Menezes Jr.'s thesis is imperative, since his impressive research could help to elucidate other questions about Leucospidae systematics.

According to the catalog of Zilch & Kohler (2018) and the Universal Chalcidoidea Database (Noyes 2017), *L. affinis* is indicated as being recorded from the state of Pará, Brazil. Both catalogs stated that this record was based on information presented in two previous catalogs, Peck (1963) and De Santis (1980). This is here considered to be a cross-reference error. The origin of the error lies in the fact that Peck (1963) and De Santis (1980) cited *L. tapayosa* Walker, 1862 as occurring in Brazil, and at that time this species was treated as a synonym of *L. affinis*, as proposed by Schletterer (1890). Bouček (1974) later synonymized *L. tapayosa* with *L. egaia*, but the record of *L. affinis* from Brazil remained.

The CCT-UFMG Leucospidae collection is geographically very restricted, with most of its specimens collected in Minas Gerais, where the Institution is located. Nonetheless, it contains 12 *Leucospis* species, of which two are new species described here. Collection metadata shows that most specimens come from long-term surveys with Malaise traps or bee surveys using trap-nests. The maps show few points where *Leucospis* were collected in Brazil, but the diversity in some of these points is remarkable (Figs 25, 26). This is the case of the tiny secondary forest of the Ecological Station of the Federal University of Minas Gerais (around 600 ha), surrounded by city buildings, where six species were collected, of which one is a new species. Some regions located far from the country's major research centers are still almost completely unexplored, such as the northeast region, or the state of Acre in the Amazon rainforest, from which we report the first record of Leucospidae. But even states with better known insect diversity and important research institutions, such as Rio de Janeiro and Espírito Santo, still have no formal records of the genus. These observations demonstrate how the diversity and distribution of Brazilian *Leucospis* is still extremely under-sampled, mainly due to lack of effective sampling throughout the country.

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