



<https://doi.org/10.11646/zootaxa.4441.1.1>

<http://zoobank.org/urn:lsid:zoobank.org:pub:8E7CD7D8-650B-4430-956F-53045F5FD65A>

## 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

ALESSANDRO RODRIGUES LIMA & PRISCILA GUIMARÃES DIAS

*Centro de Coleções Taxonômicas, Instituto de Ciências Biológicas, Universidade Federal de Minas Gerais, Brazil.*

*E-mail: alerolima@ufmg.br; prisciladias@ufmg.br*

### 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

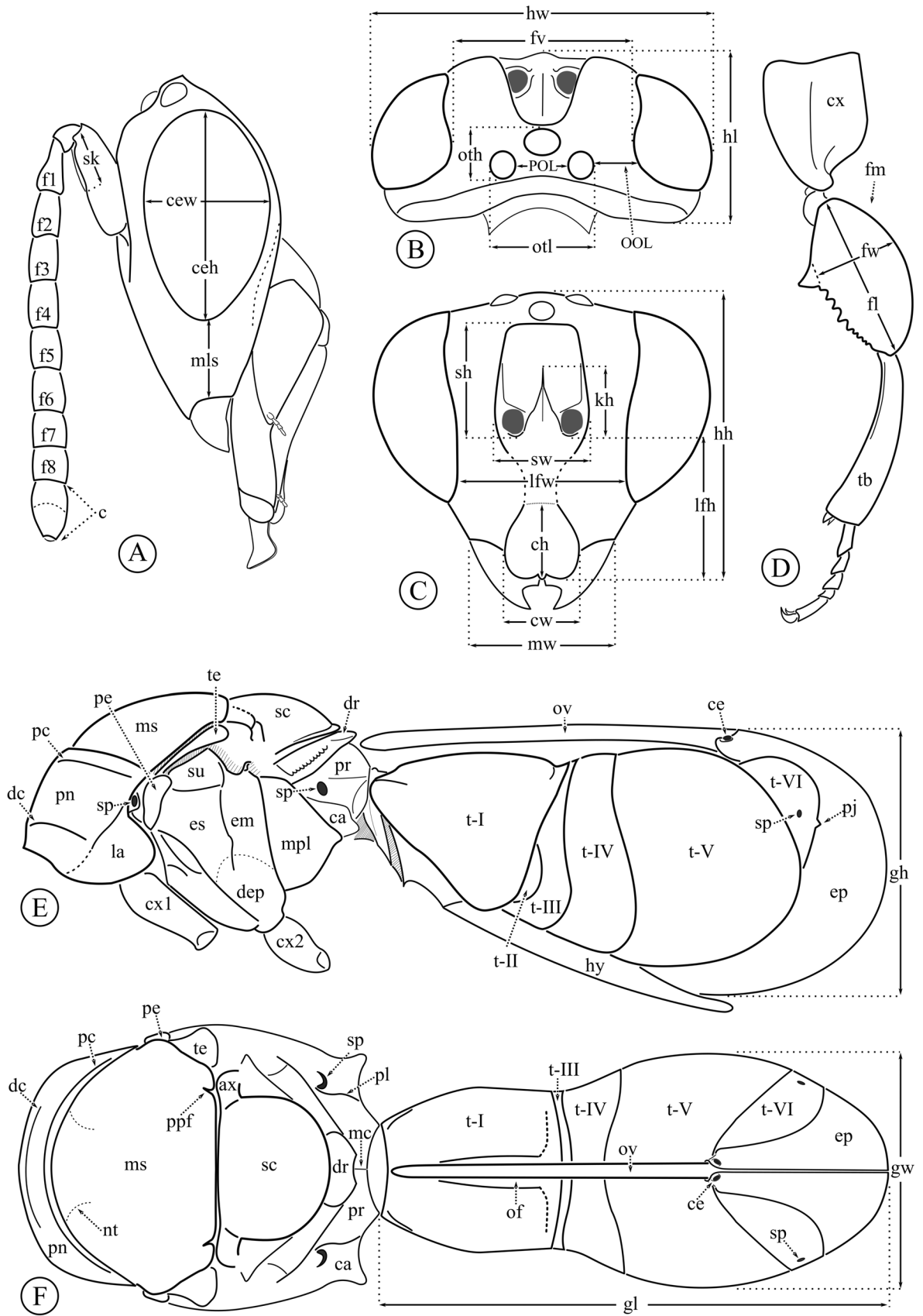
The abbreviations used for listed collections are:

CCT–UFMG: Centro de Coleções Taxonômicas da Universidade Federal de Minas Gerais, Belo Horizonte, Brazil.  
BMNH: British Museum of Natural History, London, England.  
MfN: Museum für Naturkunde, Berlin, Germany.  
PUC–MG–MCN: Pontifícia Universidade Católica de Minas Gerais, Museu de Ciências Naturais, Belo Horizonte, Brazil.  
ROM: Royal Ontario Museum, Toronto, Canada.  
UNESP: Universidade Estadual Paulista "Júlio de Mesquita Filho", São José do Rio Preto, Brazil.

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 lowermost 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).



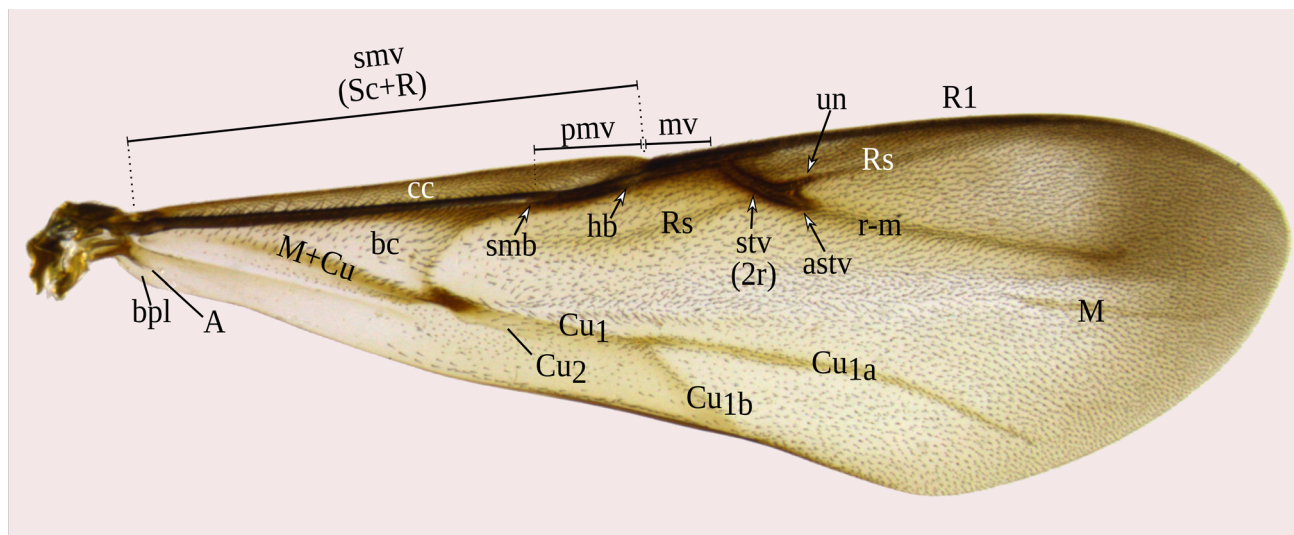
←  
**FIGURE 1.** *Leucospis* morphology and measurements, modified from Bouček (1974a) **A.** Head, lateral view. **B.** Head, dorsal view. **C.** Head, frontal view. **D.** Hind leg, lateral view. **E.** Meso and metasoma, female, lateral view. **F.** Meso and metasoma, female, dorsal view. Abbreviations: **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; **f1–8**, 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; **lfw**, lower face width; **lfh**, 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**, ocellar triangle height; **otl**, ocellar triangle length; **ov**, ovipositor; **pc**, premarginal carina; **pe**, prepectus; **pj**, projection of sixth tergite; **pl**, plicae; **pn**, pronotum; **POL**, post-ocular length; **ppf**, 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.

Scape keel: 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).



**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**, pre-marginal 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:**

Gaster height: maximum height of the gaster, measured in lateral view (Fig. 1E).

Gaster length: maximum distance between anterior margin of the tergite I and distal end of the gaster, in dorsal view (Fig. 1F).

Gaster width: maximum width of the gaster, in dorsal view (Fig. 1F).

Tergite I length: maximum distance between anterior and posterior margins of tergite I.

#### **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 CAYENENNISIS, 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
- 1' 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*) ..... 4
- 2(1) 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 .....  
..... *L. slossonae* Weld, 1922
- 2' Gaster posteriorly with extensive yellow markings consisting of a broad band on tergite V and at least another narrower band on tergite VI (Fig. 3E); fore wing pale brown but usually slightly darker anteriorly and apically; pilosity otherwise, mostly much longer than above ..... 3
- 3(2') Tergite I extensively yellow; pronotum posteriorly with broad yellow band, its sides red; mesosoma laterally mostly reddish brown; legs extensively red; punctation on disc of tergite V often longitudinally confluent but transversely with interspaces generally broader than half width of punctures; hairs on pronotum and gaster mainly pale, fairly long, not very dense; wings usually yellowish; epipygium in female black; tergite IV in female medially with punctures in about 4 cross-rows; male scape partly yellow ..... *L. texana* Cresson, 1872
- 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; punctation 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. .... *L. rileyi* Schletterer, 1890
- 4(1') 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
- 4' Lower tooth of mandibles mostly short and broad, always separated from the upper edge by a triangular excision (figs 14I, 21F, 22F, 23F); propodeum mostly not very densely pubescent (exception: *L. sumichrastii*, Figs 3B, 3C); body with or without metallic tinge; premarginal carina of pronotum present or absent ..... 13
- 5(4) 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
- 5' Hind coxal depression punctate, or, if partly smooth, the impunctate area not reaching base of coxa (Figs 11H, 12F); ovipositor often short, not reaching mesosoma (Figs 11A, 13A); dorsellum posteriorly more or less carinate (Fig. 13H) .... 7
- 6(5) 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 .....  
..... *L. mexicana* Walker, 1862

6'	Apex of gaster dark, obscurely metallic, with mainly greyish 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, 10B); hind femur beneath coarsely and sparsely punctate (Figs 9I, 10F) . . . . .	<i>L. cayennensis</i> Westwood, 1839
7(5')	Median carina of propodeum raised into a thin, hook-like lamella (Fig. 5I) . . . . .	<i>L. pinna</i> Grissell & Cameron, 2002
7'	Median carina of propodeum various, but not raised into a hook-like lamella . . . . .	8
8(7')	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 . . . . .	<i>L. metatibialis</i> Bouček, 1974
8'	Dorsellum bare or with a few inconspicuous hairs, often not flat; hind tibia either not whitish or with dense punctation externally (figs 12F, 13I); ovipositor shorter than above (in species where female known) (Figs 11A, 13A) . . . . .	9
9(8')	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) . . . . .	10
9'	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) . . . . .	11
10(9)	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 . . . . .	<i>L. leptomera</i> Bouček, 1974b
10'	Hind coxal depression with coarse punctation on 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) . . . . .	<i>L. genalis</i> Bouček, 1974
11(9')	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) . . . . .	<i>L. ignota</i> Walker, 1862
11'	Propodeum not very densely hairy, its surface very uneven, coarsely punctate and at least anteriorly with some coarse rugae; female unknown, in male gaster otherwise . . . . .	12
12(11')	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 . . . . .	<i>L. clavigaster</i> Bouček, 1974
12'	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 . . . . .	<i>L. addenda</i> Bouček, 1974
13(4')	Pronotum with premarginal carina or at least with distinct bare raised cross-line; dorsellum with or without carinae at margins . . . . .	14
13'	Pronotum regularly punctate posteriorly, without premarginal carina or raised line; dorsellum always with carinate lateral and posterior margin (figs 14H, 24H) . . . . .	30
14(13)	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) . . . . .	<i>L. hopei</i> Westwood, 1834
14'	Body colour different, never black with contrasting white and red markings; hind coxal depression often punctate . . . . .	15
15(14')	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 . . . . .	16
15'	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) . . . . .	30
16(15)	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) . . . . .	17
16'	Fore wing brownish, yellowish or subhyaline, not blackish in basal two-thirds (Figs 14C, 16C); body usually otherwise . . . . .	19
17(16)	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) . . . . .	<i>L. leucotelus</i> Walker, 1852
17'	Dorsellum equal or shorter than propodeum at middle; ovipositor at most reaching to base of tergite I (fig. 22A); scutellum in female usually less than 1.5× as broad as long . . . . .	18
18(17')	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 . . . . .	<i>L. propinqua</i> Schletterer, 1890
18'	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) . . . . .	<i>Leucospis muru</i> sp. nov.
19(17')	Hind tibia ending in a distinct solid spine (Figs 5B, 5J); hind coxa dorso-posteriorly with inner carina which often forms a thin, partly translucent lobe (Fig. 5J), but no narrow tooth, part below lobe usually extensively smooth; hind femur very densely and rather coarsely punctate . . . . .	20

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× the length of scape . . . . .	21
20'	Body much less robust; gaster in female at least 2.5× 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
21(20)	Mesosoma and anterior half of gaster predominantly black, with at most narrow yellow markings at posterior margin of pronotum, laterally on mesoscutum, posteriorly on scutellum and on metapleuron; ovipositor not or hardly reaching anterior half of tergite I; in males sternites IV–VI subequal, slightly transverse, posterior margin of IV straight. . . . .	
	. . . . . <i>L. xylocopae</i> Burks, 1961	
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 . . . . .	
	. . . . . <i>L. anthidioides</i> 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) . . . . .	
	. . . . . <i>L. pictipyga</i> 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
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. . . . .	
	. . . . . <i>L. santarema</i> Walker, 1862	
24'	Posterior margin of dorsellum smooth, not subcarinate; propodeum medially subequal or longer than dorsellum; median ocellus and scrobal carina contiguous . . . . .	
	. . . . . <i>L. vallicaucaensis</i> Pujade-Villar & 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 . . . . .	
	. . . . . <i>L. brasiliensis</i> Bouček, 1974	
25'	Occipital carina disappearing beyond ocelli; gaster broad, anteriorly black, extensively yellow only on posterior half of tergite V (Fig. 4F) . . . . .	
	. . . . . <i>L. klugii</i> Westwood, 1839	
26(19')	Hind coxal depression with dense punctation 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 . . . . .	
	. . . . . <i>L. latifrons</i> Schletterer, 1890	
26'	Hind coxal depression and dorsal edge rather regularly punctate and clothed with short hairs which are directed uniformly caudad; in female, tergite I mostly otherwise; pale pattern on pronotum mostly different . . . . .	27
27(26')	Yellow on pronotum strongly expanding laterad but leaving median part anteriorly black or reddish; propodeum posteriorly yellow; hind tibia basally in lateral view almost straight (Fig. 5D) . . . . .	
	. . . . . <i>L. poeyi</i> Guerin-Meneville, 1844	
27'	Pale (yellow, white or red) markings on pronotum different, posterior band not expanding laterad 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) . . . . .	
	. . . . . <i>L. affinis</i> Say, 1824	
28'	Tergite I in female with smooth median crest delimited by very shallow submedian depressions (as in <i>L. latifrons</i> ); 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 . . . . .	
	. . . . . <i>L. gomezi</i> 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 . . . . .	
	. . . . . <i>L. azteca</i> Cresson, 1872	
30(13/15')	Hind basitarsus 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
30'	Hind basitarsus dorsally at least as long as breadth of tibia (Figs 19E, 20A, 20I), the latter often different than above; occipital carina laterally conspicuous, although sometimes less distinct in situation between lateral ocellus and eye, but again distinct on temples (Fig. 3F) . . . . .	33
31(30)	Interocellar area strongly raised above the unusually small ocelli, median ocellus hidden in postero-lateral view, lateral ocellus about 3 diameters from eye (Fig. 3H); pronotum anteriorly with round pale spot (Fig. 3H) . . . . .	
	. . . . . <i>L. birkmani</i> Brues, 1925	
31'	Interocellar area not strongly raised above ocelli which are of normal size (Fig. 3G), the median visible in postero-lateral view, the lateral closer to eye than above; pronotum without round spot anteriorly . . . . .	32
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. . . . .	
	. . . . . <i>L. auripyga</i> 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 band narrowed or interrupted medially. . . . .	
	. . . . . <i>L. desantisi</i> 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, 24A) (exception: <i>L. sumichrastii</i> , Fig. 3B) . . . . .	34

33'	Hind tibia apically oblique, ventrally produced into a more or less conspicuous spine, the outer spur on apex of spine rudimentary or indistinct (Figs 5J, 6I, 6J); median carina of propodeum low, weak or indistinct . . . . .	40
34(33)	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. . . . .	<i>L. speifera</i> Walker, 1862
34'	Hind coxa at least laterally on dorsal edge with abundant punctures; hind femur otherwise; ovipositor length variable . . .	35
35(34')	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. . . . .	<i>L. imitans</i> Bouček, 1974
35'	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. . . . .	36
36(35')	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). . . . .	<i>L. sumichrastii</i> Cresson, 1872
36'	Propodeum with sparser pilosity, hairs medially directed towards head or, if median carina high, sideways; apex of gaster usually not broadly golden-clothed; ovipositor longer than half the hind tibia, tergite V in female convex only basally. . . . .	37
37(36')	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) . . . . .	38
37'	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) . . . . .	39
38(37)	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). . . . .	<i>L. nigripyga</i> Bouček, 1974
38'	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) . . . . .	<i>L. versicolor</i> Bouček, 1974
39(37')	Ovipositor reaching posterior margin of tergite I; interantennal area with distinct median keel; fore wing intensively infumate . . . . .	<i>L. robertsoni</i> Crawford, 1909
39'	Ovipositor not reaching anterior third of tergite V; interantennal area without keel; fore wing weakly infumate (Fig. 23C). . . . .	<i>L. enderleini</i> Ashmead, 1904
40(33')	Hind coxa dorso-posteriorly with a broad obtuse-angular thin lobe (Figs 5J, 6D, 17I); scutellum (as far as known) without yellow colour (Fig. 17H); known males with petiolate gaster (Figs 4I–K); female with unusual hairy fascia on gaster (Figs 4G, 17B) . . . . .	41
40'	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) . . . . .	42
41(40)	Known only from male which has gaster unusually petiolate (Figs 4I–K), tergite I 1.5× as long as broad; hind femur with interspaces nearly as broad as punctures (Fig. 6D) . . . . .	<i>L. bulbiventris</i> Cresson, 1872
41'	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) . . . . .	<i>L. manaica</i> Roman, 1920
42(40')	Dorsellum bare, subtriangular, 2.0–2.3× as broad as long, with deep and broad crenulate furrow along margin (Figs 8B, 8I, 14H, 16H); hind femur very broad, 1.7–1.8× as long as broad excluding teeth (Figs 7A, 7C, 8A, 8H, 16I) (except <i>L. copepucu</i> sp. nov. around 2.2× as long as broad, Figs 14K, 14L) and interspaces of punctures on upper mesepimeron dull, obliquely strigose (Figs 7B, 7D); ovipositor sometimes not reaching base of gaster . . . . .	43
42'	Dorsellum at least sparsely hairy, admarginal groove shallow; hind femur mostly much more slender (Figs 18I, 20I) and, if about as broad as above (in <i>pulchriceps</i> ), then interspaces of punctures on upper mesepimeron smooth and shiny; ovipositor always reaching mesosoma (Figs 18A, 20A) . . . . .	45
43(42)	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) . . . . .	<i>Leucospis copepucu</i> sp. nov.
43'	Plicae present; hind femur enlarged, 1.7–1.8× as long as broad, excluding teeth (Figs 7A, 7C, 8A, 8H, 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, 16J) . . . . .	44
44(43')	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 mesepisternum covered with very broad punctation, interspaced with small punctation and strong diagonal rugae (Figs 7C, 7D) . . . . .	<i>L. coxalis</i> Kirby, 1885
44'	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 mesepisternum covered with very broad punctation, interspaced weak diagonal striae (Figs 7A, 7B) . . . . .	<i>L. egaia</i> Walker, 1862
45(42')	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). . . . .	46

- 45' Interspaces on mesepimeron dull, distinctly subhorizontally striate; hind femur at least 2.1× as long as broad, excluding teeth (Figs 18I, 20I) ..... 47
- 46(45) Interspaces of punctures on mesepimeron 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 ..... *L. pulchriceps* Cameron, 1909
- 46' Interspaces of punctures on mesepimeron shallowly striate; hind femur about twice as long as broad; pronotum with short anterior and long posterior band, scutellum with broad yellow band (Fig. 3J); in female, tergite V and epipygium dorsally mainly black ..... *L. colombiana* Bouček, 1974
- 47(45') Mesosoma with yellow lines of subequal breadth almost completely bordering pronotum, and lateral and posterior margins of mesoscutum and scutellum (Fig. 3I); hind leg relatively broad ..... *L. aliena* Bouček, 1974
- 47' Yellow pattern on mesosoma different, generally much reduced on mesoscutum (Figs 18G, 18H, 19B, 19D, 20G, 20H); hind leg relatively slender (Figs 18I, 20I) ..... 48
- 48(47') Mesoscutum all dark metallic but scutellum extensively yellow except for narrow dark anterior margin extending backwards along median line (20G, 20H); in male, gaster without yellow marks; in female, tergite VI without spiniform projection at posterior margin ..... *L. signifera* Bouček, 1974
- 48' Mesoscutum and scutellum posteriorly with yellow bands (Figs 18G, 18H, 19D); in male, gaster with yellow marks (Figs 19A, 19B); in female, tergite VI with spiniform projection at posterior margin, below spiracle level (Fig. 18J) ..... *L. opalescens* Weld, 1922

## Taxonomy

### CAYENNENSIS species-group

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

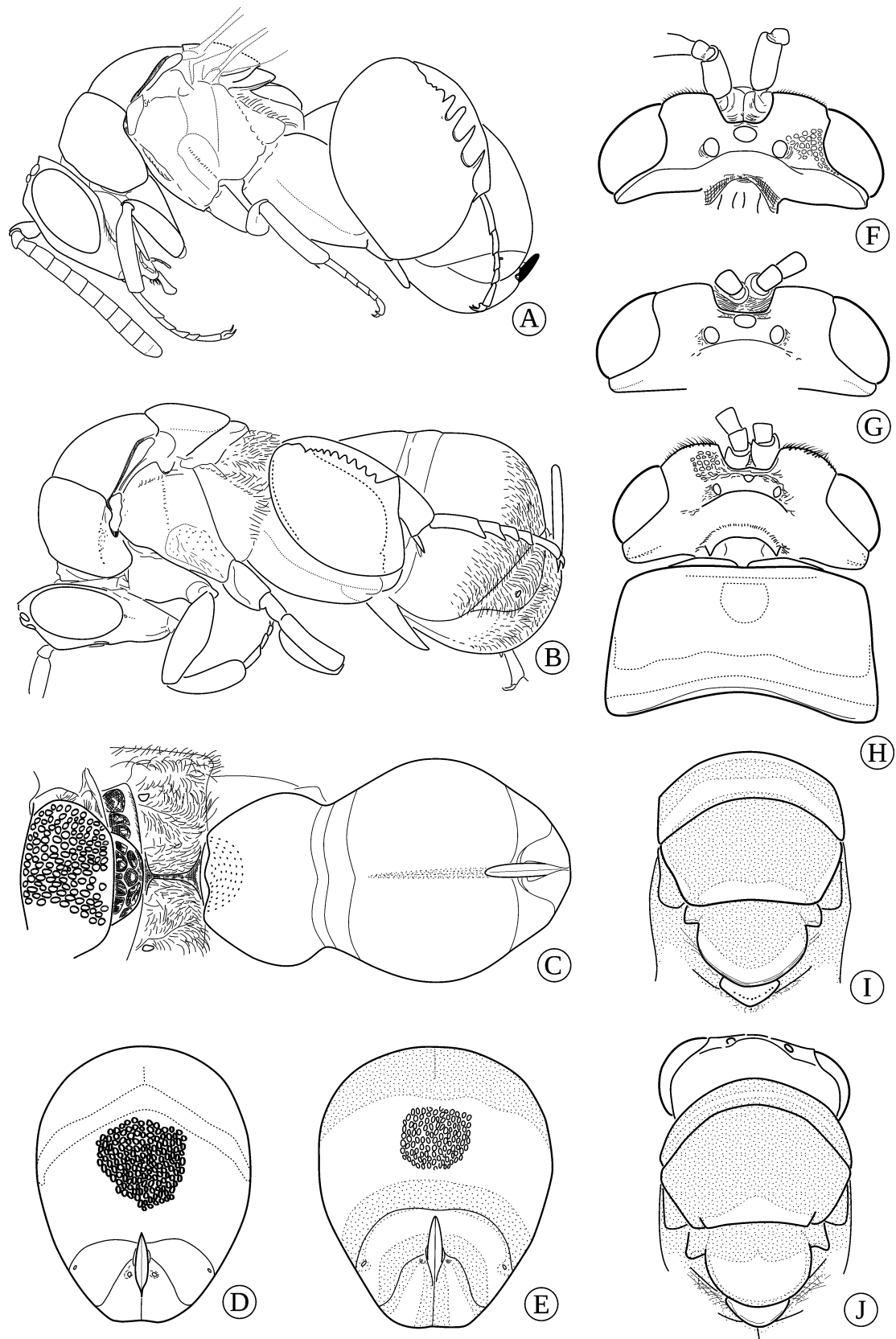
*Leucospis cayennensis* Westwood, 1839; Weld 1922: 15, Figs 1a, 17, 24 (*Leucospidae* revision); Bouček 1974a: 92–93, figs 107–110; Chandler *et al.* 1985: 170–174 (hosts); Cooperband *et al.* 1999: 162, fig. 6 (hosts); Grissell & Cameron 2002: 277, fig. 10 (compared *L. pinna*); Noyes 2017 (*online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

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

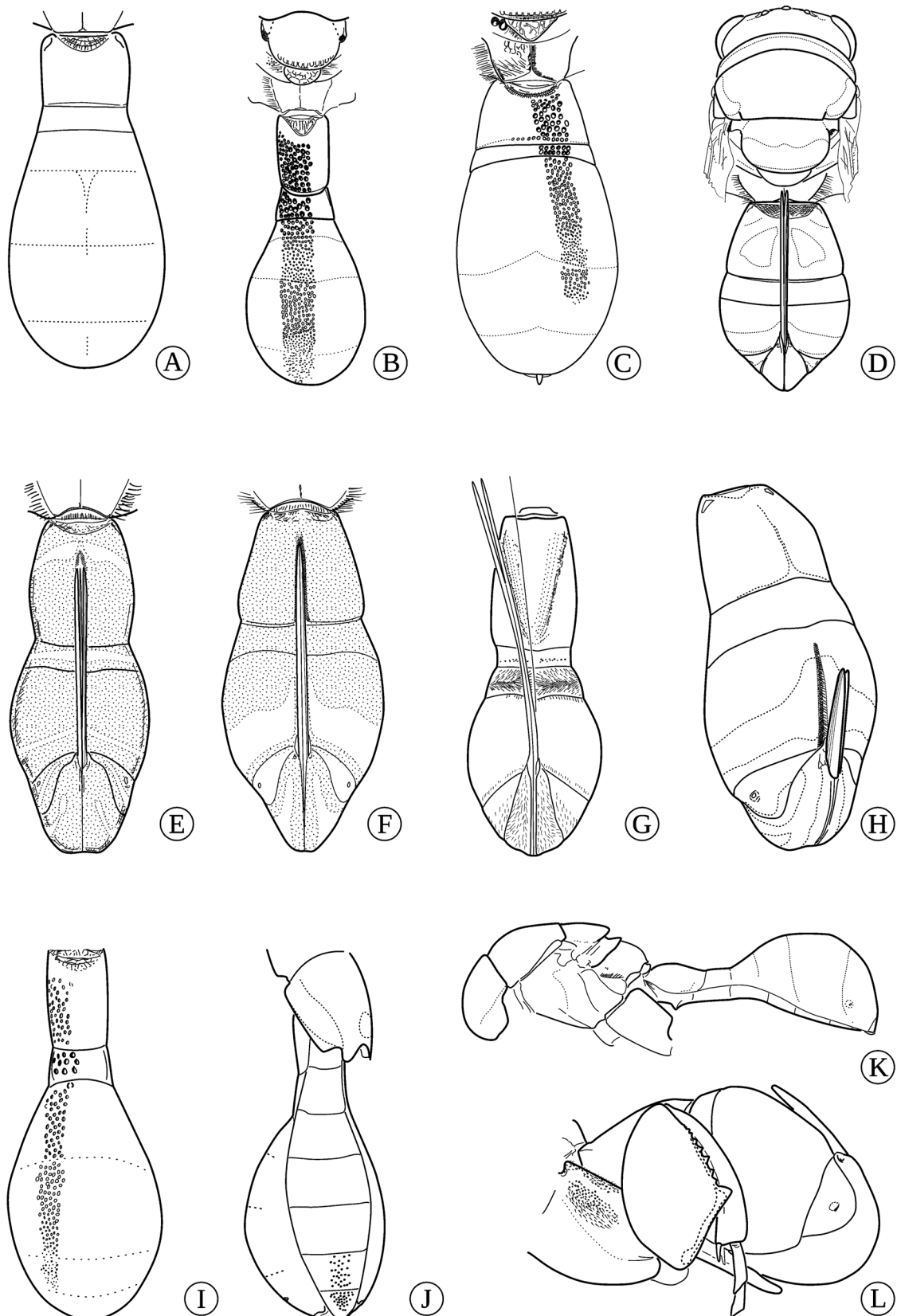
*Leucospis tomentosa* Kirby, 1883: 70. Lectotype ♀: West Indies: St. Thomas (BMNH, London); Dalla Torre 1898: 407 (syn. *L. cayennensis*); Bouček 1974a: 92 (syn. *L. cayennensis*); Noyes 2017 (*online catalog*).

*Leucospis distinguenda* Schletterer, 1890: 269–271. Holotype ♀: Brazil: Santa Catarina, Blumenau (NM, Vienna); Burks 1961: 540 (compared *L. xylocopae*); Bouček 1974a: 92 (syn. *L. cayennensis*); Noyes 2017 (*online catalog*).

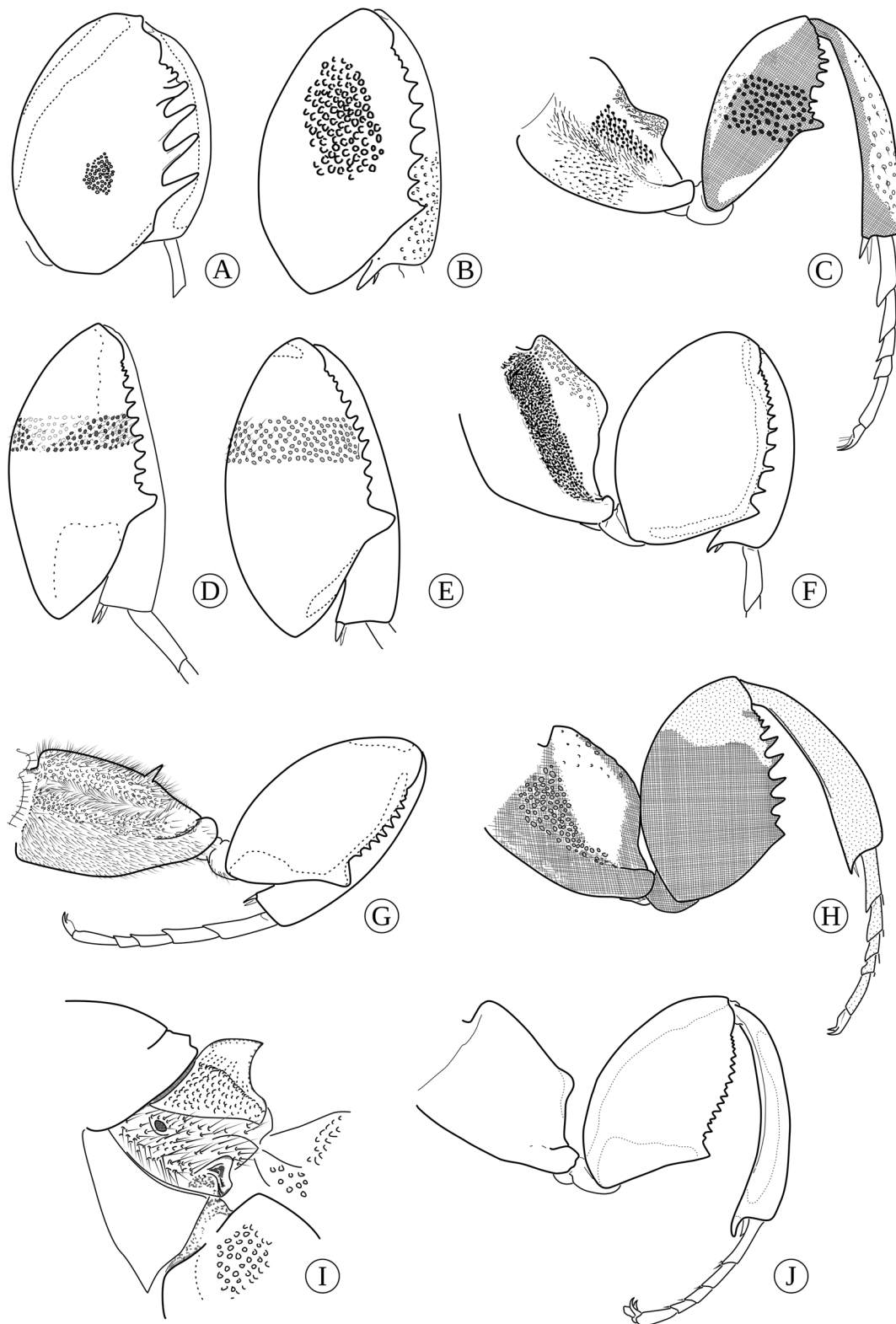
**Diagnosis.** Occipital carina complete; POL about 1.0–1.3× OOL; inner margin of eyes not emarginate; clypeus apically bilobate, with a conspicuous median tooth; dorsellum not carinate, short but strongly convex; propodeum densely pilose, median carina present, plicae present; hind coxa with smooth 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.



**FIGURE 3.** *Leucospis slossonae* **A.** Habitus female, lateral view. *L. sumicharstii* **B.** Habitus female, lateral view. **C.** Part of mesosoma and gaster, dorsal view. *L. slossonae* **D.** Gaster of female, posterior view. *L. rileyi* **E.** Gaster of female, posterior view. *L. opalescens* **F.** Head, dorsal (slightly oblique) view. *L. auripyga* **G.** Head, dorsal (slightly oblique) view. *L. birkmani* **H.** Head and pronotum, dorsal view. *L. aliena* **I.** Mesosoma, dorsal view. *L. colombiana* **J.** Mesosoma, dorsal view. Figures modified from Bouček (1974a, figs 36, 101, 100, 37, 38, 82, 88, 91, 76, 78).

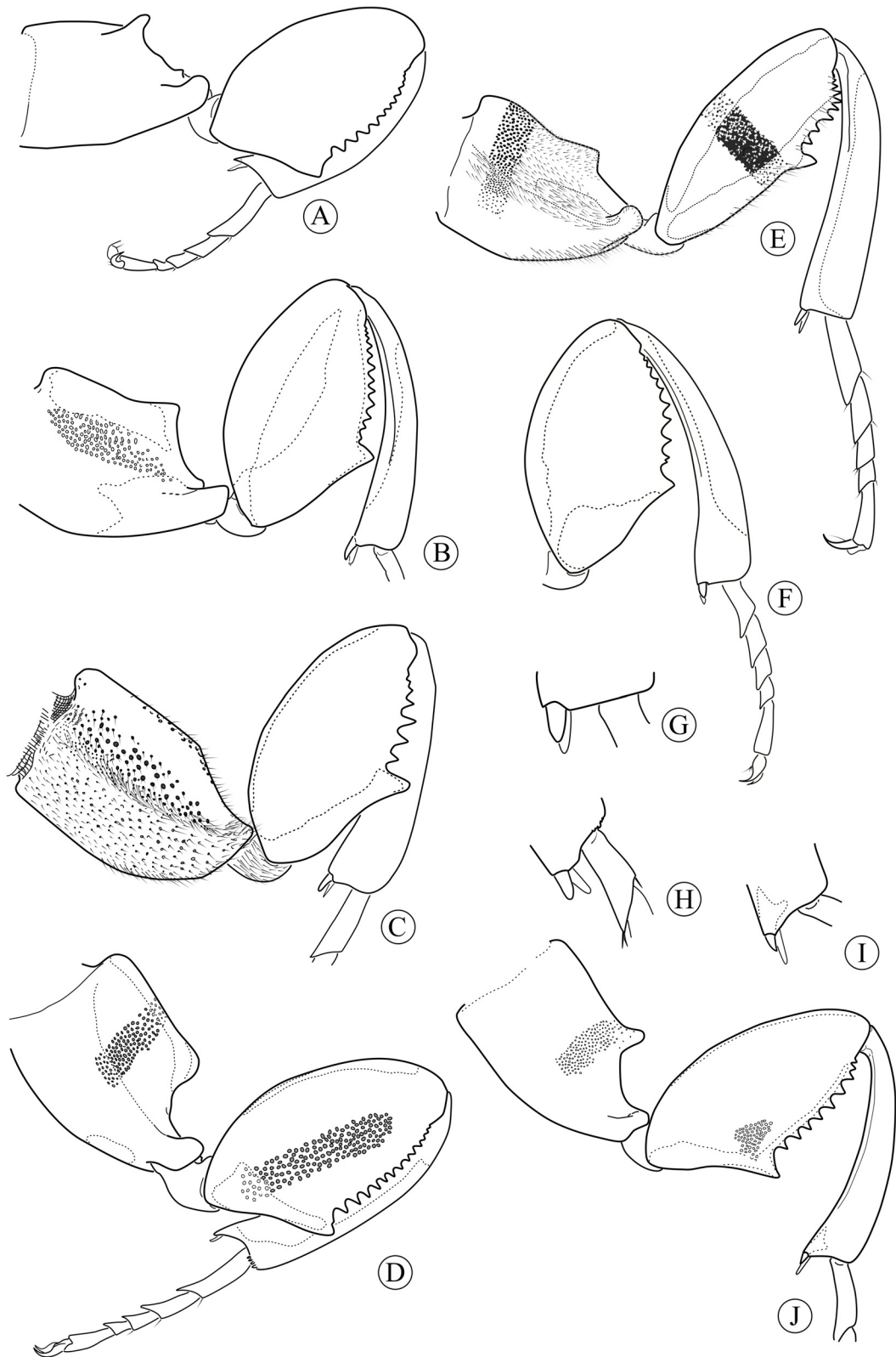


**FIGURE 4.** *Leucospis ignota* **A.** Gaster of male, dorsal view. *L. clavigaster* **B.** Part of mesosoma and gaster of male, dorsal view. *L. addenda* **C.** Part of mesosoma and gaster of male. *L. anthidioides* **D.** Habitus of female, dorsal view. *L. brasiliensis* **E.** Gaster of female, dorsal view. *L. klugii* **F.** Gaster of female, dorsal view. *L. manaica* **G.** Gaster of female, dorsal view. *L. pictipyga* **H.** Gaster of female, oblique dorsal view. *L. bulbiventris* male **I.** Gaster, dorsal view. **J.** Gaster, oblique ventral view. **K.** Mesosoma and gaster, lateral view. *L. nigripyga* **L.** Hind leg and gaster of female, lateral view. Figures modified from Bouček (1974a, figs 115, 114, 120, 56, 48, 49, 68, 55, 64, 65, 66, 96).

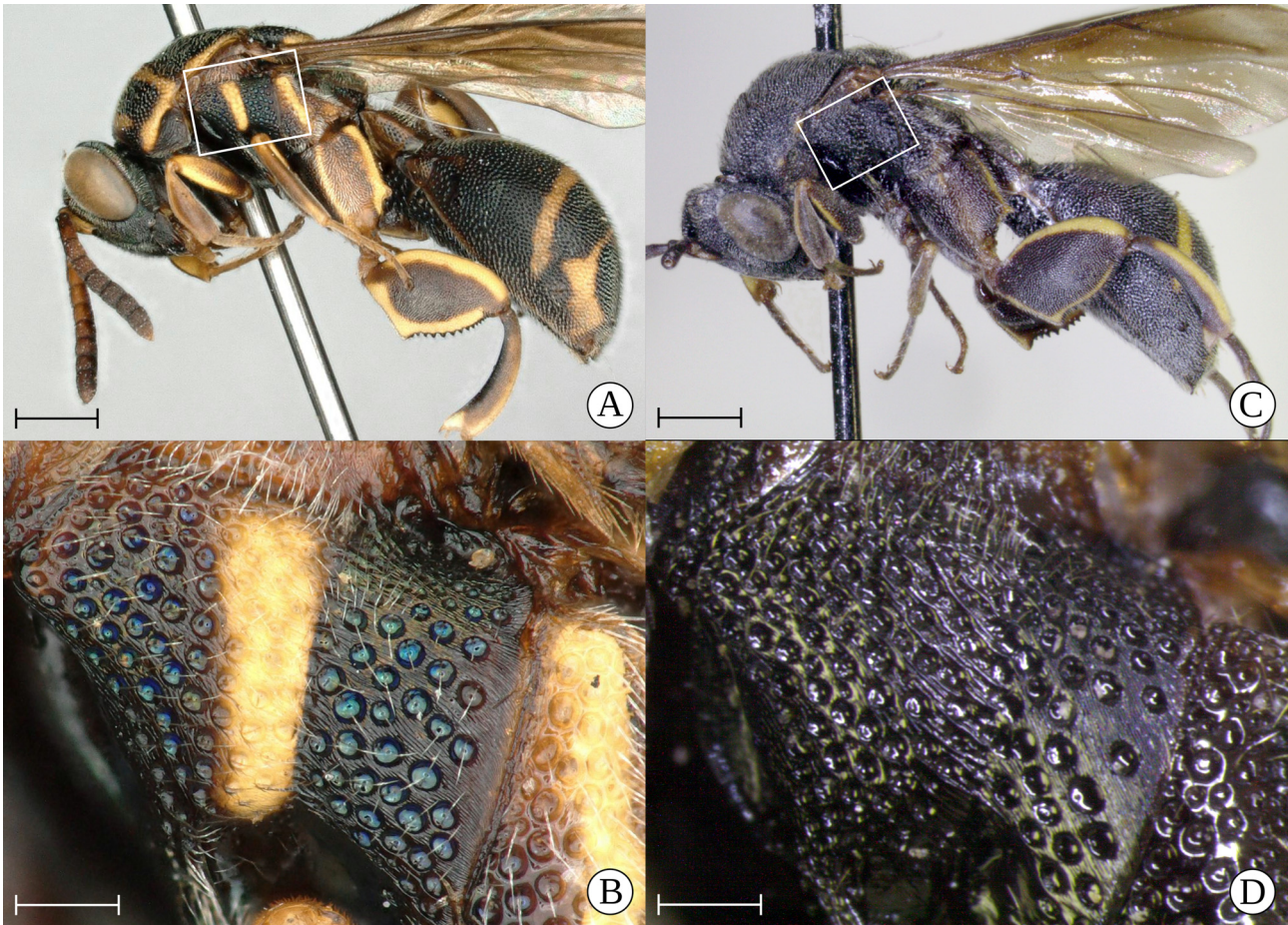


**FIGURE 5.** *Leucospis rileyi* **A.** Hind femur and tibia. *L. santarema* **B.** Hind femur and tibia. *L. metatibialis* **C.** Hind leg. *L. poeyi* **D.** Hind femur and tibia. *L. affinis affinis* **E.** Hind femur and tibia. *L. pictipyga* **F.** Hind leg. *L. latifrons* **G.** Hind leg. *L. hopei* **H.** Hind leg with white, black and red (dotted) colour indicated. *L. pinna* **I.** Propodeum, lateral view. *L. manaica* **J.** Hind leg. Figure **I** modified from Grissell and Cameron (2002, fig. 5); figures **A–H, J** modified from Bouček (1974a, figs 41, 43, 113, 60, 61, 54, 58, 45, 69).





**FIGURE 6.** *Leucospis egaia* **A.** Hind leg. *L. speifera* **B.** Hind leg. *L. mexicana* **C.** Hind leg. *L. bulbiventris* **D.** Hind leg. *L. leptomera* **E.** Hind leg. *L. desantisi* **F.** Hind femur and tibia. **G.** Apex of hind tibia. *L. auripyga* **H.** Apex of hind tibia. *L. opalescens* **I.** Apex of hind tibia. **J.** Hind leg. Figure E modified from Bouček (1974b, fig. 1), Figs A–D, F–J modified from Bouček (1974a, figs 74, 94, 106, 67, 90, 89, 87, 84, 83).



**FIGURE 7.** *Leucospis egaia* ♂. **A.** Habitus. **B.** Mesopleuron, in detail. *L. denticoxa* v. *melanosa* ♂ (sin. jr *L. coxalis* - Paralectotype - MfN). **C.** Habitus; **D.** Mesopleuron, in detail. Figs **A** and **C**, scale bar = 1mm; **B** and **D**, scale bar = 200µm. Figs **A–B** courtesy of D.C.Darling, ROM.

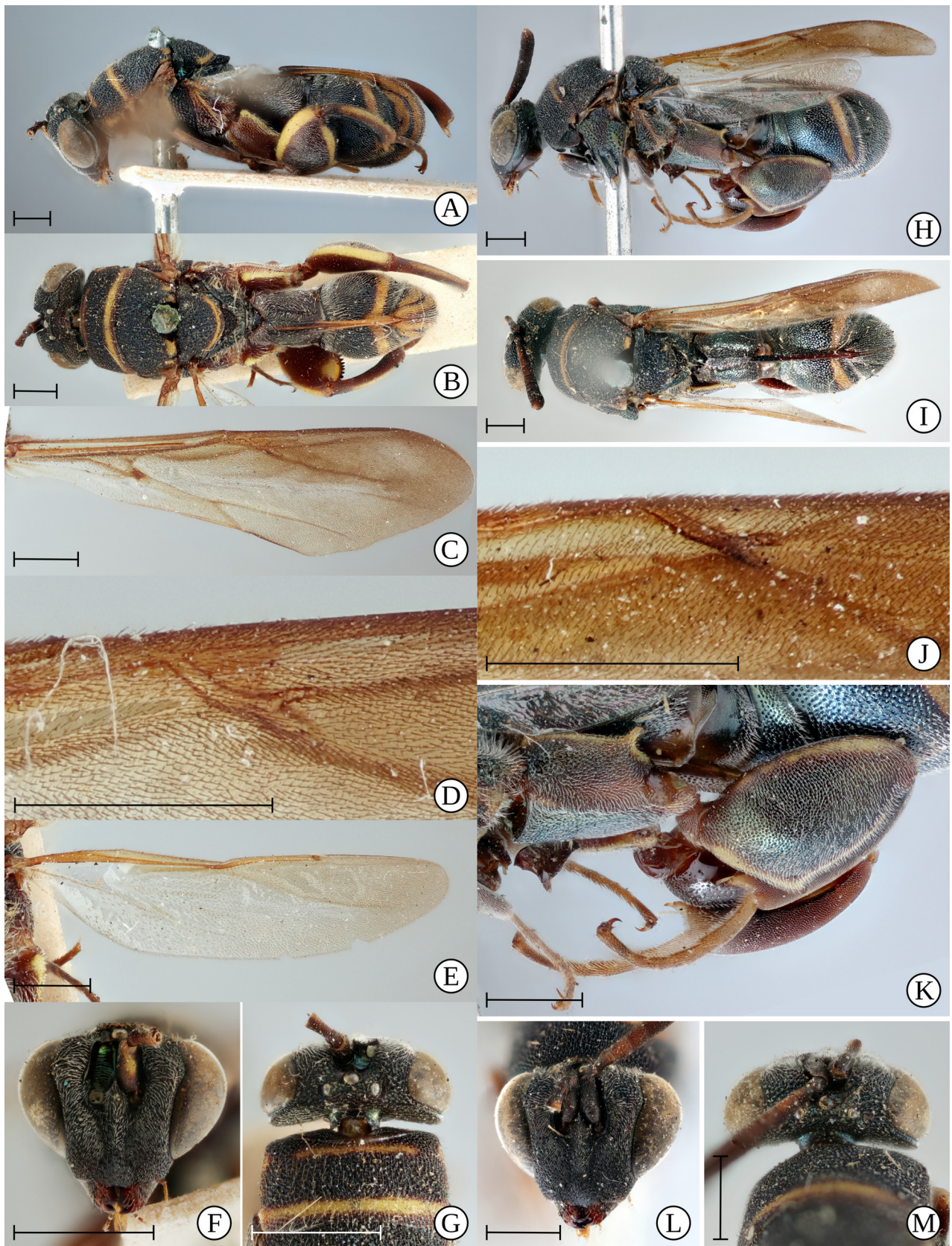
**Distribution.** Brazil (Acre, Amazonas, Minas Gerais, Pará, Rio de Janeiro, Santa Catarina, São Paulo), Colombia, Costa Rica, Ecuador, French Guiana, Guatemala, Guyana, Honduras, Mexico, Nicaragua, Panama, Peru, St. Thomas, Trinidad, Venezuela.

**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).

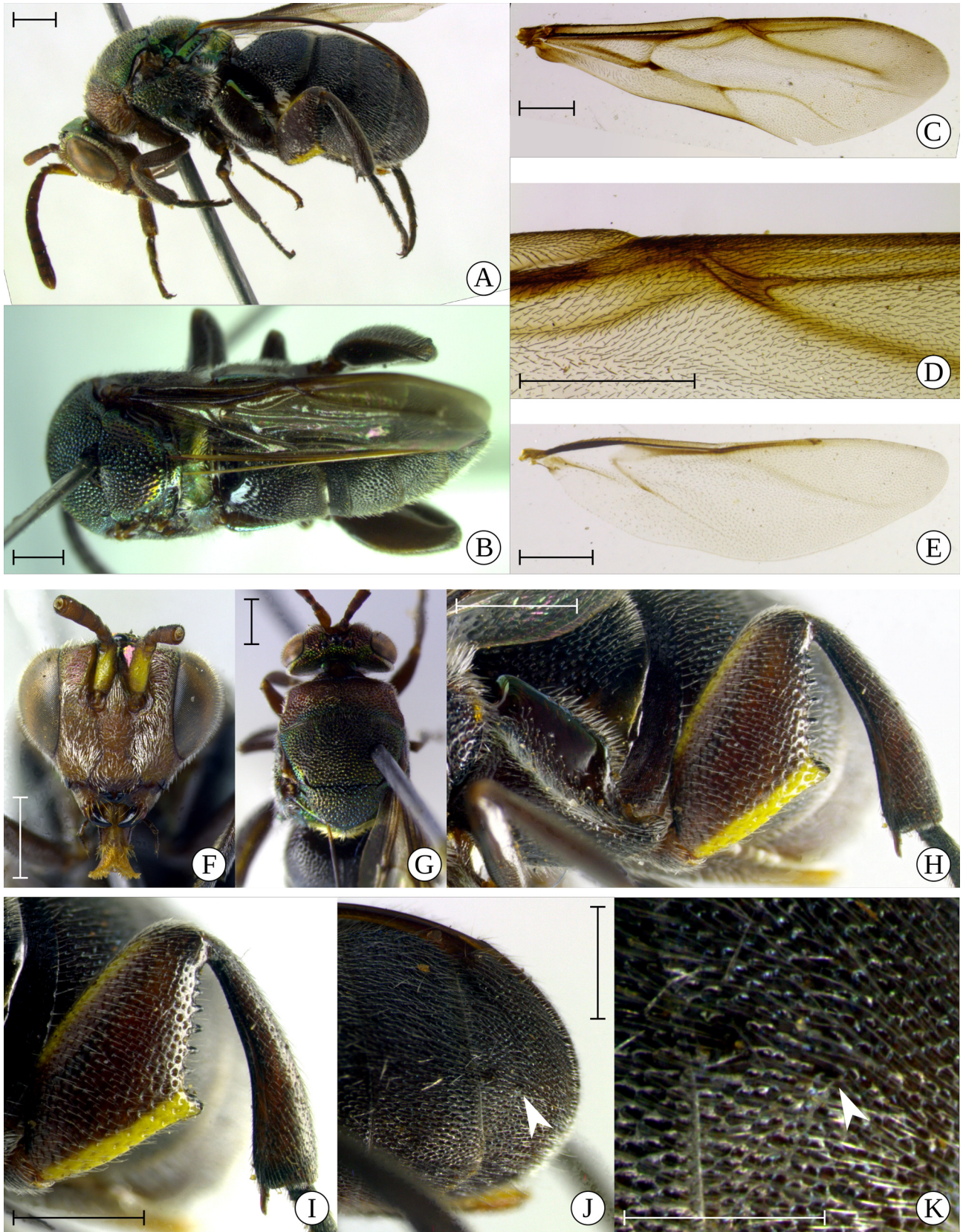
**Material examined.** (8♀, 15♂) **Brazil**, Acre, Rio Branco, Embrapa Acre, Área Aberta / Rancho P2, 10°01'30.7"S; 67°42'06.1"W, Ninho n° 939, 4.vi.2012 (Data de emergência: 25.vi.2012), F.Pacheco Jr. *leg.* Trap nest. [1♀ UFMG-IHY-1308727]; Minas Gerais, Uberlândia, Margens do rio Araguari, Ninho de barro às margens do Rio Araguari, 18°50'50.0"S; 48°05'54.0"W, 632m, 7.x.2005 (Data de emergência: xi.2005), R.B. Martines *leg.* Trap nest [6♀ UFMG-IHY-1613039 to UFMG-IHY-1613044; 14♂ UFMG-IHY-1613045 to UFMG-IHY-1613058]; São Paulo, Santo Antônio do Pinhal, Centro, Habitat: Floresta Ombrófila montana, 22°49'32"S; 45°39'16"W, 8.i.2016, H.N.Vasconcelos & M.F.Vasconcelos *leg.* [1♀ PUC-MG-MCN-HYM-01]. **French Guiana**, Cayenne [Lectotype ♂ MfN 13354, GBIF-ChalcIDSD ID:ChalD0081].





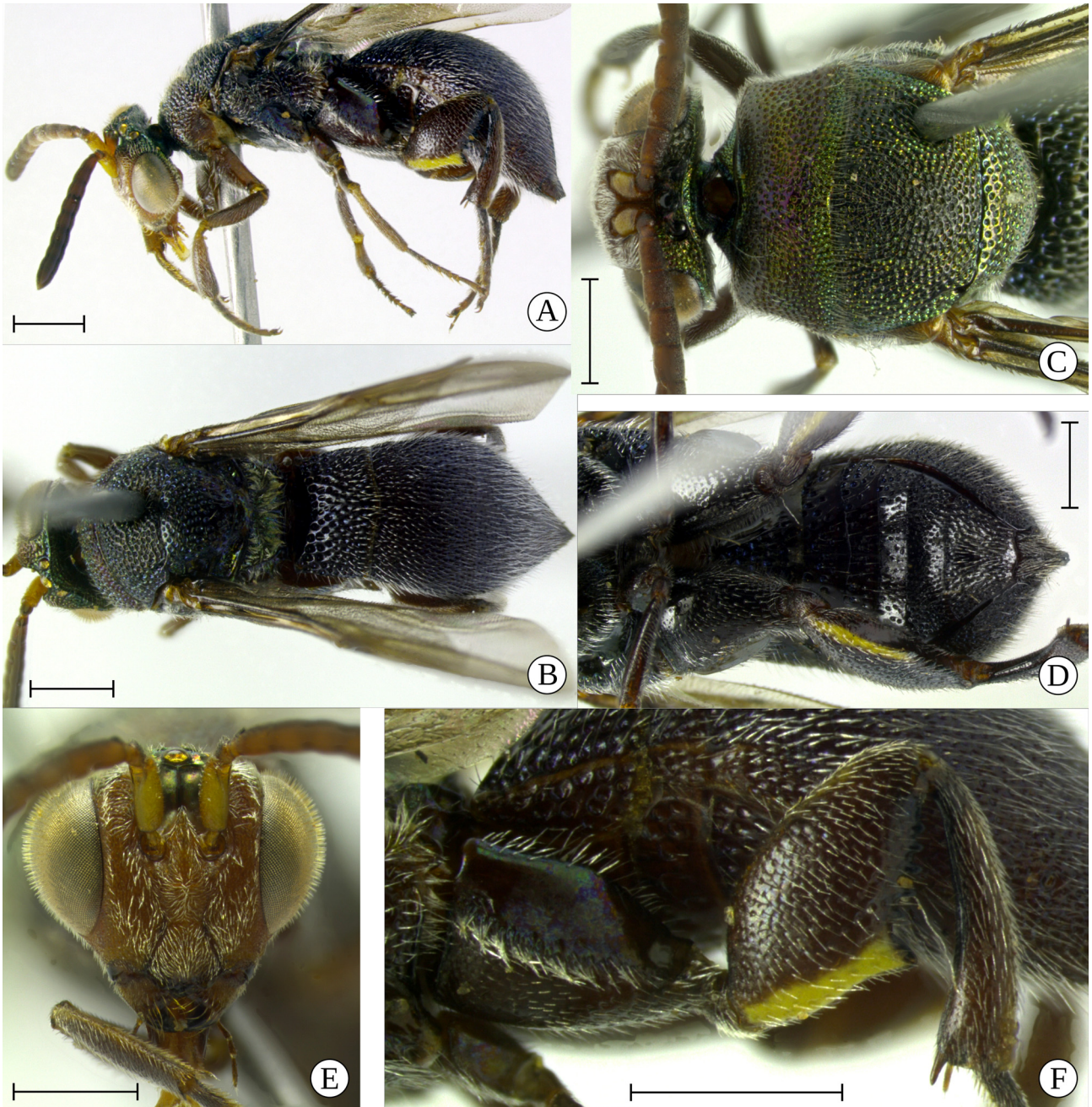
**FIGURE 8.** *Leucospis coxalis* (♀ Lectotype, BMNH, NHMUK011508280). **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Left fore wing. **D.** Fore wing, stigmal vein in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and pronotum, dorsal view. *Leucospis bicaniculata* (♀ Lectotype, BMNH, NHMUK011508281). **H.** Habitus, lateral view. **I.** Habitus, dorsal view. **J.** Fore wing, stigmal vein in detail. **K.** Hind leg. **L.** Head, frontal view. **M.** Head and pronotum, dorsal view. Scale bar = 1mm. (Courtesy of Natalie Dale-Skey, BMNH)





**FIGURE 9.** *Leucospis cayennensis* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Hind leg, lateral view. **I.** Hind femur and tibia, lateral view. **J.** Posterior region of metasoma, lateral view. Arrow shows a spiniform projection on sixth tergite. **K.** Spiniform projection on sixth tergite in detail. Scale bar = 1 mm. UFMG-IHY-1613040





**FIGURE 10.** *Leucospis cayennensis* ♂ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Head and mesosoma, dorsal view. **D.** Metasoma, ventral view. **E.** Head, frontal view. **F.** Hind leg, lateral view. Scale bar = 1 mm. UFMG-IHY-1613045

***Leucospis genalis* Bouček, 1974**

(Figs 11, 12)

*Leucospis genalis* Bouček, 1974a: 94–96; figs 111, 112. Holotype ♀: Paraguay: Villarica (MCZ, Cambridge); Bouček 1974b: 430–432; fig. 1.1 (compared *L. leptomera*); Martins & Antonini 1994: 556, 558 (hosts); Martins *et al.* 1996: 13–14 (hosts); Grissell & Cameron 2002: 277 (compared *L. pinna*); Noyes 2017 (*online catalog*).

**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 punctation 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 infusate, 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.



**FIGURE 11.** *Leucospis genalis* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Hind coxa and hind femur, lateral view. Scale bar = 1 mm. UFMG-IHY-1305659.

**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).

**Material examined.** (7♀, 4♂) **Brazil**, Minas Gerais, Belo Horizonte, Campus da UFMG, Estação Ecológica da UFMG, J.F.Macedo *leg.* 5.iv.1993, [1♀ UFMG-IHY-1305657], 6.ix.1993 [1♀ UFMG-IHY-1701143], 27.vii.1993 [1♀ UFMG-IHY-1701142]; H.R.Pimenta *leg.*, 26.viii.1991 [1♂ UFMG-IHY-1305658], 9.iv.1992 [1♀ UFMG-IHY-1305659] 18.iv.1991 [1♀ UFMG-IHY-1305660], 6.iii.1992 [1♀ UFMG-IHY-1305661],



20.ii.1992 [1♂ UFMG-IHY-1305662], 14.v.1991 [1♂ UFMG-IHY-1305663]; São Paulo, Rio Claro, Horto Florestal Navarro de Andrade, em vôo, 18.iv.1988, R.P.Martins leg. [1♀ UFMG-IHY-1305759]; São Paulo, Jundiahy, 1899, Schrottky [Paratype ♂ MfN].



**FIGURE 12.** *Leucospis genalis* ♂ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Head and mesosoma, dorsal view. **D.** Metasoma, ventral view. **E.** Head, frontal view. **F.** Hind leg, lateral view. Scale bar = 1 mm. UFMG-IHY-1305662

***Leucospis ignota* Walker, 1862**

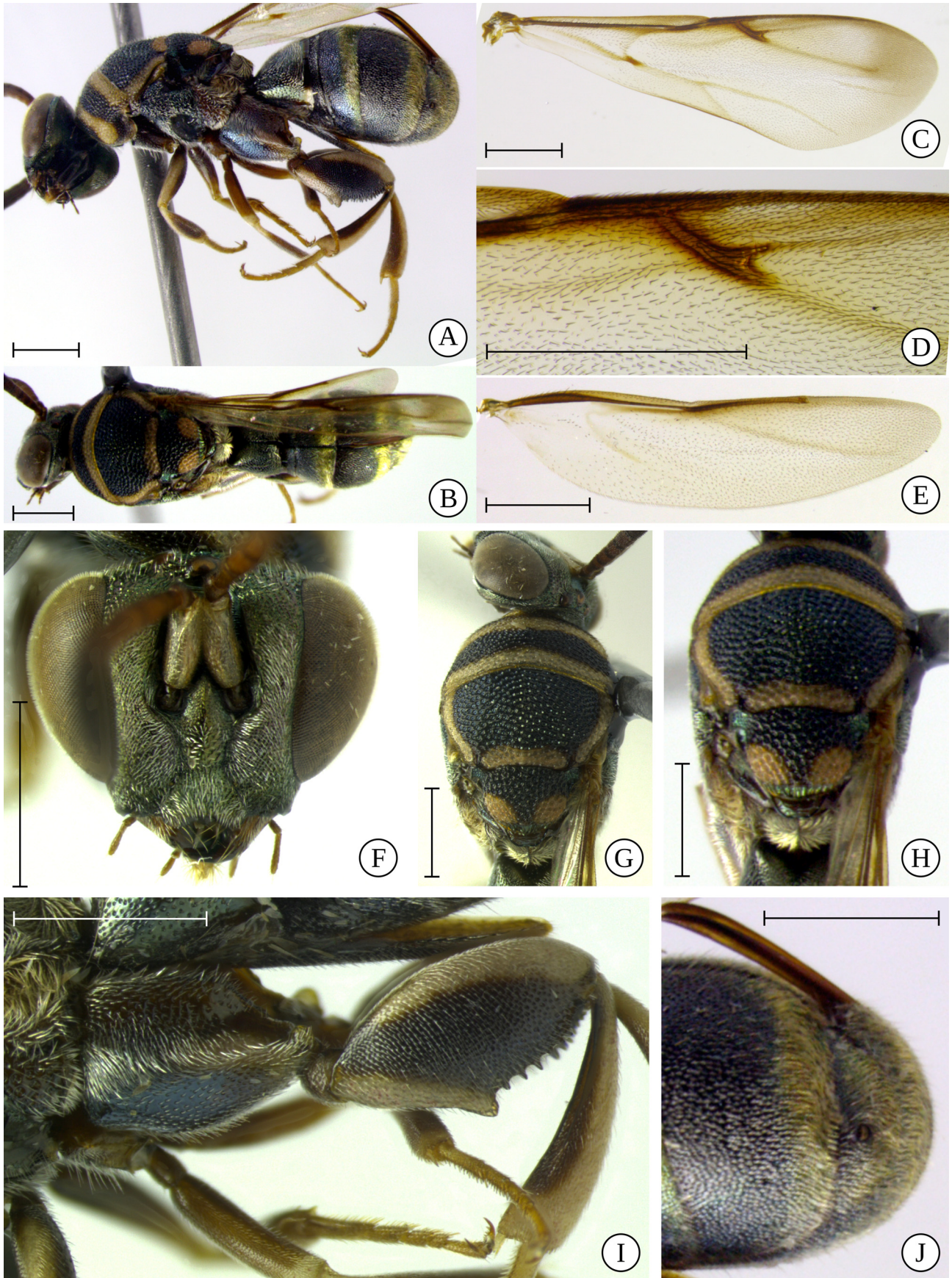
(Fig. 13)

*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*).





**FIGURE 13.** *Leucospis ignota* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Mesosoma, dorsal view. **H.** Scutellum, dorsellum and propodeum, postero-dorsal view. **I.** Hind leg, lateral view. **J.** Posterior region of metasoma, lateral view. Scale bar = 1 mm. UFMG-IHY-1611610



**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<sup>a</sup> 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].

### **EGALIA 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.***

LSIDurn: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



**FIGURE 14.** *Leucospis copepucu* sp. nov. Holotype ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Fore wing. **D.** Fore wing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum and dorsellum, postero-dorsal view. **I.** Mandible and clipeous, frontal view. **J.** Head, dorsal view. **K.** Hind femur and tibia, lateral view. **L.** Hind leg, lateral view. **M.** Posterior region of metasoma, lateral view. Arrow shows a spiniform projection on sixth tergite. **N.** Spiniform projection on sixth tergite in detail. Scale bar = 1 mm. UFMG-IHY-1305656.

high; face densely punctate-reticulate, with dense white pubescence (Fig. 14F). Malar space  $0.29\times$  eye height, in lateral view; finely vertically rugulose-punctate. Clypeus in frontal view  $0.9\times$  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 white 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),  $0.8\times$  as long as maximum breadth, in dorsal view (Fig. 14H). Dorsellum  $2.5\times$  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, plicae absent (Fig. 14H). Subalar area and mesepisternum obliquely rugulose-punctate-reticulate; mesepisternum punctate with longitudinal microsculpture; mesopleural depression deep and smooth except finely punctate at anterior border. Metapleuron punctate-reticulate with pilosity as long as propodeal pilosity.

**Legs.** Upper edges of fore femur and tibia carinate. Hind coxa uniformly punctate (Fig. 14L); upper edge blunt, posteriorly with a translucent tooth-like projection; with dense white pilosity, in depression downward directed, and below depression backward directed. Hind femur  $2.2\times$  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 9 other teeth (Fig. 14K). Hind tibia densely finely punctate, apically with sharp outer spur (Fig. 14K).

**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  $40^\circ$  to R1. Stigmal vein  $1.65\times$  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.**  $2.6\times$  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 spiracle 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 mesepimeron; 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  $2.53\times$  as broad as long. POL about  $1.44\times$  OOL, ocellar triangle  $2.5 : 1$  (length : height). Frontal view, head  $1.33\times$  as broad as high. Malar space  $0.25\times$  eye height, in lateral view. Dorsellum  $3.15\times$  as broad as long medially

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

**Gaster**  $2.23\times$  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  $1.35\times$  as broad as long,  $0.40\times$  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 supraceral keel



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.

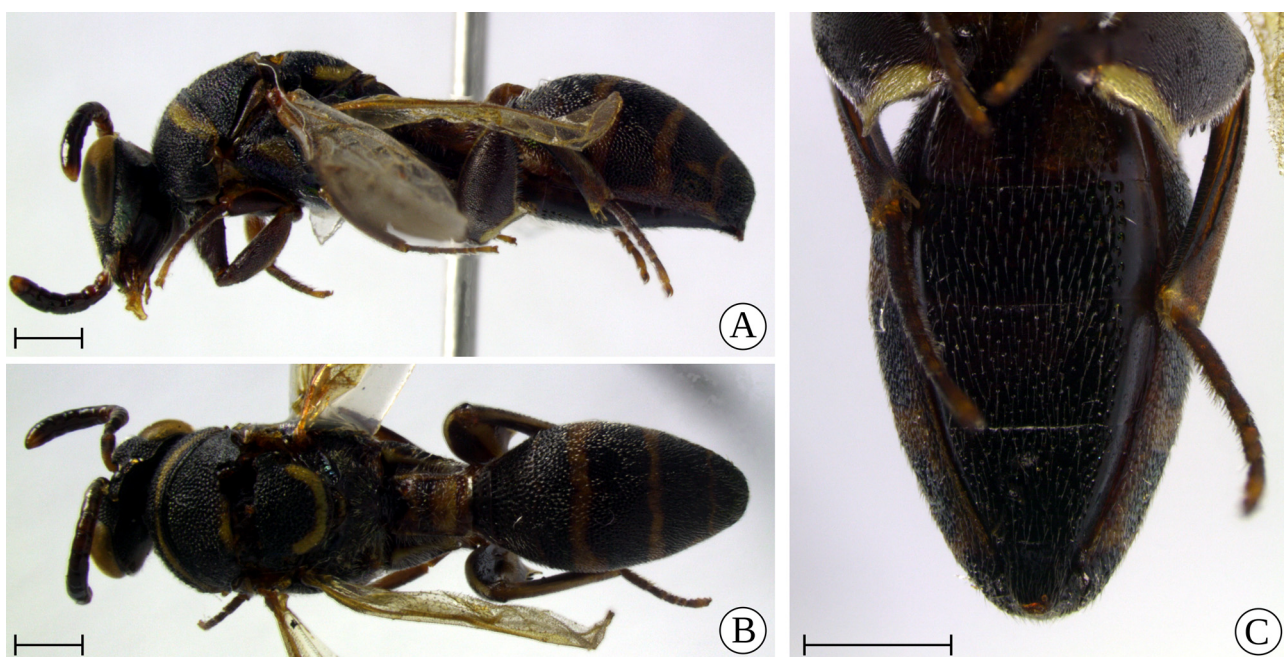
**Etymology.** From Brazilian Tupi *copé* (back) and *puçú* (long), in reference to the propodeum as long as or longer than dorsellum.

**Comments.** We classify *Leucospis copepucu* in the EGAlA-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 (punctation 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 egaja* Walker, 1862. Dalla Torre 1898: 402 (unjustified emendation); Noyes 2017 (online catalog).

*Leucospis tapayosa* Walker, 1862: 21. Lectotype ♀: Brazil: Tapajós (BMNH); Bouček 1974a: 72 (syn. *L. egaia*); 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.

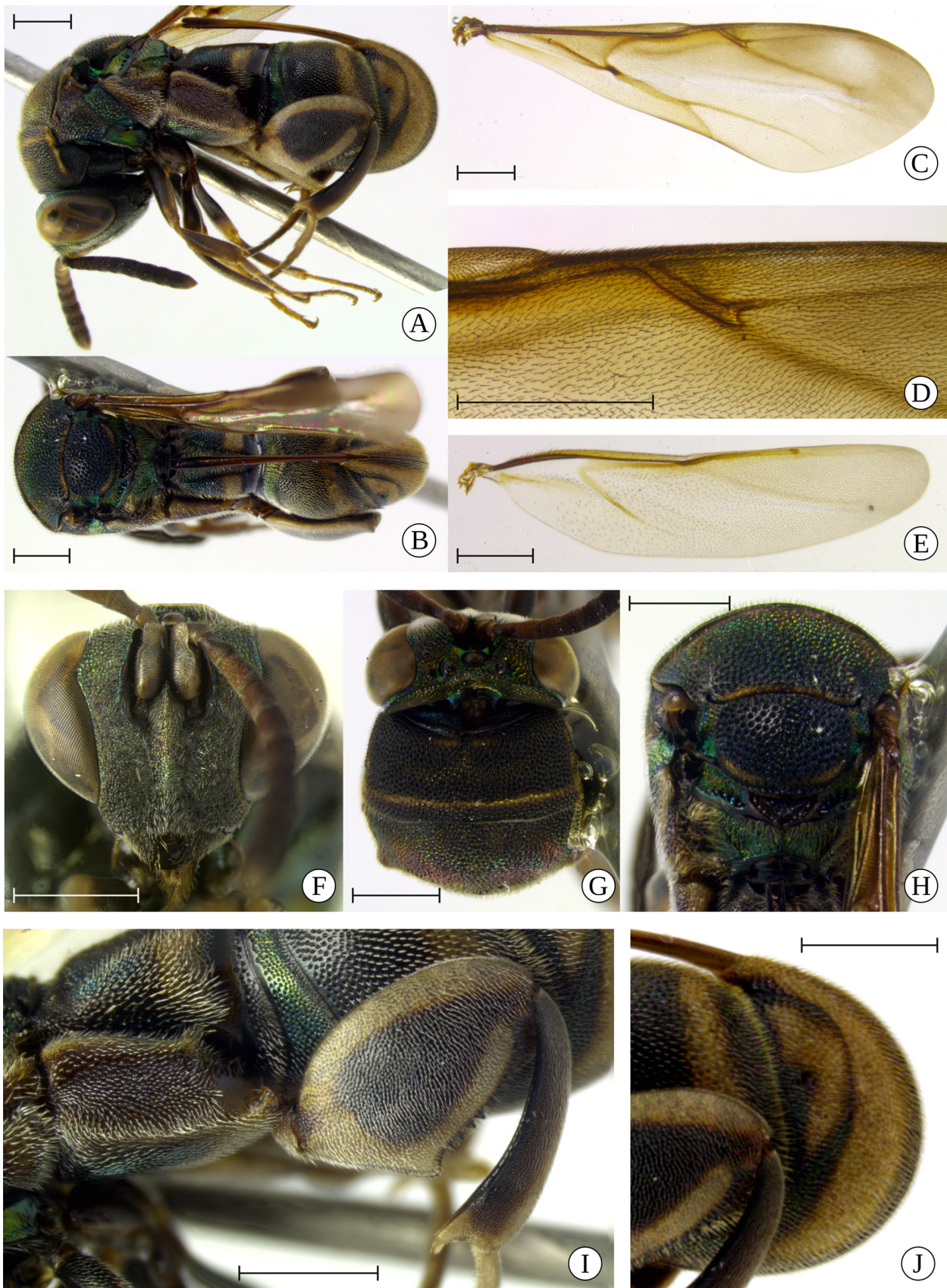
**Comments.** *Leucospis egaia* was previously recorded from northern, southern and southwestern Brazil (Figs 25, 26). The new records presented here extends its occurrence southwestward in the Brazilian Savannah.

*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.

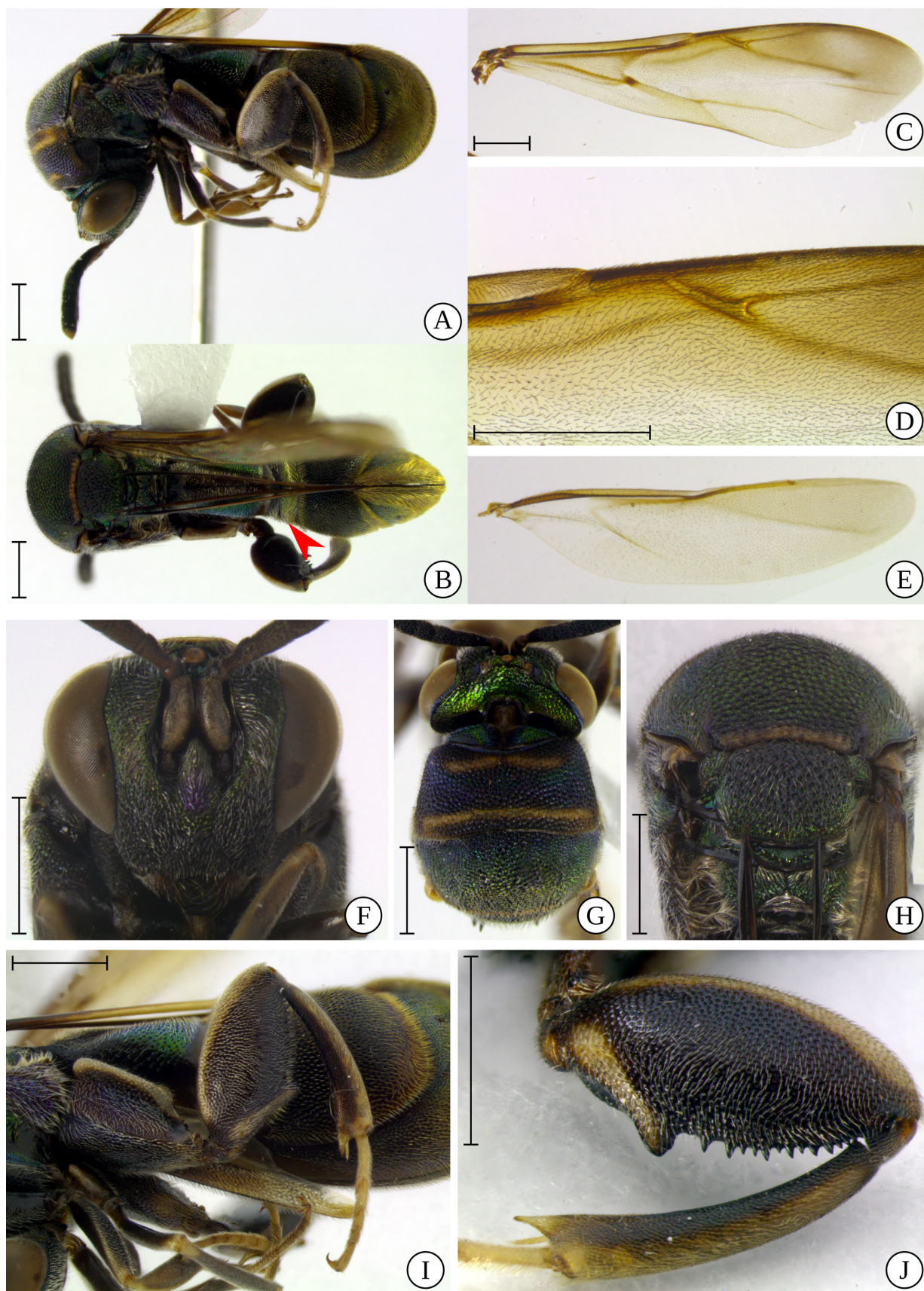
**Material examined.** (19♀) **Brazil**, Minas Gerais, Nova Porteirinha, 1<sup>a</sup> CIG, CODEVASF, 15°48'55.1"S; 43°16'26.8"W, 25.x.2013 N.G.Fonseca leg. Malaise [UFMG–IHY–1613562]; Belo Horizonte, UFMG Pampulha, 11.iii.1998 [UFMG–IHY–1504435]; Belo Horizonte, UFMG Pampulha, Estação Ecológica, 19°52'30"S; 43°58'20"W, 842m, malaise, 28.vii–4.viii.1999, A.F. Kumagai leg. [UFMG–IHY–1504427], 3–10.xi.1999 [UFMG–IHY–1504428], 4–11.viii.1999 [UFMG–IHY–1504429], 15–22.iv.1998 [UFMG–IHY–1504430], 10–17.iii.2014 [UFMG–IHY–1504431], 17–24.iii.2014 [UFMG–IHY–1504432], 16–23.ix.1998 [UFMG–IHY–1504433], 19–26.viii.1998 [UFMG–IHY–1504434], 1–7.x.1991 [UFMG–IHY–1614804]; Marliéria, Parque Estadual do Rio Doce, Trilha Tereza, 19°42'1.85"S; 42°30'7.66"W, 252m, malaise J.C.R. Fontenelle leg. 26.x–2.xi.2003 [UFMG–IHY–1504436]; São Gonçalo do Rio Abaixo, Estação Ambiental de Peti, Alojamento (Al), 19°53'14"S; 43°22'06"W, malaise, A.F.Kumagai leg. 31.v–7.vi.2002 [UFMG–IHY–1504421], 30.i–6.ii.2004 [UFMG–IHY–1504422], 24–31.x.2003 [UFMG–IHY–1504423]; São Gonçalo do Rio Abaixo, Estação Ambiental de Peti, Ponte (Po), 19°52'49"S; 43°22'06"W, malaise, A.F.Kumagai leg. 4–11.x.2002 [UFMG–IHY–1504424], 13–20.ix.2002 [UFMG–IHY–1504425], 9–16.xi.2007 [UFMG–IHY–1504426]; São Paulo, Pindorama, malaise, 2.xii.2008 F. Noll leg. [UNESP–Leu–005]; São Paulo, Macaubal, malaise, 19.xi.2007 F. Noll leg. [UNESP–Leu–006].





**FIGURE 16.** *Leucospis egaia* ♀ A. Habitus, lateral view. B. Habitus, dorsal view. C. Forewing. D. Forewing, stigma region in detail. E. Hind wing. F. Head, frontal view. G. Head and pronotum, dorsal view. H. Scutellum, dorsellum and propodeum, postero-dorsal view. I. Hind leg, lateral view. J. Posterior region of metasoma, lateral view. Scale bar = 1 mm. UFMG-IHY-1504425





**FIGURE 17.** *Leucospis manica* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. Red arrow shows the pilosity pattern on tergite IV. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum and dorsellum, postero-dorsal view. **I.** Hind leg, lateral view. **J.** Hind femur and hind tibia, lateral view. Scale bar = 1 mm. UFMG-IHY-1504413

### ***Leucospis manaica* Roman, 1920**

(Fig. 17)

*Leucospis manaica* Roman 1920: 9–10, fig. 1a. 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 infusate, 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.

**Material examined.** (4♀) **Brazil**, Minas Gerais, São Gonçalo do Rio Abaixo, Estação Ambiental de Peti, Alojamento (AI), 19°53'14"S; 43°22'06"W, 18–25.x.2002, Malaise, A.F. Kumagai *leg.* [UFMG–IHY–1504413, UFMG–IHY–1504414], 17–24.x.2003 [UFMG–IHY–1504415]; Belo Horizonte, UFMG Pampulha, Estação Ecológica, 19°52'30"S; 43°58'20"W, 842m, 24.xi–1.xii.1999, Malaise, A.F. Kumagai *leg.* [UFMG–IHY–1504416].

### ***Leucospis opalescens* Weld, 1922**

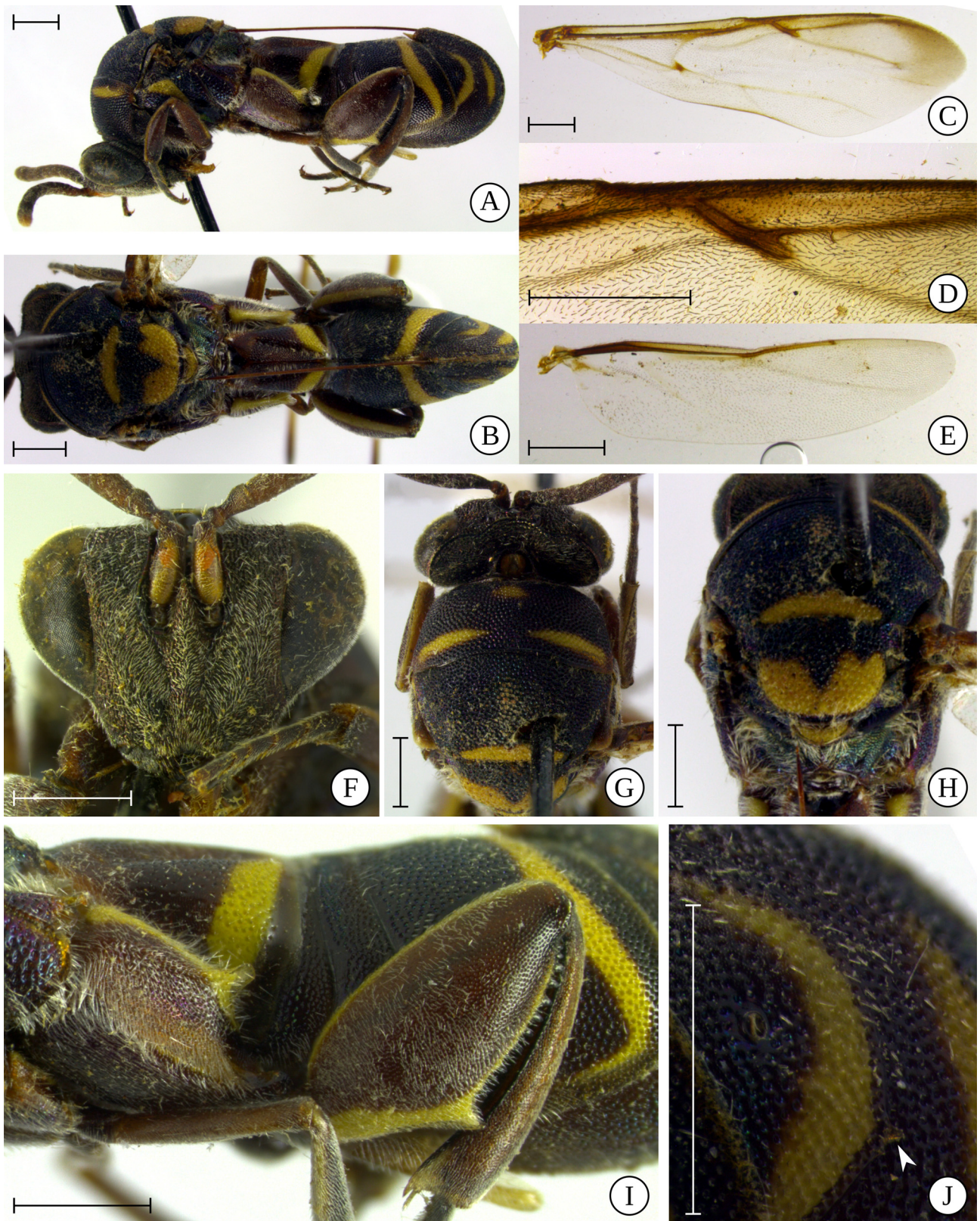
(Figs 18, 19)

*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 infusate 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. Scrobes 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





**FIGURE 18.** *Leucospis opalescens* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum, dorsellum and propodeum, postero-dorsal view. **I.** Hind leg, lateral view. **J.** Posterior region of metasoma, lateral view. Arrow shows a spiniform projection on sixth tergite. Scale bar = 1 mm. UFMG-IHY-1305651





**FIGURE 19.** *Leucospis opalescens* ♂ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Metasoma, ventral view. **D.** Head and mesosoma, dorsal view. **E.** Hind leg, lateral view. Scale bar = 1 mm. UFMG-IHY-1305653

pubescence. Malar space  $0.26\times$  eye height in lateral view; glabrous adjacent to eye, vertically aciculate, with few sparse hairs. Clypeus in frontal view  $0.85\times$  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,  $0.8\times$  as long as maximum breadth in dorsal view. Dorsellum  $3\times$  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; punctation 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 punctation 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].

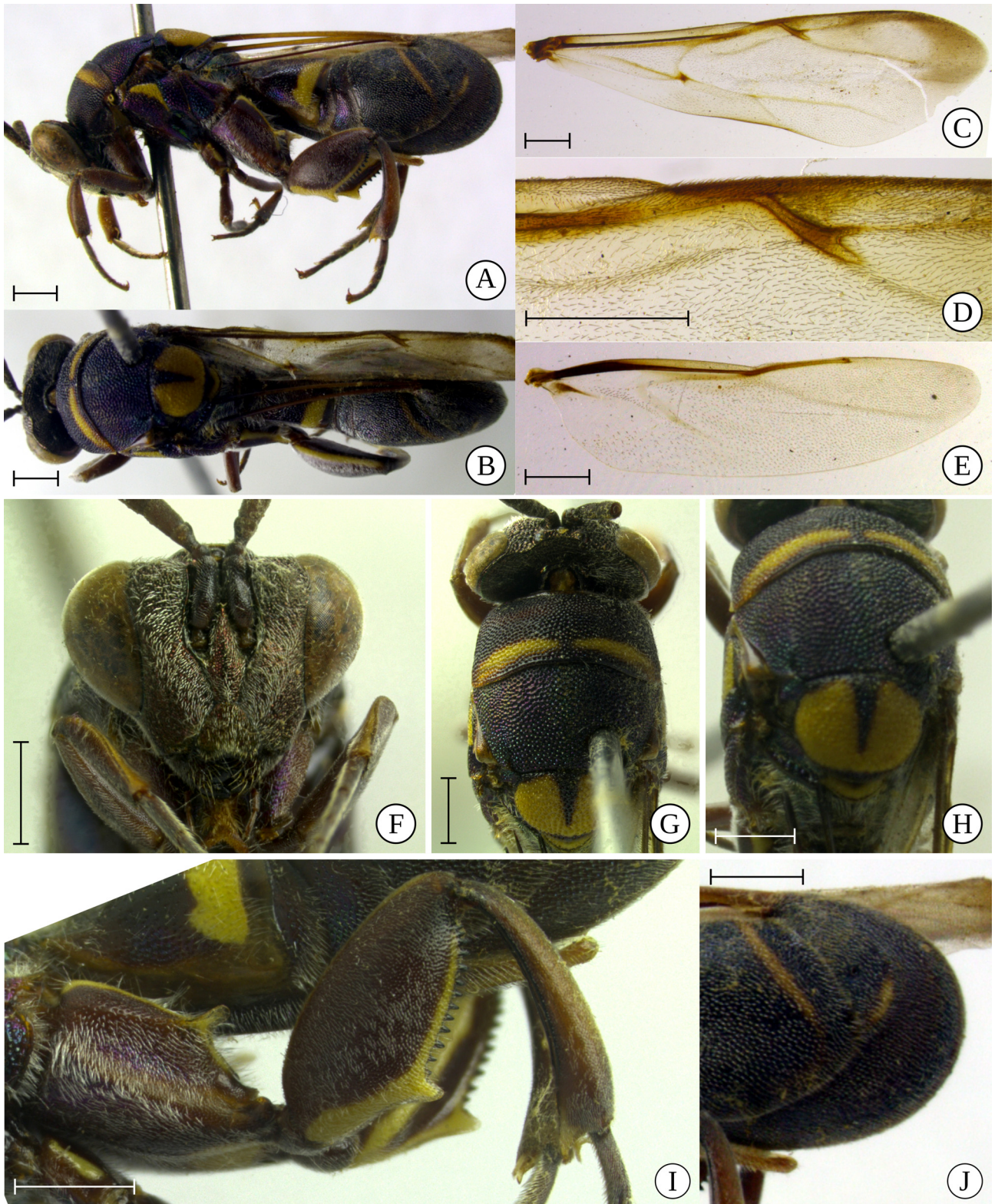
### ***Leucospis signifera* Bouček, 1974**

(Fig. 20)

*Leucospis signifera* Bouček 1974a: 76–77, fig. 77. Holotype ♀: Brazil, Santa Catarina, Nova Teutônia (BMNH); Periotto & 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.





**FIGURE 20.** *Leucospis signifera* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum, dorsellum and propodeum, postero-dorsal view. **I.** Hind leg, lateral view. **J.** Posterior region of metasoma, lateral view. Scale bar = 1 mm. UFMG-IHY-1305652

**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.

**Material examined.** (4♀) **Brazil**, Minas Gerais, Paraopeba, Estação Florestal de Experimentação, 19°20'S, 44°20'W, 734m–750m, 14.x.1993, H.R. Pimenta *leg.* [UFMG–IHY–1305649, UFMG–IHY–1305650, UFMG–IHY–1305652, UFMG–IHY–1305654].

## 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. xylocopae*, and *\*L. muru 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. xylocopae*); 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.

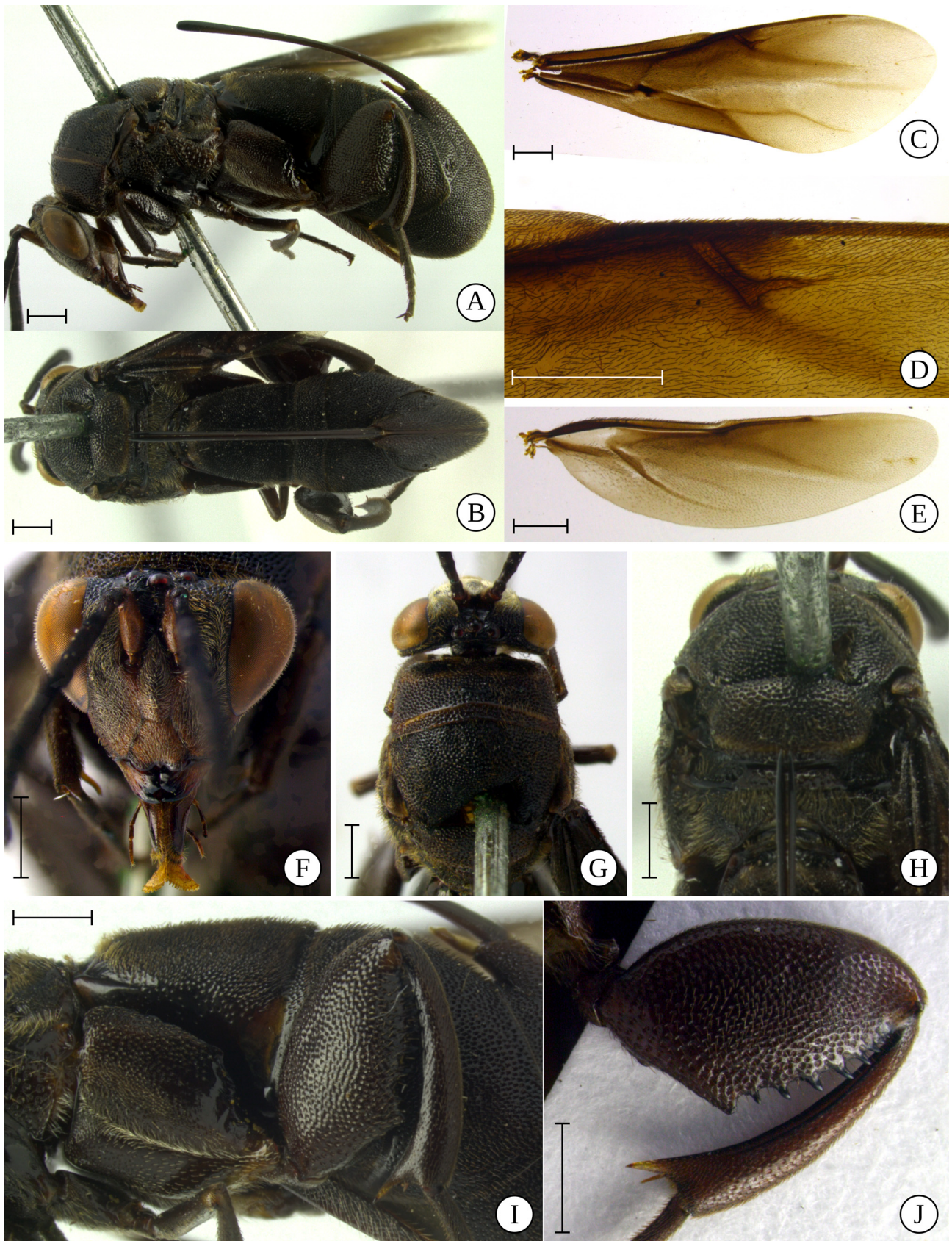
**Distribution.** Mexico, Guatemala, Panama, Colombia, Ecuador, Peru, Guyana, French Guiana, Brazil (Amazonas, Pará, Goiás, Mato Grosso, **Minas Gerais**, Santa Catarina).

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

**Biology.** Unknown.

**Material examined.** (2♀) **Brazil**, Minas Gerais, Belo Horizonte, UFMG Pampulha, 28.x.1987 [UFMG–IHY–1504418]; Belo Horizonte, UFMG Pampulha, Estação Ecológica, 19°52'30"S, 43°58'20"W, 842m, malaise, 1–8.x.1998, A.F. Kumagai *leg.* [UFMG–IHY–1504417].





**FIGURE 21.** *Leucospis leucotelus* ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum, dorsellum and propodeum, postero-dorsal view. **I.** Hind leg, lateral view. **J.** Hind femur and tibia, lateral view. Scale bar = 1 mm. UFMG-IHY-1504418

***Leucospis muru* sp. nov.**

LSIDurn: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 ocellar 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.

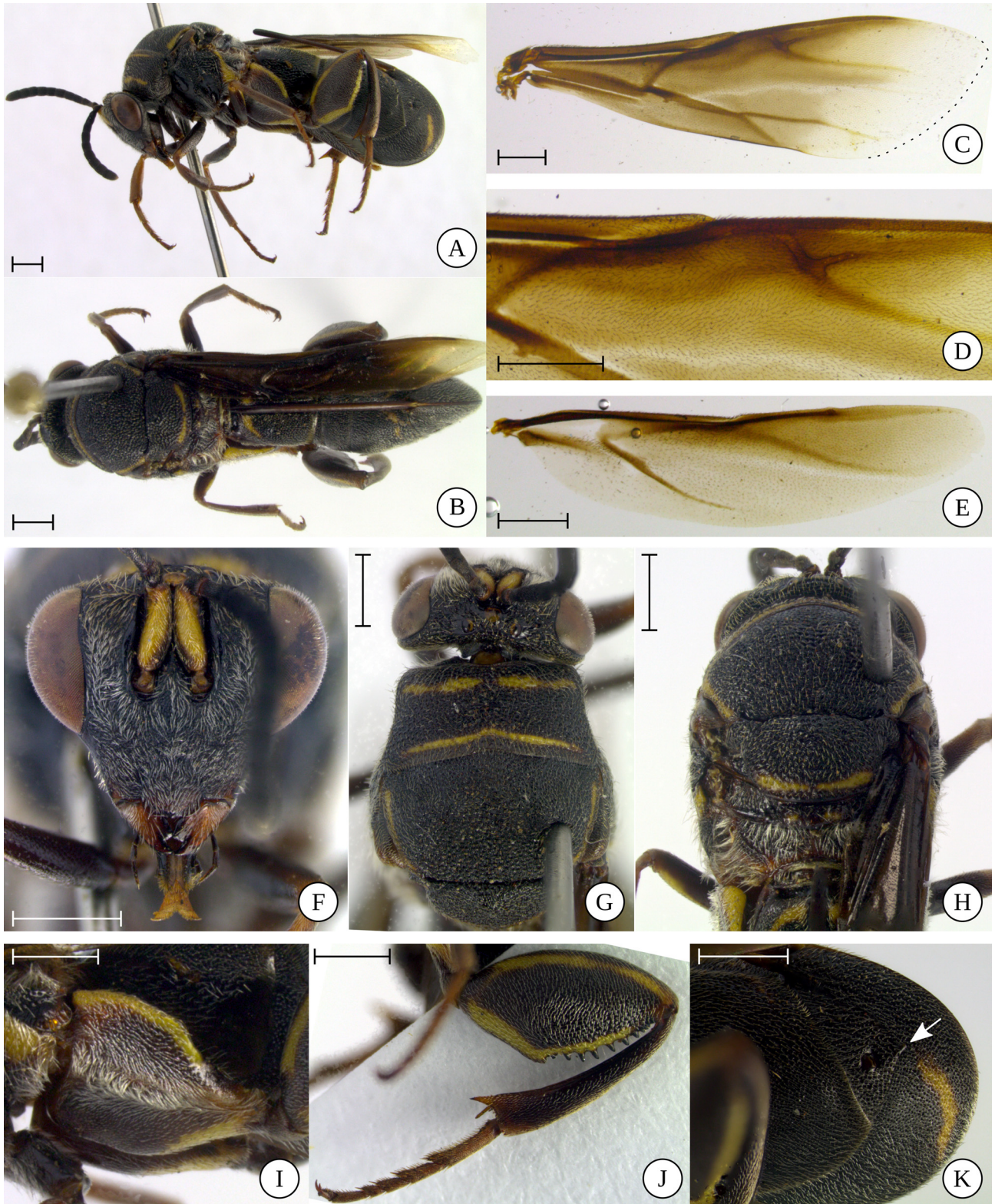
**Mesosoma** dorsally with short pubescence. Pronotum and mesoscutum punctate-reticulate (Fig. 22G), with punctation very dense and transversally confluent, with a transverse microsculpture, which is more evident on mesoscutum; scutellum punctate, punctation closer centrally. Pronotum with discal carina 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).





**FIGURE 22.** *Leucospis muru* sp. nov. Holotype ♀ **A.** Habitus, lateral view. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum and dorsellum, postero-dorsal view. **I.** Hind coxa, lateral view. **J.** Hind femur and hind tibia, lateral view. **K.** Posterior region of metasoma, lateral view. Arrow shows a projection on sixth tergite. Scale bar = 1 mm. UFMG-IHY-1317252



**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-posteriorly 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 muru* resembles *L. propinqua* 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. propinqua* and *L. leucotelus* versus conspicuous in *L. muru*; the hind coxa in *L. propinqua* and *L. leucotelus* has a glabrous area on the posterior depression (Fig. 21I) while in *L. muru* the hind coxa is uniformly punctate (Fig. 22I); and tergite VI of female with a latero-posterior triangular projection above spiracle level in *L. muru*, 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.

**Material examined.** (2♀) **Holotype.** Brazil, Minas Gerais, Brumadinho, Serra da Moeda. Em ninho 16.viii.1998, E.A.B. Almeida leg. [UFMG–IHY–1317252]. **Paratype.** Same data as Holotype [UFMG–IHY–1317245].

## **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. nigripyga*, *L. robertsoni*, \**L. speifera*, *L. sumichrasti*, 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)

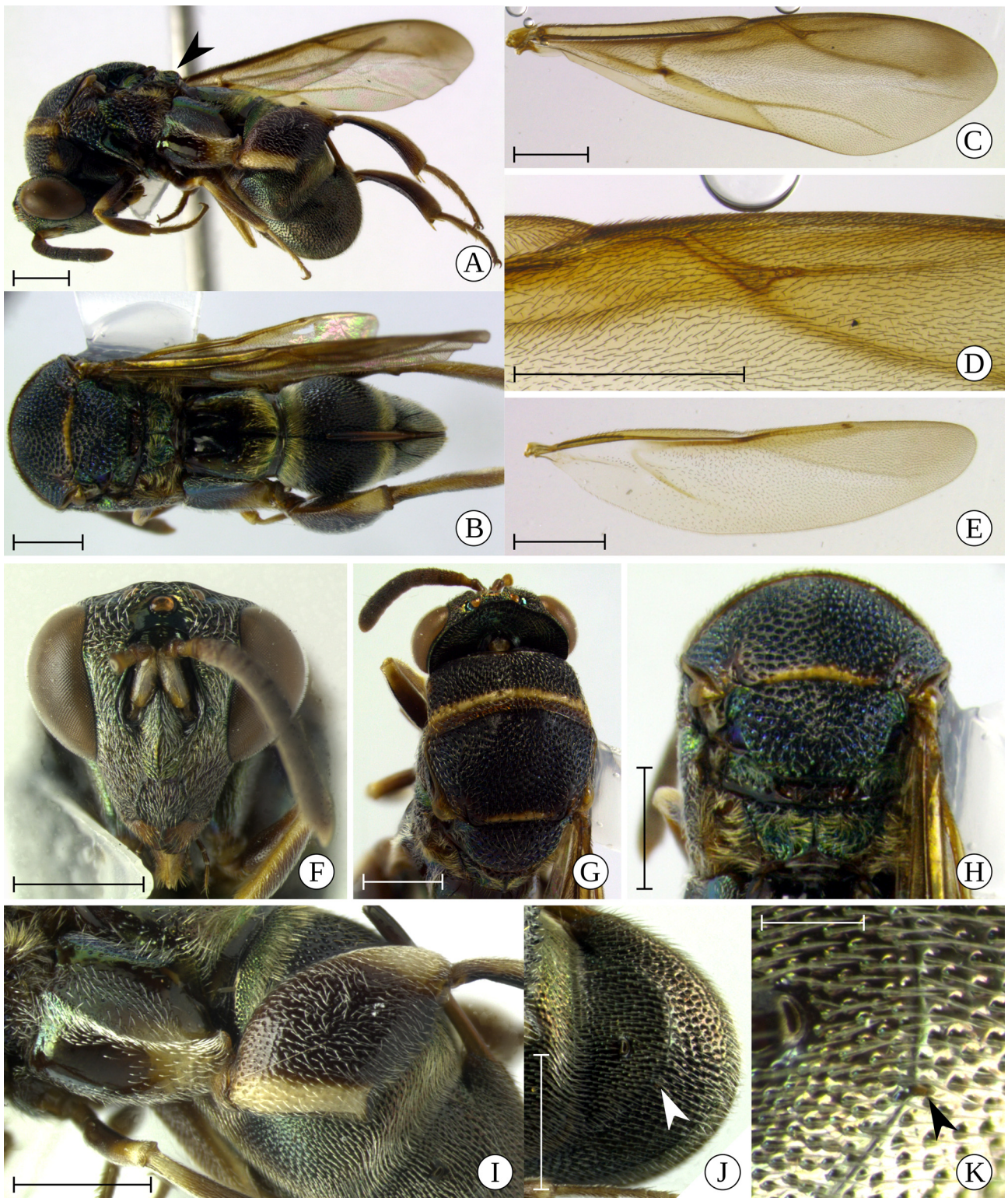
*Leucospis enderleini* Ashmead 1904: 405, pl. 31, fig. 1. Holotype ♀: Brazil: Santarém (USNM); Burks 1961: 540 (compared *L. xylocopae*); Bouček, 1974a: 90–91, figs 103, 104 (description of male); De Santis 1980: 273 (catalog); Arias-Penna 2008: 165 (Colombia registre); Noyes 2017 (*online* catalog).

*Leucospis metallica* Weld 1922: 13–14, figs 2a,b. Holotype ♀: Brazil: São Paulo (USNM); Burks 1961: 541 (syn. *L. enderleini*).



**FIGURE 23.** *Leucospis enderleini* ♂ **A.** Habitus, lateral view. Arrow indicates keel-like median carina on propodeum. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Hind leg, lateral view. **I.** Hind femur and tibia, lateral view. **J.** Metasoma, ventral view. Scale bar = 1 mm. UFMG-IHY-1706263





**FIGURE 24.** *Leucospis versicolor* ♀ **A.** Habitus, lateral view. Arrow indicates keel-like median carina on propodeum. **B.** Habitus, dorsal view. **C.** Forewing. **D.** Forewing, stigma region in detail. **E.** Hind wing. **F.** Head, frontal view. **G.** Head and mesosoma, dorsal view. **H.** Scutellum, dorsellum and propodeum, postero-dorsal view. **I.** Hind leg, lateral view. **J.** Posterior region of metasoma, lateral view. Arrow shows a spiniform projection on sixth tergite. **K.** Spiniform projection on sixth tergite in detail. Figs A–J: scale bar = 1 mm, Fig. K: scale bar = 200µm. UFMG-IHY-1504420

**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)

*Leucospis versicolor* Bouček, 1974: 87–89, fig. 97. Holotype ♀: French Guiana: Kourou (MNHN, Paris).

**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 sublaminar; propodeum 1.5× longer than dorsellum at middle; propodeum pilose, median carina present, keel-like, plicae present; wings infusate 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.

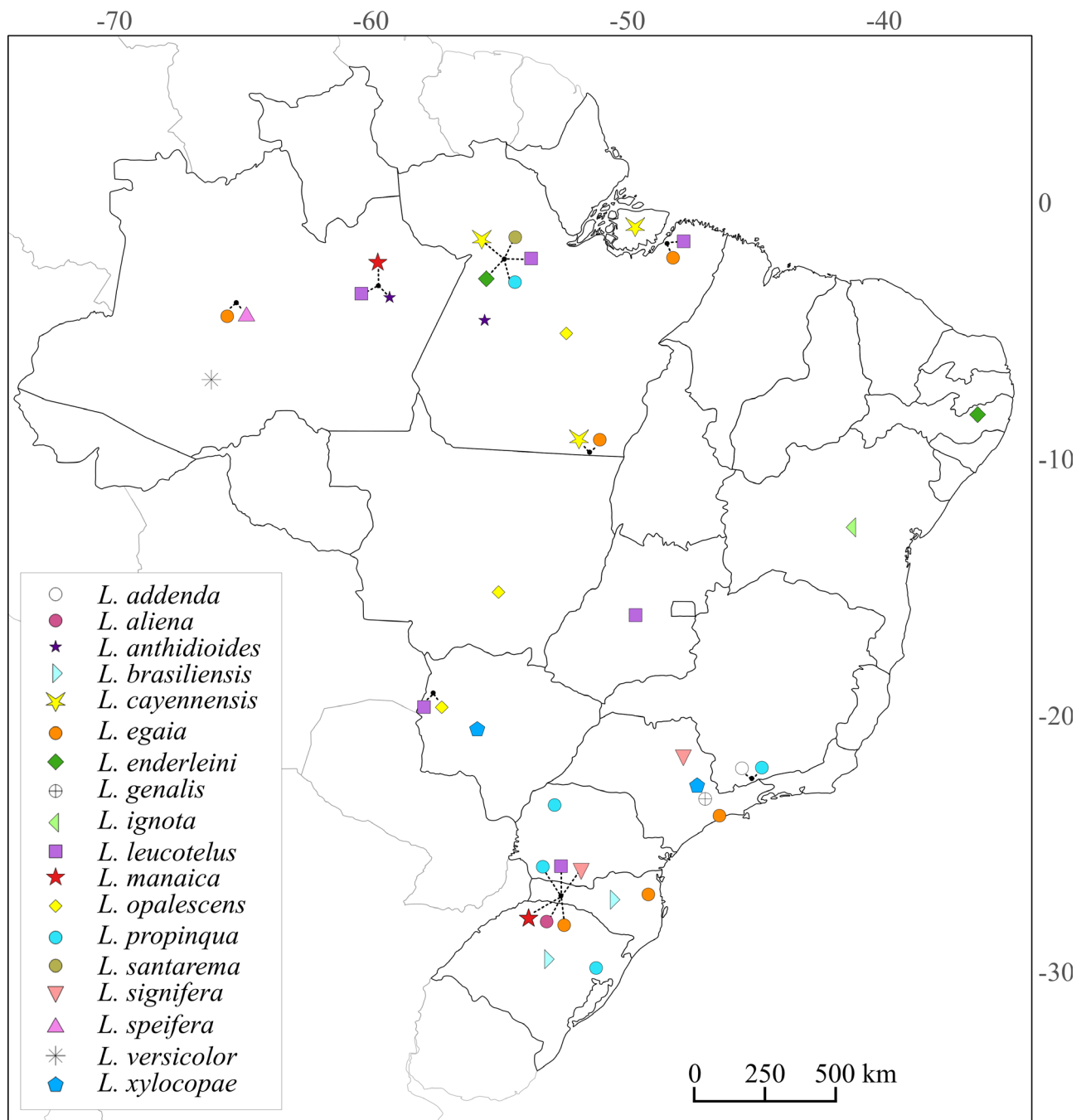
**Material examined.** (2♀) **Brazil**, Minas Gerais, Belo Horizonte, UFMG Pampulha, 1992 [UFMG–IHY–1504420]; Belo Horizonte, UFMG Pampulha, Estação Ecológica, 19°52'30"S, 43°58'20"W, 842m, malaise, 25.x–1.xi.2013, A.F. Kumagai *leg.* [UFMG–IHY–1504419].

### **Discussion**

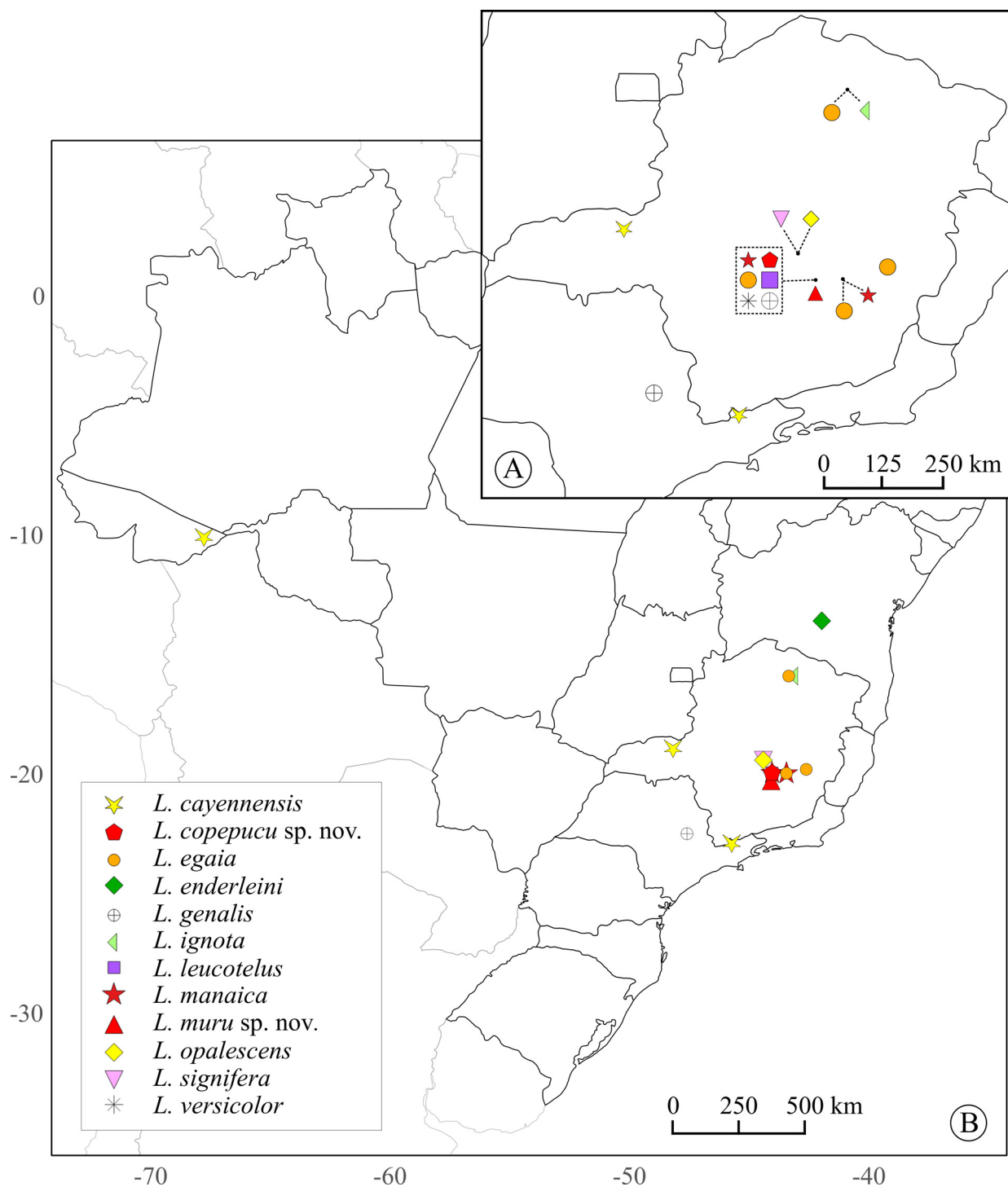
The revision of Leucospidae by Bouček (1974a) is a monumental work, which contributed greatly to clarifying and organizing the taxonomy of this family, with several lectotypes designated, revalidations, and synonyms. Thanks to his outstanding work, it was possible to recognize and identify the large *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*

Measurements (mm)	<i>Leucospis copepucu</i> sp. nov.		<i>L. opalescens</i>	<i>Leucospis muru</i> sp. nov.	
	Holotype	Paratype	Non type male	Holotype	Paratype
	UFMG-IHY- 1305656	UFMG-IHY- 1305655	UFMG-IHY- 1305653	UFMG-IHY- 1317252	UFMG-IHY- 1317245
POL	0.528	0.520	0.534	0.510	0.530
OOL	0.384	0.360	0.400	0.450	0.410
Ocellar triangle length	0.800	0.800	0.820	0.850	0.850
Ocellar triangle height	0.375	0.320	0.288	0.350	0.330
Frontoververtex width	1.600	1.488	1.600	1.740	1.660
Compound eye width	0.821	0.912	0.930	0.728	0.725
Compound eye height	1.480	1.441	1.457	1.395	1.348
Malar space	0.425	0.360	0.384	0.625	0.620
Head length	0.713	1.054	1.100	1.200	1.085
Head width	2.759	2.666	2.790	2.790	2.697
Head height	2.150	2.000	2.025	2.400	2.325
Scrobes width	0.750	0.750	0.775	0.950	0.937
Scrobes height	0.875	0.800	0.790	0.940	1.000
Keel height	0.440	0.450	0.480	0.400	0.437
Lower face width	1.472	1.395	1.470	1.640	1.580
Lower face height	1.025	0.937	1.007	1.162	1.162
Clypeus width	0.600	0.588	0.650	0.600	0.600
Clypeus height	0.560	0.520	0.550	0.700	0.580
Mouth width	1.209	1.085	1.240	1.187	1.147
Scape length	0.600	0.600	0.800	0.850	0.810
Scape keel	0.390	Not visible	0.250	0.400	0.375
Antennal length	3.855	3.440	Missing	4.300	3.910
f1 - length/width	0.240/0.204	Pharate	Missing	0.360/0.228	0.368/0.248
f5 - length/width	0.270/0.210	Pharate	Missing	0.350/0.300	0.320/0.248
f8 - length/width	0.270/0.300	Pharate	Missing	0.300/0.350	0.288/0.336
Pronotum width	2.635	2.604	2.759	2.976	2.697
Dorsellum length	0.280	0.224	0.250	0.475	0.350
Dorsellum width	0.760	0.688	0.760	1.050	0.920
Propodeum length	0.355	0.510	0.560	0.437	0.310
Scutellum length	1.250	1.240	1.237	1.280	1.125
Scutellum width	1.534	1.426	1.519	2.000	1.740
Fore wing length	9.009	7.688	8.184	9.424	8.990
Hind wing length	5.704	5.208	5.580	6.882	6.572
Hind femur length	2.250	2.125	2.250	3.100	2.945
Hind femur width	1.025	0.962	1.037	1.395	1.395
Hind femur, teeth number	10 / 9	8 / 8	11 / 11	10 / 10	8 / 9
Gaster length	5.456	5.270	5.580	6.758	6.448
Gaster height	2.759	2.294	1.900	3.278	3.239
Gaster width	2.075	2.356	2.225	2.686	2.480
Tergite I length	1.875	1.240	1.162	2.375	2.125

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 *Leucospis* 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-UFGM 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.

## Acknowledgments

We thank the anonymous reviewer and Dr. Gary A.P. Gibson for essential comments on the manuscript. We also thank Dr. Alice F. Kumagai (UFGM) and Dr. D. C. Darling (ROM) for all the structure and support provided for the execution of this research; Dr. Adalberto J. Santos (UFGM) for use of the Leica M205C stereomicroscope; Dr. Michael Ohl (MfN), MSc. Rogério B. Lopes (UNESP) and Alex de S. Braga (PUC–MG–MCN) for loan of the specimens; Dr. D. C. Darling (ROM) for the male *L. egaia* photos and Dr. Natalie D.S. Papilloud (BMNH) for the type photos of *L. coxalis* (NHMUK011508280) and *L. bicanaliculata* (NHMUK011508281), available under Creative Commons License 4.0 (<https://creativecommons.org/licenses/by/4.0/>). We also thank Alexandra Asanovna Elbakyan for her support of freedom in science.

## References

- Arias-Penna, D.C. (2008) New records of species of Leucospidae (Hymenoptera: Chalcidoidea) for Colombia. *Acta Biológica Colombiana*, 13 (3), 161–166.
- Ashmead, W.H. (1904) Classification of the chalcid flies of the superfamily Chalcidoidea, with descriptions of new species in the Carnegie Museum, collected in South America by Herbert H. Smith. *Memoirs of the Carnegie Museum*, 1 (4), 225–551.  
<https://doi.org/10.5962/bhl.title.10341>
- Bouček, Z. (1974a) A revision of the Leucospidae (Hymenoptera: Chalcidoidea) of the world. *Bulletin of the British Museum (Natural History)*, Entomology, 23 (Supplement), 1–241.
- Bouček, Z. (1974b) Description of a new *Leucospis* [sic] (Hymenoptera: Leucospidae) from Bolivia. *Studia Entomologica*, 17 (1–4), 430–432.
- Burks, B.D. (1961) A new Brazilian *Leucospis* parasitic on *Xylocopa*, with a brief review of the South American species of *Leucospis* (Hym., Leucospidae). *Studia Entomologica*, 4 (1–4), 537–541.
- Chandler, L., Barrigossi, J.A.F. & Diaz, E.B.S. (1985) The first definitive host record for *Leucospis cayennensis* Westwood (Hymenoptera: Leucospidae). *Revista Ceres*, 32 (180), 170–174.
- Cooperband, M.F., Wharton, R.A., Frankie, G.W. & Vinson, S.B. (1999) New host and distribution records for *Leucospis* (Hymenoptera: Leucospidae) associated primarily with nests of *Centris* (Hymenoptera: Anthophoridae) in the dry forests



- of Costa Rica. *Journal of Hymenoptera Research*, 8 (2), 154–164.
- Cresson, E.T. (1872) Synopsis of the North American species belonging to the genera *Leucospis*, *Smicra* and *Chalcis*. *Transactions of the American Entomological Society*, 4, 29–60. [1867–1877]  
<https://doi.org/10.2307/25076262>
- Dalla Torre, K.W. von (1898) *Catalogus Hymenopterorum hucusque descriptorum systematicus et synonymicus. V. Chalcididae et Proctotrupidae*. G. Engelmann, Leipzig, 598 pp.
- Darling, D.C. & Cardinal, S. (2005) The world species-groups of *Leucospis* (Hymenoptera: Leucospidae) – thirty years later. *Acta Societatis Zoologicae Bohemicae*, 69, 49–64.
- De Santis, L. (1980) *Catálogo de los Himenopteros brasileños de la Serie Parasítica incluyendo Bethyloidea*. Editora da Universidade Federal do Paraná, Curitiba, 395 pp.
- Gazola, A.L. & Garófalo, C.A. (2003) Parasitic Behavior of *Leucospis cayennensis* Westwood (Hymenoptera: Leucospidae) and Rates of Parasitism in Populations of *Centris (Heterocentris) analis* (Fabricius) (Hymenoptera: Apidae: Centridini). *Journal of the Kansas Entomological Society*, 76 (2), 131–142.
- Genaro, J.A. (2012) New species of *Leucospis* (Hymenoptera: Leucospidae) from La Hispaniola, Antilles. *Solenodon*, 10, 81–86.
- Grissell, E.E. & Cameron, S.A. (2002) A new *Leucospis* Fabricius (Hymenoptera: Leucospidae), the first reported gregarious species. *Journal of Hymenoptera Research*, 11 (2), 273–277.
- Heraty, J.M., Burks, R.A., Cruaud, A., Gibson, G.A.P., Liljeblad, J., Munro, J., Rasplus, J.-Y., Delvare, G., Janšta, P., Gumovsky, A., Huber, J., Woolley, J.B., Krogmann, L., Heydon, S., Polaszek, A., Schmidt, S., Darling, D.C., Gates, M.W., Mottern, J., Murray, E., Dal Molin, A., Triapitsyn, S., Baur, H., Pinto, J.D., van Noort, S., George, J. & Yoder, M. (2013) A phylogenetic analysis of the megadiverse Chalcidoidea (Hymenoptera). *Cladistics*, 29, 466–542.  
<https://doi.org/10.1111/cla.12006>
- Inkscape Team (2004–2017) Inkscape: A vector drawing tool. Available from: <http://www.inkscape.org> (accessed 5 February 2017)
- Kirby, W.F. (1883) Remarks on the genera of the subfamily Chalcidinae, with synonymic notes and descriptions of new species of Leucospidinae and Chalcidinae. *Journal of the Linnean Society (Zoology)*, 17, 53–78.
- Martins, R.P. & Antonini, Y. (1994) The biology of *Diadasina distincta* (Holmberg, 1903) (Hymenoptera: Anthophoridae). *Proceedings of the Entomological Society of Washington*, 96 (3), 553–560.
- Martins, R.P., Guimarães, F.G. & Dias, C.M. (1996) Nesting biology of *Ptilothrix plumata* Smith, with comparison to other species in the genus (Hymenoptera: Anthophoridae). *Journal of the Kansas Entomological Society*, 69 (1), 9–16.
- Munro, J.B., Heraty, J.M., Burks, R.A., Hawks, D., Mottern, J., Cruaud, A., Rasplus, J.Y. & Janšta, P. (2011) A molecular phylogeny of the Chalcidoidea (Hymenoptera). *PLoS ONE*, 6 (11), e27023.  
<https://doi.org/10.1371/journal.pone.0027023>
- Noyes, J.S. (2017) Universal Chalcidoidea Database. World Wide Web electronic publication. Database last updated: September 2017. Available from: <http://www.nhm.ac.uk/chalcidoids> (accessed 1 May 2018)
- Perioto, N.W. & Lara, R.I. (2012) First record of *Leucospis signifera* Bouček, 1974 (Insecta: Hymenoptera: Leucospidae) in the São Paulo State, Brazil. *Check List*, 1294–1295.  
<https://doi.org/10.15560/8.6.1294>
- Peck, O. (1963) A catalogue of the Nearctic Chalcidoidea (Insecta; Hymenoptera). *Canadian Entomologist*, 30 (Supplement), 892–894.  
<https://doi.org/10.4039/entm9530fv>
- Pujade-Villar, J. & Caicedo, G. (2010) Description of a new Colombian species of Leucospidae: *Leucospis vallicaucaensis* n. sp. (Hymenoptera: Chalcidoidea [sic]). *Dugesiana*, 17 (2), 138–142.
- QGIS Development Team (2017) QGIS Geographic Information System v.2.8.6. Open Source Geospatial Foundation Project. Available from: <http://qgis.osgeo.org> (accessed 5 February 2017)
- Roman, A. (1920) Wissenschaftliche Ergebnisse der Schwedischen entomologischen Reise des Herrn Dr. A. Roman in Amazonas 1914–1915. 3. Hymenoptera. 2. Chrysididae 8. Chalcididae (pars). *Arkiv för Zoologi*, 12 (19), 1–30.
- Schletterer, A. (1890) Die Gruppe der Hymenopteren-Gattungen *Leucospis* Fab., *Polistomorpha* Westw. und *Marres* Walk. *Berliner Entomologische Zeitschrift*, 35, 141–302.  
<https://doi.org/10.1002/mmnd.18900350204>
- Walker, F. (1852) Notes on Chalcidites, and descriptions of various new species. *Annals and Magazine of Natural History*, 9 (2), 39–43.
- Walker, F. (1862) Characters of undescribed species of the genus *Leucospis*. *Journal of Entomology*, 1, 16–23.
- Weld, C.J. (1922) *Studies on Chalcid-flies on Subfamily Leucospidinae: With Descriptions of New Species. Vol. 61*. US Government Printing Office, Washington, 43 pp.
- Westwood, J.O. (1839) Die Hymenopteren-Gattung *Leucospis*, monographisch behandelt. *Zeitschrift für Entomologie*, 1 (2), 237–266.
- Westwood, J.O. (1874) *Thesaurus Entomologicus Oxoniensis: Or, Illustrations of New, Rare, and Interesting Insects, for the Most Part Contained in the Collections Presented to the University of Oxford by the Rev. FW Hope... with Forty Plates from Drawings by the Author. Oxford, At the Clarendon Press*. 205 pp.
- Zilch, K. & Kohler, A. (2017) Leucospidae in Catálogo Taxonômico da Fauna do Brasil. PNUD. Available from: <http://fauna.jbrj.gov.br/fauna/faunadobrasil/5901> (accessed 27 January 2018)