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Taxonomic Revision of *Lipoptilocnema* (Diptera: Sarcophagidae), With Notes on Natural History and Forensic Importance of Its Species

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Abstract

Lipoptilocnema Townsend is a small genus of Neotropical Sarcophaginae with a distinctive genitalic morphology. This genus is revised based on the examination of the type series and large numbers of specimens of the seven previously known species, plus three new ones herein described, one from Argentina (*L. delfinado* Mulieri and Mello-Patiu, sp. nov.), and two from Brazil (*L. savana* Mulieri and Mello-Patiu, sp. nov. and *L. tibanae* Mulieri and Mello-Patiu, sp. nov.). All species are described or redescribed and illustrated. Distribution maps and a key for male identification are provided. The taxonomic position of this genus is reviewed and the interpretation of phallic structures is discussed. Notes on the natural history of *Lipoptilocnema* species are provided, and their potential importance as PMI indicators is highlighted, including the first record of *Lipoptilocnema* reared from a dead human body.

Key words: flesh fly, biodiversity, forensic entomology, Neotropics, new species

Lipoptilocnema Townsend, 1934 is a small group of sarcophagine flesh flies exclusively distributed in the Neotropical Region. The definition provided for this group has been repeatedly focused on the morphology of the phallus, the fifth sternite of the male, and on general features of the female terminalia. Lopes (1942) provided the first definition of *Lipoptilocnema* based on the following character state: male with ST5 with median projection; phallus with a hinge between basi- and distiphallus; female with very broad sternites, with ST7 surrounded by ST8.

Lopes (1975a: 291) diagnosed the subtribe Lipoptilocnemina (as part of the Sarcophagini) virtually identically to the generic definition of *Lipoptilocnema* on the basis of the following characters: "Cerci very much sclerotized, mostly bent backwards but with large base; penis very large, heavily pigmented and sclerotized. Female sternites are less broad than tergites." Lopes (1983: 311) added for this subtribe the presence of "4 post-dorsocentral bristles, only posterior two strong; 1–2 small preacrostichals present; fifth sternite of male concave on hind margin with conspicuous median apophyses [. . .], rarely with a median concavity [. . .] or only a spinous region [. . .]". Later, Lopes (1988) briefly defined the genus on the basis of characters of female terminalia.

Currently there are no keys for the identification of the species and their biology remains largely unknown. Although *Lipoptilocnema* is frequently not included in works summarizing the taxonomic information and keys for the identification on the sarcophagine genera of forensic importance (Oliva 2002, Carvalho and Mello-Patiu 2008), recent studies include them among species collected on carrion (Firmino-Alves et al. 2014, Armani et al. 2015). For the present study, the sorting of a great amount of new material and the revision of material from several entomological collections allowed us to improve the morphological diagnosis of the genus and revise all the species of *Lipoptilocnema*, including the description of three new species, one of them directly obtained from a human corpse during a forensic autopsy. Also, the results obtained from two different experiments of decomposing carcass in semiarid environments of Argentina are included to highlight the potential of the species as PMI indicators. We also include notes on natural history and distribution maps of the species based on an exhaustive compilation of specimen data and literature records.

Materials and Methods

Taxonomic Work

Phallic structures of the newly captured specimens, including the holotype of new species, were made visible using the technique described by Lopes (1973) and Dahlem and Naczi (2006), after

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keeping the specimen in a moist container for 24 h. The terminology used in the descriptions of external morphology follows that of McAlpine (1981) and Cumming and Wood (2009). The terminology of phallic structures follows Mello-Patiu and Pape (2000) and Giroux et al. (2010).

Reliable identifications are restricted to male specimens, as the females are unknown or scarcely known on the basis of brief descriptions. For this reason, the key and descriptions are focused on adult males. A revision of the females is beyond the scope of this study. The only exception is the description of the new species, *Lipoptilocnema delfinado*, which was obtained through larval rearing, for which reason the females can be considered as conspecific beyond doubt. Other studied female specimens are only listed as examined material.

Digital photographs of the habitus and terminalia of the species were taken using an Olympus DP 25 digital camera mounted on an Olympus SZX 16 stereomicroscope. Scanning electron micrographs were taken under high vacuum with a Philips XL 30 after gold-palladium coating. Image processing programs used in this study include Adobe Photoshop CS 3 (Adobe Systems, Inc., San Jose, CA) and Combine ZM (Alan Hadley, United Kingdom).

The labels of the holotypes are cited verbatim, lines separated by a slash, different labels by a double slash and comments given in square brackets.

All specimens cited belong to the following institutions (acronyms in parentheses):

Centro Nacional Patagónico, Puerto Madryn, Argentina (CENPAT)

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(FAUBA)

Fundación de Historia Natural Félix de Azara, Buenos Aires, Argentina (CFA)

Instituto Argentino de Investigaciones de las Zonas Áridas, Mendoza, Argentina (IADIZA)

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Museo de La Plata, Buenos Aires, Argentina (MLP)

Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil (MNRJ)

Museu de Zoologia da Universidade de São Paulo (MZSP)

Nomenclature

This paper and the nomenclatural act it contains have been registered in Zoobank (www.zoobank.org), the official register of the International Commission on Zoological Nomenclature. The LSID (Life Science Identifier) number of the publication is: urn:lsid:zoobank.org:pub:6DC86BF2-F41E-452C-9B13-973672C10722

Abbreviations Used in Text and Figures

c, capitis; chu, cercal hump; h, harpes; j, juxta; jk, juxtal keel; jsp, juxtal spines; lpms, lateral projections of median stylus; ls, lateral stylus; ms, median stylus; mpms, medial projection of median stylus; po, postgonite; pph, paraphallus; pr, pregonite; sp, cercal spine; sur, surstylus; v,vesica.

Distribution

A georeferenced database including all the species was generated by digitizing all the localities cited in the bibliography and given on the reference label data of the examined specimens deposited in entomological collections. Coordinates for localities or collection sites of museum specimens were recorded using Google Earth, which allows georeferencing points based on site information (García-Milagros and Funk 2010). All specimens and published records with unequivocal identification and georeference were filtered in Microsoft Excel for unique locations, and these data points were converted to shape files (.SHP) for mapping in DIVA-GIS 5.3 (http://www.diva-gis.org/). In addition, values of 19 bioclimatic and one elevation data were extracted from the WorldClim databases (Hijmans et al. 2005) and incorporated into DIVA-GIS as.cli files. These datasets were then used to obtain a map of the potential distribution of the genus *Lipoptilocnema*, by means of the widely employed species distribution model (SDM), using the ecological niche model reconstruction algorithm DOMAIN.

DOMAIN (Carpenter et al. 1993) is a presence-only modeling method. This algorithm uses a distance-based method (the Gower metric) to assess new sites in terms of their environmental similarity to sites of known presence. DOMAIN produces an index of habitat suitability on a continuous scale (0–100), hence a threshold rule is needed to differentiate "suitable" and "not suitable" grid cells; we only mapped the scores ranging from 80 to 100 as highly suitable.

Lipoptilocnema Townsend, 1934

Lipoptilocnema Townsend, 1934: 111. Type species: *Lipoptilocnema lanei* Townsend, 1934, by original designation.

Eumicrocerella Hall, 1938: 253. Type species: *Eumicrocerella duca* Hall, 1938 [= *Sarcophaga margaretae* Lahille, 1907], by original designation.

Lahillemyia Blanchard, 1939: 818. Type species: *Sarcophaga margaretae* Lahille, 1907, by original designation.

Parapeltopyga Blanchard, 1939: 845. Type species: *Parapeltopyga liguloides* Blanchard, 1939 [= *Lipoptilocnema lanei* Townsend, 1934], by original designation.

References: Townsend (1935, *Lipoptilocnema* in key to genera); Blanchard (1939, key to genera including *Lahillemyia* and *Parapeltopyga*); Lopes (1942, *Parapeltopyga* as synonymy of *Lipoptilocnema*); Lopes (1969, catalogue including *Eumicrocerella* and *Lipoptilocnema*, *Lahillemyia* as synonym of *Lipoptilocnema*); Lopes (1975b, *Eumicrocerella* as synonymy of *Lipoptilocnema*); Lopes (1988, *Lipoptilocnema* as part of Sarcophagini, diagnosis); Verves 1989 (*Lipoptilocnema* as part of Sarcodexiini); Pape (1996, catalogue, *Lipoptilocnema* as subgenus of *Sarcophaga*); Sabrosky (1999, family-group names based on *Lipoptilocnema*); Buenaventura and Pape (2015, diagnosis, phylogeny).

Systematic Position

Lopes (1969) catalogued the genus *Lipoptilocnema* in the Neotropical catalogue in the tribe Sarcophagini. Rohdendorf and Gregor (1973) erected the subtribe Lipoptilocnemina placing *Lipoptilocnema* with *Abapa* Dodge (currently considered a subgenus of *Blaesoxipha* Loew) due to the possession of "recurved and deep splitted cerci," and considered this group closely related to Tephromyiina (which includes *Tephromyia* Brauer and Bergenstamm, also currently considered as subgenus of *Blaesoxipha*).

Lopes (1975a: 291) placed the subtribe Lipoptilocnemina as part of the Sarcophagini but later (Lopes 1983) transferred the taxon to the Sarcodexiini because of larval characteristics observed in *L. crispula*. Subsequently, Lopes (1988) reconsidered the position of

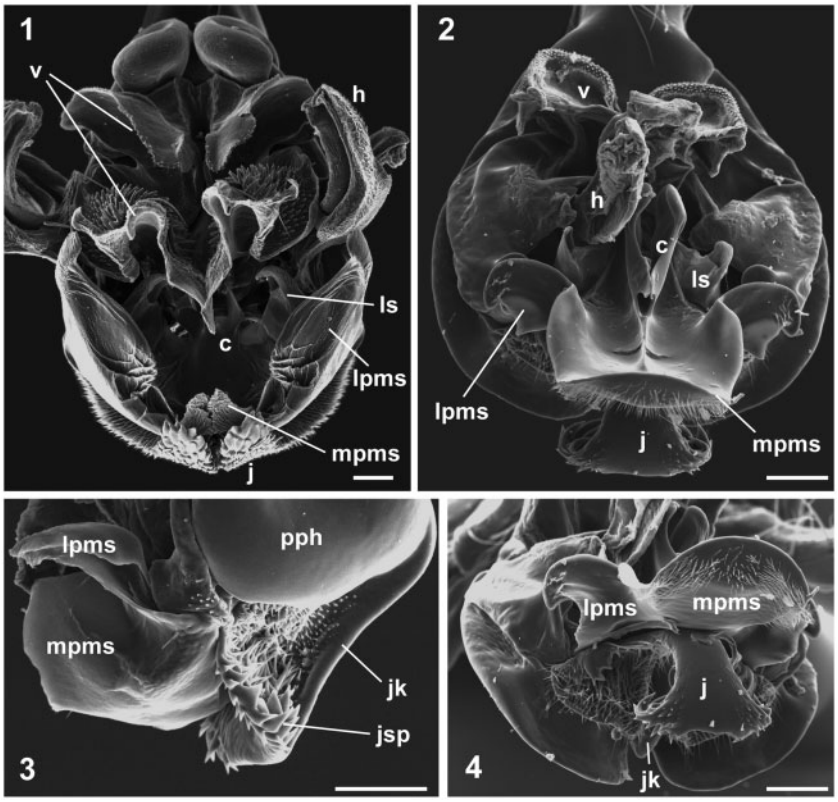

Fig. 1–4. Distiphallic structures of *Lipoptilocnema*. (1) *Lipoptilocnema margaretae*, distiphallus, anterior. (2) *Lipoptilocnema koehleri*, distiphallus, anterior. (3) *Lipoptilocnema lanei*, tip of phallus, lateral. (4) *Lipoptilocnema koehleri*, distiphallus, antero-lateral. Scale bars = 100 μm.

this subtribe as part of the Sarcophagini taking into account the structures of the spermathecae observed in *L. lanei*.

Pape (1996) catalogued *Lipoptilocnema* as subgenus of *Sarcophaga*. In a recent work, Buenaventura and Pape (2015) presented a phylogenetic analysis of those groups related to *Peckia*, the so-called *Peckia* clade, containing the genera *Engelimyia* Lopes, *Helicobia* Coquillet, *Peckia* Robineau-Desvoidy, *Peckimyia* Dodge, *Sarcophaga* Meigen, *Titanogrypa* Townsend, and *Villegasia* Dodge, with the addition of *Lipoptilocnema* based on the concept of Sarcodexiini presented by Lopes (1983). Their analysis found *Lipoptilocnema* as monophyletic and as a separate genus, closely related to *Helicobia* and *Sarcophaga* (Buenaventura and Pape 2015).

Buenaventura and Pape (2015) gave the monophyly of *Lipoptilocnema* as supported by four autapomorphic characters which were based on a study of two species (*L. crispina* and *L. koehleri*): 1) cercal prong with dorsal surface S-shaped, 2) surstylus with anterior and posterior margin slightly folded, 3) paraphallic apical elongated expansion with apical spines, and 4) juxta tongue-shaped, broad proximally and gradually getting narrow to the entire apex.

After reviewing all the species, we agree with the importance of these structures to define this taxon but do not agree with the interpretation of the last two structures.

According to our observations, in *Lipoptilocnema*, the median stylus is composed of a basal capitis and a strongly broadened median process (Figs. 1 and 2), which is directed anteriorly in the form of medial and paired lateral projections (Figs. 1–4), and not tube-shaped as in many genera of the Sarcophaginae. The capitis is usually the most sclerotized part of the median stylus, but, together with the lateral and medial projections, they form a single piece. There may be a clear demarcation between the capitis and the remainder of the median stylus (i.e., the median process) by a crease (as in *L. margaretae* or *L. delfinado*, see Fig. 5), but in other cases there is a continuity of both parts (see *L. koehleri* Fig. 2). In addition, the lateral styli are short and striated, and usually not exposed, as these structures are situated behind the lateral projections of the median stylus (Figs. 9 and 10).

In *Lipoptilocnema*, the harpes are distally membranous and well projected between the vesica and the median stylus (Figs. 1 and 2). These structures are only found in *Lepidodexia* and *Sarcophaga*, according to the definition provided by Giroux et al. (2010); however, there are other genera with paired structures placed similarly to the harpes, and further studies are needed to test the homology between the harpes and these structures [e.g., the so-called lateral plates of Lopes (1966)] for a consistent use of the term "harpes" in future phylogenetic studies (Mulieri and Mello-Patiu 2013, Buenaventura and Pape 2015).

The juxta of *Lipoptilocnema* is here considered in the same sense as in Lopes (1975b) and Lopes and Leite (1990), as composed of an apical and mostly membranous expansion covered with sclerotized spines apically. Frequently, this structure is equipped with a longitudinal keel in its midline (usually more sclerotized), with membranous, microtrichiose surfaces at each side (Figs. 3 and 4). The presence of a longitudinal keel, membranous lateral areas, and sclerotized apical spines is therefore probably an autapomorphic configuration of the juxta of *Lipoptilocnema*. This complex structure was interpreted as "paraphallic apical elongated expansion with apical spines" by Buenaventura and Pape (2015). According to the position of this structure and its connection with (and delimitation from) the remaining "paraphallus," this apical structure is best interpreted as the juxta (Figs. 3 and 77).

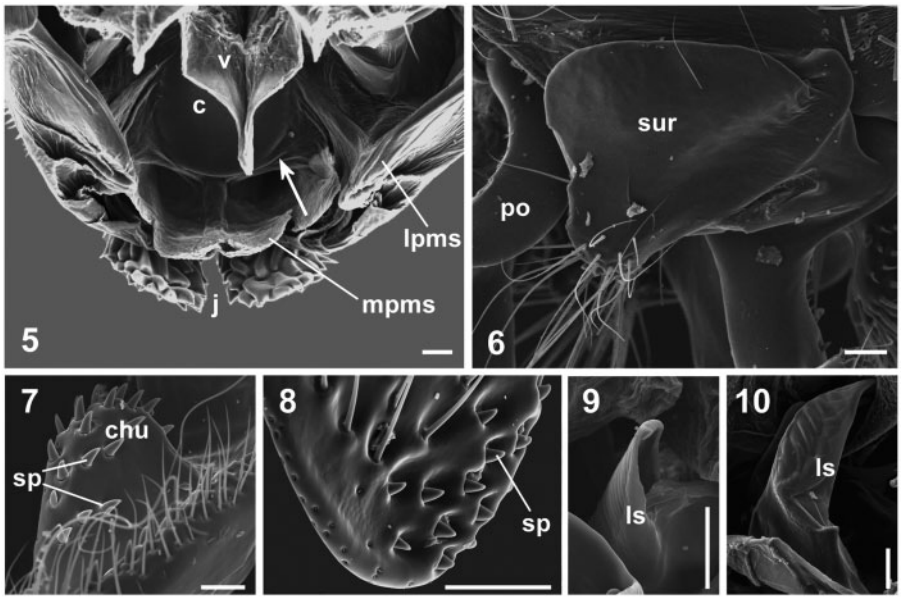

Fig. 5–10. Phallic and cercal structures of *Lipoptilocnema*. (5) *Lipoptilocnema margaretae*, distiphallus, anterior. Arrow indicating a crease between the capitis and the rest of the median stylus (6) *Lipoptilocnema crispula*, surstylus, lateral. (7) *Lipoptilocnema koehleri*, cercal prong with hump, latero-dorsal. (8) *Lipoptilocnema margaretae*, tip of cercus, dorsal. (9) *Lipoptilocnema koehleri*, lateral stylus. (10) *Lipoptilocnema margaretae*, lateral stylus. Scale bars = 50 μm.

The juxta has been interpreted as an apical extension of the posterior surface of the paraphallus (Giroux et al. 2010, Buenaventura and Pape 2015). This is a highly variable structure in shape, degree of sclerotization, and development. According to the reinterpretation given here of the median stylus and of the median process, these structures are basally inserted to the front (or anterior) wall of the structure considered here as juxta. Hence, both structures fit with the corresponding definition provided by Giroux et al. (2010) and Whitmore et al. (2013).

The surstyli in *Lipoptilocnema* are laterally compressed (Fig. 6), being typically as long as broad (except in *L. misella* and *L. savana* with narrower structures), with smooth and shining surface, not covered with microtrichiae, only covered with the usual setae in its apical portion, as observed by Lopes and Leite (1990, p. 7: "surstyli flat, mostly bare, the hairs limited to apices"). The coverage of setae also shows interspecific variation. All species showed surstylar folded margins as referred by Buenaventura and Pape (2015).

All species of this genus have the cercal prong proximally bent backward (as in *Blaesoxipha*) with dorsal surface S-shaped, as stated by Buenaventura and Pape (2015). The information currently available does not allow corroborating whether the basal cercal curvature is homologous to that seen in *Blaesoxipha*, since no phylogenetic study includes both genera. The species of *Lipoptilocnema* also possess short and thickened spines on the cercal prong in addition to the usual setae, with the only exception of *L. misella* (Figs. 7 and 8).

Sternite 5 has a distinct apophysis projecting medially from the inner margin. This projection varies in shape, and can be elongated and rounded at the tip (*L. crispula*, *L. lanei*, Figs. 33 and 51), bifid (*L. crispina*, *L. koehleri*, *L. salobrensis*, *L. tibanae*, Figs. 26, 41, 65, 72), broad (*L. savana*, Fig. 69) or simply a slightly projected bulge (*L. delfinado*, *L. margaretae*, Figs. 36 and 55). The only exception to this condition is *L. misella*, which has a slightly cleft margin with a spinose area (Fig. 59).

Lipoptilocnema may, most likely, be closely related to *Sarcophaga*, according to structure and rotation of harpes found by Buenaventura and Pape (2015).

Generic Diagnosis

Frontal row of setae strongly diverging near lunule; arista plumose; male without orbital proclinate setae; one row of parafacial setae near the eye; facial ridge with setulae on lower 0.5–0.75; dark genal setae; pale post genal setae; 0–1 posterior acrostichal setae; postalar wall setulose; two pairs of lateral scutellar setae, and one pair of apical scutellars; three katepisternals; costal spine not developed (except *L. savana*); third costal sector without ventral setae; cell r4 + 5 open at wing apex; male mid femur with or without apical postero-ventral ctenidium (absent in *L. delfinado*, *L. margaretae*, *L.savana*); abdominal T5 with a complete row of marginal setae; ST5 with a more or less well developed medial apophysis on its posterior margin (except *L. misella*); proximal part of ST5 without a window (a medial desclerotized area). Male terminalia with syntergosternite 7 + 8 red, black or dark brown in ground colour, and red epandrium; cercal prong with short and thickened spines; cerci with cercal prong S-shaped dorsally; phallus with basi- and distiphallus connected by a desclerotized articulation; lateral styli not exposed (except in *L. misella*); phallus with vesica bearing microserrations and folded; phallus with membranous harpes; Juxta with sclerotized apical spines; juxta with lateral membranous surfaces covered with microtrichia (except in *L. savana*); median stylus composed of capitis and a broadened median process formed by medial and paired laterals projections, not tube-shaped; lateral styli short and striated, usually hidden behind the lateral extensions of the median stylus.

Natural History

Previous breeding records exist for *L. koehleri*, which has been obtained as larvae from dead land snails (Mulieri et al. 2010). Here, we provide the first rearing records of *Lipoptilocnema* (for *L. margaretae* and *L. delfinado*) from large mammal carcasses, including humans (see Table 1). Also, adults of *L. koehleri* and *L. lanei*, have been recorded to be strongly attracted to dog feces in comparison with rotten cow liver (Mulieri et al. 2010, 2015), whereas *L. crispula* was more attracted to dead fish or chicken viscera in comparison

Table 1. Records of adults and larvae of *Lipoptilocnema* associated with different animal carcass types

Species	Source	Larvae /adult	Locality	Ecoregion	Reference
L. crispina	Rodent carcass	Adult	Campinas, São Paulo, Brazil	AF	Moretti et al. 2008
L. crispina	Pig carcass	Adult	Uberlândia, Minas Gerais, Brazil	C	Mello-Patiu et al. 2014
L. crispula	Rodent carcass	Adult	Campinas, São Paulo, Brazil	AF	Moretti et al. 2008
L. crispula	Pig carcass	Adult	Uberlândia, Minas Gerais, Brazi	C	Rosa et al. 2011
L. crispula	Pig carcass	Adult	Uberlândia, Minas Gerais, Brazi	C	Mello-Patiu et al. 2014
L. delfinado	Pig carcass	Adult	Mendoza, Mendoza, Argentina	M	**new record**
L. delfinado	Human corpse	Larvae	Villavicencio, Mendoza, Argentina	M	**new record**
L. koehleri	Dead snail	Larvae	Burzaco, Buenos Aires, Argentina	P	Mulieri et al. 2010
L. lanei	Pig carcass	Adult	Curitiba, Parana, Brazil	AF	Vairo et al. 2011
L. margaretae	Pig carcass	Adult	Puerto Madryn, Chubut, Argentina	M	Armani et al. 2015
L. margaretae	Pig carcass	Larvae	Puerto Madryn, Chubut, Argentina	M	Armani et al. 2015
L. margaretae	Pig carcass	Adult	Mendoza, Mendoza, Argentina	M	**new record**
L. salobrensis	Pig carcass	Adult	São Jose dos Cordeiros, Paraiba, Brazil	CA	Firmino-Alves et al. 2014
L. savana (as L. sp.nov.)	Pig carcass	Adult	Brasília, DF, Brazil	C	Barros et al. 2008
L. savana (as L. sp.)	Pig carcass	Adult	Uberlândia, Minas Gerais, Brazil	C	Mello-Patiu et al. 2014

Ecoregions: AF, Atlantic Forest; C, Cerrado; CA, Caatinga; M, Monte; P, Pampean.

to other baits such as human feces or fermented banana (Dias et al. 1984c, Mendes and Linhares 1993). Based on these observations, species of this genus seem to be zoosaprophagous according to a broad classification. However, the existing new records of several species collected as adults or larvae from decomposing pigs or small rodents, human corpses and small invertebrate carrion provide strong evidence that the species of *Lipoptilocnema* are truly necrophagous on a wide variety of carcass sizes and types (Table 1).

Some species of *Lipoptilocnema*, as is the case of *L. koehleri* and *L. lanei*, surveyed in east-central Argentina appear to be more abundant in summer (Mulieri et al. 2011), whereas others, such as *L. crispula*, surveyed in Belo Horizonte, Brazil, are found throughout the year (Dias et al. 1984b). On the other hand, some species, such as *L. koehleri* and *L. lanei*, show synanthropic trends, associated with urban or suburban environments (Mulieri et al. 2011, Patitucci et al. 2015). Dias et al. (1984a) found *L. crispula* inhabiting both, urbanized and wild sites.

The geographical distribution of *Lipoptilocnema* is restricted to the eastern areas of South America, with records located in ecoregions belonging to the Chacoan Subregion (Atlantic Forest, Caatinga, Cerrado, Chacoan and Pampean) and the South American transition Zone (Monte ecoregion), according to the biogeographic regionalization of the Neotropics proposed by Morrone (2014) (Figs. 11 and 12).

Lipoptilocnema as Forensic Indicators

In contrast to the very well-documented calliphorid flies, the Sarcophagidae are usually neglected as forensic tools. Recent forensic cases and field experimental studies have provided novel information on the genus *Lipoptilocnema* as insects of medico-legal importance. This information is summarized below.

Carcass Succession Experiment

Several specimens of *Lipoptilocnema* were obtained during four succession experiments with domestic pigs (*Sus scrofa* L.) conducted in 2008, corresponding to four seasonal experiments. The environment where the sampling took place is typical of the Monte desert, with vegetation dominated by shrubs of *Larrea* sp. The sampling site was located at the Instituto Argentino de Investigaciones de las Zonas Áridas (CONICET), in the city of Mendoza, Province of Mendoza, Argentina (32° 53′51.1″ S, 68° 52′22.7″ W). Two adults of *L. delfinado* were captured during spring samples, and one female during autumn samples. Adults of *L. margaretae* (2 males and 2 females) were captured in summer and autumn samples.

Forensic Case

The case described here constitutes the first record of *Lipoptilocnema* breeding in human carrion. A human body was found in Villavicencio Natural Reserve, next to Route 52 at 1,421 m.a.s.l., on July 24 of 2010. The body was partly buried and wrapped in tent canvas and tied tightly with wire both at head height and waist. Several larvae II and III were collected from the corpse and canvas. The larvae were reared at a constant temperature of 15°C and a photoperiod of 12:12 (L:D) h; larvae were fed with beef, and puparia were stored until the emergence of adults. Adults emerged at the end of September 2010, and were identified as a new species, *L. delfinado*. This species should be considered for potential forensic importance for estimating time since death (PMI = postmortem interval) in bodies found in the Monte desert.

Key to males of *Lipoptilocnema*

1. Male mid femur with apical posteroventral ctenidium. . .2
– Male mid femur without apical posteroventral ctenidium. . .4

2. Postocular area golden. Costal spine developed. Epandrium red. ST5 with a broad and slightly bilobed medial apophysis (Fig. 69). Cercal prong distally narrowed in dorsal view (Fig. 67). Pregonite small, spine-like. Juxta bifid with strongly divergent prolongations (Fig. 68). . .*L. savana*
– Postocular area silvery. Costal spine not developed. Epandrium red with dark basal part. ST5 with a weakly developed medial apophysis or with a differentiated bulged spinose or setose area (Figs 36, 55). Cercal prong broadened in dorsal view (Figs 38, 53). Pregonite spatulated and curved. Juxta composed of two parallel prolongations. . .3

3. Golden pruinosity in both lower parafacials and upper frontoorbital plates separated by a wide silvery pruinose area (Figs 13, 14, 16). ST5 with inner margin covered with short spine-like setae (Fig. 36). Cerci with cercal prong short and broad (Fig. 15). . .*L. delfinado*

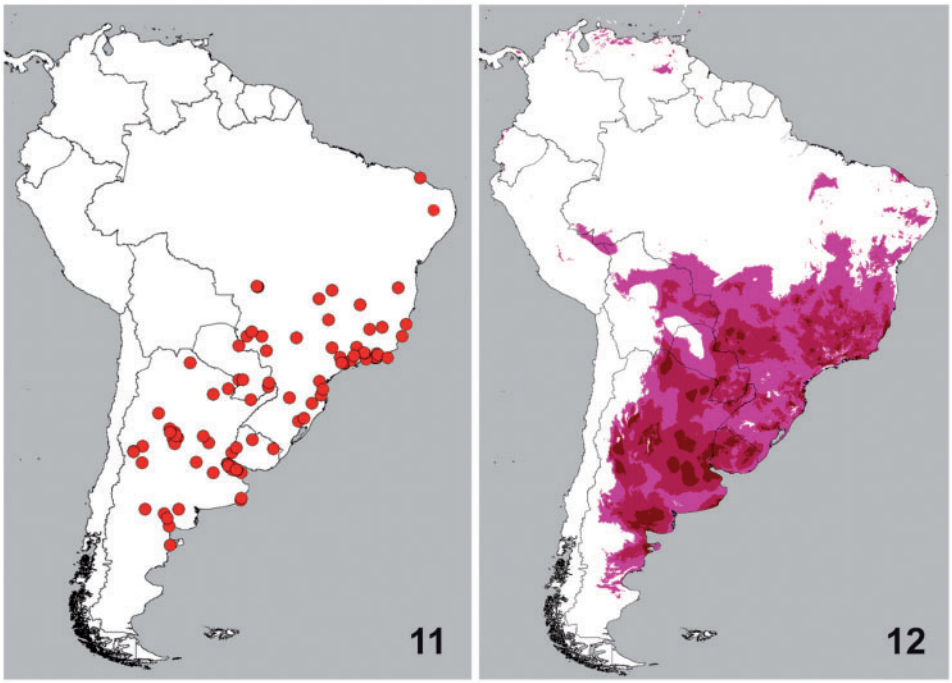

Fig. 11–12. Geographical distribution of *Lipoptilocnema*. (11) Locality records. (12) Potential distribution modeled with Domain (darker areas indicate greater confidence in predicted presence).

– Golden pruinosity in both lower parafacials and upper fronto-orbital plates separated by a narrow strip of silvery pruinosity at level of lower fronto-orbital setae (Figs 17, 19, 20). ST5 with inner margin covered with normal setae (Fig. 55). Cerci with cercal prong elongated (Fig. 18)...*L. margaretae*

4. ST5 without apophysis, with setose postero-medial shallow cleft (Fig. 59). Pregonite very reduced. Postgonite with bifid apical part. Cerci with cercal prong without short and blunt spines (Figs. 57, 58). Cerci not basally humped in lateral view and slightly recurved (not S-shaped)...*L. misella*
– ST5 with apophysis (Figs 26, 33, 41, 51, 65, 72). Pregonite broad or spatulated, and curved. Postgonite not bifid. Cerci with cercal prong with short and blunt spines. Cerci basally humped in lateral view and strongly recurved (S-shaped)...5

5. ST5 with elongated single-headed apophysis with rounded tip (Figs. 33, 51)...6
– ST5 with a short bifid apophysis (slightly bifid in *L. salobrensis*) (Figs. 26, 41, 42, 65, 72)...7

6. Juxta elongated, strongly projected anteriorly (Fig. 29)...*L. crispula*
– Juxta short, not strongly projected anteriorly (Fig. 47)...*L. lanei*

7. Cercal prong with distinct dorsolateral humps (Figs 7, 25, 43)...8
– Cercal prong without dorsolateral humps (Figs 60, 73)...9

8. Juxta noticeably recurved posteriorly (Fig. 40). Median stylus with microtrichia on distal surface (Fig. 2)...*L. koehleri*
– Juxta slightly recurved posteriorly (Fig. 24). Median stylus without microtrichia on distal surface (Fig. 24)...*L. crispina*

9. Postcranium with two rows of black occipital setae parallel to postorbitals (sometimes with a few isolated black setae below the second row). ST5 with basal medial hump. Cerci with pointed tip in dorsal view (Fig. 64)...*L. salobrensis*
– Postcranium with three rows of black occipital setae parallel to postorbitals (Fig. 71). ST5 without basal medial hump. Cerci with rounded tip in dorsal view (Fig. 74)...*L. tibanae*

Lipoptilocnema crispina (Lopes)

Figs 24–28, 75, 85

Sarcophaga crispina Lopes, 1938a: 282. Brazil, Rio de Janeiro.

References: Lopes (1942, moved to *Lipoptilocnema*, distribution); Lopes (1969, catalogue); Lopes (1975a, list, distribution); d'Almeida (1984, synanthropy); Lopes and Leite (1990, phallic morphology); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)); Moretti et al. (2008, list, forensic); Mello-Patiu et al. (2009, list, distribution); Firmino-Alves et al. (2014, forensic); Mello-Patiu et al. (2014, forensic, distribution); Buenaventura and Pape (2015, phylogeny).

Male

Body length = 9.14–12.52 mm (m = 10.50 mm, $n = 5$).

Head

Head length at antennal base 1.04–1.11 (m = 1.07, $n = 5$) times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with row of setulae close to eye; fronto-orbital plate with sparse black setulae; post-cranium with golden pruinosity at upper part and yellowish pruinosity below, with two rows of black occipital setae on upper part, parallel to postorbitals, and pale setae below; frontal vitta brown at anterior part, black at posterior part; frons at its narrowest point 0.20–0.22 (m = 0.21, $n = 5$) times head width; eight to nine frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate

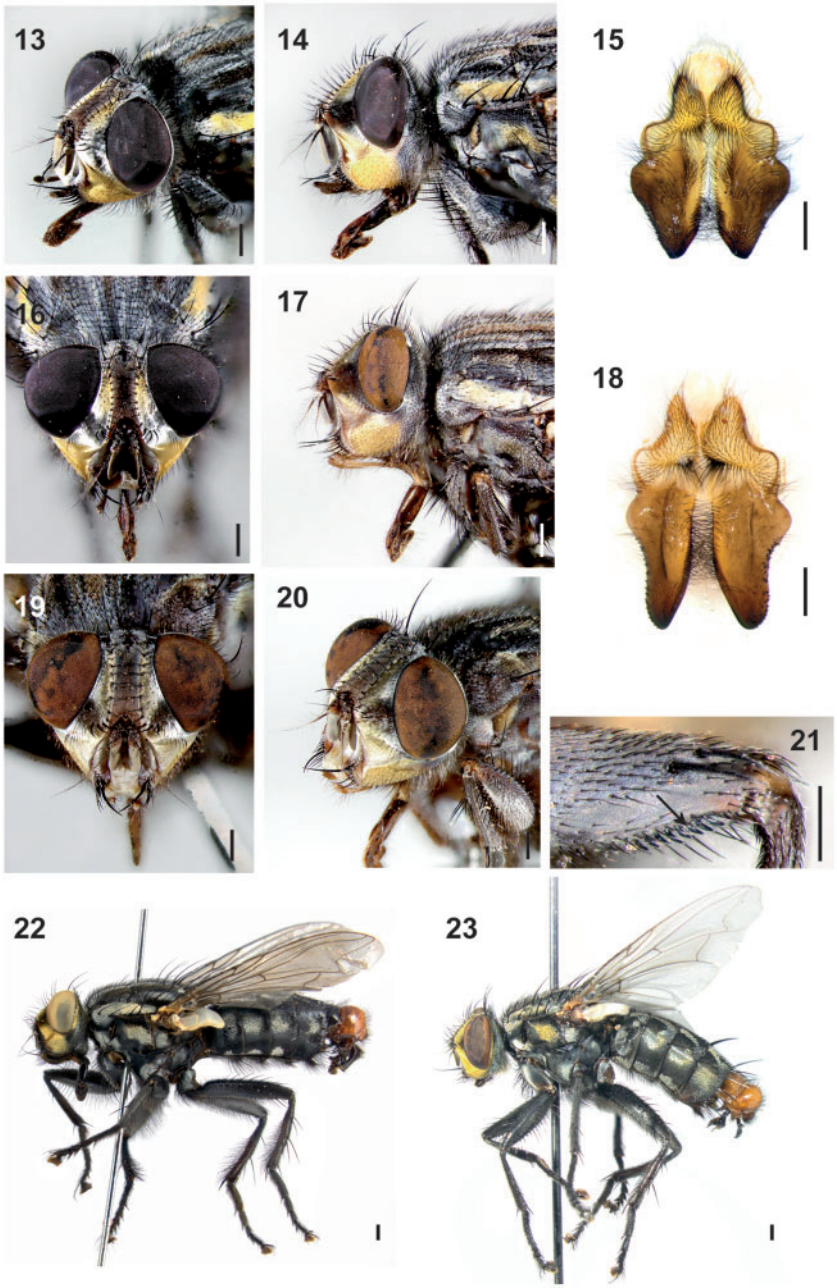

Fig. 13–23. *Lipoptilocnema delfinado.* (13) Head latero-dorsal. (14) Head, lateral. (15) Cerci, dorsal (dissected). (16) Head, dorsal. *Lipoptilocnema margaretae.* (17) Head, lateral. (18) Cerci, dorsal (dissected). (19) Head, dorsal. (20) Head latero-dorsal. (21) Male mid femur, posterior. Arrow indicating ctenidium. *Lipoptilocnema tibanae.* (22) Male habitus. *Lipoptilocnema crispula.* (23) Male habitus. Scale bars = 500 μm.

setae present; inner vertical setae strong and reclinate, outer vertical setae 0.25 times inner vertical and divergent; ocellar triangle black, with one pair of small proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior half; five to six subvibrissal setae; antenna dark brown, first flagellomere brown with gray pruinosity, length 0.38–0.43 (m = 0.39, $n = 5$) times head height, arista long plumose on basal 2/3 with rays six to seven times largest diameter of arista; palpus brown with black setulae.

Thorax

Black, with silvery-gray pruinosity; prescutum and scutum with dorsal and lateral stripes of silvery pruinosity and three black bands; postpronotal lobe notopleuron, anepisternum and anepimeron with golden pruinosity, katepisternum with silvery pruinosity; proepisternum silvery, bare; one strong proepisternal setae plus one weaker and shorter supplementary inferior seta; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 with median seta smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 3–4 + 3–4 (only the two posterior larger and differentiated), intra-alars 1–2 + 2–3, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals

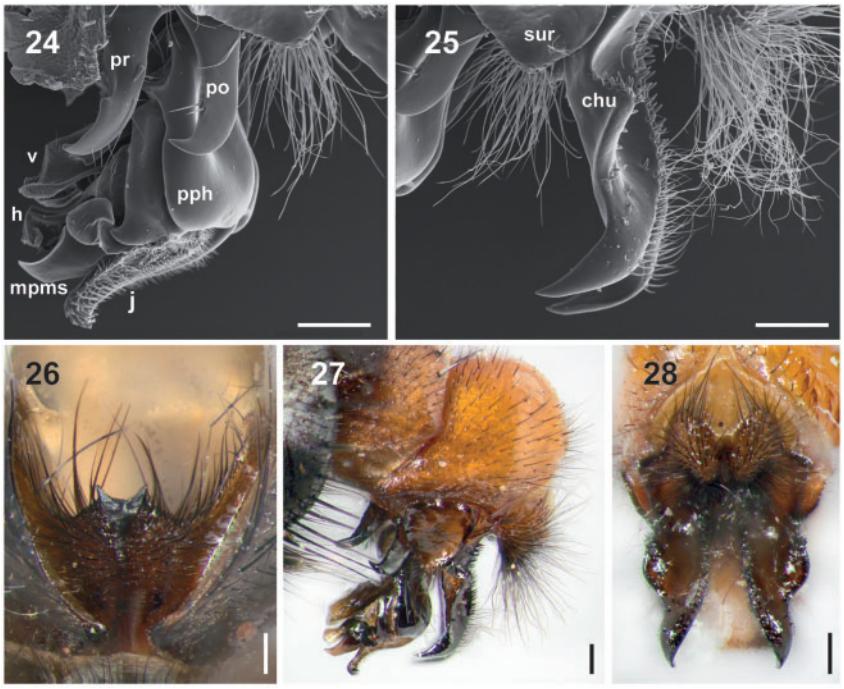

Fig. 24–28. *Lipoptilocnema crispina*. (24) Distiphallus, lateral. (25) Cercal prong, lateral. (26) ST5, ventral. (27) Terminalia, lateral. (28) Cerci, dorsal. Scale bars = 200 μm.

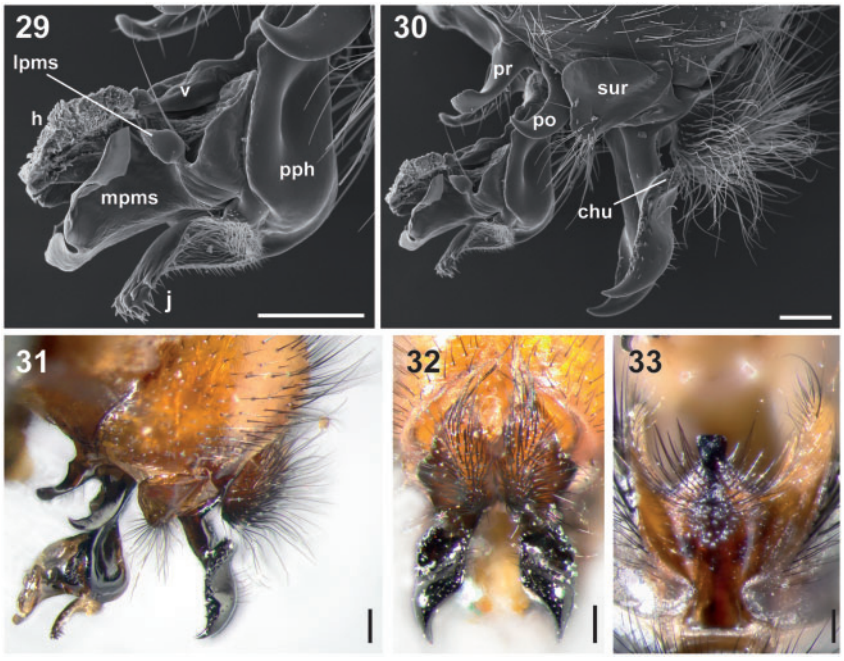

Fig. 29–33. *Lipoptilocnema crispula*. (29) Distiphallus, lateral. (30) Terminalia (SEM), lateral. (31) Terminalia, lateral. (32) Cerci, dorsal. (33) ST5, ventral. Scale bars = 200 μm.

2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae, scutellar discal setae usually absent (if present they are weak). Wing hyaline, tegula black, yellowish basicosta and brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6–0.8 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, and femora black with silvery pruinosity; tibia brown; middle femur without posteroventral ctenidium, rows of anterior and anteroventral setae; middle tibia with one anterdorsal setae, two posterodorsals and one posterior setae; hind trochanter with long ventral villosity; hind femur with rows of anterodorsal and anterior setae, two to three apical anteroventral setae; hind tibia with three to four anterodorsal setae, one anteroventral seta, and

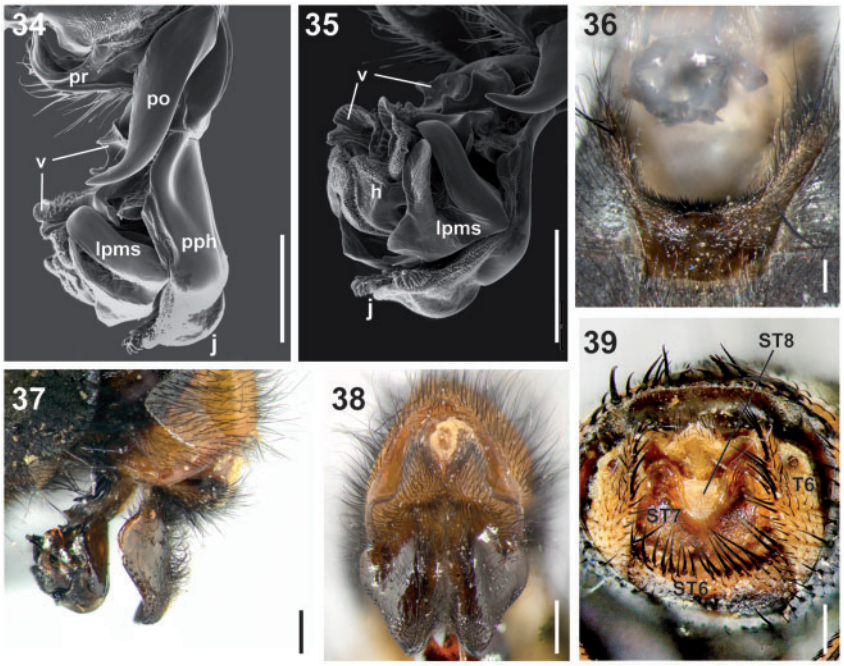

Fig. 34–39. *Lipoptilocnema delfinado*. (34) Phallus, lateral. (35) Phallus, latero-ventral. (36) ST5, ventral. (37) Terminalia, lateral. (38) Cerci, dorsal. (39) Female terminalia, postero-ventral. Scale bars = 500 μm.

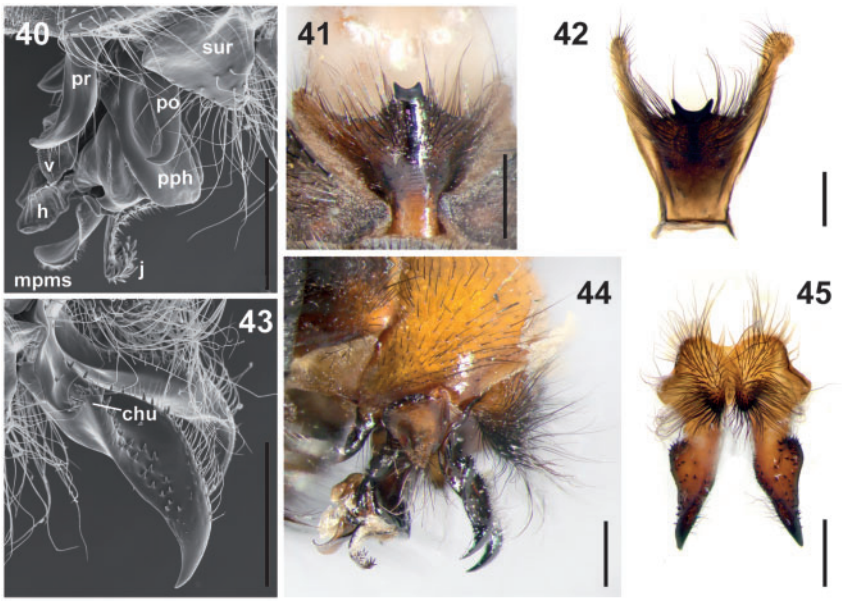

Fig. 40–45. *Lipoptilocnema koehleri*. (40) Phallus, lateral. (41) ST5, ventral. (42) ST5, ventral (dissected). (43) Cercal prong lateral. (44) Terminalia, lateral. (45) Cerci, dorsal (dissected). Scale bars = 500 μm.

two posterodorsal setae; middle and hind femora covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 black with silvery pruinosity, ST1–4 covered with long setulae; ST5 reddish or brown, distinctly convex at base, with median bifid apophysis on median margin, covered with fine large setulae (Fig. 26).

Terminalia

Syntergosternite 7 + 8 orange-reddish, with short hair-like setulae and a marginal row of setae; epandrium orange-reddish, with hair-like setae; cercus with pointed apex (Figs. 27, 28); cerci with cercal base 0.5× the cercal prong; cercal prong with lateral humps covered with short and thickened spines (Fig. 25); surstylus broad with setae

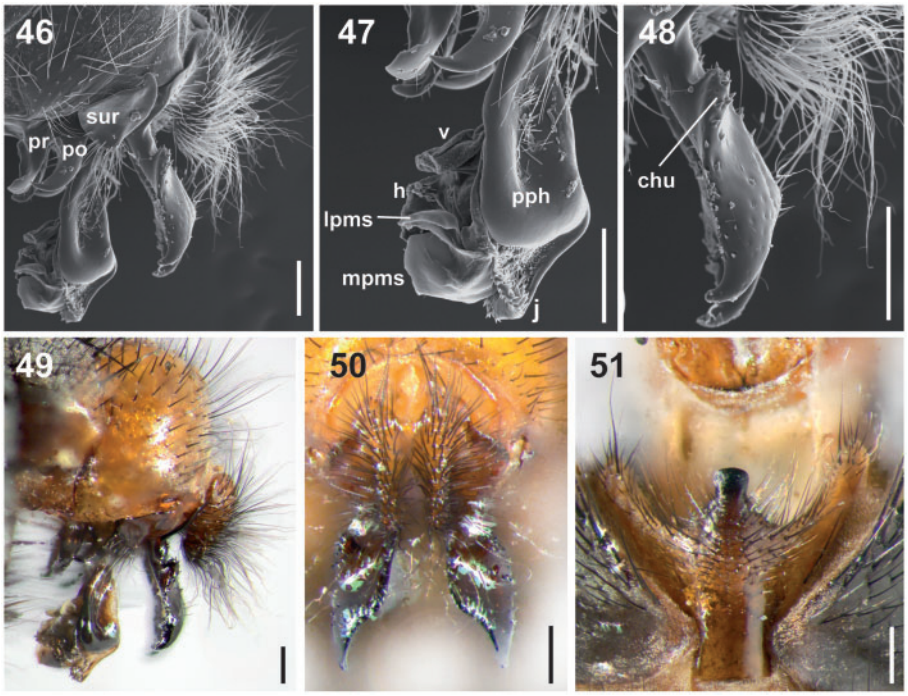

Fig. 46–51. *Lipoptilocnema lanei.* (46) Terminalia, lateral (SEM). (47) Distiphallus, lateral. (48) Cercal prong, lateral. (49) Terminalia, lateral. (50) Cerci, dorsal. (51) ST5, ventral. Scale bars = 200 μm.

only at inferior tip (Figs. 25, 27); pregonite spatulate and curved, with ventral setulae (Fig. 24); postgonite curved with two or more setulae (Fig. 24); phallus with vesica membranous, covered with microtrichia (Figs. 24, 27, 75); harpes membranous (Figs. 24, 27, 75); juxta with a well sclerotized medial keel, and membranous lateral surfaces covered with microtrichia, and spines on apex (Figs. 24, 75); median stylus without microtrichiae, with a medial projection and laterals projections (Figs. 24, 75).

Distribution (Fig. 85)

Argentina: Misiones (**new record**). **Brazil:** Ceará, Espírito Santo (**new record**), Mato Grosso (**new record**), Minas Gerais, Rio de Janeiro, Santa Catarina (**new record**), São Paulo.

Type Material Examined

Male holotype (MNRJ), "Rio de Janeiro / Jard[im]. Botânico / H.S. Lopes-7.[1]935 [printed on white paper]"// "Holotype [printed on red paper, black frame]"// "Sarcophaga / crispina, / n.sp. / S.Lopes-det.937 [printed on white paper, black frame]"// "MNRJ [printed] / 2176 [handwritten on white paper, black frame]". The holotype is in good condition, terminalia spread and exposed. **Paratypes:** Angra dos Reis, Jussaral, 1 male (MNRJ), IV.1934, Penido and H.S Lopes; Angra dos Reis, 2 males (MNRJ), XII.1932, L. Travassos; Jardim Botânico, 1 male, 3 females (MNRJ), VIII.1935, VII.1936, H.S Lopes; Rio de Janeiro, Horto, 1 male (MNRJ), 28.IV.1932, H.S Lopes; Rio de Janeiro, Represa Camorim, 1 male (MNRJ), I.1933, H.S Lopes; Rio de Janeiro, Rio de Janeiro, Botafogo, 1 male (MNRJ), II.1931, L. Travassos; Rio de Janeiro, Tijuca, 1 male (MNRJ), I.1934, Seabra; Rio de Janeiro, 2 males (MNRJ), XII.1931, H.S Lopes; Rio de Janeiro, 2 males (MNRJ), D. Mendes; Rio de Janeiro, 1 male (MNRJ), H.S Lopes.

Additional Material Examined

Argentina, Misiones: Puerto Esperanza, 3 males (MACN), XII.1976, J.C. Mariluis; Iguazú, 1 male (MACN), XII.1987, J.C. Mariluis. **Brazil, Espírito Santo:** Linhares, 2 males (MNRJ), VI.1972, P.C. Elias. **Mato Grosso:** Chapada dos Guimarães, 2 males (MNRJ), 12.VII.2012, Lamas, Nihei and collaborators, Projeto Sisbiota-Diptera; Chapada dos Guimarães, Vale da Benção, 12 males (MNRJ, MZSP), 18–21.I.2012, Lamas, Nihei and collaborators, Projeto Sisbiota-Diptera. **Rio de Janeiro:** Angra dos Reis, 2 males (MNRJ), 23.VI.1971 and 13.XI.1972, H.S Lopes; Magé, 3 males (MNRJ), VII.1969, H. Ebert; Petrópolis, 13 males, 3 females (MNRJ) II.1969, 27.VI.1971 and 7.I.1973, H.S. Lopes; Resende, 3 males (MNRJ), III.1958 and 21.VII.1959, H.S Lopes; Rio de Janeiro, 1 male (MACN), 1.IX.1937, H.S Lopes; Rio de Janeiro, 1 male (MNRJ), XII.1931, H.S Lopes; Rio de Janeiro, Tijuca, 1 male (MNRJ), 24.VIII.1944, E.S. Cruz and Machado Rocha. **Santa Catarina:** Joinville, 1 male (MNRJ), 11.XII.1957, J. Lane. **São Paulo:** São Paulo, Butantan, Horto O. Cruz, 2 males (MNRJ), 22.VI.1971 and 16.VII.1971, L. Travassos Filho; Campos do Jordão, Engenheiro Lefreve 1300m, 1 male (MNRJ), 22.III.1963, J. Guimarães, E.Rabello, A. Barroso and L. Travassos Filho; Barueri, 1 male (MNRJ), 11.VII.1955, K. Lenko.

Remarks

L. crispina is morphologically very close to *L. koehleri*, based on phallic morphology and shape of ST5. Both species differ in the shape of juxta and by the configuration of the median stylus (without macrotrichia in *L. crispina*). The female was briefly described by Lopes (1938a) but not illustrated.

Biology

Adults of this species are attracted to carrion (Moretti et al. 2008, Mello-Patiu et al. 2014).

Fig. 52–59. *Lipoptilocnema margaretae*. (52) Terminalia, lateral. (53) Cerci, dorsal. (54) Distiphallus, lateral. (55) ST5, ventral. (56) Surstylus, lateral. *Lipoptilocnema misella*. (57) Cercus, lateral. (58) Cerci, dorsal. (59) ST5, ventral. Scale bars = 200 μm.

Lipoptilocnema crispula (Lopes)

Figs. 6, 23, 29–33, 76,77, 86

Sarcophaga crispula Lopes, 1938a: 281. Brazil, Rio de Janeiro.

References: Lopes (1941, moved to *Lipoptilocnema*, morphology of female terminalia); Lopes (1942, distribution); Lopes (1969, catalogue); Lopes (1975a, list, distribution); Linhares (1981, synanthropy); Lopes (1983, morphology of first instar larvae); D'Almeida (1984, synanthropy); Dias et al. (1984a, synanthropy); Dias et al. (1984b, seasonality); Dias et al. (1984c, bait preference); Mendes and Linhares (1993, seasonality, bait preferences); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)); Cunha and Lomônaco (1996, poultry farm association); Lopes (2000, synanthropic flies associated to urban waste); Mendes and Linhares (2002, ecology of cattle dung breeding Diptera); Leandro and d'Almeida (2005, list, distribution); Moretti et al. (2008, list, forensic); Mello-Patiu et al. (2009, list, distribution); Rosa et al. (2011, forensic); Firmino-Alves et al. (2014, forensic); Mello-Patiu et al. (2014, forensic, distribution).

Male

Body length = 10.06–10.76 mm (m = 10.44 mm, $n = 5$).

Head

Head length at antennal base 1.02–1.09 (m = 1.06, $n = 5$) times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with row of setulae close to eye; fronto-orbital plate with sparse black setulae; post-cranium with golden pruinosity at upper part and yellowish or gray pruinosity below, with two rows of black occipital setae on upper part, parallel to postorbitals, and pale setae below; frontal vitta blackish; frons at its narrowest point 0.20–0.21 (m = 0.21, $n = 5$) times head width; 9–11 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.2 times inner vertical and divergent, not well differentiated from the postorbitals; ocellar triangle black with yellowish pruinosity, with one pair of small proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior half; four to six subvibrissal setae; antenna black or dark brown, first flagellomere dark brown with gray pruinosity, length 0.33–0.36 (m = 0.34, $n = 5$) times head height, arista long plumose on basal 3/4 with rays six times largest diameter of arista; palpus blackish or brown with black setulae.

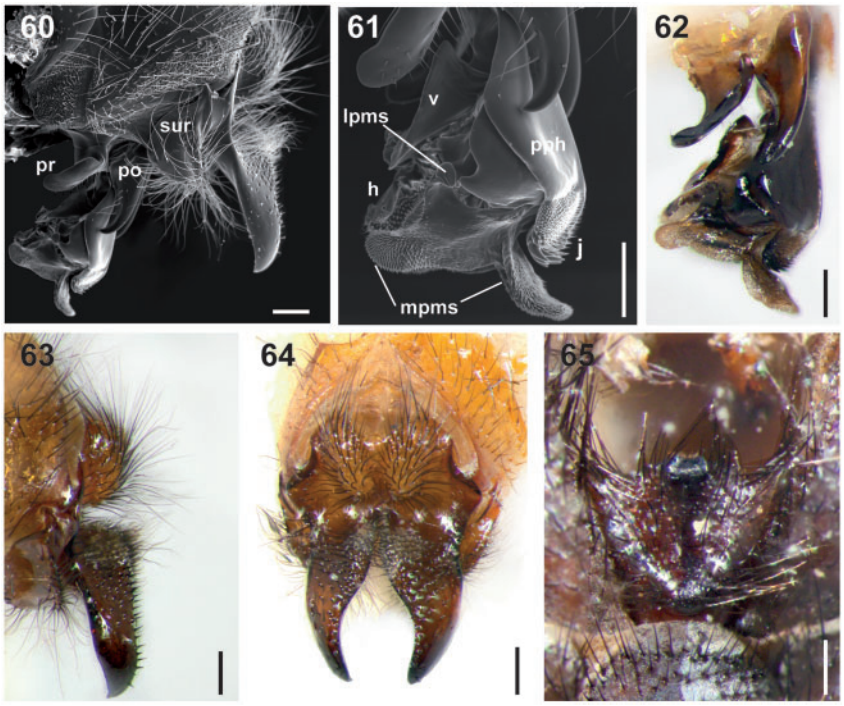

Fig. 60–65. *Lipoptilocnema salobrensis*. (60) Terminalia, lateral. (61) Distiphallus, lateral (SEM). (62) Distiphallus, lateral. (63) Cercus, lateral. (64) Cerci, dorsal. (65) ST5, ventral. Scale bars = 200 μm.

Fig. 66–74. *Lipoptilocnema savana*. (66) Terminalia, lateral. (67) Cerci, dorsal. (68) Distiphallus, apico-dorsal. (69) ST5, ventral. (70) Male mid femur, posterior. Arrow indicating ctenidium. *Lipoptilocnema tibanae*. (71) Postcephalon, latero-posterior. Arrows indicating rows of dark setae. (72) ST5, ventral. (73) Terminalia, lateral. (74) Cerci, dorsal. Scale bars = 200 μm.

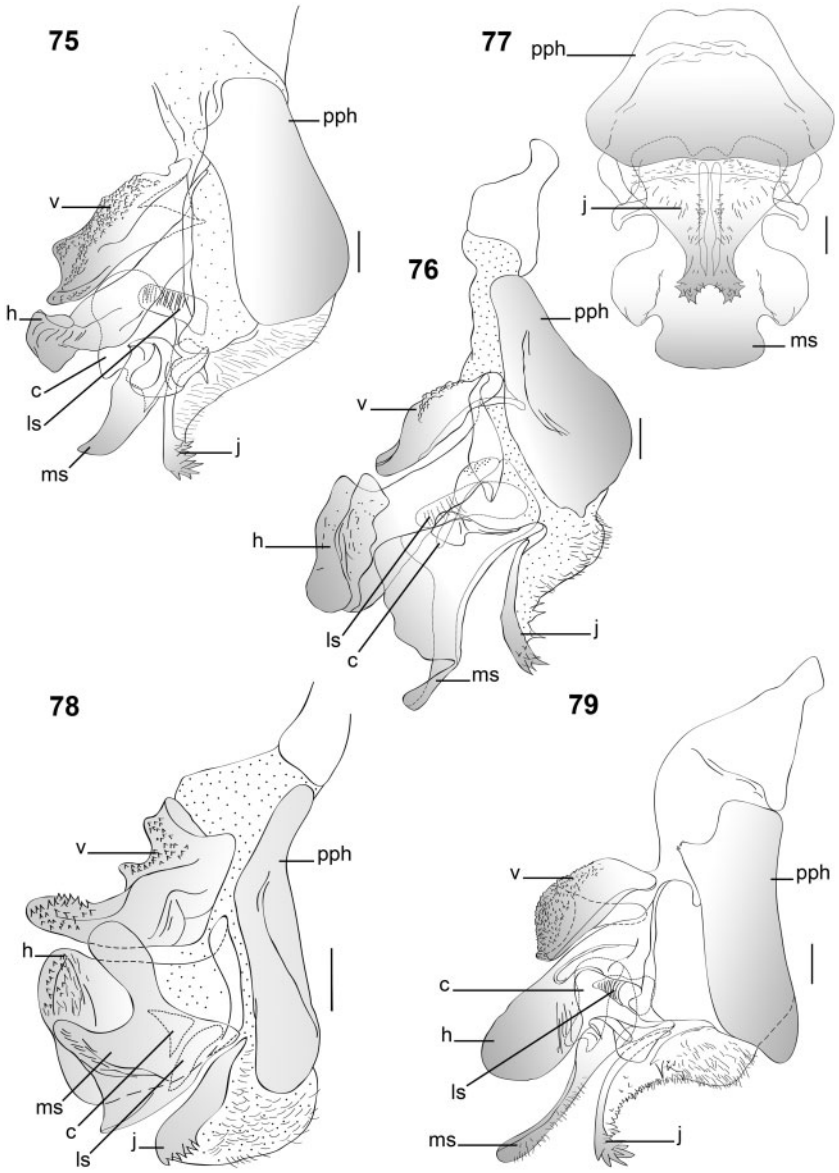

Fig. 75–79. Phallic structures, details. (75) *Lipoptilocnema crispina,* lateral. (76) *L. crispula,* lateral and (77) apico-dorsal. (78) *L. delfinado,* lateral. (79) *L. koehleri,* lateral. Scale bars = 200 μm.

Thorax

Black, prescutum and scutum with dorsal and lateral stripes of silvery pruinosity and three black bands; postpronotal lobe and notopleuron with gray-yellowish pruinosity; anepisternum with golden pruinosity; anepimeron and katepisternum with silvery pruinosity; proepisternum silvery, bare; one strong proepisternal setae strong plus two or three weaker and shorter supplementary inferior seta; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 the median seta slightly smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 2–4 + 3–4 (only the two posterior larger and differentiated), intra-alars 1–2 + 2–3, supra-alars 1–2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae, scutellar discal setae usually absent (if present they are weak). Wing hyaline, tegula black, yellowish basicosta and dark brown veins, R_1 bare, R_{4+5} setulose in proximal 0.5–0.8 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, trochanter and femora black with silvery pruinosity; middle femur without posteroventral ctenidium, rows of anterior, anteroventral and posteroventral setae; middle tibia with one anterdorsal seta, two posterodorsal and one posterior setae; hind trochanter with long ventral villosity; hind femur with rows of anterodorsal and anterior setae, one apical anteroventral setae; hind tibia with two to four anterodorsal setae, one anteroventral seta, and two posterodorsals setae; middle and hind femora covered with long villosity; tarsi blackish.

Abdomen (Fig. 23)

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 black with silvery pruinosity, ST1–4 covered with

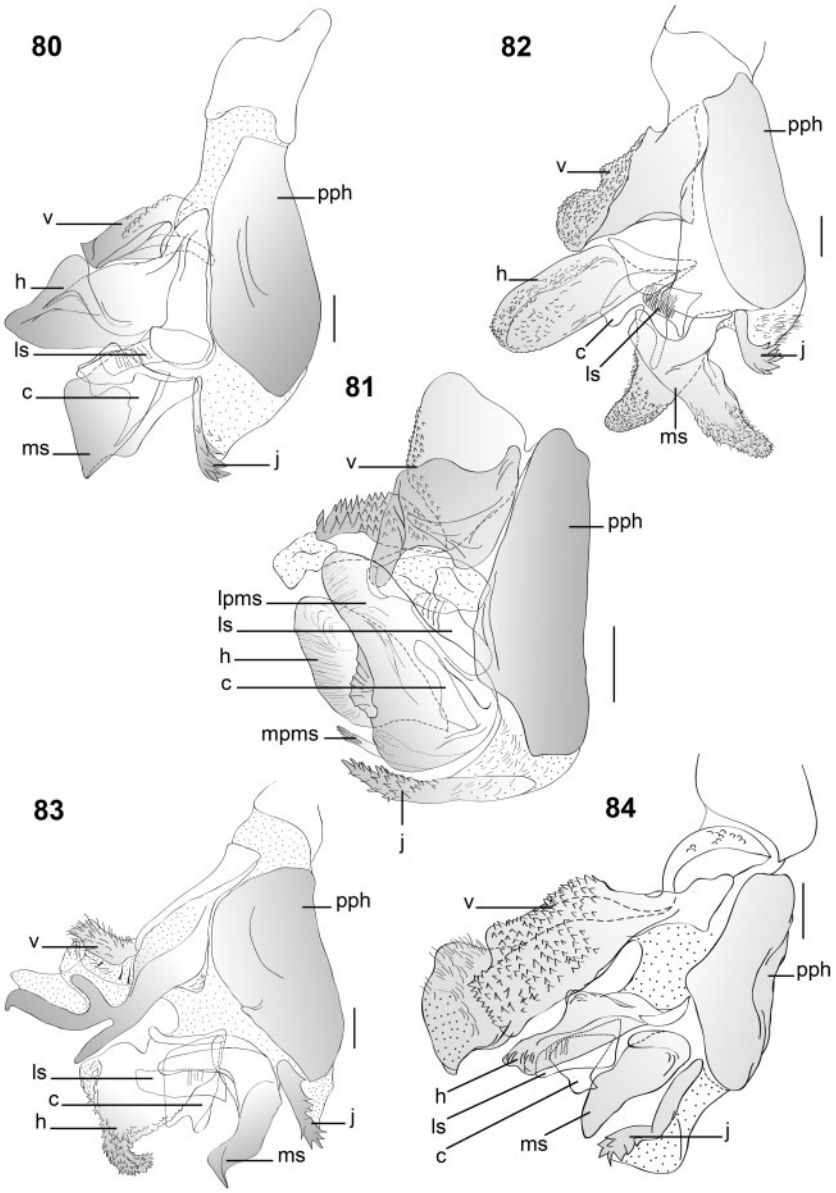

Fig. 80–84. Phallic structures, details. (80) *Lipoptilocnema lanei*, lateral. (81) *L. margaretae*, lateral. (82) *L. salobrensis*, lateral. (83) *L. misella*, lateral. (84) *L. savana*, lateral. Scale bars = 200 μm.

long setulae; ST5 reddish or brown, distinctly convex at base, with black median long apophysis on its margin, covered with fine large setulae (Fig. 33).

Terminalia

Syntergosternite 7 + 8 orange-reddish, with short hair-like setulae and a marginal row of setae; epandrium orange-reddish, with hair-like setae; cercus with pointed apex (Figs. 31, 32); cerci with cercal base 0.7X the cercal prong; cercal prong with transverse humps with short and thickened spines (Fig. 30); surstylus broad with setae only at inferior tip (Fig. 30); pregonite spatulate and curved, with ventral setulae (Figs. 30, 31); postgonite curved with two setulae (Figs. 30, 31); phallus with vesica membranous covered with scarce macrotrichia (Figs. 29, 30, 76); harpes membranous and conspicuously developed (Figs. 29, 76); juxta with a well sclerotized medial keel, and membranous lateral surfaces covered with microtrichia and apical juxtal spines (Figs. 29, 76, 77); median stylus without microtrichiae, with a large medial projection and small laterals projections (Figs. 29, 76).

Distribution (Fig. 86)

Argentina: Misiones (**new record**), Formosa (**new record**). **Brazil:** Ceará, Distrito Federal (**new record**), Espírito Santo (**new record**), Goiás (**new record**), Mato Grosso (**new record**), Mato Grosso do Sul (**new record**), Minas Gerais, Paraná (**new record**), Rio de Janeiro, São Paulo.

Type Material Examined

Male holotype (MNRJ), "Rio de Janeiro / Jard[im]. Botânico / H.S. Lopes-2.[1]935 [printed on white paper, black frame]"// "Holotype [printed on red paper, black frame]"// "Sarcophaga / crispula, / n.sp. / S.Lopes-det.[1]937 [printed on white paper, black

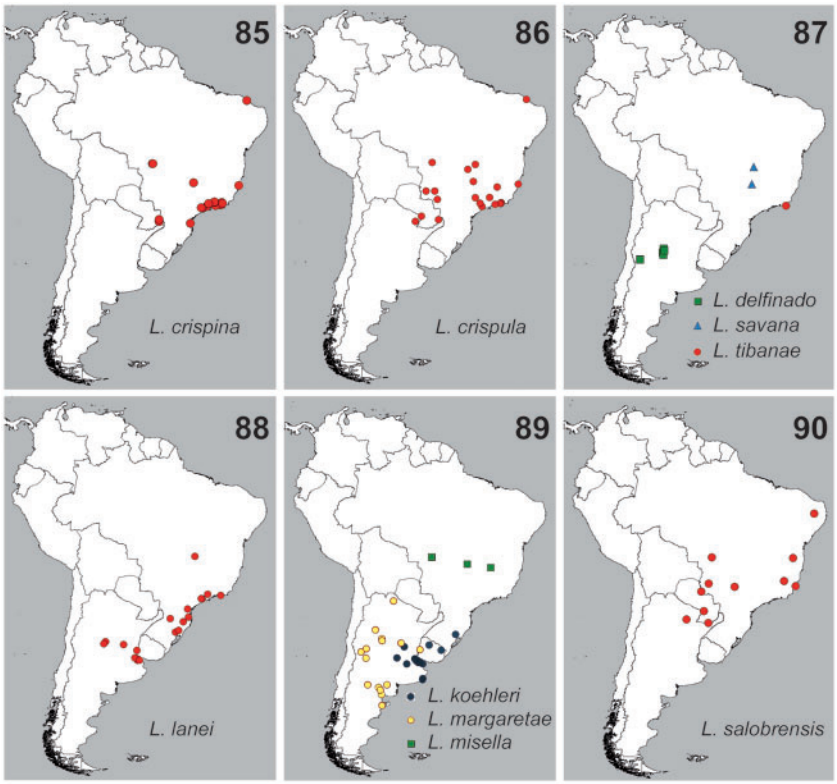

Fig. 85–90. Distibution of *Lipoptilocnema* species. (85) *Lipoptilocnema crispina.* (86) *Lipoptilocnema crispula.* (87) *Lipoptilocnema delfinado, L. savana,* and *L. tibanae.* (88) *Lipoptilocnema lanei.* (89) *Lipoptilocnema koehleri, L. margaretae,* and *L. misella.* (90) *Lipoptilocnema salobrensis.*

frame]"// "MNRJ [printed] / 2177 [handwritten on white paper, black frame]". The holotype is in good condition, terminalia spread and exposed. **Paratypes: Brazil,** Rio de Janeiro, Jardim Botânico, 3 males (MACN, MNRJ), II, VII.1935, H.S. Lopes; Rio de Janeiro, Jacarepaguá, 1 male, 2 females (MNRJ), VIII–IX.1932, H.S. Lopes.

Additional Material Examined

Argentina, Formosa: Clorinda, 2 males (MACN), XI.1947, Morel; Laishí, Reserva El Bagual, 2 males (MACN), 6.I.2014, P.R. Mulieri. **Misiones:** Puerto Libertad [as Puerto Bemberg], 1 male (MACN), III.1934, K. Hayward. **Brazil, Distrito Federal:** Brasília, 7 males (MNRJ), VII.1960, H.S. Lopes; Linhares, 1 male (MNRJ), VI.1972, P.C. Elias; Conceição da Barra, 1 male (MNRJ), VI.1973, P.C. Elias; Conceição da Barra, Novo Horizante, 2 males (MNRJ), X.1972, Alvarenga and Roppa. **Goiás:** Goiânia, 1 male (MNRJ), VIII.1969, H. Ebert. **Mato Grosso:** Chapada dos Guimarães, Vale da Benção, 10 males (MNRJ, MZSP), 18–21.I.2012, Lamas, Nihei and collaborators, Projeto Sisbiota-Diptera. **Mato Grosso do Sul:** Bodoquena, Fazenda Califórnia, 1 male (MNRJ), 6.X.2011, Lamas and collaborators, Projeto Sisbiota-Diptera; Dois Irmãos do Buriti, 14 males, 1 female (MNRJ), R.Tibana; Dourados, 4 males (MNRJ), III.1974, Alvarenga and Roppa. **Minas Gerais:** Cambuquira, 1 male (MNRJ), IX.1969, H. Ebert. **Paraná**: Curitiba, 1 male (MNRJ), 10.III.1972, H.S. Lopes; Iguaçu, 1 male (MNRJ), XII.1941, Com. E.N.V. **Rio de Janeiro:** Ilha Seca, 1 male (MNRJ), 18–26.II.1940, Com. I.O.Cruz; Angra dos Reis, 4 males, 1 female (MNRJ), IX.1972, H.S. Lopes; Rio de Janeiro, Jardim Botânico, 4 males (MACN), X.1935, H.S. Lopes.

Remarks

L. crispula is similar to *L. koehleri*, but has the median stylus and the juxta more developed. The female was briefly described by Lopes (1938a) but not illustrated.

Biology

Adults of this species are attracted to carcasses and baits composed of rotten animal tissues (Dias et al. 1984c, Mendes and Linhares 1993, Moretti et al. 2008, Rosa et al. 2011, Mello-Patiu et al. 2014).

Lipoptilocnema delfinado Mulieri and Mello-Patiu sp. nov.

Figs. 13–16, 34–39, 78, 87

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Male

Body length = 10.80–13.15 mm (m = 12.23 mm, $n = 6$).

Head

Head length at antennal base 0.93–1.00 (m = 0.97, $n = 6$) times head length at vibrissal level. Parafacial plates with silvery pruinosity on the upper portion and near the ocular margin, and with golden pruinosity near the genal groove (Figs 13, 14, 16); fronto-orbital plate with silvery pruinosity at the level of antennal insertion and at vertex with a spot of golden pruinosity in the middle; parafacial plate with setulae (as a row at inferior part); fronto-

orbital plate with sparse black setulae; post-cranium with silvery pruinosity, with row of black setulae near the post-ocular setae, with pale setulae below; frontal vitta brownish; frons at its narrowest point 0.24–0.25 (m = 0.24, $n = 6$) times head width; 10–12 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.3 times inner vertical and divergent; ocellar triangle black, with silvery pruinosity, with one pair of proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with silvery pruinosity; genal groove and gena with deep golden pruinosity; postgena (and a posterior part of gena) with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior half; five to eight subvibrissal setae; antenna dark brown, first flagellomere brown, covered with gray pruinosity, length 0.32–0.38 (m = 0.36, $n = 6$) times head height, arista long plumose on basal 2/3 with rays six times the largest diameter of arista; palpus brown with black setulae.

Thorax

Black, with silvery-gray pruinosity; prescutum and scutum with intermediate and lateral stripes of silvery pruinosity and three black bands; scutellum with intermediate stripes with pale golden pruinosity posteriorly; postpronotal lobe with silvery pruinosity, posterior part of postpronotal lobe and notopleuron with golden pruinosity, katepisternum with gray pruinosity, an with a pale golden spot on the inferior part; anepisternum black with golden pruinosity; anepimerum with silvery or yellowish pruinosity; proepisternum gray; one strong proepisternal setae, and one proepimeral setae, katepisternals 3 with median seta smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 2–4 + 2 (two posterior), intra-alars 1–2 + 2, supra-alars 1–2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae, and one pair of crossed apical scutellar setae. Wing hyaline, tegula pale brown, whitish basicosta and brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, calypteres whitish. Legs with coxae, and femora black with thin silvery pruinosity; trochanters somewhat reddish, tibia brown; middle femur with posteroventral ctenidium along 0.3 apical portion, four to six anterior setae, one row of anteroventral; middle tibia with two anterdorsal setae, two posterodorsal and one posterior setae; hind trochanter with ventral pad of short and stout spines; hind femur with rows of anterodorsal and anterior setae, one to two apical anteroventral setae; hind tibia with three to four anterodorsal setae, one anteroventral seta, and two posterodorsal setae; middle and hind femora and tibiae covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–5 with one pair of dorsal spots of silvery pruinosity and latero-ventral spots with golden pruinosity; T1 + 2–4 with one pair of lateral marginal setae without median marginal setae (sometime one pair scarcely differentiated in T4); T5 with complete row of marginal setae; ST1–4 black, ST1–3 covered with villous setulae; ST4 covered with shorter setulae; ST5 reddish or brown, distinctly convex at base, with slightly projected bulge, bearing erect short spines (Fig. 36).

Terminalia

Syntergosternite 7 + 8 shiny black with golden pruinosity along its posterior margin, with short hair-like setulae and a marginal row of four to five pairs of strong setae; epandrium with black at basal part (specially on laterals), orange-reddish on posterior part, with hair-like setae; cercus short and broad with few short blunt spines on laterals and with pointed apex (Fig. 37); cerci with cercal base 0.4X cercal prong (Fig. 38); surstylus broad, subtriangular, with setae on distal 3/4 (Fig. 37); pregonite spatulate and curved, with several ventral setulae (Fig. 34); postgonite curved with two setulae (Fig. 34); phallus with vesica well sclerotized, covered with microserration and microtrichia (Fig. 34, 78); harpes large and membranous densely covered with macrotrichia (Figs 34, 35, 78); juxta with medial keel not well developed and membranous, lateral surfaces covered with microtrichia, and spines restricted to the short and separated juxtal apical prolongations (Figs 34, 35, 78); median stylus without microtrichiae, with a small medial projection and large lateral projections divided into two digitiform lobes (Figs 35, 78).

Female

Body length = 13.41 mm ($n = 1$).

Head

Differs from the male by possessing a wider frons 0.32 ($n = 1$) times head width; two well-differentiated fronto-orbital proclinate setae; first flagellomere, length 0.38 ($n = 1$) times head height.

Thorax

Differs from the male by possesing scutellum with one pair of discal setae.

Abdomen

Similar to male, somewhat broader, with T5 entirely black or with a reddish margin; T4 with one pair of median marginal setae; ST2–5 with row of marginal setae.

Terminalia (Fig. 39)

Tergite 6 dorsally divided, broadly membranous on mid dorsal part, with dense marginal row of seta and covered with smaller setae; epiproct (or anal tergite) membranous; ST6 wider than ST5, orange-reddish covered with silvery pruinosity on basal 2/3 except a narrow strip on mid line; ST6 with a dense row of long marginal setae; ST7 orange-reddish, with a hinged posterior margin forming two lobes (U shaped), with rough surface on basal half, without a row of marginal setae; ST8 membranous; hypoproct with setulae at posterior margin; cerci covered by setulae.

Etymology

The species epithet, *delfinado*, is an Argentinean slang in reference to specimens that were obtained from human corpse. The name should be treated as a noun in apposition.

Distribution (Fig. 87)

Argentina: Córdoba, Mendoza.

Type Material

Male holotype (MACN), "Arg[entina], Mendoza, Dept. Las Heras, / Reserva Natural Villavicencio / 24/07/2010 Larva II y III / Adulto 27/09/2010 [printed on white paper]"// "Holotype [printed on red paper, black frame] / Lipoptilocnema / delfinado / Mulieri det. 2011

[handwritten]". The holotype is in good condition, terminalia spread and partly exposed. **Paratypes: Argentina, Mendoza:** 3 males, 1 female (MACN, IADIZA), same data as the holotype; Mendoza, 2 males, 1 female on pig carcass (MACN, MNRJ), 1.XI.2008, 6.XI.2008 and 8.V.2008, F. Aballay; Mendoza, 1 female (MNRJ), I.1997, J.C. Mariluis. **Córdoba:** El Sauce, Calamuchita, 1 female (MACN), XII.1934, Vianna; Cabana, Colón, 1 male (MACN), XII.1952, M. Birabén; Copina, 1 female (MACN), II.1975, J.C. Mariluis; Capilla del Monte 1000 m.a.s.l., 1 female (MACN), I.2001, J.C. Mariluis.

Remarks

L. delfinado seems to be most probably the sister species of *L. margaretae*, on the basis of their similar general cercal and phallic morphology, and specifically, on the shape of ST5.

Biology

Adults of this species are attracted to pig carcasses. In adition, larvae were found on a human corpse, giving to this species a valuable potential as a forensic indicator.

Lipoptilocnema koehleri (Blanchard)

Figs. 2, 4, 7, 9, 40–45, 79, 89

Parapeltopyga koehleri Blanchard, 1939:847. Argentina, Salta.

References: Lopes (1942, moved to *Lipoptilocnema*, taxonomic notes, distribution); Lopes (1969, catalogue); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)); Mariluis et al. (2007, distribution, bait preference, sex ratio); Mulieri et al. (2008, seasonality, habitat and bait preference); Mulieri et al. (2010, female description, key, biological notes); Mulieri et al. (2011, seasonality, synanthropy, habitat and bait preferences); Patitucci et al. (2011, list, distribution); Buenaventura and Pape (2015, phylogeny); Patitucci et al. (2015, list, urban fauna); Mulieri et al (2015, bait preference, sex bias).

Male

Body length = 8.13–11.01 mm (m = 10.21 mm, $n = 5$).

Head

Head length at antennal base 1.04–1.09 (m = 1.07, $n = 5$) times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with row of setulae close to eye; fronto-orbital plate with sparse black setulae; post-cranium with silvery pruinosity, with two rows of black occipital setae on upper part, parallel to postorbitals, and pale setae below; frontal vitta blackish; frons at its narrowest point 0.20–0.21 (m = 0.20, $n = 5$) times head width; 9–11 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.20 times inner vertical and divergent, not well differentiated from the postorbitals; ocellar triangle black with silvery pruinosity, with one pair of small proclinate and divergent ocellar setae and supplementary setulae; postocellar and paravertical setae present; postocular area with golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge black, with short setulae in the inferior half; five to seven subvibrissal setae; antenna black, first flagellomere with gray pruinosity, length 0.35–0.37 (m = 0.36, $n = 5$) times head height, arista long plumose on basal 3/4 with rays seven times the largest diameter of arista; palpus brown with black setulae.

Thorax

Black. Prescutum and scutum with dorsal stripes of silvery pruinosity with slight bluish reflections (and more yellowish near the scutellum), lateral tripes with golden pruinosity, and three black bands; postpronotal lobe, notopleuron, anepisternum and anepimeron with golden pruinosity, katepisternum with silvery pruinosity; proepisternum silvery, bare; one strong proepisternal setae plus two weaker and shorter supplementary inferior setae; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 the median seta slightly smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 3–4 + 4 (only the two posterior larger and well differentiated), intra-alars 1–2 + 3, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae, scutellar discal setae usually absent or weaker. Wing hyaline, tegula black, yellowish basicosta and dark brown veins, R_1 bare, R_{4+5} setulose in proximal 0.5–0.6 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, and femora black with thin silvery pruinosity; trochanters somewhat reddish, tibia brown; middle femur without posteroventral ctenidium on portion, two to four anterior setae, one row of anteroventral; middle tibia with one anterdorsal setae, two posterodorsal and one posterior setae; hind trochanter without ventral pad of short and stout spines; hind femur with rows of anterodorsal and anterior setae, one to two apical anteroventral setae; hind tibia with two to four anterodorsal setae, one anteroventral seta, and two posterodorsal setae; middle and hind femora covered with long villosity at ventral surface; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity; T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 black with silvery pruinosity, ST1–4 covered with setulae; ST5 reddish or brown, distinctly convex at base, with black median bifid apophysis on posterior margin, covered with fine large setulae (Figs. 41, 42).

Terminalia

Syntergosternite 7 + 8 black or dark brown with short hair-like setulae and a marginal row of setae; epandrium orange-reddish with hair-like setae; cercus with pointed apex (Figs. 43, 44, 45); cerci with cercal base 0.5X the cercal prong; cercal prong with lateral humps, and short and thickened spines (Figs. 7, 43, 45); surstylus broad with setae on distal half (Figs. 40, 44); pregonite spatulate and curved with ventral setulae (Fig. 40); postgonite curved with two or more setulae (Fig. 40); phallus with vesica membranous and microserrated (Figs 40, 79); harpes membranous (Figs 40, 79); juxta noticeably recurved with a well sclerotized medial keel, and membranous lateral surfaces covered with microtrichia and spines in juxtal apical prolongations (Figs. 2, 4, 40, 79); median stylus with a large medial projection with microtrichia on the inferior surface, and small laterals projections (Figs. 2, 4, 40, 79).

Distribution (Fig. 89)

Argentina: Buenos Aires, Jujuy (**new record**), Salta, Santa Fe (**new record**). **Brazil:** Rio Grande do Sul. **Uruguay:** Cerro Largo (**new record**), Tacuarembó (**new record**).

Material Examined

Argentina, Buenos Aires: Bragado, 1 male (MACN), X.2008, P.R. Mulieri; Buenos Aires, Ciudad Universitaria, 1 male (MACN), V.2002, P.R. Mulieri; Buenos Aires, 1 male (MACN), X.2002, P.R. Mulieri; Buenos Aires, 1 male (MACN), XII.1996, J.C. Mariluis; Buenos Aires Reserva Ecológica Costanera Sur, 2 males (MACN), 24.IX.2003, X.2002, P.R. Mulieri; Buenos Aires Reserva Ecológica Costanera Sur, 8 males, 6 females (MACN), II–III.2002, 31.III.2004, J.C. Mariluis; Burzaco, 4 males, 1 female on feces and liver (MACN), III.2002, IV–V.2005, P.R. Mulieri; Burzaco, 1 male on dead snail (MACN), 23.II.2007, P.R. Mulieri; Campana, 2 males, 1 female (MACN), III.2003, J.C. Mariluis; Campana, Basural Tapado, 1 female (MACN), XI.1998, J.C. Mariluis; Isla Paulino, 1 male (MLP), 3.II.1977; M. de Pinazo, 2 males, 1 female from *Oiketicus kirbyi* (MACN), III.1953; Mar del Plata, 1 male (MACN), XI.2007, J,C, Mariluis; Punta Lara, 1 male (CFA), IV.1981; Reserva Natural Estricta Otamendi, 2 males, 1 female (MACN), XI.2009, I–II.2010, P.R. Mulieri; San Isidro, 1 male (MACN), 22.IV.1916, J. Brèthes; San Miguel, 4 males, 9 females (MACN), XI.1973, J.C. Mariluis; Santa Clara del Mar, 3 males (MACN), V.2009, 24.III.2011, Patitucci or Mulieri and Patitucci; Tigre, 1 female (MACN), 23.IX.1932, J. Brèthes; Villa Elisa, 4 males (MACN), III.1980, III.1982, J.C. Mariluis. **Jujuy:** 1 male, (MNRJ), S. Mazza. **Santa Fe:** Sancti Spiritu, 1 female (MACN), I.1933, Denier; Coronda, 2 males (MACN), IV.1940. **Brazil, Rio Grande do Sul:** 1 male, without further data (MNRJ), Gliesh; São João de Montenegro, 1 male (MNRJ), I.1922, Dacorso. **Uruguay, Cerro Largo:** Sierra de Vaz, Rio Tacuari, 20 km SE Melo, 1 male (MNRJ), 15.III.1965, J.K. Bouseman. **Tacuarembo:** 40 km NW Tucuarembo, 1 male (MNRJ), 2–9.II.1963, J.K. Bouseman.

Remarks

L. koehleri is morphologically very similar to *L. crispina* (see remarks for this species). The female was described and illustrated by Mulieri et al. (2010).

Biology

Larvae of *L. koehleri* were found bred from land snails (Mulieri et al. 2010). Adults are strongly attracted to feces and rotten cow liver (Mulieri et al. 2015).

Lipoptilocnema lanei Townsend

Figs 3, 46–51, 80, 88

Dasypygia selloi Enderlein, 1928: 40. *Nomen nudum*.

Lipoptilocnema lanei Townsend, 1934: 112. Brazil, São Paulo, Pinheiros.

Parapeltopyga liguloides Blanchard, 1939: 845. Argentina, Salta.

References: Lopes (1942, redescription of *lanei*, *liguloides* moved to *Lipoptilocnema*); Lopes (1968, taxonomic notes); Lopes (1969, catalogue, *liguloides* as synonym of *lanei*); Lopes (1988, morphology of female terminalia); Lopes and Leite (1990, phallic morphology); Pape (1995, taxonomic note on *Dasypygia selloi*); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)); Mariluis et al. (2007, distribution, bait preference, sex ratio); Mulieri et al. (2008, seasonality, habitat and bait preference); Mulieri et al. (2010, key); Mulieri et al. (2011, seasonality, synanthropy, habitat and bait preferences); Rosa et al. (2011, forensic); Vairo et al. (2011, key); Firmino-Alves et al. (2014, forensic); Patitucci et al. (2015, list, urban fauna) Mulieri et al. (2015, bait preference, sex bias).

Male

Body length = 8.88–10.40 mm (m = 9.46 mm, $n = 5$).

Head

Head length at antennal base 1.05–1.11 (m = 1.07, $n = 5$) times head length at vibrissal level. Parafacial with golden pruinosity; fronto-orbital plate with golden pruinosity (brazilian specimens) or with silvery pruinosity (argentinean specimens); parafacial plate with row of setulae close to eye; fronto-orbital plate with sparse black setulae; post-cranium with yellowish or silvery-gray pruinosity, with two rows of black occipital setae on upper part, parallel to postorbitals, and pale setae below; frontal vitta black; frons at its narrowest point 0.20–0.22 (m = 0.21, $n = 5$) times head width; 7–10 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.23 times inner vertical and divergent; ocellar triangle black, with one pair of small proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with silvery (Argentina) or golden (Brazil) pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior half; five to seven subvibrissal setae; antenna dark brown, first flagellomere brown with gray pruinosity, length 0.32–0.35 (m = 0.33, $n = 5$) times head height, arista long plumose on basal 2/3 with rays seven times the largest diameter of arista; palpus black with black setulae.

Thorax

Black, with silvery-gray pruinosity; prescutum and scutum with dorsal and lateral stripes of silvery-gray pruinosity and three black bands; postpronotal lobe notopleuron, anepisternum and anepimeron with yellowish or pale golden pruinosity (Argentina) or with deep golden pruinosity (Brazil), katepisternum with silvery pruinosity; proepisternum silvery, bare; one proepisternal setae strong plus one weaker and shorter supplementary inferior seta; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 with the median seta slightly smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 3–4 + 3–4 (only the two posterior larger and differentiated), intra-alars 1–2 + 2, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae, one pair of crossed apical scutellar setae and scutellar discal setae present. Wing hyaline, tegula black, yellowish basicosta and brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6–0.8 of distance to r-m, costal spine differentiated but short, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, and femora black with thin silvery pruinosity; trochanters somewhat reddish, tibia brown; middle femur without posteroventral ctenidium on apical portion, rows of anterior and anteroventral setae; middle tibia with one anterdorsal setae, two posterodorsal and one posterior setae; hind trochanter without ventral pad of short and stout spines; hind femur with rows of

anterodorsal and anterior setae (some specimens with anteroventral), one to two apical anteroventral setae; hind tibia with three to five anterodorsal setae, one to two anteroventral seta, and two posterodorsal setae; middle and hind femora and tibiae covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 black with silvery pruinosity, ST1–4 covered with long setulae; ST5 reddish or brown, distinctly convex at base, with conspicuous median apophysis on its median margin, covered with fine large setulae (Fig. 51).

Terminalia

Syntergosternite 7 + 8 dark brown or reddish with a median spot of slight silvery pruinosity, with short hair-like setulae and a marginal row of setae; epandrium orange reddish, with hair-like setae; cercus with pointed apex (Figs. 49, 50); cerci with cercal base 0.4X the cercal prong (Fig. 50); cercal prong with lateral humps covered with short and thickened spines (Fig. 48); surstylus broad with setae only at inferior tip (Figs 46, 49); pregonite spatulate and curved, with ventral setulae (Fig. 46); postgonite curved with one or two setulae (Fig. 46); phallus with vesica membranous with microserrations (Figs 47, 80); juxta shortened with a sclerotized medial keel, and membranous lateral surfaces covered with microtrichia, spines restricted to the juxtal apical prolongations (Figs 3, 47, 80); median stylus without microtrichiae, with a somewhat short and broad medial projection and folded laterals projections (Figs 3, 47, 80).

Distribution (Fig. 88)

Argentina: Buenos Aires, Córdoba (**new record**), Corrientes (**new record**), Entre Ríos (**new record**), Salta, Santa Fe (**new record**). **Brazil:** Distrito Federal (**new record**), Paraná, Rio de Janeiro (**new record**), Rio Grande do Sul, Santa Catarina, São Paulo.

Material Examined

Argentina, Buenos Aires: Burzaco, 1 male (MACN), IV.2002, P.R. Mulieri; Burzaco, 5 males, 3 females on liver and feces (MACN), IV, XI.2005, I, XII.2006, XII.2008, V.2010, P.R. Mulieri; Punta Lara, 1 male (CFA), IV.1981; Zelaya, 1 male (MACN). **Córdoba:** Córdoba, 1 male (MACN), II.1975, J.C. Mariluis; Villa Ciudad de América, Dique Los Molinos, 1 male (IFML), I.1981, A. Willink. **Corrientes:** 1 male, (MACN), IV.1942. **Entre Ríos:** Gualeguaychú, 1 male (MACN), 4.I.1933, Doello Jurado. **Santa Fe:** 1 male (MACN), I.1933, Denier; Coronda, 1 male (MACN), IV.1940. **Brazil, Distrito Federal:** Brasília, 1 male (MNRJ), IX.1969, A.B. Guimarães. **Paraná:** Castro, 1 male (MNRJ), 10.I.1972, H.S. Lopes. **Rio de Janeiro:** Rio de Janeiro, 4 males (MNRJ), XII.1931, H.S. Lopes. **Rio Grande do Sul:** Gramado, 4 males, 1 female (MNRJ), 15–18.I.1972, H.S. Lopes. **Santa Catarina:** Blumenau, 1 male (MNRJ), 24.I.1972, H.S. Lopes; Nova Teutônia, 9 males, 1 female (MNRJ), IV.1961, III.1962, I.1937, F. Plaumann. **São Paulo:** Campos do Jordão, 3 males (MNRJ), 25–31.I.1959, Lopes and Izecksohn; Pinheiros, 1 male [paratype of *crispula* misidentified] (MNRJ), 3.XII.1932; Ypiranga, 1 male (MNRJ), 7.I.1937, Lange de Morretes; Ypiranga, 2 males (MNRJ), 23.X.1935, 25.X.1939, M. Carrera; São Paulo, Butantan, Horto Oswaldo Cruz, 3 males (MNRJ), 18.I.1972, 30.I.1973, 1.IX.1971, L. Travassos Filho.

Remarks

L. lanei is morphologically very similar to *L. crispula* (see remarks for this species). The morphology of female terminalia was illustrated by Lopes (1988).

Biology

Adults of *L. lanei* are strongly attracted to feces and rotten cow liver (Mulieri et al. 2015).

Lipoptilocnema margaretae (Lahille)

Figs 1, 5, 8, 10, 17–21, 52–56, 81, 89

Sarcophaga margaretae Lahille, 1907: 92 (as *margareti*). Argentina, Catamarca, Chumbicha.

Eumicrocerella duca Hall, 1938: 253. Argentina, Mendoza.

References: Brèthes (1907, catalogue); Blanchard (1939, redescription, moved to *Lahillemyia*); Lopes (1942, moved to *Lipoptilocnema*, distribution); Salavin (1958, list) Lopes (1969, catalogue including *margaretae* and *duca*); Blanchard and De Santis (1975, biological notes); Lopes (1975b, *duca* as synonym of *margaretae*, redescription); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)), Armani et al. (2015, forensic).

Male

Body length = 9.75–12.67 mm (m = 11.64 mm, $n = 7$).

Head

Head length at antennal base 0.96–1.02 (m = 0.99, $n = 7$) times head length at vibrissal level. Parafacial plates with golden pruinosity on the anterior part, silvery at the ocular margin (Figs 17, 19, 20); fronto orbital plate with golden pruinosity near the frontal vitta, silvery at vertex and close to ocular margin; parafacial plate with setulae (forming a row at the inferior part); fronto-orbital plate with sparse black setulae; post-cranium with silvery pruinosity, with a row of black setulae near the post-ocular setae, with pale setulae below; frontal vitta brownish; frons at its narrowest point 0.23–0.26 (m = 0.25, $n = 7$) times head width; 10–12 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.3 times inner vertical and divergent; ocellar triangle black with silvery pruinosity, with one pair of proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with silvery pruinosity; genal groove and gena with golden pruinosity; postgena (and a posterior part of gena) with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior half; five to six subvibrissal setae; antenna dark brown, first flagellomere brown, covered with gray pruinosity, length 0.30–0.35 (m = 0.32, $n = 7$) times head height, arista long plumose on basal 3/4 with rays five times the largest diameter of arista; palpus brown with black setulae.

Thorax

Black, with silvery-gray pruinosity; prescutum and scutum with intermediate and lateral stripes of silvery pruinosity and three black bands; seen from behind, the intermediate stripes with somewhat yellowish reflections; scutellum with intermediate stripes with pale golden pruinosity; postpronotal lobe with silvery pruinosity, posterior part of postpronotal lobe and notopleuron with pale golden pruinosity, katepisternum with gray pruinosity, an with a pale

golden spot on the inferior part; anepisternum and anepimeron black with pale golden pruinosity; proepisternum gray; one proepisternal setae strong, and one proepimeral setae, katepisternals 3 with median seta smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 4–2 + 2 (two posterior), intra-alars 1 + 2, supra-alars 1–2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 2 (plus one or two supplementary setulae). Scutellum with basal and subapical scutellar setae, and one pair of crossed apical scutellar setae. Wing hyaline, tegula pale brown, whitish basicosta and brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, calypteres whitish. Legs with coxae, and femora black with thin silvery pruinosity; trochanters somewhat reddish, tibia brown; middle femur with posteroventral ctenidium along 0.3 apical portion, four to five anterior setae, one row of anteroventral; middle tibia with two to three anterdorsal setae, one anteroventral seta, two posterodorsal and one posterior setae; hind trochanter with ventral pad of short and stout spines; hind femur with rows of anterodorsal and anterior setae, one to two apical anteroventral setae; hind tibia with three to four anterodorsal setae, one anteroventral seta, and two posterodorsal setae; middle and hind femora and tibiae covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–5 with one pair of dorsal spots of silvery pruinosity and latero-ventral spots with pale golden pruinosity; T1 + 2–4 with one pair of lateral marginal setae without median marginal setae; T5 with a complete row of marginal setae; ST1–4 black, ST1–3 covered with villous setulae; ST4 covered with shorter setulae; ST5 reddish or brown, distinctly convex at base, with slightly projected bulge, bearing erect setae (Fig. 55).

Terminalia

Syntergosternite 7 + 8 shiny black with golden pruinosity along its posterior margin, with short hair-like setulae and a marginal row of four pairs of strong setae; epandrium with black at basal part (specially on laterals), orange reddish on posterior part, with hair-like setae; cercus broad with rounded apex, covered with few short and thickened spines on laterals (Figs 18, 52); cerci with cercal base 0.67X cercal prong (Figs. 18, 53); surstylus subtriangular, with setae on distal 3/4 (Figs 52, 56); pregonite spatulate and curved, with several ventral setulae (Fig. 52); postgonite curved with two setulae (Fig. 52); phallus with vesica well sclerotized, covered with microserrations and spines (Figs 1, 54, 81); harpes large, somewhat sclerotized and densely covered with macrotrichia (Figs 1, 54, 81); juxta with medial keel basally sclerotized, lateral surfaces covered with microtrichia, and spines restricted to the juxtal apical prolongations (Figs 1, 5, 52, 54, 81); median stylus without microtrichiae, with a small medial projection and large lateral projections poorly sclerotized (Figs 1, 5, 54, 81).

Distribution (Fig. 89)

Argentina: Catamarca, Chubut (**new record**), Córdoba, Río Negro (**new record**), Salta, Santa Fe. **Uruguay:** Río Negro (**new record**).

Material Examined

Argentina: Pampa Central, 1 male (MACN), 23.IX.1931, E. Caride. **Chubut:** Puerto Madryn, 2 males, pitfall, pig carcass (CENPAT), 26–27.X.2010, A.P. Armani; 1 male (CENPAT), 15.II.2011, A.P. Armani; Puerto Madryn, 5 males, 4 females, pitfall, pig carcass (CENPAT), III–IV.2011, A.P. Armani. **Córdoba:** Guanaco Muerto, 3 males (MACN), II.1975, J.C. Mariluis; La Para, 2 females (MACN), II.1975, J.C. Mariluis; Soto, 1 male, 2 females (MACN), I.1918, Curel and Pettis. **Mendoza:** Road 7 between Mendoza and Uspallata, 1 male (MACN) 13.I.2000; Levalle, 1 male (MACN), 28.II.1944, Mansoner; Levalle, Telteca, 1 male, 3 females (MACN), 15-XII-1994, 23.III.1995, 15.II.1996, Roig Juñent and Flores; Mendoza, 2 males, 2 females, on pig carcass (MACN), II–IV.2008, F. Aballay; Santa Rosa, Ñacuñán, 3 males, 7 females (MACN), 16, 29.XII.1981, 4.III.1982, S. Claver. **Río Negro:** Coronel Gomez, 1 male (MLP), II.1950; Las Grutas, 1 male (MACN), I.2000, Ojanguren; Pomona, 1 male (MACN), I.1977, J.C. Mariluis; Road 305 Km 90 between S.A. Oeste y Pomona, 3 males, 2 females (MACN), 15.I.1977, J.C. Mariluis; Río Colorado, 1 male (MACN), 21.I.1977, J.C. Mariluis; San Antonio Oeste, 1 female (MACN), 14.I.1977, J.C. Mariluis. **Salta:** Morillo, 7 males, 6 females (MACN, MNRJ), XII.2003, M. Lucía. **Uruguay, Río Negro:** Arroyo Negro, 15 km S. Paysandu, 1 male (MNRJ), 27-31.XII.1962, R.G. van Gelder.

Remarks

L. margaretae is morphologically very close to of *L. delfinado* (see remarks for this species). The female terminalia are briefly described and illustrated by Blanchard (1939).

Biology

Larvae and adults obtained from pig carcass provide strong evidence of the potential of this species as a forensic indicator.

Lipoptilocnema misella (Lopes)

Figs. 57–59, 83, 89

Sarcophaga misella Lopes, 1938b: 335. Brazil, Goiás, Campinas.

References: Lopes (1942, moved to *Lipoptilocnema*, distribution); Lopes (1969, catalogue); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)).

Male

Body length = 10.08–13.05 mm (m = 11.50 mm, $n = 5$).

Head

Head length at antennal base 1.05–1.10 (m = 1.07, $n = 5$) times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with row of setulae close to eye; fronto-orbital plate with sparse black setulae; post-cranium with golden pruinosity at upper part and gray pruinosity below, with two rows of black occipital setae on upper part, parallel to postorbitals, and pale setae below; frontal vitta brownish; frons at its narrowest point 0.20–0.25 (m = 0.22, $n = 5$) times head width; 8–11 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.3 times inner vertical and divergent, not well differentiated from the postorbitals; ocellar triangle black with yellowish pruinosity, with one pair of small proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with pale golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae; face

with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior half; six to eight subvibrissal setae; antenna dark brown, first flagellomere dark brown with gray pruinosity, length 0.37–0.42 (m = 0.39, *n* = 5) times head height, arista long plumose on basal 3/4 with rays six times largest diameter of arista; palpus brown with black setulae.

Thorax

Black, prescutum and scutum with dorsal and lateral stripes of silvery pruinosity and three black bands; postpronotal lobe and notopleuron with gray-yellowish pruinosity; anepisternum, anepimeron and katepisternum with silvery pruinosity; proepisternum silvery, bare; one proepisternal setae strong plus two or three weaker and shorter supplementary inferior seta; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 with median seta slightly smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 1–2 + 2–3 (only the two posterior larger and differentiated), intra-alars 1–2 + 2, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae, scutellar discal setae absent. Wing hyaline, tegula dark brown, yellowish basicosta and brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6–0.7 of distance to r-m, costal spine well-differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, trochanter and femora black with silvery pruinosity; middle femur without posteroventral ctenidium, three to four anterior setae, and row of anteroventral setae; middle tibia with two anterdorsal seta, two posterodorsal, one to two posteroventral and one posterior setae; hind trochanter with long ventral villosity; hind femur with rows of anterodorsal and anterior setae, one apical anteroventral setae; hind tibia with two anterodorsal setae, one anteroventral seta, and two posterodorsal setae; middle and hind femora covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity; T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 with silvery pruinosity, ST1–4 covered with long setulae; ST5 reddish or brown, V-shaped, posterior margin without median apophysis but with median shallow cleft covered with a tuft of dense spiny setulae (Fig. 59).

Terminalia

Syntergosternite 7 + 8 dark-reddish, with short hair-like setulae and a marginal row of setae; epandrium orange-reddish, with hair-like setae; cercus with pointed and divergent apex (Figs. 57, 58); cerci with cercal base 0.85X cercal prong, cercal prong without short and blunt spinas, bearing normal setae (Figs. 57, 58); surstylus subtriangular with setae on distal 3/4 (Fig. 57); pregonite tiny, with 1/3 of the postgonite length and several setulae (Fig. 57); postgonite curved, elongated, with bifid apex, and without setulae (Fig. 57); phallus with vesica well sclerotized with microserration and macrotrichia, and with lateral projections (Figs. 57, 83); harpes with microserration; juxta without medial keel, juxtal membane covered with microtrichia, with spines on juxtal apical prolongations (Figs. 57, 83); lateral styli partially exposed (lateral view) (Figs 57, 83).

Distribution (Fig. 89)

Brazil: Goiás, Mato Grosso (new record), Minas Gerais.

Type Material Examined

Male holotype (MNRJ), "Campinas-Goyas / Borgmeier et / S.Lopes 2.1.936 [printed on white paper]"// "Holotype [printed on red paper, black frame]"// "Sarcophaga ♂/ misella, n.sp. / Holotypus / 1.38 [handwritten] Det. H.S.Lopes. [printed on white paper, black frame]"// "MNRJ [printed] / 2189 [handwritten on white paper, black frame]". The holotype without abdomen, terminalia glued on label. **Paratype:** one male, same data of holotype (in good condition, terminalia partly extended).

Additional Material Examined

Brazil, Mato Grosso: Chapada dos Guimarães, Vale da Benção S15°26'10" W55°47'9", 1 male (MNRJ), 15.I.2012, Mello-Patiu and Patiu, Projeto Sisbiota-Diptera; Chapada dos Guimarães, Vale do Eco S15°24' W55°50', 1 male (MNRJ), 21.I.2012, Mello-Patiu and Patiu, Projeto Sisbiota-Diptera. **Minas Gerais:** Pirapora, 1 male (MACN), 20.XII.1978, C.J.B. Carvalho.

Remarks

This species does not share several of the diagnostic character states present in all other species of *Lipoptilocnema*, such as the medial apophysis in ST5 present, spines on cercal prong, lateral styli not exposed. However, taking into account the general groundplan of phallic morphology, and specifically the configuration of its juxta, this species would seem to fall in *Lipoptilocnema*. Female unknown.

Biology

Unknown.

Lipoptilocnema salobrensis Lopes

Figs. 60–65, 82, 90

Lipoptilocnema salobrensis Lopes, 1942: 301. Brazil, Mato Grosso [do Sul], Salobra.

References: Lopes (1969, catalogue); Pape (1996, catalogue, moved to *Sarcophaga* (*Lipoptilocnema*)); Firmino-Alves et al. (2014, forensic).

Male

Body length = 10.9–11.43 mm (m = 11.17 mm, *n* = 2).

Head

Head length at antennal base 1.03–1.09 (m = 1.06, *n* = 2) times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with row of small setulae close to eye; fronto-orbital plate with sparse black setulae; postcranium with silvery pruinosity, with two rows of black occipital setae on upper part, parallel to postorbitals, and pale setae below; frontal vitta black; frons at its narrowest point 0.21–0.22 (m = 0.21, *n* = 2) times head width; 7–10 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.25 times inner vertical and divergent; ocellar triangle black, with one pair of small proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae;

face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior 3/4; five to six subvibrissal setae; antenna brown, first flagellomere brown with gray pruinosity, length 0.34–0.38 (m = 0.36, $n = 2$) times head height, arista long plumose on basal 3/4 with rays six times the largest diameter of arista; palpus brown with black setulae.

Thorax

Black, with silvery-gray pruinosity; prescutum and scutum with dorsal and lateral stripes of silvery pruinosity and three black bands; postpronotal lobe notopleuron, anepimeron and katepisternum with silvery pruinosity; anepisternum with yellowish pruinosity; proepisternum silvery, bare; one strong proepisternal setae plus one weaker and shorter supplementary inferior seta; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 with median seta smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 2–3 + 3–4 (only the two posterior larger and differentiated), intra-alars 1–2 + 1–2, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae. Wing hyaline, tegula black, yellowish basicosta and brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, and femora black with thin silvery pruinosity; trochanters somewhat reddish, tibia brown; middle femur without posteroventral ctenidium, three to four anterior setae, three anteroventral setae; middle tibia with one anterdorsal setae, two posterodorsal and one posterior setae; hind trochanter without ventral pad of short and stout spines; hind femur with rows of anterodorsal and anterior setae, one to two apical anteroventral setae; hind tibia with three to four anterodorsal setae, one anteroventral seta, and two posterodorsal setae; middle and hind femora and tibiae covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity; T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 black with silvery pruinosity, ST1–4 covered with long setulae; ST5 reddish or brown, distinctly convex at base, with median basal hump in ventral surface and a median apophysis (slightly bifid) on posterior margin, covered with fine large setulae (Fig. 65).

Terminalia

Syntergosternite 7 + 8 dark reddish (darker at anterior part) with a spot of silvery pruinosity, with short hair-like setulae and a marginal row of four to five pairs of weak setae; epandrium orange-reddish, with hair-like setae; cercus with pointed apex (Figs. 60, 63); cerci with cercal base 0.8X the cercal prong; cercal prong without lateral humps and covered with short and thickened spines (Figs. 60, 63, 64); surstylus broad with setae on distal 3/4 (Fig. 60); pregonite broad, with ventral setulae (Fig. 60); postgonite curved with two or more setulae (Fig. 60); phallus with vesica heavily sclerotized on margins, with microserration (Figs 61, 62, 82); harpes membranous with microserration (Figs 61, 62, 82); juxta short bearing microtrichia on lateral surfaces medial keel membranous, spines on juxtal apical prolongations (Figs. 61, 62, 82); median stylus membranous with microtrichia on upper and lower surface, with large medial and small lateral projections; two prolongations arise from the basal part of median stylus, arching over the juxta (Figs 61, 62, 82).

Distribution (Fig. 90)

Argentina: Chaco (**new record**). **Brazil:** Bahia (**new record**), Espírito Santo (**new record**), Mato Grosso (**new record**), Mato Grosso do Sul, Minas Gerais (**new record**), Paraíba, São Paulo (**new record**). **Paraguay:** Cordillera (**new record**), Misiones (**new record**).

Type Material Examined

Male holotype (MNRJ), "Salobra Jan [1]941 / Mato Grosso [currently Mato Grosso do Sul] / Com. I.O.C. [printed on white paper, black frame]"// Holotype [printed on red paper, black frame]"// "Lipoptilocnema / salobrensis / n.sp. [handwritten] / Det. H.S. Lopes [printed on white paper, black frame]"// "MNRJ [printed] / 2190 [handwritten on white paper, black frame]". The holotype is in good condition, terminalia spread and partly exposed. **Paratype:** 1 female (MNRJ), same data as the holotype.

Additional Material Examined

Argentina: 1 male (MACN), no further data. **Chaco:** Saenz Peña, 1 male (INTA), 14.VIII.1947, Zunino. **Brazil, Bahia:** Encruzilhada, Divisa 4 males (MNRJ), XI.1972, XI.1974, Seabra. **Espírito Santo:** Guarapari, 1 male (MNRJ), XI–XII.1975, A. Aguirre. **Mato Grosso:** Chapada dos Guimarães, Vale do Eco, 1 male (MNRJ), Shannon trap/fish, 16.I.2012, Mello-Patiu and Patiu, Projeto Sisbiota-Diptera; **Mato Grosso do Sul:** Porto Murtinho, Fazenda Retiro Conceição, 1 male (MNRJ), Malaise trap, 10-25.I.2012, Lamas, Nihei and collaborators, Projeto Sisbiota-Diptera; Bodoquena, 1 male (MNRJ), XI.1941. **Minas Gerais:** Parque Florestal do Rio Doce, 1 male (MNRJ), II.1973, H. Ebert; Três Lagoas, Horto Barra do Moedo, 1 male (MNRJ), 13.IV.1993, Flechtmann. **São Paulo:** Anhembi, Barro Rico, 1 male (MNRJ), X.1969, H, Ebert. **Paraguay, Cordillera:** San Bernardino, 1 male (MNRJ), I.1944. **Misiones:** Isla Yacyretá, 1 male (MACN), XII.1976, J.C. Mariluis.

Remarks

The female was briefly described but not illustrated by Lopes (1942).

Biology

Adults were found associated with carrion in a study performed in the Caatinga ecoregion (Firmino-Alves et al. 2014).

Lipoptilocnema savana Mulieri and Mello-Patiu sp. Nov

Figs 66–70, 84, 87

(urn:lsid:zoobank.org:act:588225B1-B911-4F7E-98DE-5DF151552598)

Male

Body length = 9.56–11.52 mm (m = 10.69 mm, $n = 4$).

Head

Head length at antennal base 0.80–0.87 (m = 0.84, $n = 4$) times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with row of setulae close to eye; fronto-orbital plate with sparse black setulae; post-cranium with golden pruinosity, with two rows of black occipital setae on

upper part, parallel to postorbitals, and pale setae below; frontal vitta black; frons at its narrowest point 0.25–0.29 (m = 0.27, *n* = 4) times head width; 9–10 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and reclinate, outer vertical setae 0.20 times inner vertical and divergent; ocellar triangle black, with one pair of small proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae; face with silvery pruinosity; facial ridge blackish with silvery pruinosity, with short setulae in the inferior half; four to six subvibrissal setae; antenna dark brown, first flagellomere brown with gray pruinosity, length 0.33–0.39 (m = 0.36, *n* = 4) times head height, arista long plumose on basal 2/3 with rays six times the largest diameter of arista; palpus dark brown with black setulae.

Thorax

Black, with silvery-gray pruinosity; prescutum and scutum with dorsal and lateral stripes of silvery pruinosity and three black bands; postpronotal lobe notopleuron, anepisternum and anepimeron with pale golden pruinosity, katepisternum with silvery pruinosity; proepisternum silvery, bare; one strong proepisternal setae plus one weaker and shorter supplementary inferior seta; one; katepisternals 3, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 2–3 + 2–3 (only the two posterior larger and differentiated), intra-alars 1 + 1–2, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae, scutellar discal setae usually absent (if present they are weak). Wing hyaline, tegula black, yellowish basicosta and brown veins, R_1 bare, $R_{4\ 5}$ setulose in proximal 0.4–0.6 of distance to r-m, costal spine differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, and femora black with thin silvery pruinosity; trochanters somewhat reddish, tibia brown; middle femur with posteroventral ctenidium along 0.3 apical portion, four to five anterior setae, one row of anteroventral; middle tibia with two anterdorsal setae, two posterodorsal and one posterior setae; hind trochanter with with long ventral villosity; hind femur with rows of anterodorsal and anterior setae, one to two apical anteroventral setae; hind tibia with two to four anterodorsal setae, one anteroventral seta, and two posterodorsal setae; hind femora and tibiae covered with long villosity; tarsi blackish.

Abdomen

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 reddish-brown with silvery pruinosity, ST1–4 covered with long setulae; ST5 reddish or brown, distinctly convex at base, with bilobed and higly sclerotized median apophysis on median margin, covered with fine large setulae along its inner margin (Fig. 69).

Terminalia

Syntergosternite 7 + 8 shining dark brown, with short hair-like setulae and a marginal row of seven to eight pairs of setae; epandrium orange-reddish, with hair-like setae; cercus with pointed apex (Figs. 66, 67); cerci with cercal base 2X the cercal prong; cercal prong without lateral humps, covered with few short and thickened spines (Fig. 67); surstylus longated with setae at inferior half (Fig. 66); pregonite small and spine-like shaped with setulae (Fig. 66); postgonite curved with two setulae (Fig. 66); phallus with a conspicuous and elongated vesica basally well sclerotized, covered with microserrations, distally membranous with microtrichia (Figs 66, 84); harpes membranous covered with microtrichia (Figs 66, 84); juxta without medial keel and lateral surfaces not covered with microtrichia, spines restricted to the apical part of the strongly divergent juxtal prolongations (Figs 66, 68, 84); lateral styli somewhat exposed (lateral view) (Fig. 84); median stylus without microtrichiae with medial projection and lateral slender projections (Figs 66, 84).

Etymology

The species epithet, *savana*, is referring to the ecoregion where the species has been collected, the Cerrado, also known as Brazilian savanna. The name is to be treated as a noun in apposition.

Distribution (Fig 87)

Brazil: Distrito Federal, Minas Gerais.

Type Material

Male holotype (MNRJ), "Brasil, D[istrito] F[ederal] / Faz[enda] Água Limpa / Porco 4, 4° dia / 03-IV-2004." [printed on white paper] // "Holotype [printed on red paper, black frame]" // "Lipoptilocnema / savana n.sp. (HOL.) [handwritten on white paper] / Det. C.A. Mello-Patiu [printed] / 2008 [handwritten in vertical position]". The holotype with terminalia spread and exposed, two legs glued on card. **Paratypes: Brazil, D.F.** [Distrito Federal], Brasília, 1 male (MACN), IX.1960, A.B. Guimarães; **Minas Gerais,** Uberlândia, 2 males (MNRJ), 24.VII.2005, 20.II.2010, Mendes et al.

Remarks

This species is easily distinguished by the markedly divergent juxtal prolongations.

Biology

Adults were obtained on pig carcasses from two experiments in the Brazilian savanna (Barros et al. 2008, Mello-Patiu et al. 2014).

Lipoptilocnema tibanae Mulieri and Mello-Patiu sp. Nov

Figs 22, 71–74, 87

(urn:lsid:zoobank.org:act:0B502FEE-7043-4012-9D8B-3327105AD1E9)

Male

Body length = 12.60 mm (*n* = 1).

Head

Head length at antennal base 1.08 times head length at vibrissal level. Parafacial and fronto-orbital plates with golden pruinosity; parafacial plate with few sparse setulae; fronto-orbital plate with few sparse black setulae; post-cranium with silvery pruinosity, with three rows of black occipital setae on upper part, parallel to postorbitals (Fig. 71), and pale setae below; frontal vitta dark brown or blackish; frons at its narrowest point 0.22 times head width; 10–11 frontal setae, row of frontals diverging anteriorly at level of pedicel; orbital reclinate setae present; inner vertical setae strong and

reclinate, outer vertical setae 0.25 times inner vertical and divergent; ocellar triangle black, with one pair of proclinate and divergent ocellar setae; postocellar and paravertical setae present; postocular area with golden pruinosity; genal groove and genal dilation with golden pruinosity; postgena with silvery pruinosity, gena with black setae; postgena with pale setae and few black setae on the anterior part; face with silvery pruinosity; facial ridge black with silvery pruinosity, with short setulae in the inferior 3/4; five to seven subvibrissal setae; antenna black, first flagellomere brown with gray pruinosity, length 0.39 times head height, arista long plumose on basal 2/3 with rays eight times largest diameter of arista; palpus black with black setulae.

Thorax

Black, with silvery pruinosity; prescutum and scutum with dorsal and lateral stripes of silvery pruinosity and three black bands; postpronotal lobe notopleuron, anepisternum, anepimeron and katepisternum with silvery pruinosity; proepisternum silvery, bare; one strong proepisternal setae plus one weaker and shorter supplementary inferior seta; one proepimeral setae plus one weaker and shorter supplementary inferior seta; katepisternals 3 with median seta smaller, postalar wall setulose. Chaetotaxy: acrostichals setae 0 + 1, dorsocentrals 3–5 + 3–4 (only the two posterior larger and differentiated), intra-alars 2 + 2, supra-alars 2 + 3 (the middle stronger), anterior postpronotal 1, basal postpronotals 2, postalars 2, notopleurals 4 (two larger and two smaller). Scutellum with two pairs of lateral scutellar setae and one pair of crossed apical scutellar setae, scutellar discal setae absent. Wing hyaline, tegula black, whitish basicosta and dark brown veins, R_1 bare, R_{4+5} setulose in proximal 0.6 of distance to r-m, costal spine not differentiated, third costal sector without ventral setae, cell r_{4+5} open at wing apex, lower calypter whitish. Legs with coxae, trochanters and femora black with thin silvery pruinosity; tibia black; middle femur without posteroventral ctenidium, four to five anterior setae and one row of anteroventral setae; middle tibia with one anterdorsal setae, two posterodorsals and one posterior setae; hind femur with rows of anterodorsal and anterior setae, one to three apical anteroventral setae; hind tibia with three to four anterodorsal setae, one anteroventral seta, and two posterodorsal setae; middle and hind femora and tibiae covered with long villosity; tarsi blackish.

Abdomen (Fig. 22)

Black; sternites exposed; T1 + 2–T5 with dorsal and lateral spots of silvery pruinosity T1 + 2–T4 each with one pair of lateral marginal setae; T4 with median marginal setae; T5 with complete row of marginal setae; ST1–4 black with silvery pruinosity, ST1–4 covered with long setulae; ST5 dark reddish, distinctly convex at base, with bifid apophysis on median margin, covered with fine large setulae (Fig. 72).

Terminalia

Syntergosternite 7 + 8 shiny black with a faint median spot of yellowish pruinosity, with short hair-like setulae and a marginal row of setae; epandrium orange-reddish, with hair-like setae; cercus with rounded apex (Fig. 73, 74); cerci with cercal base 0.6X the cercal prong; cercal prong covered with short blunt spines, without humps (Fig. 74); surstylus broad with setae on distal 3/4 (Fig. 73); pregonite broad and curved, with ventral setulae (Fig. 73); postgonite curved with four or more setulae (Fig. 73); phallus with vesica somewhat sclerotized with microserration (Fig. 73); harpes membranous with microserration (Fig. 73); juxta short bearing microtrichia on lateral surfaces, medial keel membranous, spines restricted to shortened juxtal apical projections (Figs 73, 74); median stylus very much developed, membranous, with microtrichia on upper and lower surface, with medial and lateral folded projections (Fig. 73).

Etymology

The species epithet, *tibanae*, is given in honor of Prof. Rita Tibana, professor emerita of the Museu Nacional Rio de Janeiro, for her endeavors in understanding the Neotropical fauna of Sarcophagidae.

Distribution (Fig 87)

Brazil: Rio de Janeiro.

Type Material

Male holotype (MNRJ), "Brasil, Rio de Janeiro / Arraial do Cabo, Prainha / 15.IX.2005 Barros col." [printed on white paper]" // "Holotype [printed on red paper, black frame]" // "Lipoptilocnema / tibanae n.sp. / Det. C. Mello-Patiu" [handwritten on white paper]. The holotype is in good condition, terminalia spread and exposed.

Remarks

This species is easily distinguished by the noticeably developed and folded median stylus covered by microtrichia on dorsal and ventral surfaces.

Biology

Unknown.

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