

# A new species of *Labania* Hedqvist (Braconidae, Doryctinae) from Costa Rica, reared from aerial root galls of *Ficus obtusifolia* Kunth

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## Abstract

A new species of the Doryctinae genus *Labania* Hedqvist, *L. ficophaga* **sp. n.** from Costa Rica is described. This new species was reared from aerial root galls of *Ficus obtusifolia* Kunth. An updated key to the five described species of *Labania* and digital pictures of *L. ficophaga* **sp. n.** and *L. minuta* Marsh are provided.

## Keywords

Ichneumonoidea, Neotropics, gall-association, Hymenoptera

## Introduction

The genus *Labania* Hedqvist is a small doryctine group restricted to the Neotropical region and is currently composed of four species. This genus was erected by Hedqvist (1963) based on a single species from Honduras, *L. straminea* Hedqvist. In the description, *Labania* was placed within the morphologically heterogeneous subfamily Hormiinae, but it was subsequently transferred to the Doryctinae in a tribal reclassi-

fication of this subfamily (Belokobylskij 1992). To date, only three additional species of *Labania* have been described from Costa Rica (Marsh 2002), *L. hansonii* Marsh, *L. minuta* Marsh and *L. prolata* Marsh, with the first two being reared from aerial root galls on *Ficus citrifolia* Mill. and leaf galls on *F. colubrinae* Strandl., respectively.

In his tribal reclassification of the Doryctinae, Belokobylskij (1992) placed *Labania* as the single member of the tribe Labaniini based on several putative apomorphic features. More recently, however, three molecular phylogenetic studies consistently recovered a clade exclusively composed of genera whose species are associated with galls from different plant families, including *Labania* (Zaldivar-Riveron et al. 2007, 2008, 2014). In the most recent of these studies (Zaldivar-Riverón et al. 2014), the authors described three new gall-associated doryctine genera whose species with rearing records were all associated with *Ficus* species. One of them, *Ficobolus* Belokobylskij & Zaldivar-Riverón, was recovered as sister to *Labania*; the latter genus was represented in that study by an undescribed species from Costa Rica.

In this work, this new species of *Labania*, which was reared from aerial roots on *F. obtusifolia* Kunth is described, and observations that suggest that this new species is phytophagous are provided. An updated key (adapted from Marsh 2002) to the five described species of *Labania* is given.

## Material and methods

All specimens of the new species of *Labania* described here were reared from a single tree of *F. obtusifolia* (see details below). Specimens belonging to two of the remaining species of the genus were also examined, as well as digital photographs of the holotype of *L. straminea*, deposited at National Museum of Natural History (Washington, D.C., USA). The type material of the new species is deposited in the following collections: Colección Nacional de Insectos, Instituto de Biología, Universidad Nacional Autónoma de México (CNIN IB-UNAM); Museo de Zoología, University of Costa Rica, San José, Costa Rica (MZCR); Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZISP); and National Museum of Natural History, Washington, DC (NMNH).

The terminology employed in this work for the morphological features and measurements follows Belokobylskij and Maetò (2009). The wing venation nomenclature follows Belokobylskij and Maetò (2009) and Sharkey and Wharton (1997) in parentheses. Photographs were taken with a Leica IC 3D digital camera mounted on a Leica® MZ16 microscope and using the Leica Application Suite® imaging system.

## Other examined material

*Labania straminea*. Holotype: female, Honduras, La Ceiba. *Labania minuta*: 5 females, 5 males. Costa Rica, Turriatlico, Turrialba, ex leaf-ball gall of *Ficus colubrinae*, IX-2013, K. Nishida col. *Labania hansonii*: 2 females, 1 male. “Costa Rica: DNA Hym- 46”.

## Results

### Taxonomy

#### *Labania ficophaga* Belokobylskij & Zaldívar-Riverón, sp. n.

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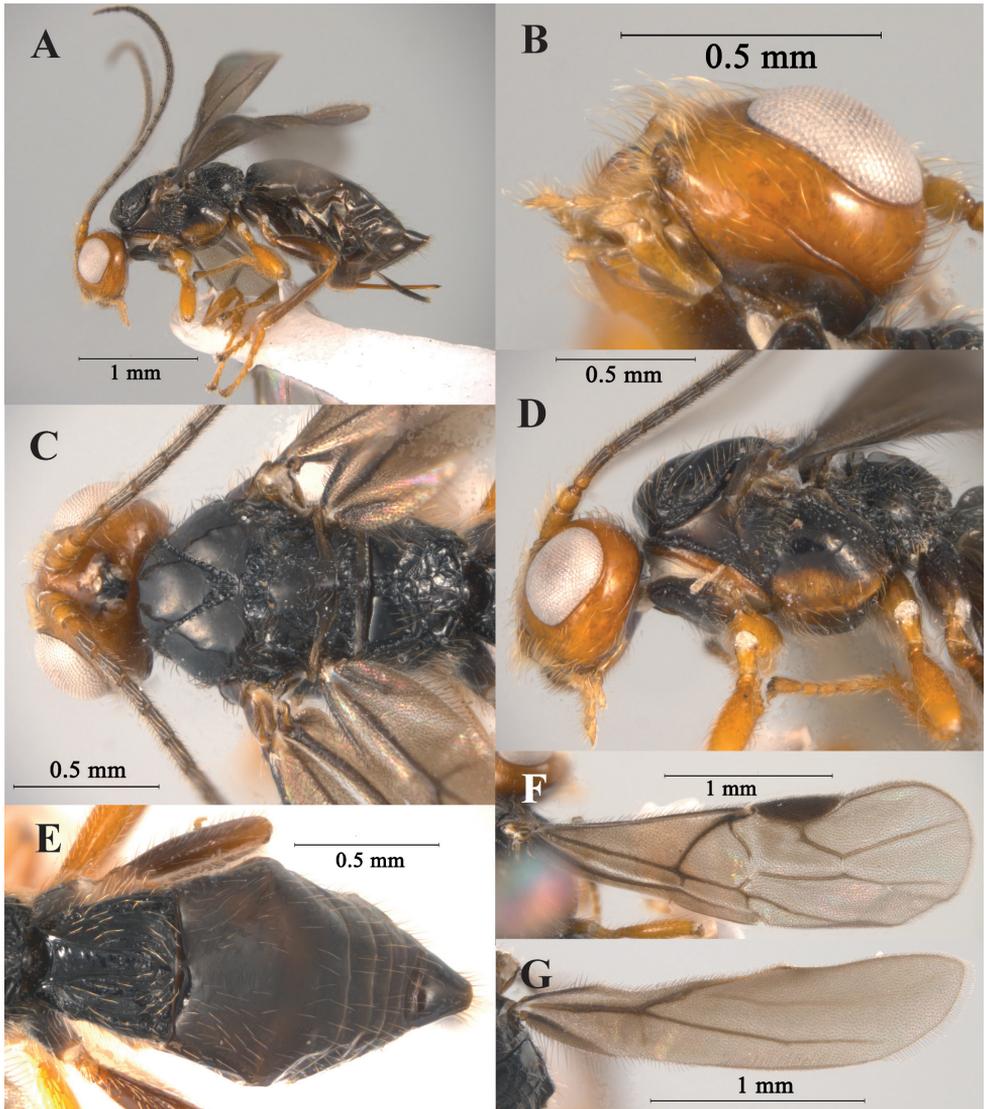
Figs 1; 2A–B

**Diagnosis.** This new species is morphologically similar to *L. hansonii* Marsh; however, *L. ficophaga* can be distinguished from the latter species by the following features: 1) greater diameter of eye 2.0–2.2 times wider than temple (1.4–1.7 times in *L. hansonii*); 2) eye covered by short and sparse setae (long and very dense setae in *L. hansonii*); 3) malar space 0.35–0.4 times height of eye (0.4–0.5 times in *L. hansonii*); 4) propodeum mainly rugose-striate, smooth only in basolateral areas (mainly smooth, rugose only medially in *L. hansonii*); 5) discoidal (first discal) cell distinctly sessile anteriorly (petiolate anteriorly in *L. hansonii*); 6) dorsal carinae of the first metasomal tergite almost complete (incomplete in *L. hansonii*); 7) vertex and frons light reddish brown or brownish yellow (reddish brown to black in *L. hansonii*); 8) basal antennal segments black or almost black (yellow or brownish yellow in *L. hansonii*); 9) hind femur and tibia of female dark reddish brown to reddish brown (yellow or brownish yellow in *L. hansonii*).

*Labania ficophaga* is also morphologically similar to *L. minuta*, but differs from this species by having: 1) a larger body length, from 3.6 to 4.1 mm (1.0 to 1.8 mm in *L. minuta*; Fig. 3A); 2) antenna 23–26-segmented (less than 20 antennomeres in *L. minuta*; Fig. 3A); 3) notauli joining at the end of mesoscutum in a wide longitudinally striate-rugose area (joining at the end of mesoscutum in narrow rugose area in *L. minuta*; Fig. 3B); 4) head light reddish brown or yellowish brownish (face and temple honey yellow to brown, frons and vertex black in *L. minuta*; Figs 3A–C); and 5) entirely smooth second metasomal tergite (with mediobasal longitudinal striae in *L. minuta*; Fig. 3E).

**Description. Female.** Body length 3.6–4.1 mm; fore wing length 3.1–3.2 mm.

**Head:** width 1.8–1.9 times its median length, 1.15–1.20 times width of mesoscutum. Head behind eyes (dorsal view) distinctly roundly narrowed. Transverse diameter of eye 2.0–2.2 times wider than temple. Ocelli medium-sized, arranged in triangle with base 1.2–1.3 times its sides. POL 0.8–1.0 times Od, 0.30–0.35 times OOL. Frons excavation deep, not wide, not extending beyond antennal sockets, with shallow or very shallow median furrow. Eye without emargination opposite antennal socket, 1.3 times as high as broad. Malar space 0.35–0.40 times height of eye, 0.8–1.0 times basal width of mandible. Face slightly convex, its width 0.9 times height of eye and 0.9–1.0 times height of face and clypeus combined. Clypeus convex, about twice as wide as high. Width of hypoclypeal depression almost equal to distance from edge of depression to eye, 0.5–0.6 times width of face. Hypostomal flange narrow. Occipital carina not fused with hypostomal carina and obliterated ventrally. Palpi short, maxillary palpus 5-segmented, labial palpus 2-segmented.



**Figure 1.** *Labania ficophaga* sp. n. (female, paratype): **A** habitus, lateral view **B** head and palpi, ventro-latero-posterior view **C** head and mesosoma, dorsal view **D** head and mesosoma, lateral view **E** metasoma, dorsal view **F** fore wing **G** hind wing.

*Antenna*: thickened, weakly setiform, covered by dense and dark setae, 23–26-segmented. Scape 1.5–1.6 times longer than its maximum width, almost twice as long as pedicel. First flagellar segment 4.0–4.5 times longer than its apical width, 1.2–1.3 times longer than second segment. Penultimate segment 2.2–2.3 times longer than its width, 0.7–0.8 times as long as apical segment; the latter pointed apically.

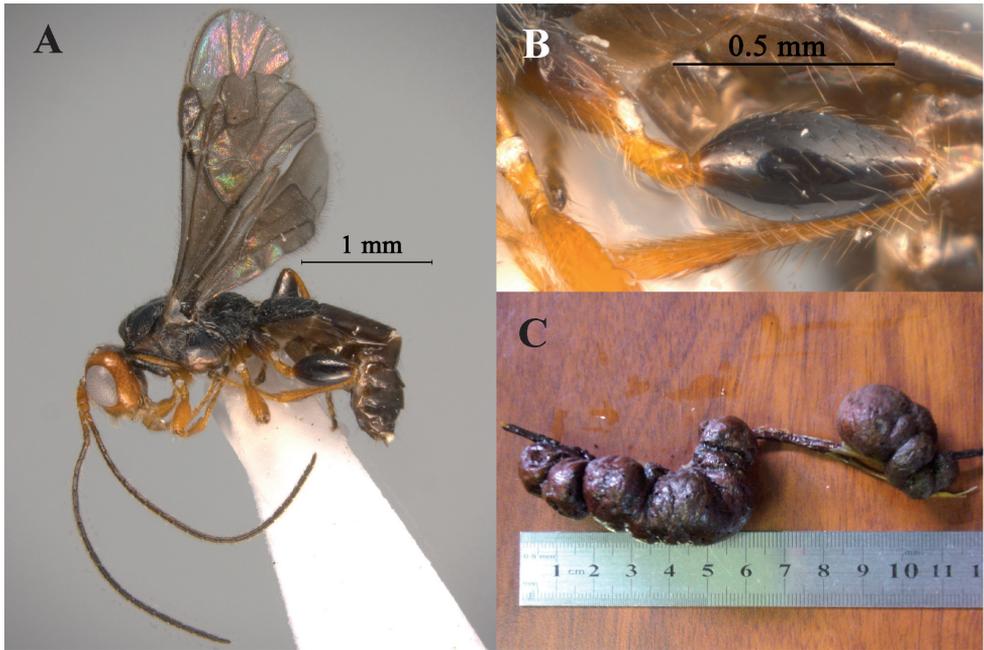
*Mesosoma*: length 1.6–1.7 times its height. Median lobe of mesoscutum distinctly and highly convex (lateral view), slightly protruding forward and rounded

anteriorly (dorsal view). Oblique submedian furrow on side of pronotum narrow and densely crenulated. Notauli complete, deep, narrow and densely crenulated, joining at the end of mesoscutum in a longitudinally striate-rugose area. Prescutellar depression long, deep, with several more or less high carinae, densely and distinctly reticulate-striate between carinae, 0.25–0.35 times as long as scutellum. Scutellum 1.2 times longer than maximum anterior width. Scuto-scutellar suture absent. Precoxal sulcus almost absent or very weak, short. Metanotal tooth low (lateral view). Metapleural flange quite short and wide, almost indistinct. Propodeal lateral tubercles large and wide.

*Wings*: fore wing 2.7–3.0 times longer than its maximum width. Pterostigma 2.9–3.5 times longer than width. Metacarp (R1) 1.2–1.3 times longer than pterostigma. Radial (marginal) cell long, open apically after strong desclerotisation of apical part of third radial abscissa (3RSb). First (r) and second (3RSa) radial abscissae forming an obtuse angle. Second radial abscissa (3RSa) 4.0–4.3 times longer than first abscissa (r), 0.35–0.40 times as long as the straight third abscissa (3RSb). First radiomedial vein (2RS) mainly or completely absent, rarely present and short, or (exceptionally) with elongate anterior part of abscissa. Second radiomedial (second submarginal) cell fused with first radiomedial (first submarginal) cell, slightly narrowed apically. First medial abscissa ((RS+M)a) distinctly sinuate. Discoidal (first discal) cell sessile. Recurrent vein (1m-cu) 0.3–0.4 times as long as basal vein (1M); these veins parallel. Distance from nervulus (1cu-a) to basal (1M) vein 0.7–0.8 times nervulus (1cu-a) length. Brachial (first subdiscal) cell long, wide, opened apico-posteriorly after strong desclerotisation of second abscissa of longitudinal anal vein (2-1A). Brachial vein (2cu-a) long and mainly pigmented. Hind wing 4.0–4.1 times longer than its maximum width. Hamuli 3–4. Medial (basal) cell apically widely open after strong desclerotisation of second abscissa of costal vein (SC+R). Nervellus (cu-a) absent; submedial (subbasal) cell widely open apically. Recurrent vein (m-cu) distinct or fine, straight or slightly curved, more or less inclivous, interstitial, distinctly or sometimes faintly pigmented.

*Legs*: hind coxa without basoventral corner and tubercle, 1.4–1.5 times longer than maximum width, about 0.8 times as long as propodeum. Hind femur 2.8–3.1 times longer than width. Hind tarsus 0.8–0.9 times as long as hind tibia. Basitarsus of hind tarsus 0.55–0.60 times as long as second to fifth segments combined. Second segment of hind tarsus 0.5 times as long as basitarsus, 0.9 times as long as fifth segment (without pretarsus). Claws large.

*Metasoma*: 1.0–1.1 times longer than head and mesosoma combined. First tergite distinctly and almost linearly widened from base to apex, with slightly impressed spiracular tubercles in basal third, with distinct, almost complete and slightly convergent posterior dorsal carinae. Maximum width of first tergite about 2.0 times its minimum width; length 0.9–1.0 times its apical width, 1.4–1.5 times length of propodeum. Suture between second and third tergites quite shallow and almost complete. Median length of second and third tergites 1.1–1.2 times basal width of second tergite, 0.8–0.9 times maximum width of these tergites. Ovipositor short, its sheath about as



**Figure 2.** *Labania ficophaga* sp. n. (male, paratype): **A** habitus, lateral view **B** hind femur **C** Aerial root galls on *F. obtusifolia* Kunth where specimens of *L. ficophaga* were reared.

long as first tergite of metasoma, 0.40–0.45 times as long as mesosoma, 0.18–0.22 times as long as fore wing.

*Sculpture and pubescence:* head entirely smooth, sometimes frons near antennal sockets with several curved striae. Mesoscutum smooth, with rugulosity in short and small medioposterior area. Scutellum mainly smooth, finely striate laterally. Mesopleuron mostly smooth. Propodeum widely rugose-striate, with all areas distinctly delineated by carinae; basolateral areas short, semi-rounded, mainly smooth; areola wide, about as long as maximum width; basal carina 0.2–0.3 times as long as basal fork of areola. Hind coxa and femur smooth. First tergite mainly striate with rugosities, finely reticulate to almost smooth between dorsal carinae. Remaining tergites entirely smooth. Vertex with numerous, dense and semi-erect pale setae. Mesoscutum mainly glabrous, with dense and erect pale setae arranged in almost single lines along notauli and laterally. Mesopleuron medially rather widely glabrous. Hind tibia dorsally with dense, relatively long and semi-erect pale setae, its length 0.5–0.8 times maximum width of hind tibia.

*Colour:* head entirely light reddish brown or sometimes yellowish brownish, ocellar triangle often black. Antenna black, dark reddish brown basally, two basal segments yellowish brown. Palpi pale brown. Mesosoma almost reddish black, with light brown on narrow stripe along lower margin of pronotal sides and along area of precoxal sulcus. Metasoma mainly dark reddish brown, dorsal basal and apical parts black. Fore and mid-

dle legs light reddish brown to yellowish brown. Hind leg mainly dark reddish brown, tibia faintly paler and light reddish brown basally and apically, hind tarsus entirely light reddish brown. Ovipositor sheath almost black. Fore and hind wings distinctly and evenly darkened, veins dark brown. Pterostigma black, slightly paler apically.

**Male.** Body length 2.9–3.9 mm; fore wing length 2.5–2.7 mm. Antenna slender, filiform or narrow basally and weakly thickened apically, 20–22-segmented. First flagellar segment 4.5–4.8 times longer than its apical width. Hind femur strongly widened, 1.9–2.1 times longer than width, dark brown or dark reddish brown. Hind tibia almost entirely light reddish brown. Metasoma 0.9–1.0 times as long as head and mesosoma combined. Length of first tergite 1.1 times its apical width, 1.2–1.5 times length of propodeum. Otherwise similar to female.

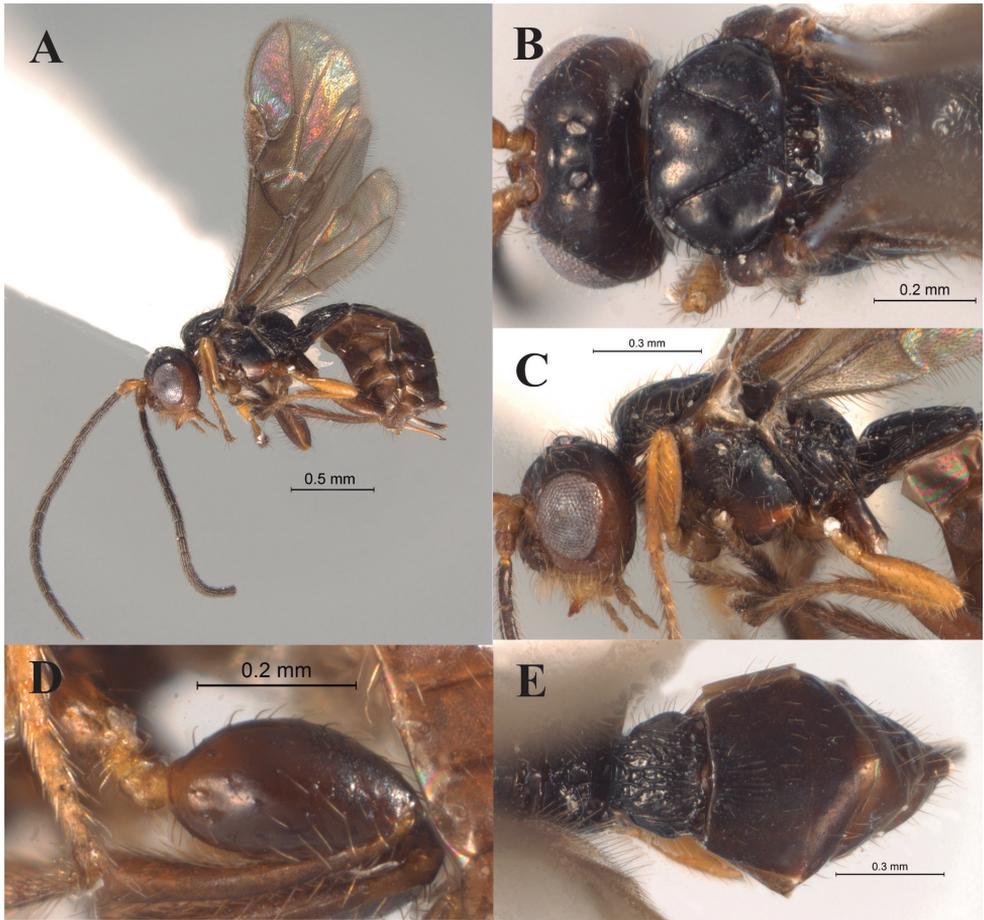
**Distribution.** Known only from Costa Rica.

**Type material.** *Holotype*: female, “Costa Rica: San Jose, Reserva el Rodeo, root galls on *Ficus obtusifolia*, IV.2011, Col. Miguel Artavia (IB-UNAM). *Paratypes*: 30 females (9 in alcohol), 16 males (4 in alcohol), the same label as holotype (IB-UNAM, MZCR, ZISP, NMNH); 1 female, same data as holotype, DNA voucher number CNIN1078 (IB-UNAM), GenBank accession numbers KJ586713 (COI), KJ586690 (*wingless*) and KJ586780 (28S) (Zaldívar-Riverón et al. 2014) (IB-UNAM).

**Biology.** All examined specimens of *L. ficophaga* were reared from aerial root galls on a single *F. obtusifolia* tree. Each gall (Fig. 2C) was approximately 1.5 cm in diameter and contained multiple larval chambers. Galls were frequently grouped together forming a mass that measured up to 6 cm in diameter and 12 cm in length. A photograph of these galls is shown in Zaldívar-Riverón et al. (2014; Fig. 1B). They are similar to the galls induced by *L. hansonii* Marsh on *F. citrifolia*, as reported by Marsh (2002). It should be noted that the identification of the *F. citrifolia* requires verification; it is possible that the correct identity is *F. eximia* Schott.

Galls of *L. ficophaga* were tracked on the host tree during a two years period (2011–2012), during which time the tree was visited every month. All wasps, including four additional species that are probably parasitoids, emerged during April and May. No wasps emerged during any other month. New galls began appearing in May and June and became full-sized in August.

Two lines of evidence suggest that *L. ficophaga* is the gall inducer. First, it is larger than the other four species emerging from these galls (parasitoids are expected to be slightly smaller, unless they feed on gall tissue). Second, of the five species of hymenopterans reared from these galls (no other insects were reared), *L. ficophaga* was the only species that was present in all the samples and in most samples it was also the most numerous species. For example, eight galls collected in April 2011 yielded 389 *Labania*, 89 Eurytomidae (probably *Phylloxeroxenus* Ashmead) species #1, and 28 Eurytomidae (probably *Phylloxeroxenus* Ashmead) species #2. Two galls collected in April 2012 yielded 45 *Labania* and 4 Eurytomidae species #2. One gall collected in May 2012 yielded 10 *Labania*, 17 *Torymus* Dalman (Torymidae), 1 Eurytomidae species #1, and 2 Platygastriidae.



**Figure 3.** *Labania minuta* Marsh (female **A–C, E**; male **D**): **A** habitus, lateral view **B** head and mesosoma, dorsal view **C** head and mesosoma, lateral view **D** hind femur **E** metasoma, dorsal view.

**Updated key to species of *Labania* (after Marsh 2002)**

- 1 Body length 1.0–1.8 mm (Fig. 3A). Antenna with less than 20 segments ..... *L. minuta* Marsh (Fig. 3A–E).
- Body length 2.5–4.1 mm (Fig. 1A). Antenna with more than 20 segments..... **2**
- 2 Second metasomal tergite completely smooth (Fig. 1E). Mesosoma and metasoma mainly or entirely black or dark reddish brown (Figs 1A, C, D, E). Wings distinctly darkened (Figs 1A, F, G, 2A) ..... **3**
- Second metasomal tergite longitudinally striate basally. Mesosoma and metasoma at least partly brown. Wings mainly subhyaline ..... **4**
- 3 Transverse diameter of eye 1.4–1.7 times wider than temple. Eye covered with long and very dense setae. Malar space 0.4–0.5 times height of eye. Propodeum mainly smooth, rugose only medially. Discoidal (first discal) cell

- petiolate. Dorsal carinae of first metasomal tergite incomplete. Vertex and frons dark reddish brown to black..... *L. hansonii* Marsh
- Transverse diameter of eye 2.0–2.2 times wider than temple (Fig. 1C). Eye covered with short and sparse setae. Malar space 0.35–0.40 times height of eye (Fig. 1D). Propodeum mainly rugose-striate, smooth only in basolateral areas (Fig. 1C). Discoidal (first discal) cell sessile (Fig. 1F). Dorsal carinae of first metasomal tergite almost complete (Fig. 1E). Vertex and frons light reddish brown or brownish yellow..... *L. ficophaga* sp. n.
- 4 Ovipositor extending beyond apex of mesosoma by length of hind basitarsus. First metasomal tergite parallel-sided, its length greater than apical width. Body length 3.0–3.5 mm..... *L. prolata* Marsh
- Ovipositor usually not extending beyond apex of mesosoma, rarely only very weakly and much less than length of hind basitarsus. First metasomal tergite distinctly widened apically, its length about equal to posterior width. Body length 2.5–4.0 mm ..... *L. straminea* Hedqvist

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