



## New data on poorly known species of the genus *Leia* Meigen (Diptera, Mycetophilidae) from the Palaearctic region

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### Abstract

New data on four poorly known species of the genus *Leia* Meigen (*L. nigricornis* van Duzee, *L. flavipennis* Laštovka & Matile, *L. iturupensis* Zaitzev and *L. rufiptera* Ostroverkhova) are presented. Detailed redescrptions and terminalia figures are provided. *Leia nigricornis* is reported for the first time from the Palaearctic region and *L. autumnala* Ostroverkhova & Grishina is found to be a junior synonym of *L. flavipennis*. A variation in the male terminalia of *L. bimaculata* Meigen is illustrated, based on specimens from several European countries.

**Key words:** Palaearctic, fungus gnats, poorly known species

### Introduction

The genus *Leia* Meigen, 1818 belongs to the Mycetophilidae (Bibionomorpha) in the subfamily Leiinae. There are 166 valid described species in the genus, of which 64 are Neotropical, 32 Palaearctic, 23 Afrotropical, 22 Oriental, 18 Nearctic and one (*L. winthemii* Lehmann) Holarctic species (Pape & Evenhuis 2013, Oliveira & Amorim 2014). Two species are Australasian, but according to Matile (1993) the species *L. delobeli* Matile, described from New Caledonia, may actually be Oriental in origin, and a Tasmanian species *Leia fulva* (Walker) may belong to a different genus. The origin of *L. arsona* Hutson may be Afrotropical or Neotropical, although the species is known to be widely spread by trade (Hutson 1978, Toft & Chandler 2004). It is known from Africa, Atlantic islands, Near East, New Zealand and several European countries, mostly occurring in nurseries and urban areas, but also caught in the wild in Czech Republic (Ševčík & Roháček 2008). Larvae of the genus *Leia* are associated with decaying plant material (Hutson 1978, Ševčík & Roháček 2008), nests of birds and mammals (Hutson et al. 1980), decaying wood (Jakovlev 2011) and fungal fruiting bodies (Weiss 1919, Rimšaitė 2000, Ševčík 2010).

A key to the Palaearctic species of *Leia* by Plassmann (1973) contains 19 species, including four species now placed in other genera of Leiinae, and two species (*L. immaculata* (Giglio-Tos) and *L. unicolor* (Winnertz)) currently treated as *nomina dubia*. Three species (*L. fuscicalcar* Edwards, *L. pilosa* Okada, *L. rubrithorax* Okada) were missing in this work and 16 species were described afterwards from Europe (Caspers 1991, Bechev 1997, Ševčík & Papp 2003, Chandler 2004, Kurina 2008), East Russia (Ostroverkhova & Grishina 1974, Ostroverkhova 1977, Zaitzev 2001), Mongolia (Laštovka & Matile 1974), Japan (Sasakawa, 1994) and Kyrgyzstan (Zaitzev 1994). Fairly comprehensive keys are available for Great Britain (Hutson et al., 1980) and Russia (Zaitzev, 1994).

Most of the *Leia* species are rather poorly documented, especially as concerns the illustrations of male terminalia. For many species these are not available at all or very sketchy. Details of the aedeagal complex (which may be of crucial importance to distinguish some closely related species) with few exceptions are illustrated only in recent descriptions.

In the present paper we give extended redescrptions and provide detailed terminalia figures for four poorly known species of the genus *Leia* from the Palaearctic region. We also illustrate a variation in the male terminalia of *L. bimaculata* Meigen, based on the specimens from several European countries.

## Material and methods

The material is deposited in the following collections:

CAS—California Academy of Sciences collection, San Francisco, USA

CNC—Canadian National Collection, Ottawa, Canada

FMNH—Finnish Museum of Natural History, Helsinki, Finland

IZBE—Institute of Zoology and Botany, Tartu, Estonia

JES—Private collection of Jukka Salmela, Rovaniemi, Finland

LZM—Lithuanian Zoological Museum, Vilnius, Lithuania

ZIN—Zoological Institute, Saint Petersburg, Russia

ZMUT—Zoological Museum, University of Turku, Finland

Terminalia of the studied specimens were detached from the abdomen, heated in a solution of KOH, washed in distilled water, and placed into glycerine for detailed study. Afterwards terminalia were kept in microvials with glycerine, pinned together with the rest of the body. A Leica DM1000 microscope with Leica DFC290 digital camera was used to capture stacked images of terminalia, which were then combined using “Helicon Focus” software (<http://www.heliconsoft.com/heliconsoft-products/helicon-focus>). Additional images were sent to us by colleagues (see acknowledgements). Photographs were used as templates to produce digital illustrations with “Inkscape” vector drawing editor (<http://inkscape.org>). Final plates were prepared with GIMP image editor (<http://www.gimp.org>).

Morphological terminology follows Söli (1997). Abbreviations of biogeographical provinces in Finland and Sweden follow the Fauna Entomologica Scandinavica series (e.g. Chandler 2001). The Finnish coordinates given below follow the international WGS84 system.

## Poorly known species of the genus *Leia* Meigen

### *Leia flavipennis* Laštovka & Matile, 1974

(Figs. 1; 6A)

*Leia flavipennis* Laštovka & Matile, 1974: 99

=*Leia automnala* Ostroverkhova & Grishina, 1974: 80 *syn.n.*

**Material examined:** RUSSIA: 1♂, Kamchatka territory, Kozyrevka, on Kamchatka river, 8.8.1908 (ZIN, A. Derzhavin leg., pinned); 1♂, Yakutia, Namtsy(Namskoje), left shore of Lena river, 90 km E of Yakutsk, 17.7.1926 (ZIN, N. Moskvina leg., pinned).

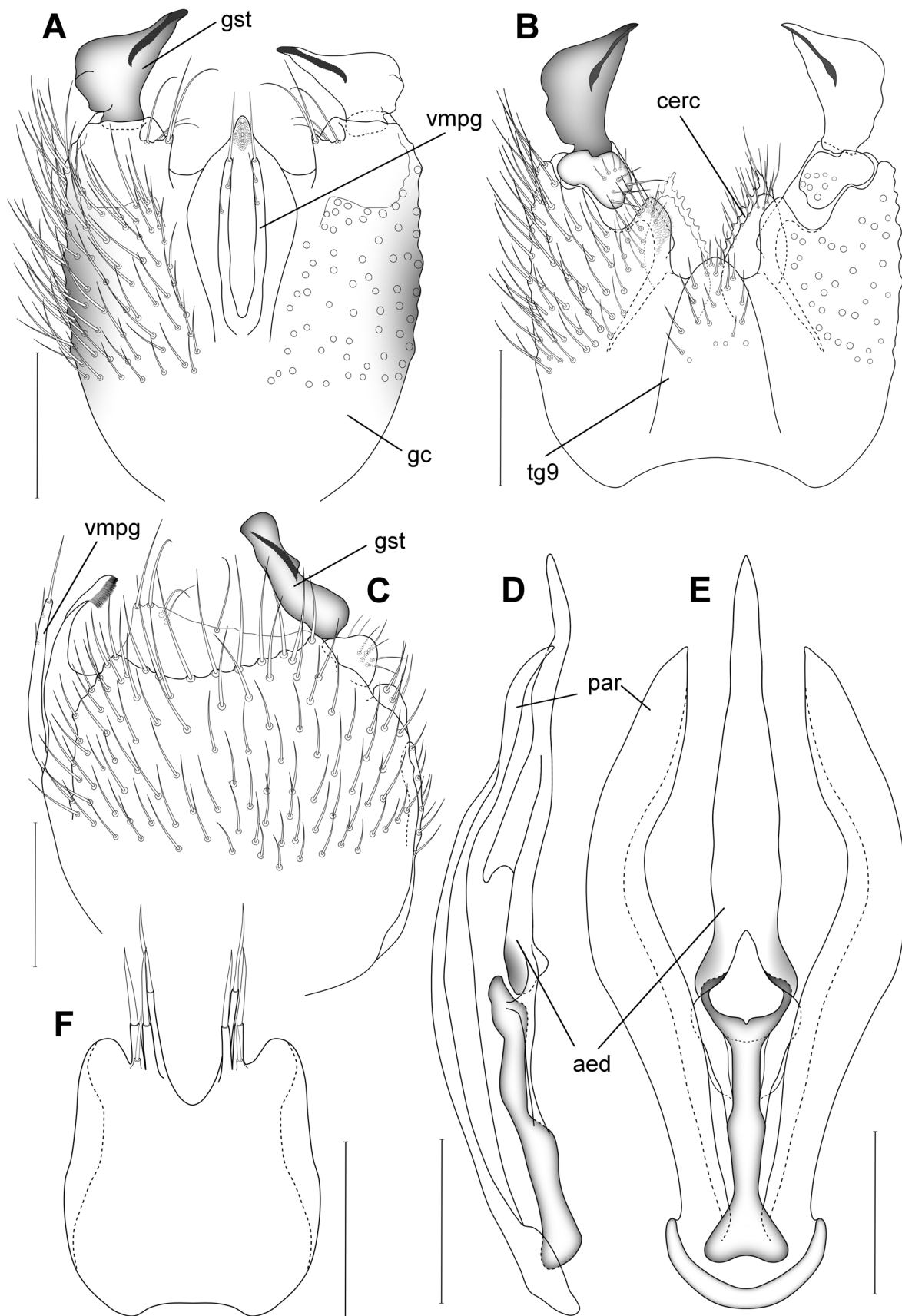
**Diagnosis.** A yellowish or mainly dark-brown species, with clear wings and strongly sclerotized bean shaped gonostylus.

#### **Description.** Male (n=2)

Head dark-brown, covered with pale setae. Three ocelli in a line, with laterals close to, but not touching, eye margin. Clypeus brown, mouthparts and palpus yellow. (In Yakutian specimen head mainly yellowish-brown and clypeus yellow). Scape and pedicel yellow, first flagellomere yellow at base, the rest of flagellum yellowish-brown to brown. Middle flagellomeres slightly longer than wide.

Thorax from yellow to mainly dark-brown with pale setae. Mesoscutum completely yellow or dark-brown with paler lateral areas. Scutellum yellow or brown with four strong marginal bristles. Propleuron yellow, the other lateral parts of the thorax and mediotergite yellow or brown.

Wing (Fig. 6A). Wing length 4.08–4.71 mm. Wing hyaline, yellowish tinged, small dark spot present at base of anal veins. Veins yellow. All, except Sc and A<sub>2</sub> densely setose on dorsal side. Sc<sub>2</sub> well beyond the middle of Sc. Base of M-fork beyond the middle of ta. CuA<sub>1</sub> interrupted at base. R<sub>1</sub> 0.72–0.78 times as long as ta, which is 0.31–0.35 times as long as R<sub>3</sub> and 1.27–1.43 times as long as M-stem. Haltere yellow, with slightly darkened club.



**FIGURE 1.** *Leia flavipennis* Laštovka & Matile, male terminalia. **A.** ventral view. **B.** dorsal view. **C.** lateral view. **D.** aedeagal complex, lateral view. **E.** aedeagal complex, ventral view. **F.** hypoproct. Scale bars = 0.2 mm. *Abbreviations:* aed = aedeagus, cerc = cercus, gc = gonocoxite, gst = gonostylus, par = parameres, tg = tergite, vmpg = ventral medial process of gonocoxites.

Legs. Coxae yellow, fore coxa with punctiform black spot at the apex, mid and hind coxa with narrowly darkened apical margins. Trochanters yellow with dark ventral spots. Femora yellow, apex of hind femur narrowly darkened. Tibiae and tarsi yellow, hind tibia slightly darkened at base. Ratio of femur to tibia for fore, mid and hind legs: 1.02–1.16; 0.89–0.97; 0.70–0.74. Ratio of tibia to basitarsus for fore, mid and hind legs: 1.29; 1.52–1.70; 2.17–2.19. Tibial setae black, spurs yellow. Fore tibia with one spur that is 2.11–2.43 times as long as apical tibial diameter. Mid and hind tibiae with two spurs. Posteroventral spur on mid tibia 1.24–1.30 times longer than anteroventral spur and posteroventral spur on hind tibia 1.14–1.31 times longer than anteroventral spur.

Abdomen uniformly brown (in Yakutian specimen tergites 2–3 yellow with brown apical bands) with pale setae. Terminalia (Fig. 1) yellowish-brown. Gonocoxite with numerous bristles in approximately apical half. Medial ventral process of gonocoxite long, consisting of two narrow lamellae (each with one apical and several subapical setules) and inner membranous structure with brush-like apical formation. Gonostylus strongly sclerotized, bean-shaped, with subapical crest. Tergite 9 evenly narrowing to the apex and setose in the apical half. Cerci near triangular, twice shorter than tergite 9. Aedeagus very long, sword-shaped in ventral view. Paramere wide and bowed, slightly shorter than aedeagus. Hypoproct apically with a medial emargination and two submedial groups of stout setae.

Female. We did not study females of this species. In the original description authors only state that it is similar to the male and give the figure of the female terminalia in lateral view (Lastovka & Matile 1974, p. 100, Fig. 10).

**Biology.** Collected by sweep net in mixed oak-pine forest.

**Distribution.** East Russia, Mongolia.

**Remarks.** We did not study the types of *L. flavipennis*, however specimens examined by us can be reliably identified based on description and figures by Laštovka & Matile (1974). The type of *L. autumnala* (type locality: Russia, Tomsk province, Kolpashev) is apparently lost (E. Subbotina pers. comm.), however several characters mentioned in the description and key features of the male terminalia, traceable in the sketchy original figures (see Ostroverkhova & Grishina 1974, p.41. fig. 2: 1), allow reliable association. As the exact publication date of both descriptions is not known we give priority to *L. flavipennis* on the basis of the imprimatur date of appropriate journal volumes (29.08.1973 for Laštovka & Matile paper and 18.03.1974 for Ostroverkhova & Grishina paper). *Leia flavipennis* is easily distinguished from other representatives of the genus by the peculiar structures of the male terminalia (e.g. strongly sclerotized, bean-shaped gonostylus and very long, sword-shaped aedeagus).

### ***Leia iturupensis* Zaitzev, 2001**

(Figs. 2; 6B)

*Leia iturupensis* Zaitzev, 2001: 457

**Material examined: RUSSIA:** 1♂, Amur province, Klimoutsy, 40 km W of Svobodnyi, 13.8.1958 (ZIN, Zinovjev leg., pinned).

**Diagnosis.** A yellow species with clear wings and tripartite gonostylus, dorsal branch forked apically.

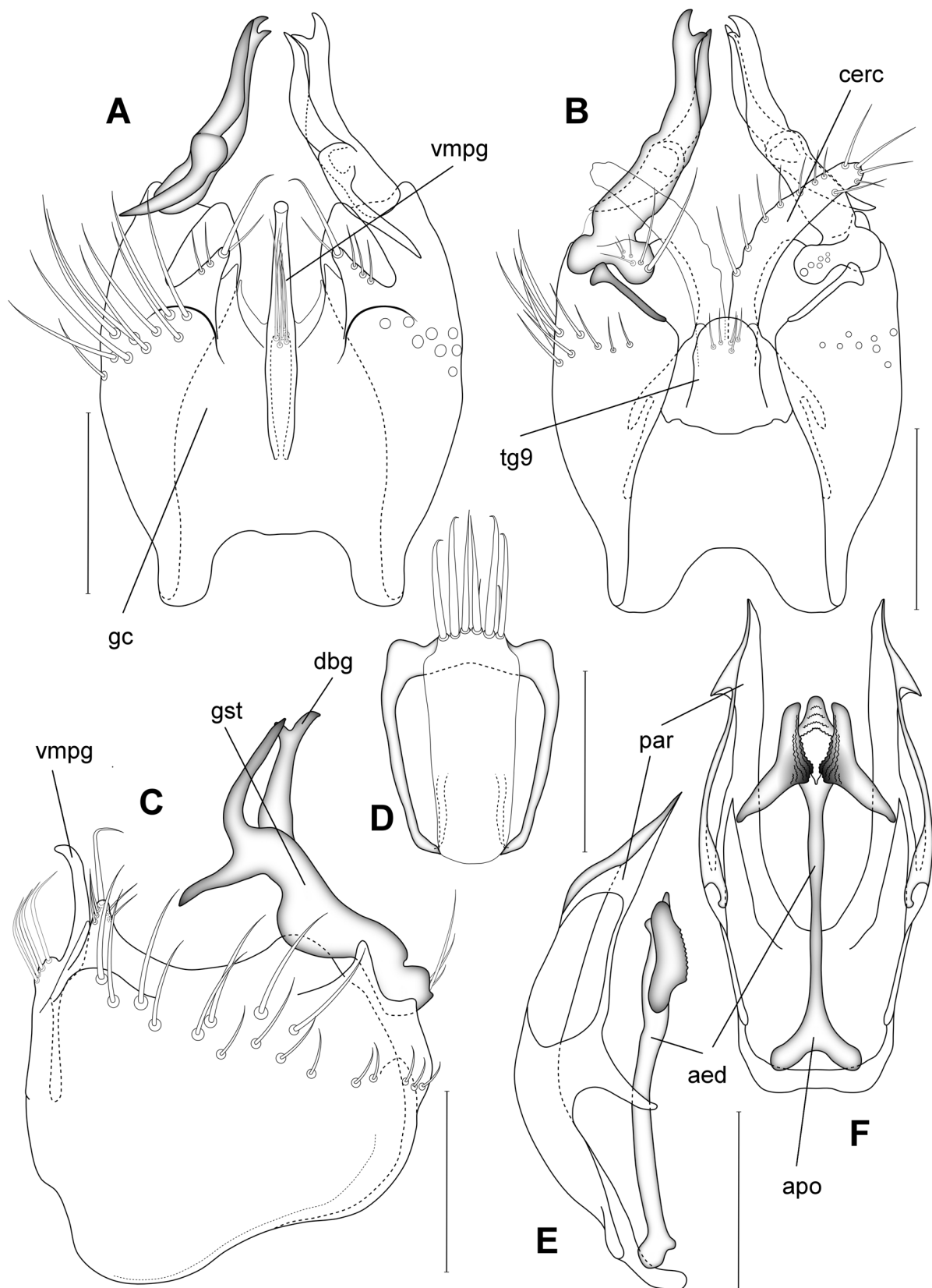
**Description.** Male (n=1)

Head yellow with darkened spots around ocelli, covered with pale setae. Three ocelli, with laterals close to, but not touching eye margin. Clypeus, mouthparts and palpus yellow. Palpus slightly longer than head height. Scape and pedicel yellow, flagellum yellow at the base, gradually darkened after segment 4. Pedicel with one elongate seta apically, reaching the apex of flagellomere 2. Middle flagellomeres 0.8 as long as wide.

Thorax mainly yellow with pale setae. Mesoscutum yellow with brown patches above wing bases. Scutellum yellow with four strong marginal bristles. Lateral parts of the thorax and mediotergite yellow.

Wing (Fig. 6B). Wing length 3.5 mm. Wing hyaline with small dark spot at base of anal veins. Veins yellow. All, except Sc and A<sub>2</sub> densely setose on dorsal side. Sc<sub>2</sub> well beyond the middle of Sc. Base of M-fork beyond the middle of ta. CuA<sub>1</sub> interrupted at base. R<sub>1</sub> 0.8 times as long as ta, which is 0.16 times as long as R<sub>5</sub> and 1.19 times as long as M-stem. Haltere pale yellow.

Legs. Coxae yellow, fore coxa with punctiform black spot at the apex, mid and hind coxa with narrowly darkened apical margins. Trochanters yellow with dark ventral spots. Femora yellow, apex of hind femur narrowly darkened. Tibiae and tarsi yellow. Ratio of femur to tibia for fore, mid and hind legs: 1.17; 1.0; 0.79. Ratio of tibia



**FIGURE 2.** *Leia iturupensis* Zaitzev, male terminalia. **A.** ventral view. **B.** dorsal view. **C.** lateral view. **D.** hypoproct. **E.** aedeagal complex, lateral view. **F.** aedeagal complex, ventral view. Scale bars = 0.2 mm. Abbreviations: *aed* = aedeagus, *apo* = ejaculatory apodeme, *cerc* = cercus, *dbg* = dorsal branch of gonostylus, *gc* = gonocoxite, *gst* = gonostylus, *par* = parameres, *tg* = tergite, *vmpg* = ventral medial process of gonocoxites.

to basitarsus for fore, mid and hind legs: 1.11; 1.46; 2.24. Tibial setae black, spurs yellow. Fore tibia with one spur that is 2.57 times as long as apical tibial diameter. Mid and hind tibia with two spurs. Posteroventral spur on mid tibia 1.24 times longer than anteroventral spur and posteroventral spur on hind tibia 1.23 times longer than anteroventral spur.

Abdomen uniformly yellow with pale setae. Terminalia (Fig. 2) yellow. Gonocoxite with only a few setae on the apical part. Medial ventral process of gonocoxite long and slender, with central protrusion bearing a group of long curved setae. Apicoventral corner of gonocoxite attenuated with two apical and several subapical setae. Gonostylus tripartite, dorsal branch forked apically. Tergite 9 small, rounded caudally and with several setae. Cerci elongate, about 2 times as long as tergite 9. Aedeagus with sclerotized, arrow-headed, apical part, ejaculatory apodeme bilobed. Paramere about 1.3 times as long as aedeagus, bowed in lateral view, with sharp apex and ventral flange in the middle. Hypoproct with slightly protruding apicolateral corners and medial group of stout setae.

Female. Unknown

**Biology.** Collected by sweep net in mixed oak-pine forest.

**Distribution.** East Russia (Kuril Islands, Amur Province).

**Remarks.** *L. iturupensis* was only known from the holotype from the Kuril Islands. The specimen studied by us is mostly yellow, while the holotype has brown spots on the thorax and abdomen (Zaitzev 2001). Nevertheless the peculiar structure of the gonostylus leaves us in no doubt about the species determination. Based on male terminalia, *L. iturupensis* resembles *L. graeca* Bechev, *L. umbrosa* Caspers and *L. subfasciata* (Meigen). Principal differences are found in the gonostylus. In *L. iturupensis* the dorsal branch of the gonostylus is forked apically, while in other species it is simple (*L. umbrosa*, *L. subfasciata*) or with a small preapical tooth (*L. graeca*) (see Caspers 1991, p. 329, Fig. 13, Bechev 1997, p. 180, Figs. 1–3).

### ***Leia nigricornis* Van Duzee, 1928.**

(Figs. 3; 4; 6C)

*Leia nigricornis* Van Duzee, 1928: 46. Holotype: 1♂ (CAS, pinned), USA, Unalaska, Alaska, 10.9.1920, prep. by G.D. Hanna, Collector, California Academy of Sciences, Type n 2503, *Leia nigricornis* (handwritten), Holotype. Van Duzee (examined).

**Other material examined. FINLAND:** 1♂, *Lkor*: Sodankylä, Viiankiaapa, Kiimakuusikko E, N67.5508, E26.7701, 10.7.–14.8.2013, Malaise trap (ZMUT, J. Salmela leg., in alcohol); 1♂, *Lkor*: Sodankylä, Heinäaapa, N67.5959, E26.8845, 10.8.–19.9.2012, Malaise trap (JES, J. Salmela leg., # MYCE-JS-2012-0021, in alcohol); 1♂, same locality and date (JES, J. Salmela leg., # MYCE-JS-2012-0029, in alcohol); 1♂, the same locality and date (FMNH, J. Salmela leg., in alcohol); 1♀, *Lkor*: Sodankylä, Viiankiaapa, Kiimakuusikko E, N67.5508, E26.7701, 14.8.–19.9.2013, Malaise trap (JES, J. Salmela leg., # DIPT-JS-2014-0171, in alcohol); 1♂, *Lkor*: Sodankylä, Viiankiaapa, Kiimakuusikko E, N67.5508, E26.7701, 10.7.–14.8.2013, Malaise trap (JES, J. Salmela leg., in alcohol); 1♂, *Lkoc*: Kittilä, Akrahamanvuoma, N67.5933, E25.3086, 1.8.–3.9.2007 (ZMUT, J. Salmela leg., in alcohol); 6♂, 2♀ *Lkoc*: Kittilä, Akrahamanvuoma, N67.5933, E25.3086, 1.8.–3.9.2007 (JES, J. Salmela leg., # DIPT-JS-2014-0213); 9♂, 1♀, *Lkor*: Sodankylä, Heinäaapa, N67.5959, E26.8845, 10.8.–19.9.2012, Malaise trap (JES, J. Salmela leg., #DIPT-JS-2014-0214, in alcohol); 16♂, 3♀, *Lkoc*: Kittilä, Vasankuoma, N67.5831, E25.2032, 2.8.–2.9.2007, Malaise trap (JES, J. Salmela leg., #DIPT-JS-2014-0294, in alcohol); 1♂, *Obb*: Keminmaa, Kallinkangas, N65.8166, E24.5008, 28.7.–23.9.2014, Malaise trap (JES, J. Salmela leg., #DIPT-JS-2014-0469, in alcohol). **RUSSIA:** 1♂, Amur province, Klimoutsy, 40 km W of Svobodnyi, 13.9.1958 (ZIN, Zinovjev leg., pinned); 1♂, Yakutia, Teplyi Klyuch, 70 km ENE of Handyga, 21.8.1974 (ZIN, Gorodkov leg., pinned)

**Diagnosis.** A black species with almost no pale markings on thorax. Coxae yellow, hind femora with darkened apices. Wings with preapical crossband, extending from costa to cell  $m_1$  or to tip of  $CuA_1$ , and a cloud behind  $CuA_2$ . Male gonostylus gently curved, smooth, resembling ox horn and lacking any secondary processes.

**Description.** Male (n=5).

Head black with yellowish setae. Three ocelli, arranged in a row between hind margin of eyes. Lateral ocelli close to, but not touching eye margin. Central ocellus smaller than laterals. Palpus pale. Palpal segments with setae, equal in length or slightly longer than palpus width. Last segment longest, 1.60–1.81 times as long as penultimate

segment. Antennae dark-brown, scape, pedicel and base of first flagellomere yellow. Scape with numerous setae, about as long as scape width, pedicel with a strong seta dorsally on apical margin, reaching the base of second flagellomere. Middle flagellomeres about 2 times longer than wide. Last flagellomere 1.27–1.53 times longer than penultimate.

Thorax black, only small yellowish spots present on anterior and posterior corners of mesoscutum (these spots are more extensive in the specimen from Amur province), and area of anterior spiracle pale. Pale setae present on mesoscutum, anteprototum, laterotergite and scutellum.

Wing (Fig. 6C). Wing length 4.21–4.39 mm. Wing yellowish with preapical crossband, extending from costa to cell  $m_1$  or to tip of  $CuA_1$  and a cloud behind  $CuA_2$ . Darkening at base of M-fork present in some specimens. Veins pale or brown,  $Sc$  and  $R_4$  lacking setosity.  $Sc_2$  beyond the middle of  $Sc$ . Base of M-fork beyond the middle of  $ta$ .  $CuA_1$  weak, appearing interrupted at base.  $R_1$  0.39–0.63 times as long as  $ta$ , which is 0.38–0.45 times as long as  $R_5$  and 1.24–1.42 times as long as M-stem. Haltere pale yellow.

Legs. Fore and mid coxae pale yellow, bearing numerous pale setulae on anterior surface, mid coxa also with a small basal brown spot on dorsal side. Hind coxa yellow with base slightly infusate and only a few setae both distally and proximally. Trochanters mainly yellow, with dark dots on ventral surface. Fore and mid femora yellow with a narrow, basal dark band on ventral side, bearing numerous pale brown setulae. Hind femur yellow with narrowly darkened tip, bearing numerous darkish setulae. Tibiae yellow with numerous pale to brownish setulae. Fore tibia with ca. 20 black setae, much shorter than tibial diameter, and a long black seta on apex, about as long as tibial diameter. Mid tibia with ca. 30 black setae, of which 13–15 are longer than tibial diameter. Hind tibia with ca. 30 black setae, of which 10–11 are longer than tibial diameter. Spurs yellow, with pale setulae and serrated inner side. Fore tibia with one spur, which is 2.25–2.60 times as long as apical tibial diameter. Mid and hind tibiae with two spurs. Posteroventral spur on mid tibia 1.24–1.30 times longer than anteroventral spur and posteroventral spur on hind tibia 1.30–1.53 times longer than anteroventral spur. Tarsomeres infusate. Ratio of femur to tibia for fore, mid and hind legs: 1.04–1.15; 0.88–1.01; 0.75–0.81. Ratio of tibia to basitarsus for fore, mid and hind legs: 1.05–1.16; 1.42–1.58; 1.91–2.09.

Abdomen predominantly dark-brown, with pale setae. Basolateral triangular pale spots present on tergites 2–5 in the specimen from Amur province. Sternites 2–4 with medial pale triangular markings, of varying size (may be confined to sternite 2 or almost totally absent). Terminalia (Fig. 4: A–F) brown. Gonocoxite with a ventral bifurcated medial process, ventral branch short and with several setae, dorsal branch bare and with slightly serrated margin. This medial process is surrounded by two pointed lobes (apicoventral corners of gonocoxites) with two setae on apices. Gonostylus gently curved, smooth, resembling ox horn and lacking any secondary spine like processes. Tergite 9 ovate with group of setae along caudal margin. Cerci with truncated apices, about as long as tergite 9. Aedeagus partly sclerotised, ejaculatory apodeme bilobed. Paramere evenly bowed in lateral view, about 1.5 times longer than aedeagus. Hypoproct subrectangular with 6 stout setae along caudal margin.

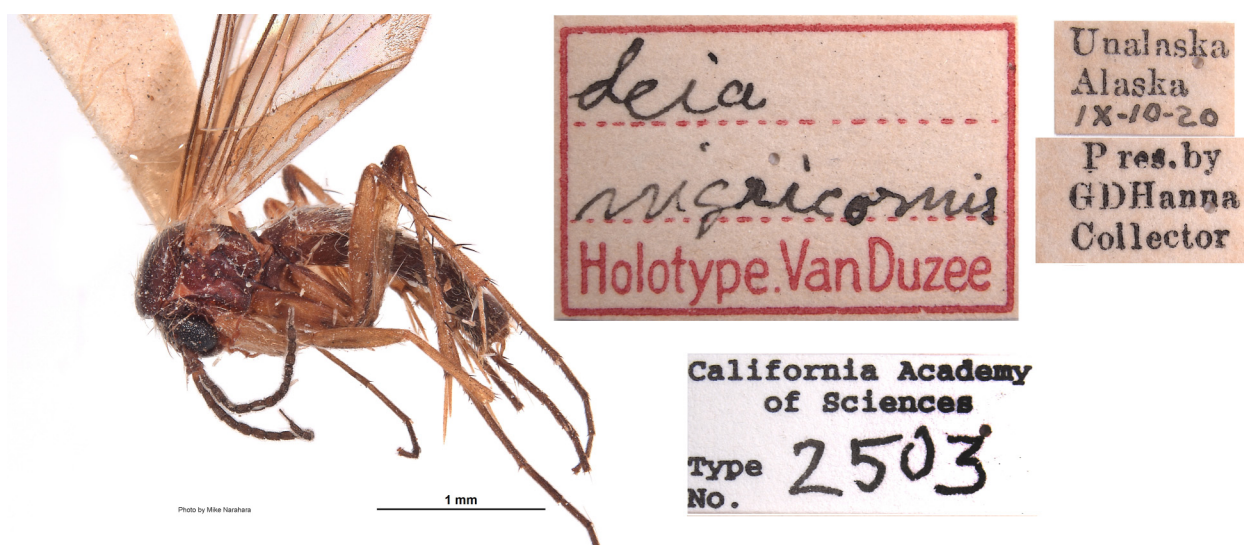
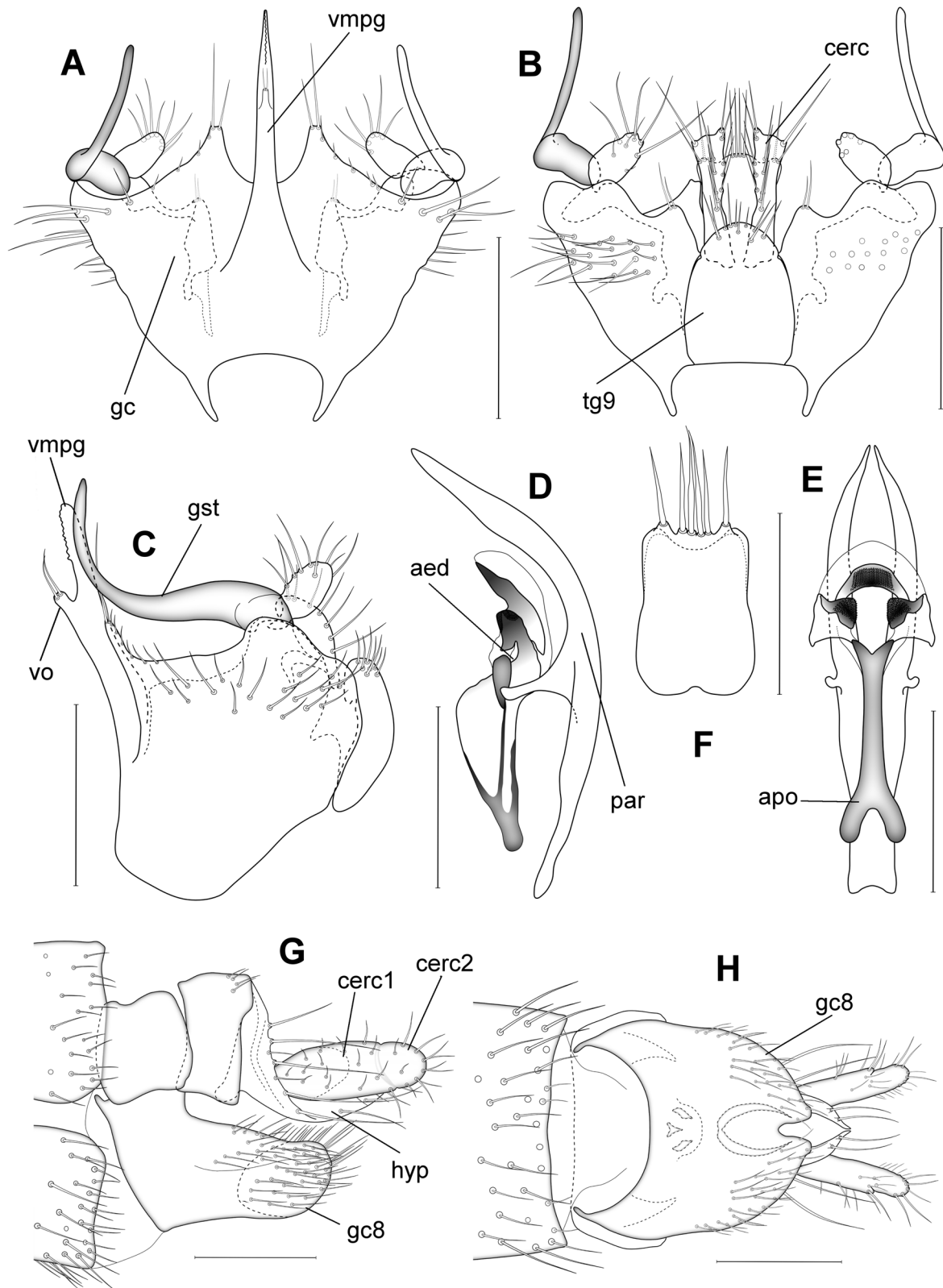


FIGURE 3. *Leia nigricornis* van Duzee, Holotype. (Photo by Mike Narahara).



**FIGURE 4.** *Leia nigricornis* van Duzee, A–F. male terminalia, G, H. female terminalia. **A.** ventral view. **B.** dorsal view. **C.** lateral view. **D.** aedeagal complex, lateral view. **E.** aedeagal complex, ventral view. **F.** hypoproct. **G.** lateral view. **H.** ventral view. Scale bars = 0.2 mm. Abbreviations: *aed* = aedeagus, *apo* = ejaculatory apodeme, *cerc* = cercus, *gc* = gonocoxite, *gst* = gonostylus, *hyp* = hypoproct, *par* = parameres, *tg* = tergite, *vmpg* = ventral medial process of gonocoxites, *vo* = ventral outgrowth of gonocoxites.



Female (n=5). In general, very similar to male. Antennae shorter. Wing length 4.6–4.7 mm. Terminalia as in Fig. 4: G, H. Cercus 2-segmented, sparsely setose, basal segment about 2 times longer than apical segment. Hypoproct with about 7 long and some shorter setae laterally. Caudal margin of gonocoxite 8 with a medial U-shaped emargination.

**Taxonomic remarks.** Type material of *L. nigricornis* (holotype and a paratype) was collected from USA, Alaska, Unalaska (ca. 53.87°N, 166.52°W). According to the original description (Van Duzee 1928) the holotype was a female and no illustrations were provided. However, the holotype (Fig. 3) is a male specimen and we can state that *L. nigricornis* is a Holarctic species. The species is here reported for the first time from the Palaearctic region (Finland and Russia). *Leia nigricornis* is rather easily separated from its congeners by the combination of spotted wings and generally black body color. Based on the male terminalia, *L. nigricornis* is quite similar to *L. fascipennis* Meigen, *L. bimaculata* Meigen and *L. montanosylvatica* Zaitzev, but can be distinguished from these due to the characteristic ventral medial process of its gonocoxite (cf. e.g. Kurina 2008, p. 282, Figs 27, 28, Zaitzev 1994, p. 269, Fig. 85: 1) and the structure of the aedeagal complex.

**Biology.** Finnish collecting localities are rich fens with sparse or non-existent woody vegetation. The species was quite numerous on Heinäaapa (Viiankiaapa mire conservation area), which is characterised by calcareous spring pools and lawn-level vegetation (that is, water level is somewhat below the moss carpet). Brown mosses such as *Scorpidium revolvens*, *Campylium stellatum* and *Paludella squarrosa* dominate in the bottom layer, and plant species such as *Saxifraga hirculus*, *Bartsia alpina* and *Saussurea alpina* are conspicuous in the mire. Other collecting sites, Akrahamanvuoma, Vasanvuoma (Tollovuoma-Vasanvuoma mire conservation area), Viiankiaapa and Kallinkangas (Kallinkankaanletot mire conservation area) are rich flark fens, that is, characterised by wet flarks with inundated brown mosses and narrow strings with bog vegetation. Based on its label, the male specimen from the Amur region of Russia, was collected from a *Larix-Quercus* forest.

**Distribution.** Holarctic, known from USA (Alaska), Europe (Finland) and East Russia (Yakutia, Amur province). Finnish collecting sites, five in total, are located in Lapland, middle–north boreal ecoregions.

***Leia rufiptera* Ostroverkhova, 1977.**  
(Figs. 5; 6D)

*Leia rufiptera* Ostroverkhova, 1977: 30.

**Material examined: RUSSIA:** 1♂, Primorje territory, east slope of Sikhote-Alin ridge, basin of the river Sankobe, 43 km along river Sitsa, 1.8.1941 (ZIN, Grunin leg., pinned).

**Diagnosis.** A yellow species, wings with preapical dark spot and darkened areas along veins, terminalia densely covered with strong setae.

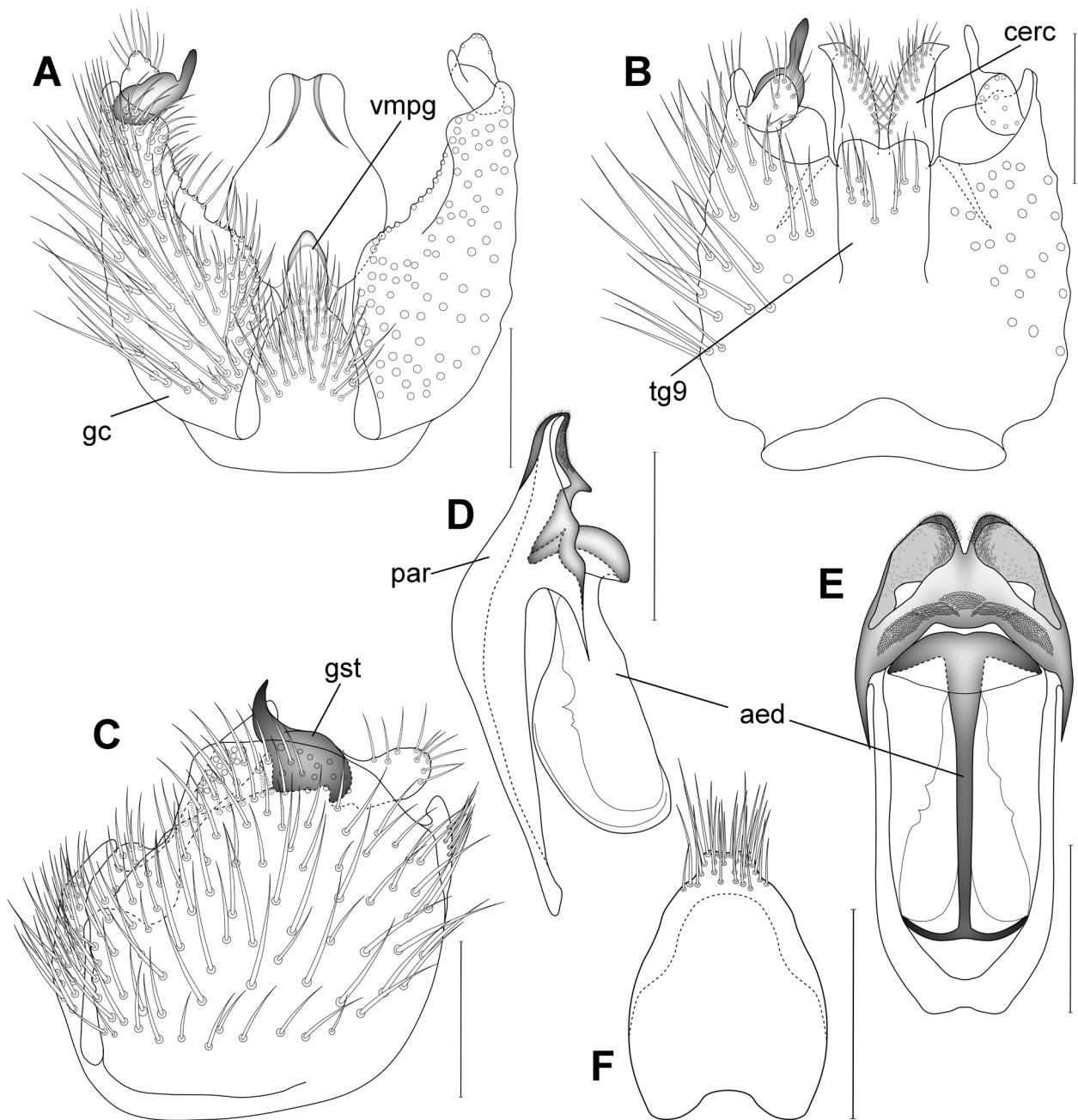
**Description.** Male (n=1)

Head yellow with darkened spots around ocelli, covered with pale and brownish setae. Three ocelli, with laterals very close to (almost touching) eye margins. Clypeus, mouthparts and palpus yellow. Palpus slightly longer than head height. Scape and pedicel yellow, flagellum yellow with darker dorsal spots (more extensively darkened in apical segments). Middle flagellomeres 1.4 times as long as wide.

Thorax mainly yellow with brownish setae. Mesoscutum yellow with three darker longitudinal stripes and small brown patches above wing bases. Scutellum yellow with four strong marginal bristles. Lateral parts of thorax yellow. Mediotergite slightly darkened caudally.

Wing (Fig. 6D). Wing length 5.37 mm. Wing greyish with yellowish anterior margin, narrow apical cloud, dark preapical spot, darkened areas at base of median fork, along  $ta$ ,  $CuA_2$  and apical portion of  $M_1$  and with small dark spot at base of anal veins. Veins yellowish-brown, all, except  $Sc$  and  $A_2$ , densely setose.  $Sc_2$  near the middle of  $Sc$ . Base of M-fork well beyond the middle of  $ta$ , slightly before  $Rs$ .  $CuA_1$  not interrupted at base.  $R_1$  1.05 times as long as  $ta$ , which is 0.27 times as long as  $R_5$  and 1.07 times as long as M-stem. Haltere yellow.

Legs. Coxae yellow, fore coxa with punctiform black spot at apex, mid and hind coxa with narrowly darkened apical margins. Trochanters yellow with dark ventral spots. Femora yellow, mid and hind femora darkened at base. Tibiae and tarsi yellow. Ratio of fore femur to fore tibia: 1.13. Ratio of fore tibia to fore basitarsus: 1.01. Tibial setae black, spurs yellow. Fore tibia with one spur, that is 1.75 times as long as apical tibial diameter.



**FIGURE 5.** *Leia rufiptera* Ostroverkhova, male terminalia. **A.** ventral view. **B.** dorsal view. **C.** lateral view. **D.** aedeagal complex, lateral view. **E.** aedeagal complex, ventral view. **F.** hypoproct. Scale bars = 0.2 mm. Abbreviations: *aed* = aedeagus, *cerc* = cercus, *gc* = gonocoxite, *gst* = gonostylus, *par* = parameres, *tg* = tergite, *vmpg* = ventral medial process of gonocoxites.

Abdomen yellow with pale setae, tergites and sternites darkened posteriorly. Terminalia (Fig. 5) yellow. Gonocoxite densely covered with strong setae. Ventromedial process of gonocoxite also densely bristled, with widened apical process produced caudally. Gonostylus with strongly sclerotised hook-like ventral portion. Tergite 9 subrectangular, with slightly emarginated caudal margin, setose apically. Cerci pointed at apices, about as long as tergite 9. Aedeagus with T-shaped apical portion. Parameres short, fused, forming apical triangular incision and paired apicolateral openings. Hypoproct with smooth apicolateral corners and medial group of numerous thin setae.

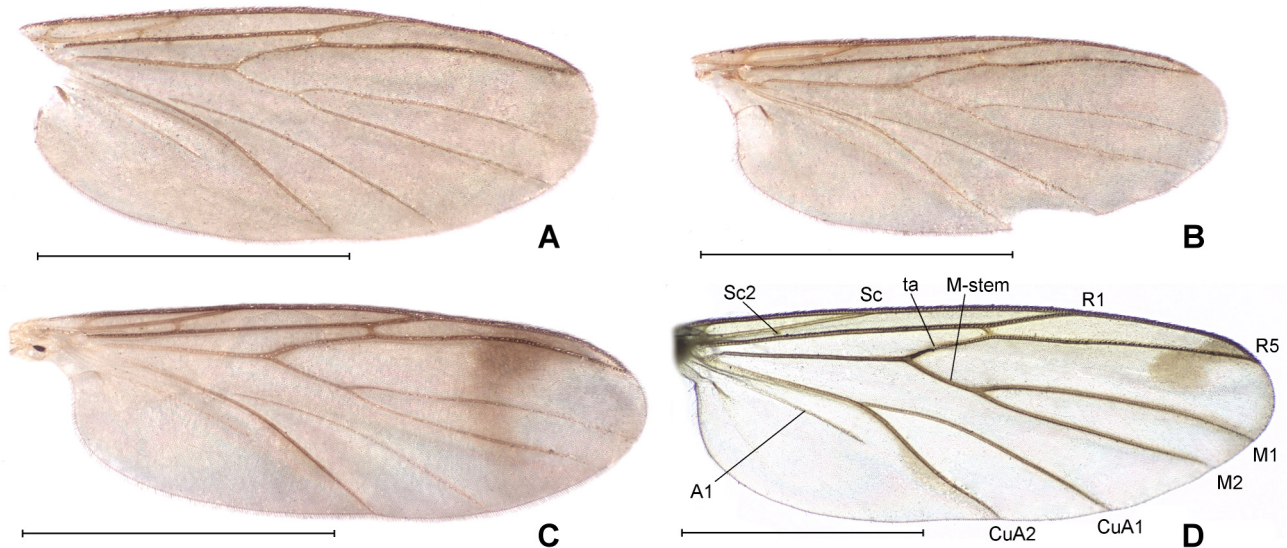
Female. Unknown

**Biology.** According to Ostroverkhova (1979), species was found in Larch and mixed forests.

**Distribution.** East Russia.

**Remarks.** Three syntypes of *L. rufiptera* are located in the collection of Tomsk University, but terminalia

preparations are severely damaged (E. Subbotina, pers. comm.). Nevertheless, the specimen examined by us fits the original description and male terminalia agree well. Several distinctive characters mentioned by G. Ostroverkhova (wing markings, dense bristles on gonocoxites, paired apicolateral openings in aedeagal complex), leave little doubt about the identity of the specimens. *Leia rufiptera* is easily distinguished from other representatives of the genus by the peculiar wing markings and structures of the male terminalia (e.g. densely setose gonocoxite, strongly sclerotized hook-like ventral portion of gonostylus and fused parameres).



**FIGURE 6.** Wings of *Leia* males. **A.** *Leia flavipennis*. **B.** *Leia iturupensis*. **C.** *Leia nigricornis*. **D.** *Leia rufiptera*. Scale bars = 2 mm.

#### Variation in the male terminalia of *Leia bimaculata* (Meigen, 1804)

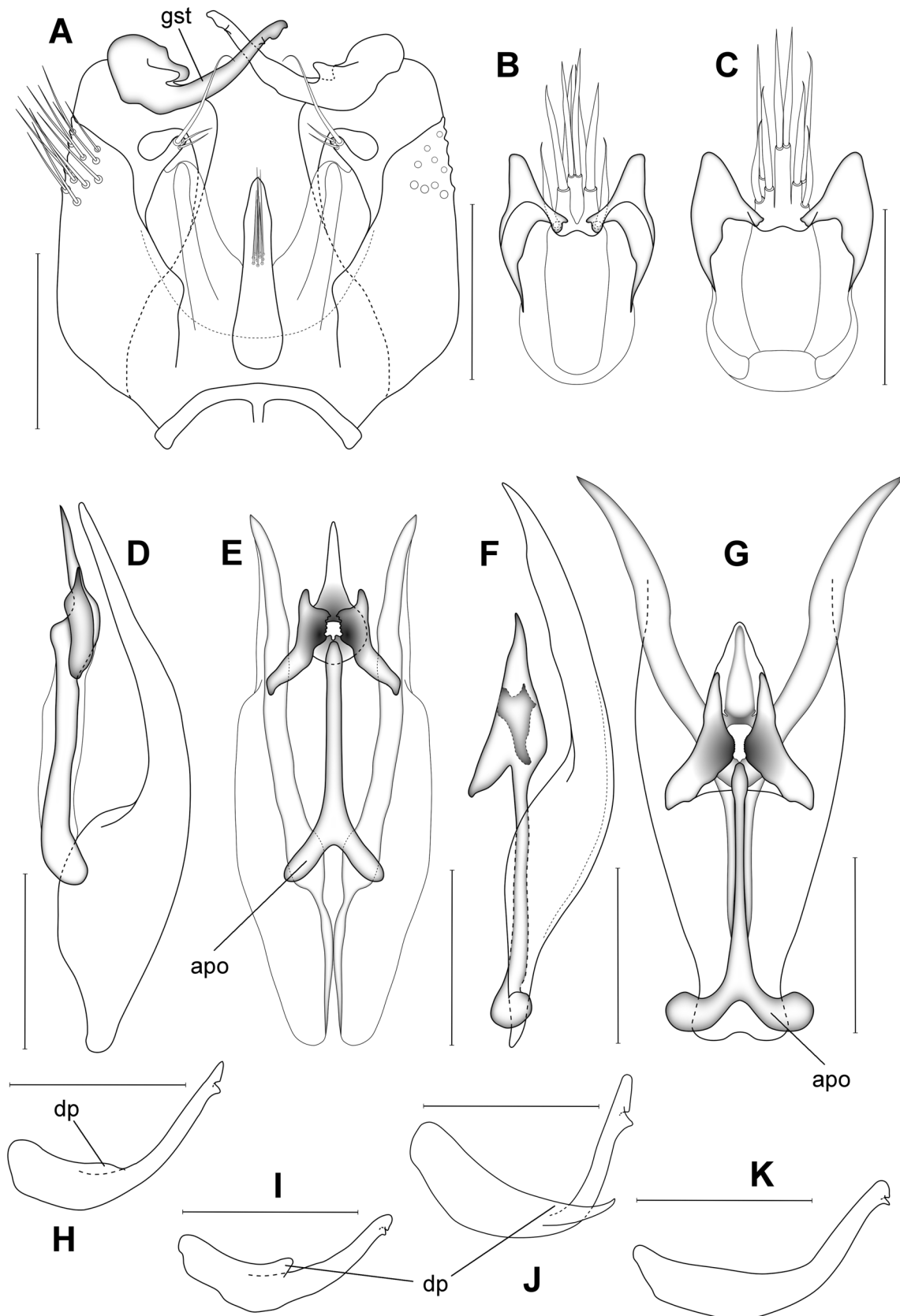
*Leia bimaculata* is a common European species, which is variable in body coloration (from almost completely yellow to mostly black) and wing markings (from distinct dark bands to completely clear wing). Male terminalia of this species have been illustrated by several authors. None of the available figures give details of the aedeagal complex structure, but there is always a well visible dorsal projection at the base of the gonostylus (Plassmann 1973; Hutson et al. 1980; Zaitzev 1994). Considering stable interpretation of the species, we call such specimens "typical". During our study we noticed four specimens from Finland and Russia with small differences in the male terminalia. The most distinctive characters are as follows.

Typical *L. bimaculata*: lobes of ejaculatory apodeme straight (Fig. 7: E), gonostylus with conspicuous dorsal projection at base (Fig. 7: A, H–J).

Deviating specimens: lobes of ejaculatory apodeme protruding caudally (Fig. 7: G), gonostylus with no trace of dorsal projection at base (Fig. 7: K)

Other differences are visible e.g. in the shape of parameres (Fig. 7: D–G), but this may depend on the position of terminalia on the slide and the angle of view. Small variation in hypoproct structure (Fig. 7: B, C) is observed in both typical and deviating specimen groups. All deviating specimens have clear wings, while studied typical specimens have wings with distinct (though sometimes quite faint) preapical band. Variable body coloration (from rather narrow dark bands on tergites and mostly yellow thorax, to considerably darkened abdomen and thorax) is observed in both typical and deviating specimen groups. Though differences in the gonostylus and ejaculatory apodeme seem to be stable, we did not feel confident enough to describe this as a new species until additional material is available.

**Material examined. Typical specimens:** **AUSTRIA:** 2♂, Igls, Tirol, 900 m, 16.8.1953, J. R. Vockeroth leg. (CNC, pinned). **ITALY:** 1♂, Caserta, Campania Prov., 30.4.1844, (CNC, coll. G. E. Shewell, pinned); 1♂, Bozen, 13.6.1873? (ZIN, #217, pinned). **LITHUANIA:** 1♂, Vilnius distr. Karmazinai, 54°49'08,4":24°55'51,9", 19.9–16.10.2003, rearing from *Paxillus involutus* (LZM, J.Rimsaite leg., pinned). **SLOVAKIA:** 1♂, Muranska



**FIGURE 7.** *Leia bimaculata* Meigen, male terminalia. **A.** ventral view, typical specimens. **B, C.** hypoproct, typical and deviating specimens. **D, F.** aedeagal complex, lateral view. **E, G.** aedeagal complex, ventral view. **H–K.** gonostylus. (**D, E, H–J:** typical specimens from Austria, Italy, Lithuania, Spain, Sweden, Czech Republic and Slovakia; **C, F, G, K:** deviating specimens from Finland and Russia). Scale bars = 0.2 mm. *Abbreviations:* apo = ejaculatory apodeme, dp = dorsal projection of gonostylus, gst = gonostylus.

planina Nat. Park Muran, Hrdzava dolina 26.7.2010, Malaise trap, (JES, J. Ševčík leg. #DIPT-JS-2014-0297); 1♂, Bratislava env., Devinska Kobyla hill, 17.6.1994, Malaise trap (JES, J. Ševčík leg., #DIPT-JS-2014-0298). **CZECH REPUBLIC:** 1♂, 1♀, Bohemia, Zivohost, near Slapy dam, 22.8.2010, rearing from fungi, *ex Lactarius vellereus*, (JES, J. Ševčík leg., DIPT-JS-2014-0299). **SPAIN:** 1♂, Granada, 700 m, 19.7.1960, J. R. Vockeroth leg. (CNC, pinned). **SWEDEN:** 2♂, *Sm:* Ulvsdal, 14.5.–14.8.2002, Malaise trap, (IZBE, N. Franc & Co. leg., pinned). **UNKNOWN LOCALITY:** 1♂, 24.7.1842? (ZIN, coll. Osten-Sacken, pinned).

**Deviating specimens:** **FINLAND:** 2♂, *Al:* Saltvik, (ZMH, Frey leg. #3760 and #4016, pinned). **RUSSIA:** 2♂, Leningrad province, Luga 13–14.8.1953 (ZIN, Stackelberg leg., pinned).

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