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## NEW GALL MIDGES (DIPTERA, CECIDOMYIIDAE, BRACHINEURINI, LEDOMYIINI) FROM THE LATE EOCENE ROVNO AMBER

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**New Gall Midges (Diptera, Cecidomyiidae, Brachineurini, Ledomyiini) from the Late Eocene Rovno Amber. Fedotova Z. A., Perkovsky E. E.** — Three new genera and six new species of the tribes Brachineurini and Ledomyiini from the Late Eocene Rovno amber are described: *Rovnobrachineura kiryeyevi* Fedotova et Perkovsky, gen. et sp. n.; *Brachineura polessica* Fedotova et Perkovsky, sp. n.; *Popovineura nacta* Fedotova et Perkovsky gen. et sp. n.; *Nascensluna mellea* Fedotova et Perkovsky, gen. et sp. n.; *Rhizomyia parkalovi* Fedotova et Perkovsky, sp. n.; *Ledomyia olgae* Fedotova et Perkovsky, sp. n. The new species of genera *Brachineura* and *Rhizomyia* are the first extinct representatives of the respective genera. Diagnoses of *Ledomyia*, *Brachineura* and *Rhizomyia* are updated.

**Key words:** Late Eocene, Rovno amber, Cecidomyiidae, gall midges, *Rovnobrachineura* gen. n., *Popovineura* gen. n., *Nascensluna* gen. n., new genus, new species.

**Новые галлицы (Diptera, Cecidomyiidae, Brachineurini, Ledomyiini) из позднеэоценового ровенского янтаря. Федотова З. А., Перковский Е. Э.** — Описаны три новых рода и шесть новых видов триб Brachineurini и Ledomyiini из позднеэоценового ровенского янтаря: *Rovnobrachineura kiryeyevi* Fedotova et Perkovsky, gen. et sp. n.; *Brachineura polessica* Fedotova et Perkovsky, sp. n.; *Popovineura nacta* Fedotova et Perkovsky gen. et sp. n.; *Nascensluna mellea* Fedotova et Perkovsky, gen. et sp. n.; *Rhizomyia parkalovi* Fedotova et Perkovsky, sp. n.; *Ledomyia olgae* Fedotova et Perkovsky, sp. n. Новые виды из родов *Brachineura* и *Rhizomyia* — первые вымершие представители соответствующих родов. Диагнозы родов *Ledomyia*, *Brachineura* и *Rhizomyia* уточнены.

**Ключевые слова:** поздний эоцен, ровенский янтарь, Cecidomyiidae, галлицы, *Rovnobrachineura* gen. n., *Popovineura* gen. n., *Nascensluna* gen. n., новый род, новый вид.

### Introduction

This publication continues a series of descriptions of new genera and species of gall midges from the Later Eocene Rovno Amber, found in the Rovno Region. The five holotypes came from the Klesov (Pugach quarry), UA–1601 could be from Pugach (Klesov) or Vol'noje (Dubrovitsa) quarries (Perkovsky et al., 2003).

Herein we describe three additional new genera and 6 new species of the genera *Brachineura* Rondani, *Ledomyia* Kieffer, *Rhizomyia* Kieffer, *Rovnobrachineura* gen. n., *Popovineura* gen. n., *Nascensluna* gen. n. from the tribes Brachineurini s. l. and Ledomyiini of subfamily Cecidomyiinae, family Cecidomyiidae s. str. (or subfamily Lasipterinae, family Cecidomyiidae, superfamily Cecidomyioidea including Cecidomyiidae + Lestremiidae, Fedotova, 2000). Earlier, 79 new species and 15 new genera have been described from Rovno amber in the subfamilies Lestremiinae, Porricondylinae and Cecidomyiinae (supertribes Brachineuridi, Cecidomyiidi, Lasipteridi and Stomatosematidi). In total 18 genera and 85 species have been described from the Rovno amber (including present paper), and five species have been described from Later Eocene Baltic Amber (Perkovsky, Fedotova, 2004, 2008 a, b; Fedotova, Perkovsky, 2004, 2005, 2007, 2008, 2009, 2011 a, b, 2012).

Species of the genus *Lauthia* Kieffer, 1912 (s. l.) are common in the Middle Miocene Mexican (Gagné, 1973) and Dominican ambers (Gagné, 2004). Five species of *Ledomyiella* Meunier, 1904 are known from the Late Eocene Baltic amber (Meunier, 1904). Two genera (*Kovaleviola* Fedotova et Perkovsky, 2008 and *Spun-*

*gisiola* Fedotova et Perkovsky, 2008) are described from the Late Eocene Rovno amber. Four species of the tribes Brachineurini and Ledomyiini are described from the Rovno amber as well: *Ledomyia dextra* Fedotova et Perkovsky, 2008, *Brachyneurina pyxidiiformis* Fedotova, 2004; *Kovaleviola injusta* Fedotova et Perkovsky, 2008, *Spungisiola insuperabilis* Fedotova et Perkovsky, 2008.

According to “A catalog of the Cecidomyiidae (Diptera) of the world” by Gagné (2004), the supertribe Brachineuridi belongs to Cecidomyiinae, is not divided on tribes, and includes only 7 genera (*Brachineura* Rondani, 1840; *Brachyneurina* Mamaev, 1967; *Chrybaneura* Gagné, 1968; *Coccidomyia* Felt, 1911; *Epimyia* Felt, 1911; *Epimiella* Mamaev, 1967; *Rhizomyia* Kieffer, 1898) with 49 species. Another related tribe Ledomyiini has been established for 6 genera (*Isogynandromyia* Spungis, 1981; *Lauthia* Kieffer, 1912; *Ledomyia* Kieffer, 1895; *Ledomyiella* Meunier, 1904; *Plesiolauthia* Mamaev, 1967; *Prolauthia* Rübsaamen, 1916) with 53 species; the tribe is now included in supertribe Lasiopteridi (Gagné, 1985, 2004, 2010).

Recently 9 genera, 2 subgenera and 28 species, that belong to Brachineurini, were described from Russian Far East: *Acinacistyla* Fedotova et Sidorenko, 2006; *Alatostyla* Fedotova et Sidorenko, 2006; *Brachineura* (*Ramineura* Fedotova et Sidorenko, 2006), subgen.; *B.* (*Cornistyla* Fedotova et Sidorenko, 2006) subgen.; *Cingola* Fedotova et Sidorenko, 2006; *Compositola* Fedotova et Sidorenko, 2006; *Effusomyia* Fedotova, 2004; *Nodalistyla* Fedotova et Sidorenko, 2006; *Stabiliola* Fedotova et Sidorenko, 2006; *Undoneura* Fedotova et Sidorenko, 2006; *Volsatiola* Fedotova et Sidorenko, 2006 (Fedotova, 2004; Fedotova, Sidorenko, 2005, 2006 a, b); 10 new species belonging to *Ledomyia* were described from the same region (Fedotova, Sidorenko, 2005, 2007). Later were described 2 additional species of the genus *Cingola* from Southern China (Jiao, Bu, 2014).

According to “Update for A catalog of the Cecidomyiidae (Diptera) of the world” (Gagné, 2010) Brachineuridi includes 18 genera with 82 species, and Ledomyiini embraces 6 genera and 64 species including taxa recently described from Rovno amber (Perkovsky, Fedotova, 2004, 2008 a; Fedotova, Perkovsky, 2004) as well as extant genera and species recorded recently from the Russian Far East (Fedotova, 2004; Fedotova, Sidorenko, 2005, 2006 a, b, 2007).

Supertribe Brachineuridi is characterized by the following synapomorphies: antennae with 10 flagellomeres, tarsal claws narrow and curved near their midlength; male seventh and eighth abdominal tergites each reduced to a strongly sclerotized, linear band and corresponding sternites shorter and weaker developed than preceding; and short, sclerotized, free, glabrous parameres, each with one to three terminal setae (Gagné, 1994). The female postabdomen is not protrusible and its cerci are separate (Gagné, 2004). Tribe Ledomyiini has only one synapomorphy, the divided parameres: one part of parameres is setulose, the other usually longer, glabrous except for apical setae. Antenna has 8–10 or regular number of 12 sexually dimorphic flagellomeres. Head of a few species with a dorsal occipital prominence, unlike the remainder of the Lasiopteridi. Tarsal claws thin, toothed on the forelegs, toothed or simple on the mid- and hindlegs. Wing venation is variable, with  $R_{4+5}$  much shorter to longer than the wing. The ovipositor is short to elongated, but the cerci are separate (Gagné, 2004).

As a result, we can see that the tribe Ledomyiini shares most characters listed by Gagne (2010) as synapomorphies of Brachineuridi and thus deserves inclusion in this supertribe (Fedotova, in prep.). However, for the present we use the system by Gagne (2010).

We consider that only one extant Indian genus related to Brachineuridi, has unclear systematic position (*Rabindrodiplosis* Grover, 1964 with 2 species) and 4 Indian species that were mistakenly described in genus *Meinertomyia* Felt, 1911. Now genus *Rabindrodiplosis* is included in subfamily Porricondyliinae; genus *Meinertomyia* is synonym of *Brephometra* Strand, 1910 with single species, belonging to supertribe Cecidomyiidi. All 4 Indian species listed in the group of unplaced species of Cecidomyiinae (Gagné, 2004, 2010). Also extinct genus *Palaeospaniocera* Meunier, 1901 from African copal, described by Meunier (1901) as similar to genus *Brachineura*, possibly mistakenly was included in Porricondyliinae (Gagné, 2004, 2010).

Larvae of some species of Brachineurini and Ledomyiini have been associated with insect and spider remains and adults have been reared from rotting wood, except for the fact that some species of Ledomyiini are associated with fungal fruiting bodies or rotting tissue. Several Nearctic species have been reared from xylem vessels in logs (Gagné, 2004; Rock, Jackson, 1985).

The examined material from Rovno amber, including types, is deposited in the amber collection of Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine (Kyiv), designated below as SIZK. Photographs have been taken by A. P. Rasnitsyn and authors using a Leica DFC 425 camera attached to a Leica M 165 microscope or AxioCam MRc5 T2-C ZEISS camera attached to a ZEISS Imager M1 «Axio Imager».

**CECIDOMYIIDAE** Newman, 1834

**CECIDOMYIINAE** Newman, 1834

**BRACHINEURIDI** Kieffer, 1913

**BRACHINEURINI** Kieffer, 1913, s. l.

***Rovnobrachineura*** Fedotova et Perkovsky, **gen. n.**

Type species: *Rovnobrachineura kiryeyevi* Fedotova et Perkovsky, sp. n.

**Description** (fig. 1, 1–6; 7, 1–3). Male. Body slightly longer than wings. Head is elongate; eyes fused, with narrow bridge, positioned on anterior part of head, occiput wide rounded. Antennae 2+10-segmented, scape narrower than round pedicel. All flagellomeres with distinct very narrow necks, but basal enlargements have different forms. Basal enlargement consists of basal node and narrower slightly swollen or parallelsided distal part: 1st and 2nd flagellomeres slightly narrowed medially; 3rd–7th with round basal node, wide distal part and little neck; 8th–9th with round basal node and narrow distal part; 10th flagellomere strongly narrowed between round basal node and wide oval distal part. Proximal flagellomeres much wider and shorter than distal ones. Flagellomeres with basal and medial whorls of very long setae. Distal part of flagellomeres bears two rings of sensorial filae. Mouthparts much elongate and wide. Palpi 2-segmented, the second one is longer. Wing evenly and very strongly widened distally, vein  $R_{4+5}$  straight, joining margin almost at wing tip, Rs absent, Cu positioned near margin of wing, not forming a fork. Fore and middle femora and tibiae shorter than hind femur and tibia. Length of hind femur and tibia almost equal. Abdomen slightly swollen near middle (2nd–4th segments) and narrowed distally. Genitalia transversal. Gonocoxite wide, almost straight on outside margin, with dense long setae and almost rectangular lobe on inner side. Gonostylus narrow, slightly curved basally. Cerci very short, far not reaching the apex of gonocoxites, with wide round lobes and triangular excision between its. Parameres or basal enlargement of gonocoxites absent. Hypoproct whole, rounded apically. Aedeagus very wide, much longer than gonocoxites.

**Comparison.** By the shape of the body, 2+10-segmented antennae, wing venation, long legs and forms of gonocoxites and gonostylus the new genus is closely related to *Brachyneurina* Mamaev, 1967 (Mamaev, 1967; Harris, Evans, 1979), but differs from it by the elongated and swollen mouthparts, very narrow eye bridge, 2-segmented palpi, different shape of flagellomeres, vein  $R_{4+5}$  joining with wing margin at the tip of the wing, very long aedeagus, presence of very dense long setae on the inner side of gonocoxites, and by smaller body size.

**Etymology.** The name is combined from the name of the amber Lagerstätte and name *Brachineura*. Gender feminine.

***Rovnobrachineura kiryeyevi*** Fedotova et Perkovsky, **sp. n.**

**Material.** Holotype. SIZKN K–3701, well preserved inclusion of male with tarsi missing, Klesov, Rovno amber, Late Eocene (fig. 1, 1–6; 7, 1–3). Syninclusions: Chironomidae; Cecidomyiidae: *Porricondyla* sp., 1 ♂.

**Description.** Male (fig. 1, 1–6; 7, 1–3). Body (without genitalia) is 1.6 times longer than antennae. Wings 1.4 times as long as antennae. Head with narrow eyes, that laterally cover only 2/3 of width of head. Scape enlarged distally, shorter than pedicel. First flagellomere 2.2 times as long as wide; 2nd flagellomere strongly narrower than 1st and slightly shorter than one. Sixth flagellomere 2.2 times as long as wide, slightly shorter than 1st flagellomere; 9th and 10th flagellomeres are longer than middle ones, enlarged distally, rounded apically. The palpi are very narrow, slightly rounded or parallelsided laterally; 2nd palpomere is 1.3–1.4 times as long as 1st. Wing is 2.7 times as long as wide. Vein  $R_{1+2}$  is less than 2 times shorter than wing length. Gonocoxites are slightly longer than gonostylus. Gonostylus is almost parallelsided distally, 1.2 times shorter than gonocoxites. Cerci are not reaching before middle of gonocoxites. Aedeagus is conical.

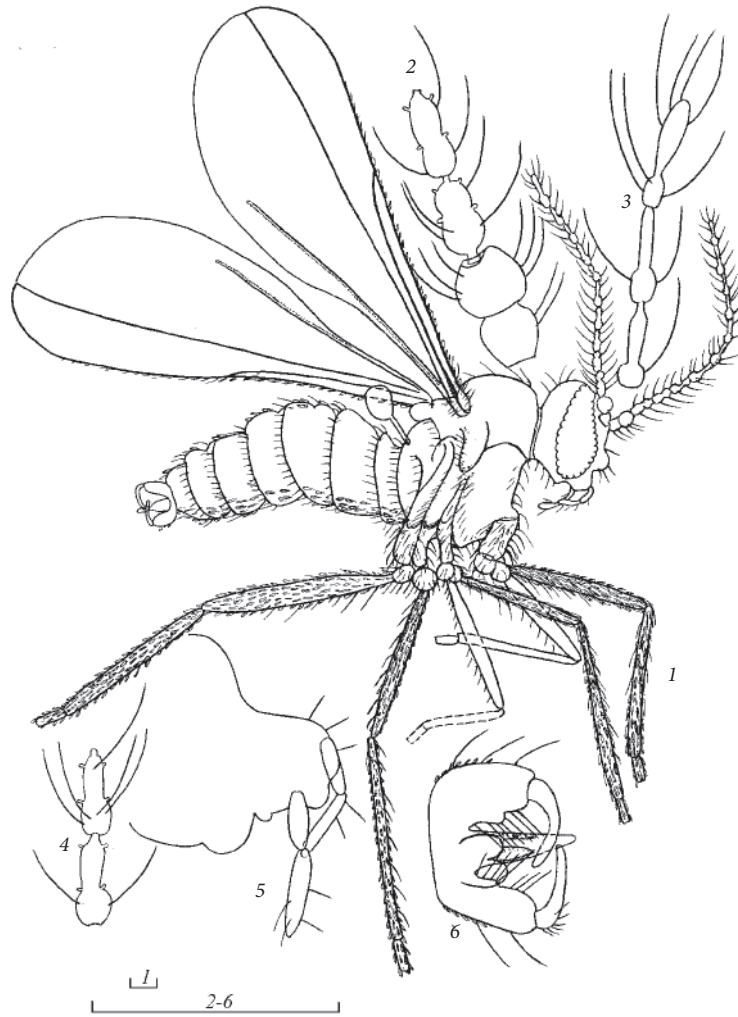


Fig. 1. *Rovnobrachineura kiryeyevi*, male, holotype (SIZK, N K-3701): 1 — general appearance; 2 — scape, pedicel, flagellomeres 1-2; 3 — flagellomeres 8-10; 4 — flagellomeres 6-7; 5 — mouth parts and palpi; 6 — genitalia dorsally. Scale bars 0.1 mm.

Рис. 1. *Rovnobrachineurina kiryeyevi*, самец, голотип (инв. номер К-3701 коллекции Института зоологии НАН Украины): 1 — общий вид; 2 — скапус, педицелл, 1-й и 2-й членики жгутика; 3 — 8-10-й членики жгутика; 4 — 6-7-й членики жгутика; 5 — ротовые органы и щупики; 6 — гениталии сверху. Масштабные линейки 0.1 мм.

Measurements, mm: body length, 0.78; antennal length, 0.49; head length, 0.19; width of lateral side of head, 0.11; palpus length, 0.07; thorax length, 0.23; wing length, 0.71; wing width 0.26; halter length, 0.12; length of fore: femur, 0.22; tibia, 0.27; metatarsus 0.04; length of middle: femur, 0.22; tibia; 0.21; length of hind: femur 0.25; tibia 0.24; abdomen length, 0.42; genitalia length, 0.06.

**Etymology.** The species is named after Denys Kiryeyev for the help to the amber collection of Schmalhausen Institute of Zoology, NAS of Ukraine.

***Brachineura* Rondani, 1840**

**Type species:** *Brachineura fuscogrisea* Rondani, 1840: 17 (monotypy).

**Diagnosis** (fig. 2, 1-11; 7, 4, 5). Body and appendages are covered by very dense dark scales (flagellomeres and tarsi particularly so). Antennae 2+10-segmented: male flagellomeres subcylindrical with short neck; female ones cylindrical, rarely with swollen peritrematae.

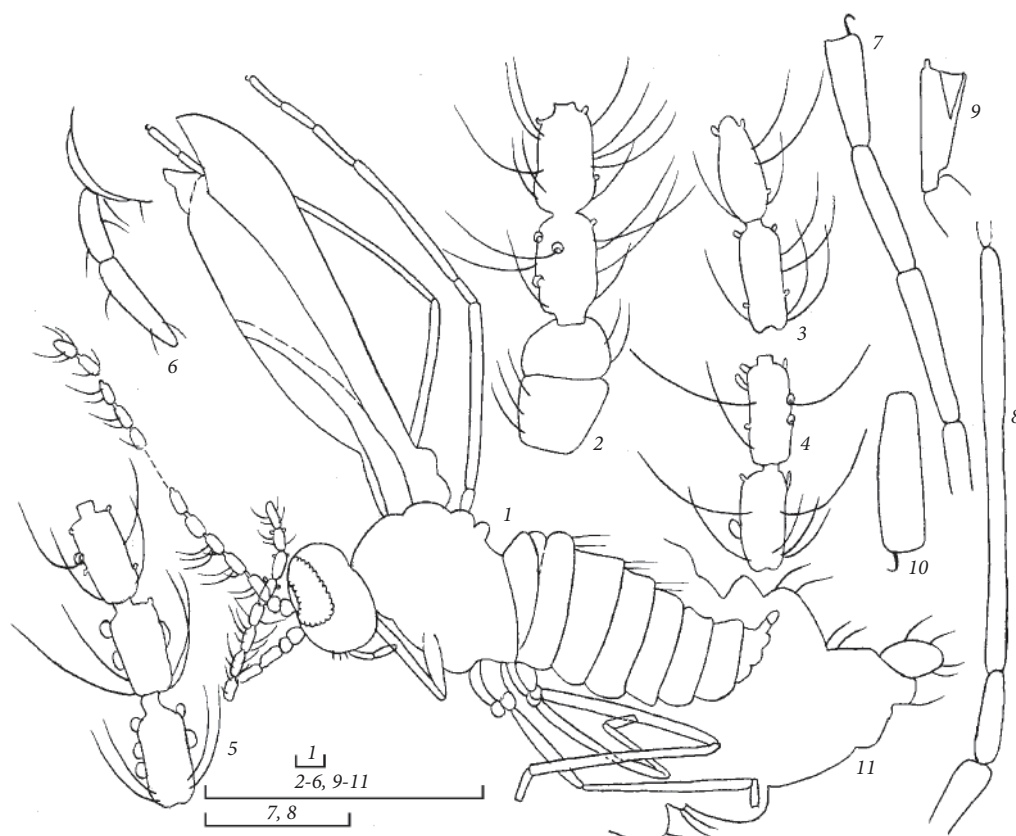


Fig. 2. *Brachineura polessica*, female, holotype (SIZK, N K-1236): 1 — general appearance; 2 — scape, pedicel, flagellomeres 1-2; 3 — flagellomeres 9-10; 4 — flagellomeres 6-7; 5 — flagellomeres 3-5; 6 — palpus; 7 — middle tarsomeres 3-5; 8 — middle tarsomeres 1-2; 9 — middle tarsomere 1; 10 — middle tarsomere 5; 11 — ovipositor laterally. Scale bars 0.1 mm.

Рис. 2. *Brachineura polessica*, самка, голотип (инв. номер К-1236 коллекции Института зоологии НАН Украины): 1 — общий вид; 2 — скапус, педицелл, 1-й и 2-й членики жгутика; 3 — 9-10-й членики жгутика; 4 — 6-7-й членики жгутика; 5 — 3-5-й членики жгутика; 6 — щупик; 7 — 3-5-й членики средней лапки; 8 — 1-2-й членики средней лапки; 9 — 1-й членик средней лапки; 10 — 5-й членик средней лапки; 11 — яйцеклад сбоку. Масштабные линейки 0.1 mm.

Length of flagellomeres increases toward apex. Claws with denticle, empodium is developed. Palpi 1-3-segmented. Vein  $R_{1+2}$  joins C before middle of wing,  $R_{4+5}$  straight or curved, join C very far before wing apex; Cu simple, almost invisible distally. Cerci of male genitalia often cordiform, with very deep triangular excision. Hypoproct is almost as long as cerci and gonocoxites, deep excavated, with oval or semiround excision. Basal outgrowths of gonocoxites undeveloped. Ovipositor is not protrusible, with two dorsal lobes and one ventral.

**Species included.** Cosmopolitan genus, includes 3 subgenera and 23 species, 19 of them Palearctic ones (Mamaev, 1967, 1994; Fedotova, 2004; Fedotova, Sidorenko, 2006 a; Gagné, 2004, 2010), 13 species are recorded from Russian Far East, 2 subgenera and 12 species were recently described (Fedotova, 2004; Fedotova, Sidorenko, 2006 a). Rovno amber species is the first extinct representative of the genus.

**Biology.** Larvae are associated with fungi and decaying leaves, small knots and bark fragments, other vegetable matter and fungi (Mamaev, Krivosheina, 1965; Gagné, Solinas, 1996). Known, that *Brachineura fungicola* (Mamaev, 1967) were reared from mycelium on thin alder snags and dead fruit bodies of *Polyporus sulphureus* (Mamaev, Krivosheina, 1965). *Brachineura squamigera* (Winnerts, 1853) was reared from mushrooms belonging to genera *Russula* and *Rhizopogon* (Bayram, Skuhrová, 2004).

***Brachineura polessica* Fedotova et Perkovsky, sp. n.**

**Material.** Holotype. SIZK N K-1236, poorly preserved inclusion of female with deformed wing and partly missing tarsi, Klesov, Rovno amber, Late Eocene (fig. 2, 1-11; 7, 4, 5). Syninclusions: K-1233: Phoridae; K-1234: Dolichopodidae; K-1235: Dolichopodidae; K-1236: spider web; K-1237: Collembola Entomobryomorpha.

**Description.** Female (fig. 2, 1-11; 7, 4, 5). Body is very wide, as long as wings, 1.7 times longer than antennae. Wings are 1.7 times as long as antennae. Head with wide eye bridge. Head length 1.7 times as long as width. Scape is enlarged distally, longer than transversal pedicel. First flagellomere is 1.8 times as long as wide; 2nd flagellomere is as long as 1st one, with very short neck. Middle flagellomeres are almost parallelsided, 5th flagellomere is 2.6 times as long as wide, almost as long as 1st flagellomere one. Lengths of 9th and 10th flagellomeres are equal, 9th is narrowed distally, apically rounded. Flagellomeres with basal and medial whorls of very long setae. Basal enlargement with rings of sensorial filae, sometimes with little wide loops around lateral sides of flagellomeres. Palpi are 2-segmented, very narrow, almost parallelsided laterally, 2nd 1.4 times as long as 1st. Wing is deformed. Vein Cu is simple, without fork, curved. Fore and middle femur and tibia are shorter than hind femur and tibia. All legs with femur that longer than tibia or have almost equal length with it. First tarsal segment with narrow apical projection laterally (fig. 2, 9). Second middle tarsomere 4.8 times as long as 1st. Tarsal claw is simple, hook-form. Ovipositor is directed dorsocaudally, apical lobes are wide-oval, covered by long setae.

**Measurements,** mm: body length, 1.54; antennal length, 0.91; head length, 0.36; width of lateral side of head, 0.21; palpus length, 0.14; 1st segment, 0.06; 2nd segment, 0.08 mm; wing length, 1.54; wing width 0.44 (unclear); length of fore: femur, 0.50; tibia, 0.52; 1st tarsal segment 0.10; length of middle: coxa, 0.18; trochanter, 0.06; femur, 0.55; tibia, 0.53; tarsus, 1.06; 1st segment, 0.10, 2nd, 0.48; 3rd, 0.19; 4th, 0.15; 5th, 0.13; length of hind: femur, 0.55; tibia, 0.58; metatarsus, 0.10.

**Comparison.** By the shape and size of the body, 2+10-segmented antennae, simple vein Cu, short legs and form of large round plates of ovipositor the new species is closely related to *Brachineura* (s. str.) *enigmatosa* Fedotova et Sidorenko, 2006, differing from it by shorter 2-segmented palpi; short and wide 1st and 2nd flagellomeres; very little neck of middle flagellomeres and presence of numerous round loops of sensorial filae around middle flagellomeres; presence of 1-2 swollen peritremae on basal enlargement of flagellomeres.

**Etymology.** From the toponym Polesje (adj.).

***Popovineura* Fedotova et Perkovsky, gen. n.**

**Type species:** *Popovineura nacta* Fedotova et Perkovsky, sp. n.

**Description.** Male (fig. 3, 1-8; 8, 1, 2). Body is very wide and swollen, slightly longer than antennae and slightly shorter than wings. Head laterally is almost round. Eyes with wide bridge, occiput wide rounded. Antennae are 2+11-segmented, scape is enlarged distally, pedicel round. All flagellomeres with distinct necks, that are shorter than basal enlargements. Basal enlargement mostly parallelsided, only middle flagellomeres with almost round basal node. Distal flagellomeres with short necks. Eleventh flagellomere ovoid. Proximal flagellomeres are slightly wider and longer than distal ones. Flagellomeres with basal whorl of relatively short setae positioned in single row and medial whorl of very long setae densely covering medial part of basal enlargement. Sensorial filae of flagellomeres are invisible. Mouthparts are short and wide. Palpi two-segmented, second segment longer than first. Wing is widely enlarged and rounded distally, vein  $R_{4+5}$  slightly curved, located near C, enters wing margin before its apex, Rs absent, Cu located far from wing margin, not forming fork. Hind femur almost as long as middle, hind tibia is much longer than the middle one. Hind femur is shorter than tibia. Tarsal claw simple, hook-form. Abdomen is evenly swollen and wide rounded distally, strongly narrowed before genitalia. Genitalia are transversal. Gonocoxite is narrow, without basal lobe or enlargement, slightly curved distally. Gonostylus

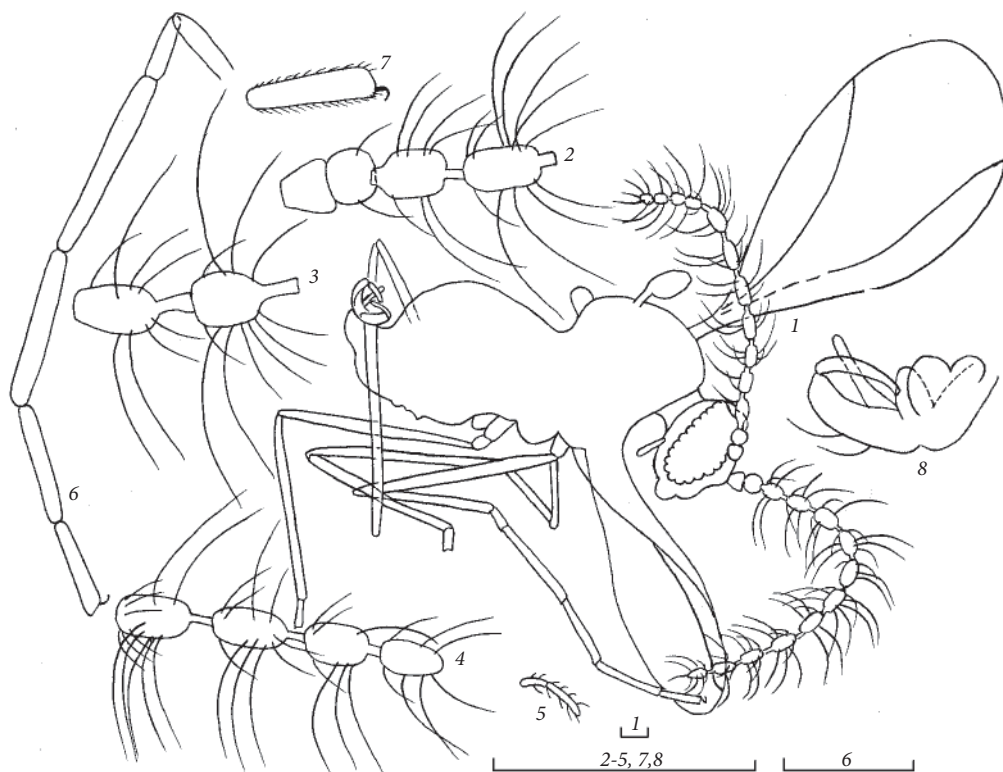


Fig. 3. *Popovineura nacta*, male, holotype (SIZK, N K-666): 1 — general appearance; 2 — scape, pedicel, flagellomeres 1–2; 3 — flagellomeres 5–6; 4 — flagellomeres 8–11; 5 — palpus; 6 — fore tarsus; 7 — fore tarsomere 5; 8 — genitalia. Scale bars 0.1 mm.

Рис. 3. *Popovineura nacta*, самец, голотип (инв. номер К-666 коллекции Института зоологии НАН Украины): 1 — общий вид; 2 — скапус, педицелл, 1-й и 2-й членики жгутика; 3 — 5–6-й членики жгутика; 4 — 8–11-й членики жгутика; 5 — щупик; 6 — передняя лапка; 7 — 5-й членик передней лапки; 8 — гениталии. Масштабные линейки 0.1 мм.

is narrow, with apical dent, slightly shorter than gonocoxites. Cerci are wide, cordiform, almost reaching apex of gonocoxites, with wide round lobe dissected by triangular excision. Parameres or basal enlargement of gonocoxites absent. Hypoproct is whole, rounded apically. Aedeagus is very narrow, almost parallelsided, much longer than gonocoxites.

**Comparison.** By the shape of the body, arrangement of wing veins, the new genus is closely related to *Brachineura* Rondani, 1840 (Mamaev, 1967; Gagné, Solinas, 1996), differing from it by the 2+11-segmented antennae, presence of much longer necks of flagellomeres not covered by dense scales, long legs and very narrow gonocoxites and gonostylus, very long aedeagus, short mouthparts, 2-segmented palpi, and smaller body size.

**Etymology.** The genus is named in honour of paleoentomologist Yu. A. Popov, the leading Russian expert in fossil Hemiptera. The name is combined of his second name and the second part of the name *Brachineura*. Gender feminine.

### ***Popovineura nacta* Fedotova et Perkovsky, sp. n.**

**Material.** Holotype. SIZK N K-666, well preserved inclusion of male with tarsi partly missing, Klesov, Rovno amber, Late Eocene (fig. 3, 1–8; 8, 1, 2). Syninclusions: K-667: Sciaridae; K-668: female of biting midge *Eohelea sinuosa* (Meunier).

**Description.** Male (fig. 3, 1–8; 8, 1, 2). Body (without genitalia) is 1.1 times longer than antennae. Wings are 1.3 times as long as antennae. Head with large eyes,

that laterally cover almost all lateral side of head. Scape enlarged distally, almost as long as wide round pedicel. First flagellomere slightly longer than 2nd and with longer neck (2.2 times as long as wide); 2nd flagellomere strongly narrower and slightly shorter than 1st. Fifth flagellomere 2.4 times as long as wide, neck 2.3 times shorter than basal enlargement, 1.3 times shorter than 1st flagellomere. Tenth flagellomere 1.5 times as long as wide, with very short neck; 11th flagellomere slightly narrowed distally, shorter than 10th. Palpi are very narrow, laterally parallelsided, its 2nd segment is 1.7 times as long as 1st. Wing 2.2 times as long as wide. Vein  $R_{1+2}$  unclear,  $R_{4+5}$  slightly curved, joining wing margin almost as far from tip of wing as Cu. Gonocoxites are slightly rounded laterally, 3.3 times as long as wide. Gonostylus is slightly curved, almost parallelsided, 1.5 times shorter than gonocoxites. Cerci are much wider than gonocoxites. Hypoproct is as long as cerci, 2.3 times shorter than cerci. Aedeagus is rounded apically.

**Measurements**, mm: body length, 0.95; wing length, 1.1; wing width, 0.50; antennal length, 0.86; head length, 0.30; width of lateral side of head, 0.20; thorax length, 0.37; length of middle: femur 0.48; tibia 0.52; metatarsus, 0.09; length of hind: femur, 0.47; tibia, 0.39; tarsi, 0.39.

**Etymology**. The species name (adj.) comes from the Latin nactus (perfect participle from nanciscor meaning to encounter).

***Nascensluna* Fedotova et Perkovsky, gen. n.**

Type species: *Nascensluna mellea* Fedotova et Perkovsky, sp. n.

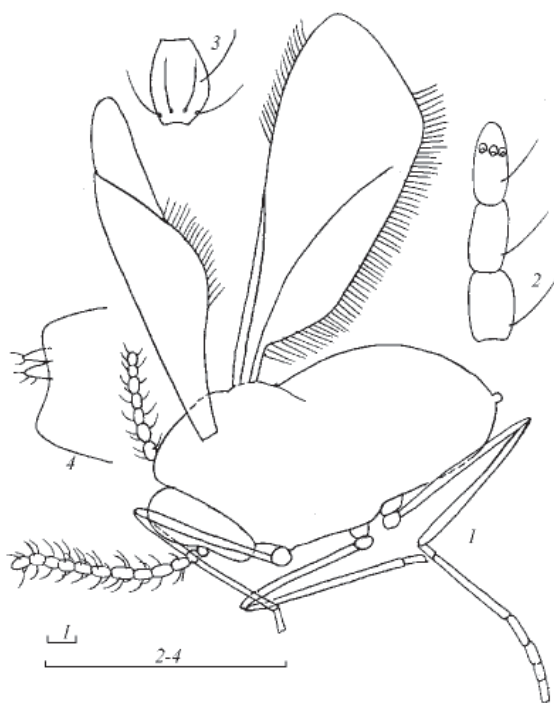


Fig. 4. *Nascensluna mellea*, female, holotype (SIKZ, N K-1601): 1 — general appearance; 2 — flagellomeres 8–10; 3 — flagellomere 5; 4 — ovipositor. Scale bars 0.1 mm.

Рис. 4. *Nascensluna mellea*, самка, голотип (инв. номер К-1601 коллекции Института зоологии НАН Украины): 1 — общий вид; 2 — 8–10-й членики жгутика; 3 — 5-й членик жгутика; 4 — яйцеклад. Масштабные линейки 0.1 мм.

**Description**. Male (fig. 4, 1–4; 8, 5–7). Body very wide and swollen, much longer than antennae and slightly shorter than wings. Body and antennae densely covered by scales. Head laterally almost oval. Eye bridge wide, occiput wide rounded. Antennae are 2+10-segmented, scape is enlarged distally, pedicel is round. All flagellomeres without neck, and slightly rounded laterally. Flagellomeres evenly narrowed and shortened distally. Tenth flagellomere widely rounded apically. Flagellomeres with basal whorl of short setae located in single row and medial whorl of very long setae rarely covering medial part of flagellomere. Sensorial filae of flagellomere are invisible. Wing is wide enlarged and rounded distally, vein  $R_{4+5}$  is short and straight, almost fused with  $R_{1+2}$  and C, joins margin of the wing near its middle, Cu is positioned far from margin of wing, without fork. Fore femur and tibia are slightly longer than middle ones and shorter than hind femur and tibia. Hind femur and tibia have equal length. Hind tarsus is 1.6 times as long as femur. Tarsal claw is simple, hook-form. Hind leg is 1.7 times as long as body and 2.1 times as



long as wing. Thorax and abdomen are strongly swollen and wide rounded distally. Ovipositor is not protrusible. Cerci are bilobed, very short and narrow.

**Comparison.** By the shape of the swollen body, 2+10-segmented antennae, covered by dense scales, the new genus is closely related to *Brachineura* Rondani, 1840 (Mamaev, 1967; Gagné, Solinas, 1996), differing from it by the wing venation (fused veins  $R_{1+2}$  and  $R_{4+5}$ ), much shorter flagellomeres, longer legs, narrow and short cerci of ovipositor and smaller body size. Wings of new genus are similar to *Lasioptera* Meigen, 1818, but new genus differs by short antennae and not protrusible ovipositor.

**Etymology.** Name is based on the Latin *Nascens luna* (new moon or moonrise). Gender feminine.

***Nascensluna mellea* Fedotova et Perkovsky, sp. n.**

**Material.** Holotype. SIZK N UA-1601, well preserved inclusion of female with tarsi partly missing, Rovno amber, Late Eocene (fig. 4, 1-4; 8, 5-7). Syninclusions: Phoridae, 6 hymenopteran larvae (including 5 larvae separated in the piece UA-1602).

**Description.** Female (fig. 4, 1-4; 8, 5-7). Body 1.8 times as long as antennae. Wings 2.1 times as long as antennae. Large eyes completely cover lateral side of head. Scape and pedicel are almost transversal. First flagellomere is slightly longer than 2nd: 2.2 times as long as wide; 5th flagellomere barrel-shaped, 1.5 times as long as wide. Tenth flagellomere 2.3 times as long as wide, 1.2 times longer than 9th flagellomere and slightly shorter than 5th. Palpi are unclear. Wing is 2.8 times as long as wide; Cu slightly curved. 1st hind tarsomere 4.7 times shorter than 2nd. Cerci of ovipositor pointed apically, covered by short setae.

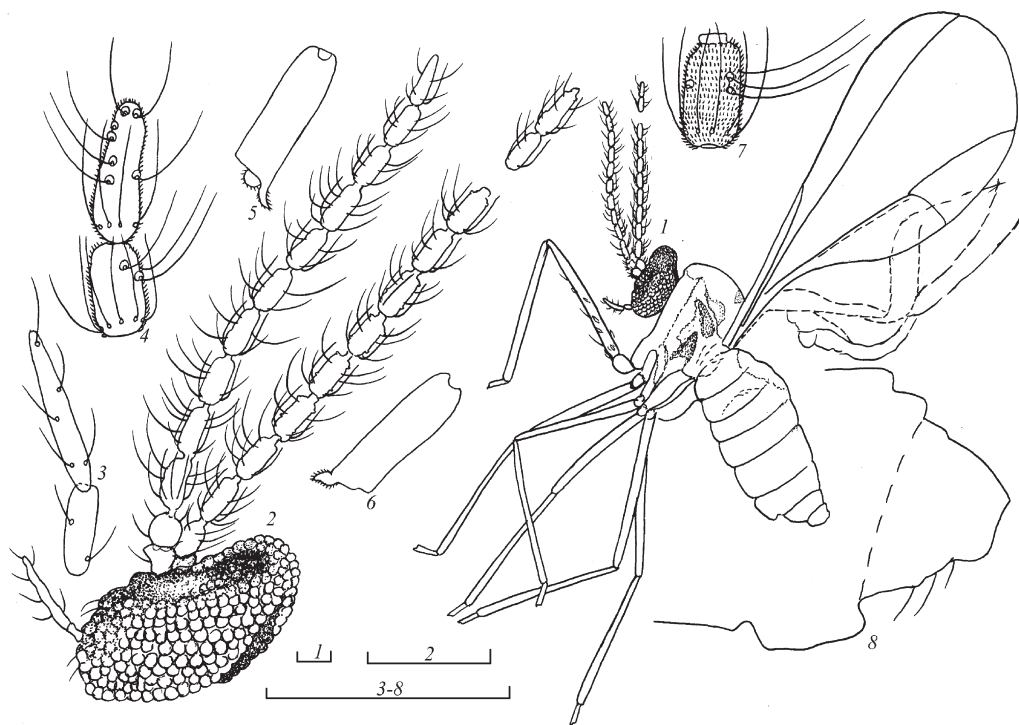


Fig. 5. *Rhizomyia parkalovi*, female, holotype (SIZK, N K-7385): 1 — general appearance; 2 — head; 3 — palpus; 4 — flagellomeres 9-10; 5, 6 — tarsomere 1 (variability of shape); 7 — flagellomere 5; 8 — apex of abdomen. Scale bars 0.1 mm.

Рис. 5. *Rhizomyia parkalovi*, самка, голотип (инв. номер К-7385 коллекции Института зоологии НАН Украины): 1 — общий вид; 2 — голова; 3 — щупик; 4 — 9-10-й членики жгутика; 5, 6 — 1-й членик лапки (изменчивость формы); 7 — 5-й членик жгутика, 8 — вершина брюшка. Масштабные линейки 0.1 мм.

Measurements, mm: body length, 0.66; wing length, 0.74; wing width, 0.26; antennal length, 0.36; head length, 0.21; thorax length, 0.35; abdomen length, 0.43; length of fore: femur 0.28; tibia 0.26; length of middle: femur 0.23; tibia 0.30; length of hind: femur, 0.30; tibia, 0.31; tarsus, 0.49.

**E t y m o l o g y.** From the Latin adjective *mellea* (honey, pleasant).

***Rhizomyia* Kieffer, 1898**

*Rhizomyia* Kieffer, 1898: 56.

**Type species:** *Rhizomyia perplexa* Kieffer, 1898: 57 (monotypy).

**Diagnosis** (fig. 5, 1–8, 7, 6, 7). Wing, body and legs are conspicuously covered by scales. Head almost completely covered by eyes or eye bridge wide. Antennae are 2+9–10-segmented. Male flagellomeres are subcylindrical with neck and swollen basal enlargement with numerous swollen peritremes of setae. Neck of male middle flagellomeres is longer, equal or slightly shorter than basal enlargement. Female flagellomeres are elongated, sessile, subcylindrical, without neck or with very short neck. Male fore tarsi usually with teeth, middle and hind tarsi with or without teeth. Palpi are 3–4-segmented, labrum is triangular. Wing is broad,  $R_{1+2}$  joins costa before its midlength.  $R_{4+5}$  is straight, joining C rather near wing apex or at wing apex; C broken at junction with  $R_{4+5}$ ; Cu forked. Claws with tooth. Genitalia are transversal. Gonocoxites are short, ovoid or parallel-sided. Gonostylus is long, narrowing apically, terminated by very little apical claw. Cerci with very deep excision. Hypoproct is slightly caved or excavated. Aedeagus is usually shorter than gonocoxites or equal in length. Basal outgrowths (or parameres) of gonocoxites absent. Ovipositor very short, not protrusible, apically with two terminal lamellae.

**Species included.** Holarctic and Oriental genus with 29 species, 21 of them Palearctic ones (Skuhrová, 1997; Mamaev, 1998; Mamaev, Zaitzev, 2002; Fedotova, 2004; Gagné, 2004, 2010; Fedotova, Sidorenko, 2005, 2006 b). Extinct species of *Rhizomyia* were unknown until now.

**Biology.** Larvae of *Rhizomyia perplexa* Kieffer, 1898 and *R. circumspinos*a (Rübsaamen, 1899) develop on roots and in sheath of leaves of a sedge (*Carex* spp., Cyperaceae) (Mamaev, Krivosheina, 1965).

***Rhizomyia parkalovi* Fedotova et Perkovsky, sp. n.**

**Material.** Holotype. SIZK N K-7385, well preserved inclusion of female with tarsi missing, Klesov, Rovno amber, Late Eocene (fig. 5, 1–8, 7, 6, 7). Syninclusions: N K-7383: Collembola Entomobryomorpha, 2 ex.; Cecidomyiidae: *Rhizomyia* sp., K-7384: Sciaridae.

**Description.** Female (fig. 5, 1–8, 7, 6, 7). Body (without genitalia) is 1.8 times longer than antennae. Wings 2.2 times as long as antennae. Length of head 2.2 times as long as lateral side of head. Antennae are 2+10-segmented. Head completely covered by eyes laterally, eye bridge narrow. Scape enlarged distally, almost as long as round pedicel. Necks of flagellomeres very short. First flagellomere slightly longer than 2nd; 5th flagellomere 2.0 times as long as wide. Ninth flagellomere without neck; 10th flagellomere 2.9 times as long as wide; narrowed distally. Palpi are very narrow, 2-segmented, 2nd segment is 1.8 times longer than the first. Fore and middle femur have equal length, shorter than tibia ones. Lengths of fore and middle tibia also almost equal. First tarsomere with lateral long projection is covered by setae. Wing is 2.3 times as long as wide. Vein  $R_{4+5}$  strongly curved near apex, joining wing margin at smaller distance from tip of wing than  $Cu_2$ . All tibiae subequal to, or longer than, respective femora. Fore tibia 1.1 times as long as femur. Ovipositor is not protrusible. 8th abdominal segment without ventral lobes or projections.

**Measurements**, mm: body length, 1.05; wing length, 1.27; wing width, 0.65; antennal length, 0.59; head length, 0.24 (without mouth parts); width of lateral side of head, 0.11; thorax length, 0.34; abdomen length, 0.61; length of fore: coxa, 0.10; trochanter, 0.07; femur 0.45; tibia 0.48; 1st segment, 0.07; length of middle: coxa, 0.11; trochanter, 0.07; femur 0.43; tibia 0.45; length of hind: coxa, 0.14; trochanter, 0.06; femur, 0.45; tibia, 0.47; 1st segment, 0.07.

**Comparison.** By the 2+10-segmented antennae, arrangement of wing veins, long flagellomeres new species is closely related to *R. operculata* Fedotova et Sidorenko, 2006, differing from it by the elongated segments of 2-segmented palpi; very short neck and wide basal enlargement of middle flagellomeres; narrowing distally 10th flagellomere; in wing, that is enlarged distally (not proximally); in  $R_{4+5}$  that joining C before wing apex, and smaller body size.

**Etymology.** The species is named after Andrej Parkalov who permanently helps the amber collection of Schmalhausen Institute of Zoology, NAS of Ukraine.

**LASIOPTERIDI** Rondani, 1856

**LEDOMYIINI** Enderlein, 1936

**Ledomyia** Kieffer, 1895

*Lepidomyia* Kieffer, 1894: 201, preoccupied by Loew, 1864.

**Type species:** *Lepidomyia lugens* Kieffer, 1894: 211 (monotypy).

*Ledomyia* Kieffer, 1895: cccxx, new name for *Lepidomyia* Kieffer.

**Diagnosis** (fig. 6, 1–7; 8, 3, 4). Wing, body and legs are conspicuously covered by scales. Antennae are 2+8–12-segmented. Male flagellomeres subcylindrical with neck and swollen basal enlargement. Female flagellomeres elongated, sessile, without neck. Tarsal claws toothed on the forelegs, toothed or simple on the mid- and hindlegs. Palpi are mostly 4-segmented, labrum triangular. Wing is broad,  $R_{1+2}$  joins C before its midlength.  $R_{4+5}$  is straight or curved, joins C rather far before wing apex; C broken at junction with  $R_{4+5}$ ; Cu is forked. Genitalia are transversal. Gonocoxites are ovoid or parallel-sided. Gonostylus is short, excavated ventrally, terminated by very wide apical or dorso-apical claw, protruding

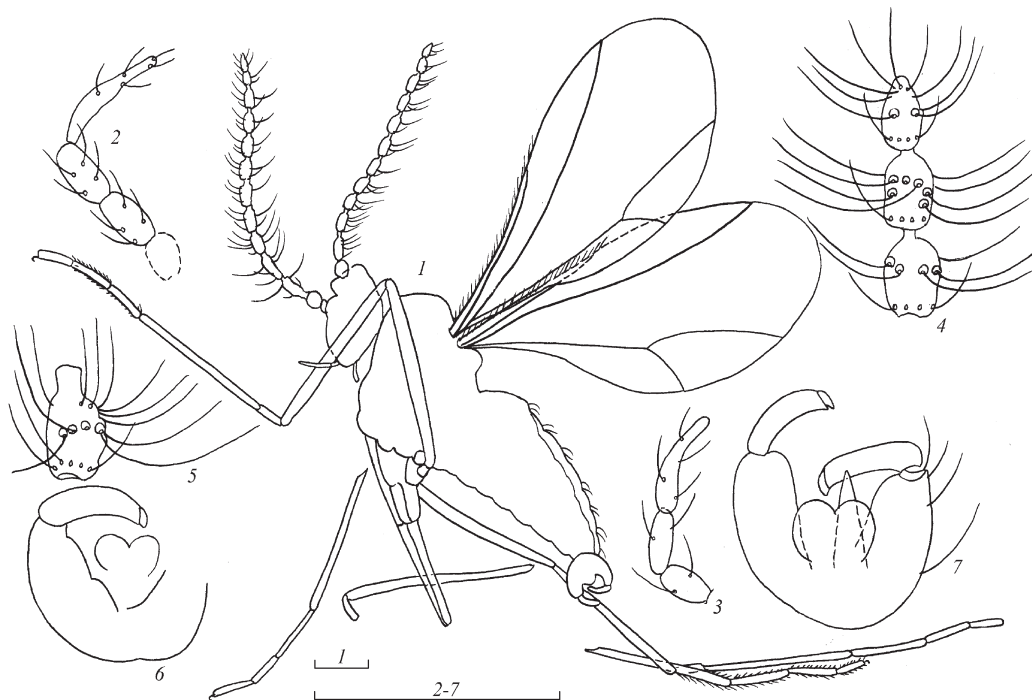


Fig. 6. *Ledomyia olgae*, male, holotype (SIZK, N K-3697): 1 — general appearance; 2, 3 — palpi (variability of shape); 4 — flagellomeres 9–11; 5 — flagellomere 5; 6, 7 — genitalia (6 — ventral view, 7 — dorsal view). Scale bars 0.1 mm.

Рис. 6. *Ledomyia olgae*, самец, голотип (инв. номер К-3697 коллекции Института зоологии НАН Украины): 1 — общий вид; 2, 3 — щупик (изменчивость формы); 4 — 9–11-й членики жгутика, 5 — 5-й членик жгутика, 6, 7 — гениталии (6 — снизу, 7 — сверху). Масштабные линейки 0.1 mm.

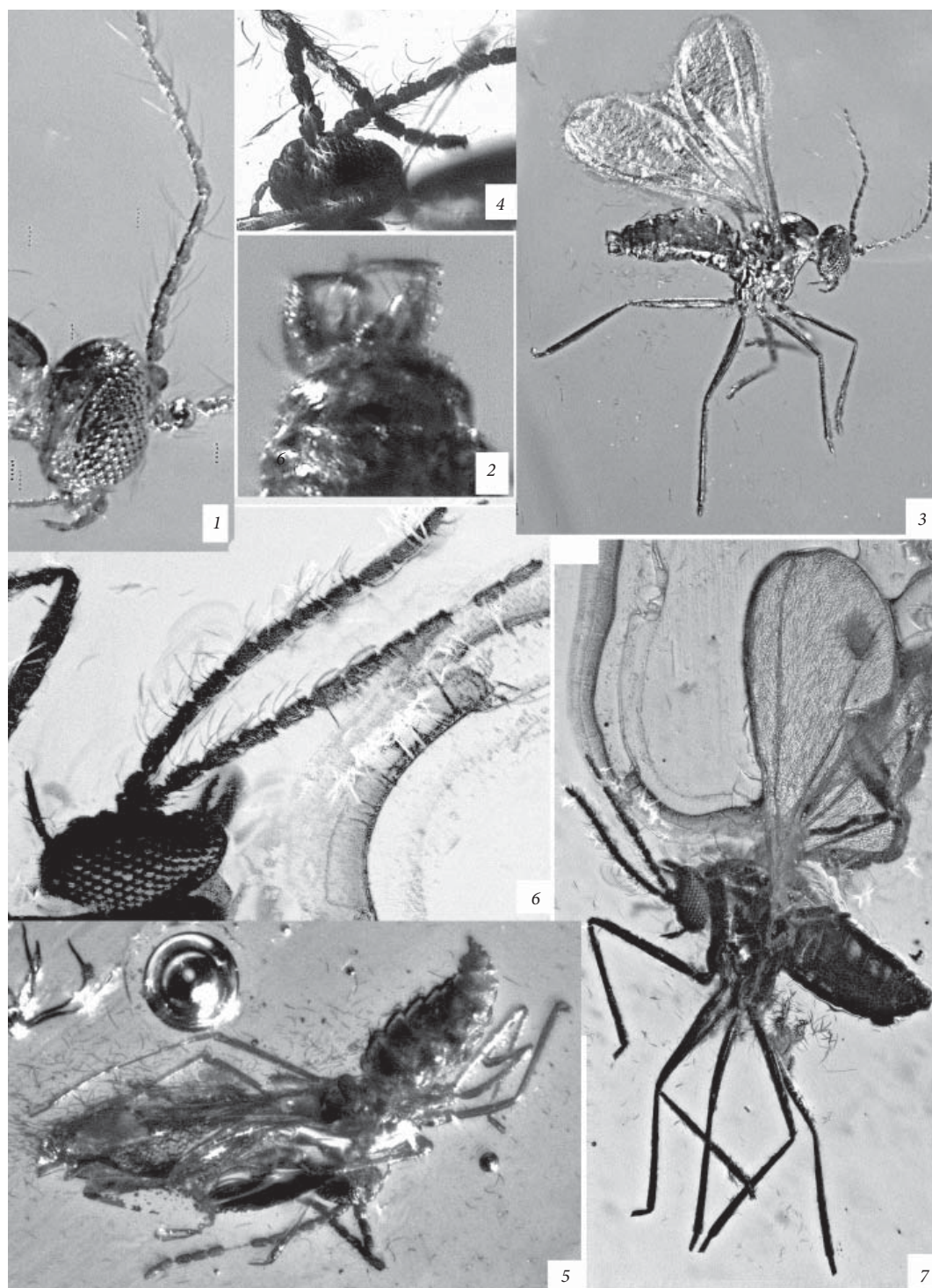


Fig. 7. *Rovnobrachineura kiryeyevi*, male, holotype SIZK, N K-3701 (1-3); *Brachineura polessica*, female, holotype (SIZK, N K-1236) (4, 5); *Rhizomyia parkalovi*, female, holotype (SIZK, N K-7385) (6, 7): 1, 4, 6 — head and antenna (1 —  $\times 129$ ; 4 —  $\times 62$ ; 6 —  $\times 117$ ); 2 — genitalia ( $\times 283$ ); 3, 5, 7 — general appearance (3 —  $\times 46$ ; 5 —  $\times 29$ ; 7 —  $\times 39$ ).

Fig. 7. *Rovnobrachineura kiryeyevi*, самец, голотип (инв. номер К-3701 коллекции Института зоологии НАН Украины) (1-3); *Brachineura polessica*, самка, голотип (инв. номер К-1236) (4, 5); *Rhizomyia parkalovi*, самка, голотип (инв. номер К-7385) (6, 7): 1, 4, 6 — голова и антенна (1 —  $\times 129$ ; 4 —  $\times 62$ ; 6 —  $\times 117$ ); 2 — гениталии ( $\times 283$ ); 3, 5, 7 — общий вид (3 —  $\times 46$ ; 5 —  $\times 29$ ; 7 —  $\times 39$ ).

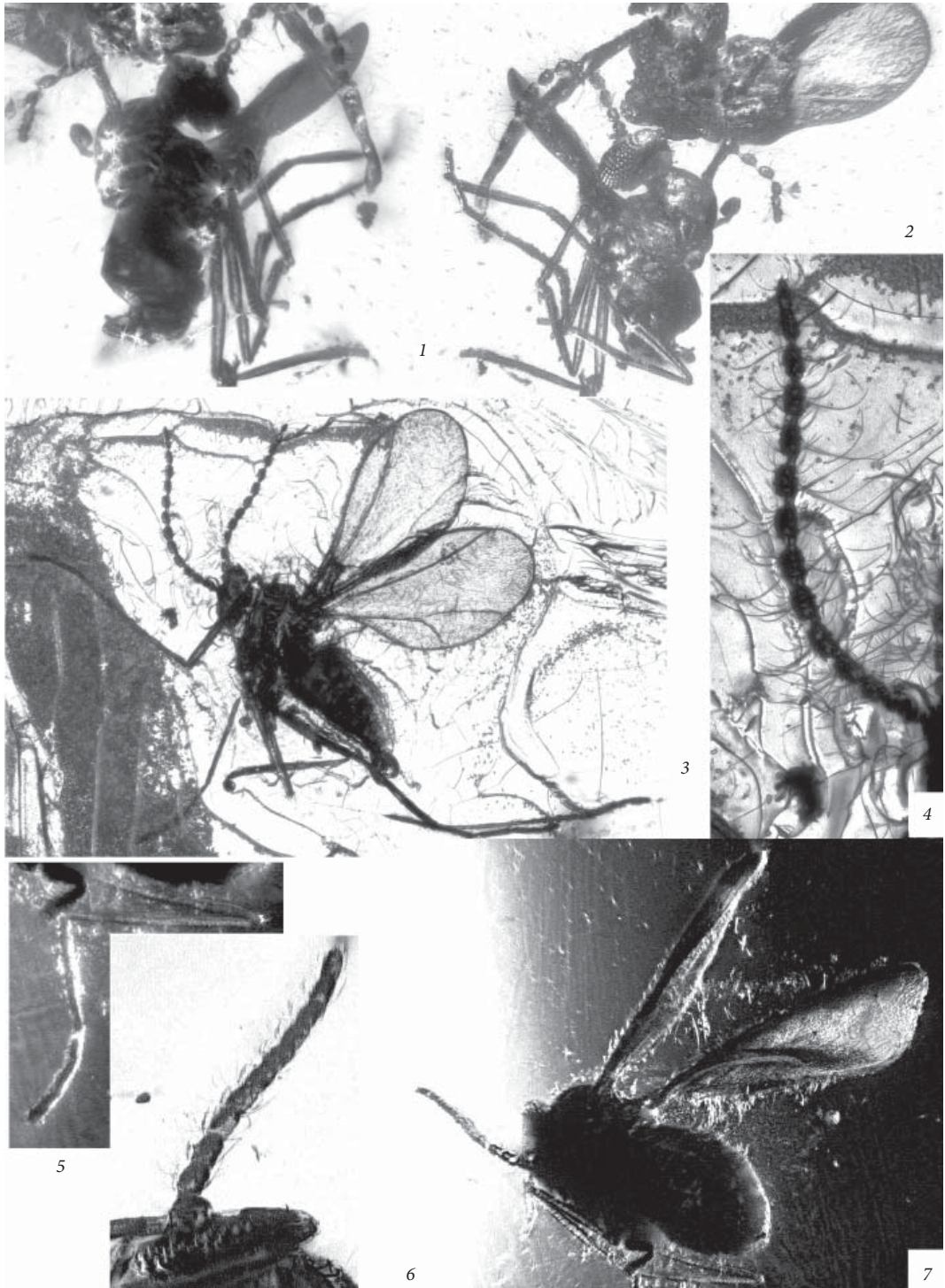


Fig. 8. *Popovineura nacta*, male, holotype (SIZK, N K-666) (1, 2); *Ledomyia olgae*, male, holotype (SIZK, N K-3697) (3, 4); *Nascensluna mellea*, female, holotype (SIZK, N K-1601) (5-7): 1-3, 7 — general appearance (1 —  $\times 45$ ; 2 —  $\times 38$ ; 3 —  $\times 48$ ; 7 —  $\times 64$ ); 4 — antennae (4 —  $\times 129$ ); 5 — hind leg ( $\times 82$ ); 6 — head and antenna ( $\times 131$ ).

Fig. 8. *Popovineura nacta*, самец, голотип (инв. номер К-666 коллекции Института зоологии НАН Украины) (1, 2); *Ledomyia olgae*, самец, голотип (инв. номер К-3697) (3, 4); *Nascensluna mellea*, самка, голотип (инв. номер К-1601) (5-7): 1-3, 7 — общий вид (1 —  $\times 45$ ; 2 —  $\times 38$ ; 3 —  $\times 48$ ; 7 —  $\times 64$ ); 4 — антенна (4 —  $\times 129$ ); 5 — задняя нога ( $\times 82$ ); 6 — голова и антенна ( $\times 131$ ).

from dorsal part of gonostylus. Cerci are cordiform with very deep excision. Hypoproct slightly caved. Aedeagus usually equal or longer than gonocoxites. Basal processes of gonocoxites are well developed, strongly narrowed apically. Ovipositor very long, extensible, apically with two terminal lamellae with two small, obtuse spines.

Species included. The genus is nearly cosmopolitan, two species were described from tropical regions (Fedotova, Sidorenko, 2007). Genus includes 26 species, 17 of them are Palaearctic (Mamaev, 1967; Skuhrová, 1997; Gagné, 2004, 2010; Fedotova, Sidorenko, 2007; Fedotova, Perkovsky, 2008). Some undescribed species are known from Middle Miocene Mexican amber (Gagné, 1973) and Late Eocene Baltic amber, part of species were mistakenly included in extinct genus *Ledomyiella* Meunier, 1904, known from Baltic amber. From Late Eocene Rovno amber was described *Ledomyia dextra* Fedotova et Perkovsky, 2008.

Most of the included species have been reared from fresh-cut logs (Gagné, 1985, 2010; Rock, Jackson 1985). *Ledomyia collarata* Gagné, 1987 was reared from galls on a fungus *Xylaria enterogena* Mont. (Xylariaceae, Ascomycetes) (Larew et al., 1987); its adults are unknown and the species is only tentatively placed in this genus.

***Ledomyia olgae* Fedotova et Perkovsky, sp. n.**

**Material.** Holotype. SIZK N K-3697, well preserved inclusion of male, Klesov, Rovno amber, Late Eocene (fig. 6, 1-7; 8, 3, 4). Syninclusion: Diptera.

**Description.** Male (fig. 6, 1-7; 8, 3, 4). Body (without genitalia) is 1.3 times longer than antennae. Wings are 1.3 times as long as antennae. Antennae are 2+12-segmented. Head with large eyes that laterally cover only dorsal part of head. Scape is enlarged distally, almost as long as wide round pedicel. First flagellomere slightly longer than 2nd, its neck is shorter than the neck of the 2nd one; 5th flagellomere is 1.9 times as long as wide, its neck is 3.0 times shorter than basal enlargement. Tenth and 11th flagellomeres have very short neck; 10th flagellomere is 1.5 times as long as wide; 11th flagellomere is slightly narrowed distally and shorter than 10th. 12th flagellomere is oviform. Palpi are very narrow, 2-3-segmented, slightly swollen laterally. Fore tarsus with 2nd tarsomere 5 times as long as 1st. Wing is 2.2 times as long as wide. Vein  $R_{1+2}$  joins C before its midlength;  $R_{4+5}$  is strongly curved near apex, joins the wing margin closer to the apex than  $Cu_2$ . All tibiae subequal to or longer than respective femora. Fore tibia 1.2 times as long as femur. Hind leg is longer than fore and middle ones. Gonocoxites are slightly rounded laterally, 2.6 times as long as wide. Gonostylus is slightly curved, almost parallelsided, with wide apical claw, 1.7 times shorter than gonocoxites. Cerci are wider than gonocoxites. Aedeagus almost triangular.

**Measurements, mm:** body length, 0.76 (without genitalia); 0.83 (with genitalia); wing length, 0.77; wing width, 0.35; antennal length, 0.59; head length, 0.20 (without mouth parts); 0.25 (with mouth parts); width of lateral side of head, 0.11; palpi length, 0.12; thorax length, 0.28; abdomen length, 0.41; length of fore leg, 1.38; coxa and trochanter, 0.09; tarsus, 0.61; femur 0.32; tibia 0.36; 1st segment, 0.06, 2nd, 0.30; 3rd, 0.06; 4th, 0.09; 5th, 0.07; length of middle: leg, 1.31; femur 0.33; tibia 0.37; tarsus, 0.61; coxa and trochanter, 0.09; 1st segment, 0.06, 2nd, 0.28; 3rd, 0.12; 4th, 0.09; 5th, 0.06; length of hind: leg, 1.46; coxa and trochanter, 0.09; tarsus, 0.66; femur, 0.34; tibia, 0.37; 1st segment, 0.06, 2nd, 0.32; 3rd, 0.11; 4th, 0.10; 5th, 0.07.

**Comparison.** By the shape of the body, wing venation, long legs and form of flagellomeres the new species is closely related to *Ledomyia dextra* Fedotova et Perkovsky, 2008 from Dubrovitsa, differing from it by the 2+12-segmented antennae (vs. 2+11 of *L. dextra*); wing ratio (2.2 vs. 2.6); very long 2nd tarsomere; wider and shorter middle flagellomeres with wide and short necks; all tibiae longer than respective femora (hind tibia of *L. dextra* shorter than femur); oviform apical flagellomere (vs. oval of *L. dextra*); larger body size.

**Etymology.** The species is named after Olga — daughter of E. E. Perkovsky.

All in all, in Rovno amber Brachineurini and Ledomyiini account for 11.9 % of all species of the superfamily Cecidomyioidea (27 vs. 227), in Baltic amber — for 9.0 % (6 vs. 67) (Fedotova, Perkovsky, 2009).

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