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NEW GENUS AND SPECIES OF GALL MIDGES (DIPTERA, CECIDOMYIIDAE: PORRICONDYINAE, HOLONEURINI) FROM THE LATE EOCENE AMBER OF OLEVSK (ZHITOMIR REGION, UKRAINE)

Z. A. Fedotova¹, E. E. Perkovsky²

¹All-Russian Institute of Plant Protection (FSBI VIZR),
Shosse Podbelskogo, 3, St.-Petersburg–Pushkin, 196608 Russia
E-mail: zoyafedotova@gmail.com

²Schmalhausen Institute of Zoology, NAS of Ukraine,
vul. B. Khmelnytskogo, 15, Kyiv, 01030 Ukraine
E-mail: perkovsk@gmail.com

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New Genus and Species of Gall Midges (Diptera, Cecidomyiidae, Porricondylinae, Holoneurini) from the Late Eocene Amber of Olevsk (Zhitomir Region, Ukraine). Fedotova, Z. A., Perkovsky, E. E. — Gall midges are reported for the first time in Late Eocene Rovno amber from the Olevsk, Zhitomir Region. This is the second amber locality to yield gall midges in the Zhitomir Region, after Gulyanka. *Rovnoholoneurus* gen. n. and two new species, *Rovnoholoneurus davidi* sp. n. and *R. miyae* sp. n. are described. *Bryocrypta laqueata* Fedotova, 2005 is transferred to the genus *Rovnoholoneurus*, and *Rovnoholoneurus laqueatus* (Fedotova, 2005), **comb. n.** is established. A key to the species of *Rovnoholoneurus* is provided.

Key words: Diptera, Cecidomyiidae, Rovno amber, gall midges, new genus, new species, Late Eocene, Zhitomir Region, Ukraine.

This publication continues a series of descriptions of new genera and species of gall midges from Late Eocene Rovno amber. Rovno amber occurs throughout southern Polissya from Volyn Region to Kyiv Region (Perkovsky et al., 2010, text: fig. 5; Perkovsky, 2017). Earlier, we described 20 genera and 88 species of gall midges from Rovno amber, and five species of gall midges from coeval Baltic amber (Perkovsky, Fedotova, 2016, and references therein). We subsequently described eight previously unknown genera and eight species of gall midges from Santonian Yantardakh amber of the Taimyr Peninsula, Siberia, and a genus and species from the Middle Eocene Sakhalinian amber (Fedotova, Perkovsky, 2016 a, b).

The amber bearing zone in the northern Zhitomir Region (Korosten District) has long been known (Perkovsky et al., 2010: text fig. 5), but no new inclusions from it were recorded from 1914 to 2015 (Fedotova, Perkovsky, 2015). A trichopteran in amber from the Olevsk District was published this year (Perkovsky, 2017). Gall midges (one new genus and two new species) are here reported for the first time from Rovno amber of the Olevsk District. Previously, only two genera and two species of gall midges had been described from the Late Eocene Gulyanka locality of the Zhitomir Region (Fedotova, Perkovsky, 2015): *Rovnodidactylomyia zhitomirensis* Fedotova et Perkovsky, 2015 (Cecidomyiinae, Stomatosematidi, Didactylomyiini) and *Gulyankiola nazarenkoi* Fedotova et Perkovsky, 2015 (Lasiopterinae, Brachineuridi, Ledomyiini). We describe below a previously unknown genus and two new species of this genus from Olevsk: *R. davidi* sp. n. and *R. miyae* sp. n.; in addition, another species is transferred to this genus from *Bryocrypta*. The new genus is assigned to the tribe Holoneurini (subfamily Porricondylinae).

Only two genera and two species of the Holoneurini have been known from Rovno amber to date: *Gratomyia inexigentis* Fedotova et Perkovsky, 2008 from Klesov (Fedorovskiy area) and *Volnococcopsis korniushini* Fedotova et Perkovsky, 2008 from Dubrovitsa (Volnoje) (Fedotova, Perkovsky, 2008; Perkovsky, Fedotova, 2008). These are the only known fossil representatives of the tribe, except for a single, badly damaged specimen from Cretaceous Taimyr amber (Fedotova, Perkovsky, 2016 a). In Rovno amber, the proportion of specimens belonging to Holoneurini is about 8 % (52 of 650 specimens), which is very similar to the proportion of the Winnertziini, 8.2 % (53 of 650). According to “A Catalog of the Cecidomyiidae (Diptera) of the World” (Gagné, 2004), the tribe Holoneurini belongs to the subfamily Porricondylinae, is not divided into subtribes, and includes 6 genera and 31 species. The Holoneurini were revised by Fedotova, Sidorenko (2005, 2007), with 4 genera and 5 species described from the Russian Far East, 1 species from the Middle Volga, and 2 genera and 2 species from Rovno amber. Subsequently, in the “Update for A Catalog of the Cecidomyiidae (Diptera) of the World” (Gagné, 2010), Holoneurini was considered as consisting of 12 genera and 39 species. It is attributed here to the subfamily Porricondylinae s. l. Gagné and Jaschhof (2014) in the 3rd edition of “A Catalog of the Cecidomyiidae (Diptera) of the World” synonymized the Holoneurini with the Porricondylini within the subfamily Porricondylinae s. str., with Porricondylinae s. l. split to form the subfamilies Porricondylinae s. str. and Winnertziinae, of equal rank with Lestremiinae and Cecidomyiinae. We believe that these changes are unjustified.

The Rovno amber samples examined and reported here, including types, are deposited in the amber collection of the Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine (Kyiv), referred to below as SIZK. Photographs were taken by V. Yu. Nazarenko and the 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”.

Family CECIDOMYIIDAE Newman, 1834

Subfamily PORRICONDYLINAE Kieffer, 1913

Tribe Holoneurini Enderlein, 1936

The tribe is characterized by synapomorphies characteristic of the valid tribe rank in Porricondylinae (Mamaev, 2001; Fedotova, Sidorenko, 2007): antennae with 10–11 flagellomeres; reduction of wing venation; absent or reduced parameres; tarsal claws narrow and curved near midlength; male and female flagellomeres with dense sensorial reticulation, and female flagellomeres with a long neck. Their wing venation is variable, with M_3 absent or slightly visible, Cu never forked, CuA_2 slightly visible distally or completely disappearing, $m+rm$ usually slightly curved distally, and rs situated at an angle to R_5 . The ovipositor is 2-segmented.

The larvae of some extant species of the Holoneurini have been associated with leaf litter and decaying wood (Mamaev, Krivosheina, 1965). Adult insects are usually captured in Malaise traps (Fedotova, Sidorenko, 2005, 2007).

The tribe includes 12 genera and 43 species: 9 extant genera with 38 species (number of species in parentheses): *Cassidoides* Mamaev, 1960 (8); *Coccopsis* Meijere, 1901 (8); *Cognitepidosis* Fedotova et Sidorenko, 2005 (1); *Cryptoneurus* Mamaev, 1964 (3); *Dalaiella* Mamaev, 1996 (1); *Holoneurus* Kieffer, 1894 (14), *Melicepidosis* Fedotova et Sidorenko, 2007 (1); *Putepidosis* Fedotova et Sidorenko, 2007 (1), *Pyxicoccopsis* Fedotova et Sidorenko, 2007 (1) and 3 extinct genera with 5 species: *Gratomyia* (1), *Volnococcopsis* (1) and *Rovnoholoneurus* gen. n. (3).

Genus *Rovnoholoneurus* Fedotova et Perkovsky, gen. n.

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Type species: *Rovnoholoneurus davidi* Fedotova et Perkovsky, sp. n.

Description (figs 1–4). Body slightly shorter than wing. Head elongate; eyes fused, wide bridge positioned on 2/3 part of head, occiput wide, rounded. Head basally with very long setae. Male antenna 2+11-segmented; female antenna 2+10–11-segmented; scape slightly enlarged apically; flagellomeres narrow, basal enlargement with constriction near base or middle, neck prolonged (in male and female), necks of distal flagellomeres much shorter than those of medial ones. Basal enlargement with whorls of long setae of different sizes, especially with long setae in basal, medial whorls. 10th flagellomere sometimes fused,

consisting of two segments. Proximal flagellomeres slightly longer than distal ones. Last flagellomere ovoid or conical, without apical projection. All female flagellomeres bearing two rings of sensorial filae with apical, basal round loops. Mouthparts strongly elongated, wide. Palpus 4-segmented, longer than head, with segments slender, almost parallel-sided, 4th segment longest. Scutellum strongly swollen. Wing longer than body, evenly and very strongly widened distally; vein R_5 almost straight, slightly curved near apex, joining margin almost at wing tip; rs strong, short; vein $m+rm$ slightly curved; Cu_2 strongly developed, positioned far from margin of wing, but fork indistinct, not fused, with two poorly visible folds near CuA_2 ; vein CuP well developed. Legs with long setae ventrally. Abdomen slightly swollen near base, narrowed apically. Abdominal segments covered by very long setae. Ovipositor consisting of one pair of dorso-apical plates.

C o m p a r i s o n . The new genus appears closely related to *Holoneurus* Kieffer, 1894 (Mamaev, 2001; Fedotova, Sidorenko, 2007), as evidenced by the body shape, 2+10–11-segmented antennae, long legs, and male and female flagellomere morphology. It differs from *Holoneurus* in the following characters: wide eye bridge, wing venation, elongated and swollen mouthparts, palpi very thin and much longer than head, different shape of flagellomeres, vein R_5 joining wing margin at apex, $m+rm$ curved, vein rs very short, M_3 absent, CuA_2 well developed and reaching near wing margin, male hind femur longer than tibia, tarsi very long (almost as long as or longer than femur+tibia), long setae on ventral side of legs, and smaller body.

S p e c i e s i n c l u d e d . *Rovnoholoneurus davidi* sp. n., *R. miyae* sp. n., *R. laqueatus* (Fedotova, 2005), **comb. n.** (for *Bryocrypta laqueata* Fedotova in: Fedotova, Perkovsky, 2005). All species are only known from Rovno amber.

E t y m o l o g y . The generic name is formed from a combination of Rovno and the gall midge generic name *Holoneurus*. Gender masculine.

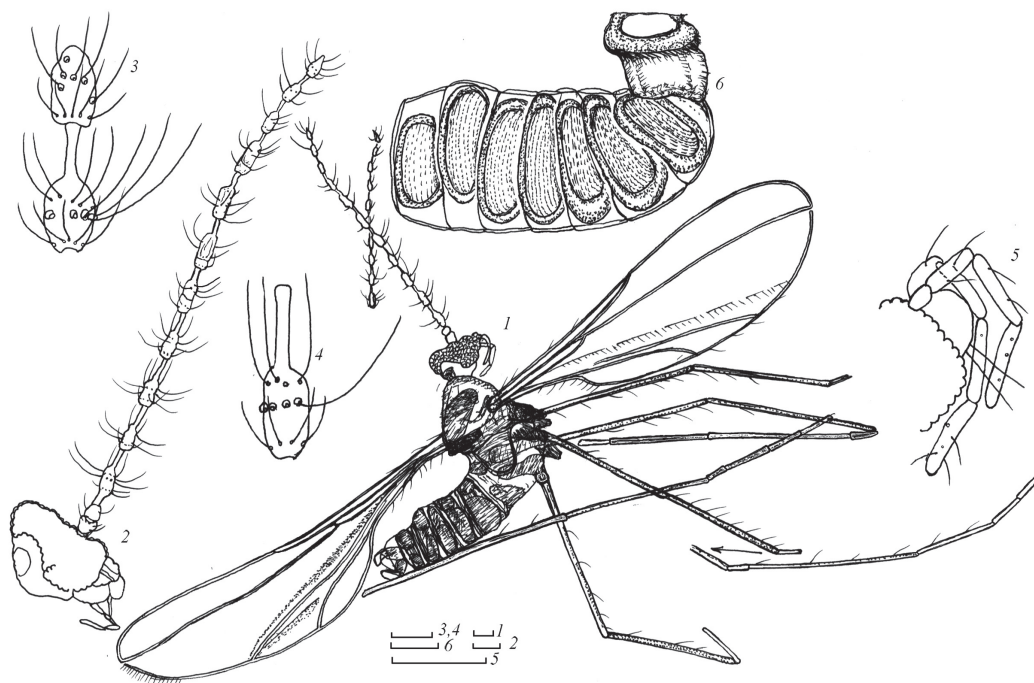


Fig. 1. *Rovnoholoneurus davidi*, male, holotype SIZK, OL-8: 1 — general appearance; 2 — head and antenna; 3 — flagellomeres 10–11; 4, flagellomere 5; 5 — mouth parts and palpi; 6 — the abdomen and part of the thorax with swollen scutellum. Scale bar 0.1 mm.

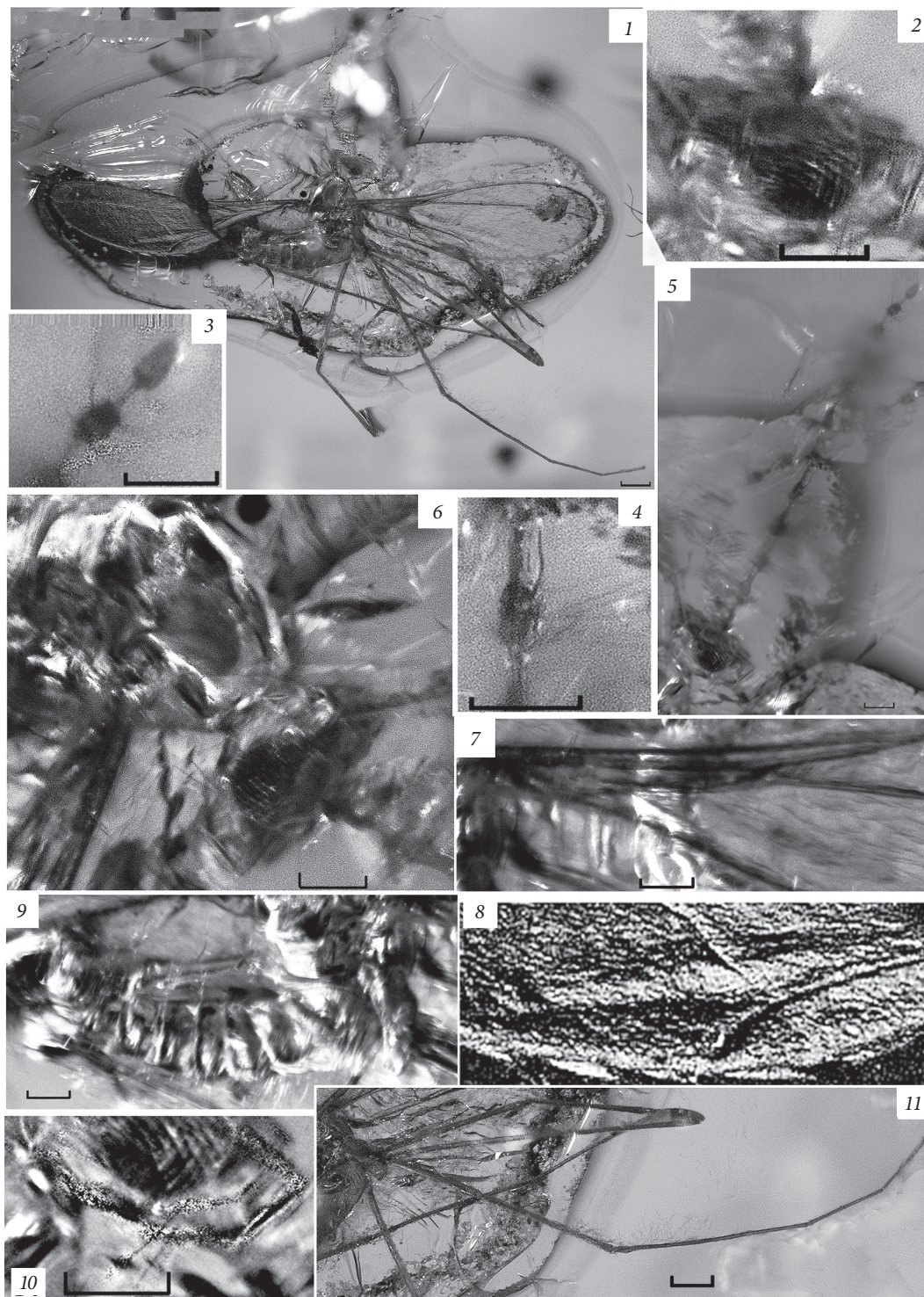


Fig. 2. *Rovnoholoneurus davidi*, male, holotype SIZK, OL-8: 1 — general appearance ($\times 20$); 2 — head, scapus, pedicel and palpi ($\times 127$); 3 — flagellomeres 10–11 ($\times 140$); 4 — flagellomere 5 ($\times 165$); 5 — head and antenna ($\times 57.4$); 6 — head, palpi and notum with swollen scutellum ($\times 100$); 7 — veins of the base of the wing: C , R_{1+2} , R_3 , $m+rm$, rs , CuA_1 ($\times 80$); 8 — veins CuA_1 , CuA_2 and fold of wing ($\times 109$); 9 — abdominal tergites 4–8 ($\times 60$); 10 — palpi ($\times 155$); 11 — middle leg ($\times 60$).

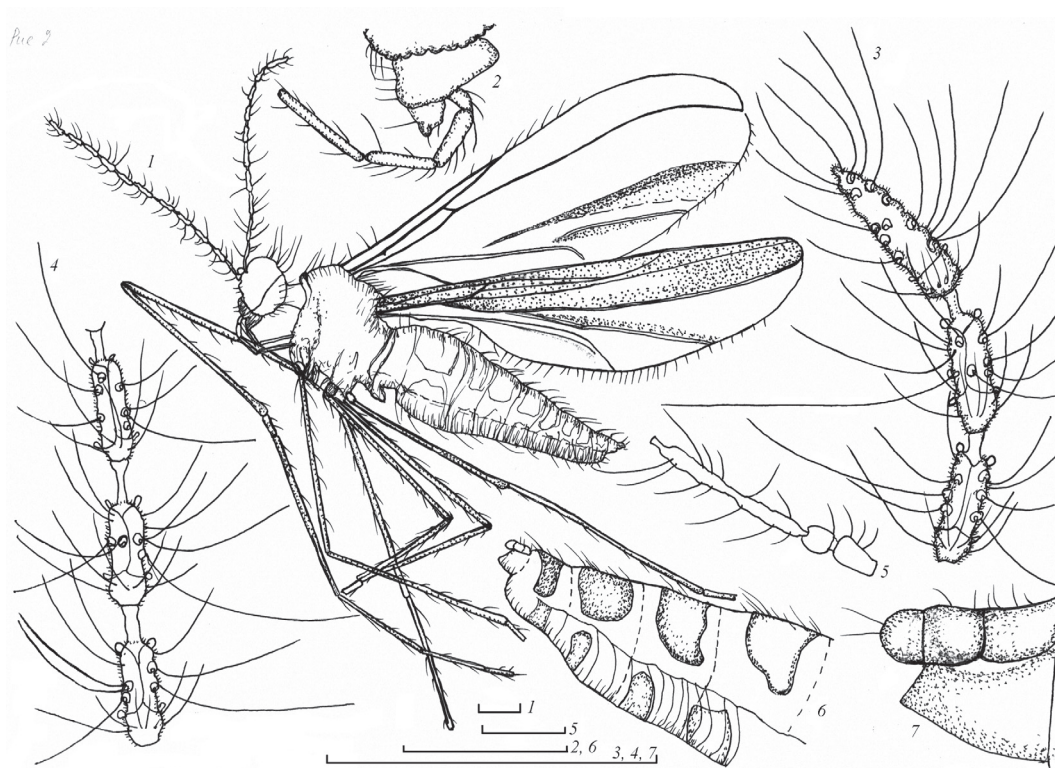


Fig. 3. *Rovnoholoneurus miyae*, female, holotype SIZK, OL-2: 1 — general appearance; 2 — mouth parts and palpi; 3 — flagellomeres 8–10; 4 — flagellomeres 4–6; 5 — scapus, pedicel, flagellomeres 1 and 2; 6 — abdomen distally; 7 — apex of abdomen and ovipositor. Scale bar, 0.1 mm.

***Rovnoholoneurus davidi* Fedotova et Perkovsky, sp. n.**

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Material. Holotype. SIZK OL-8, a well-preserved male with partly missing tarsi from Olevsk, Rovno amber; Late Eocene. Syninclusions: SIZK OL-7, Carabidae, Psychodidae; SIZK OL-8, Chironomidae, Tipuloidea, Acari; SIZK OL-9, 2 Sciaridae, Psychodidae, Tipuloidea, Chironomidae (Orthocladiinae), Cecidomyiidae, Collembola (Symphypleona), Acari; SIZK OL-10, 2 Trichoptera, 18 Diptera (4 Sciaridae, 11 Chironomidae (Orthocladiinae), 2 Cecidomyiidae, Nematocera indet.).

Description. Male (fig. 1, 1–6, 2, 1–11). Body 1.2 times as long as antenna, wing 1.3 times as long as body. Wing 1.5 times as long as antenna. 1st flagellomere 1.3 times as long as 2nd; proximal flagellomeres with long neck, almost as long as basal enlargement; 2nd flagellomere slightly shorter than 1st; distal flagellomeres with short neck; 5th flagellomere 3.8 times as long as wide; 11th flagellomere conical, 1.6 times as long as 10th. Palpi slightly longer than head, very narrow, parallel sided. Wing 3.5 times as long as wide. Vein R_{1+2} is 2.2 times shorter than wing. Profemora and metafemora shorter than corresponding tibia; mesofemur longer than mesotibia. Genitalia transverse; gonostylus short, narrow.

Measurements (mm): body length, 1.43; antennal length, 1.23; head length with mouth part, 0.31; head length without mouth part, 0.26; head height, 0.21; thorax length, 0.54; thorax width, 0.38; abdomen length, 0.93; wing length, 1.84; wing width, 0.52; vein R_{1+2} , 0.85; length of fore leg 1.88: coxa, 0.10; trochanter, 0.07; femur, 0.69; tibia, 0.79; fore tarsi, 1.44; length of middle leg: coxa, 0.11; trochanter, 0.07; femur, 0.61; tibia, 0.57; 1st tarsal segment 0.08; 2nd 0.79; 3rd 0.38; 4th 0.16; 5th 0.11; middle tarsi, 1.52 and leg, 2.88; length of hind leg: coxa, 0.10; trochanter, 0.07; femur, 0.52; tibia, 0.66; 1st tarsal segment, 0.11; 2nd 0.67; 3rd 0.33; 4th 0.15; 5th 0.12; hind tarsi, 1.41 and leg, 3.14.

Etymology. The species is named after David, the son of the junior author.

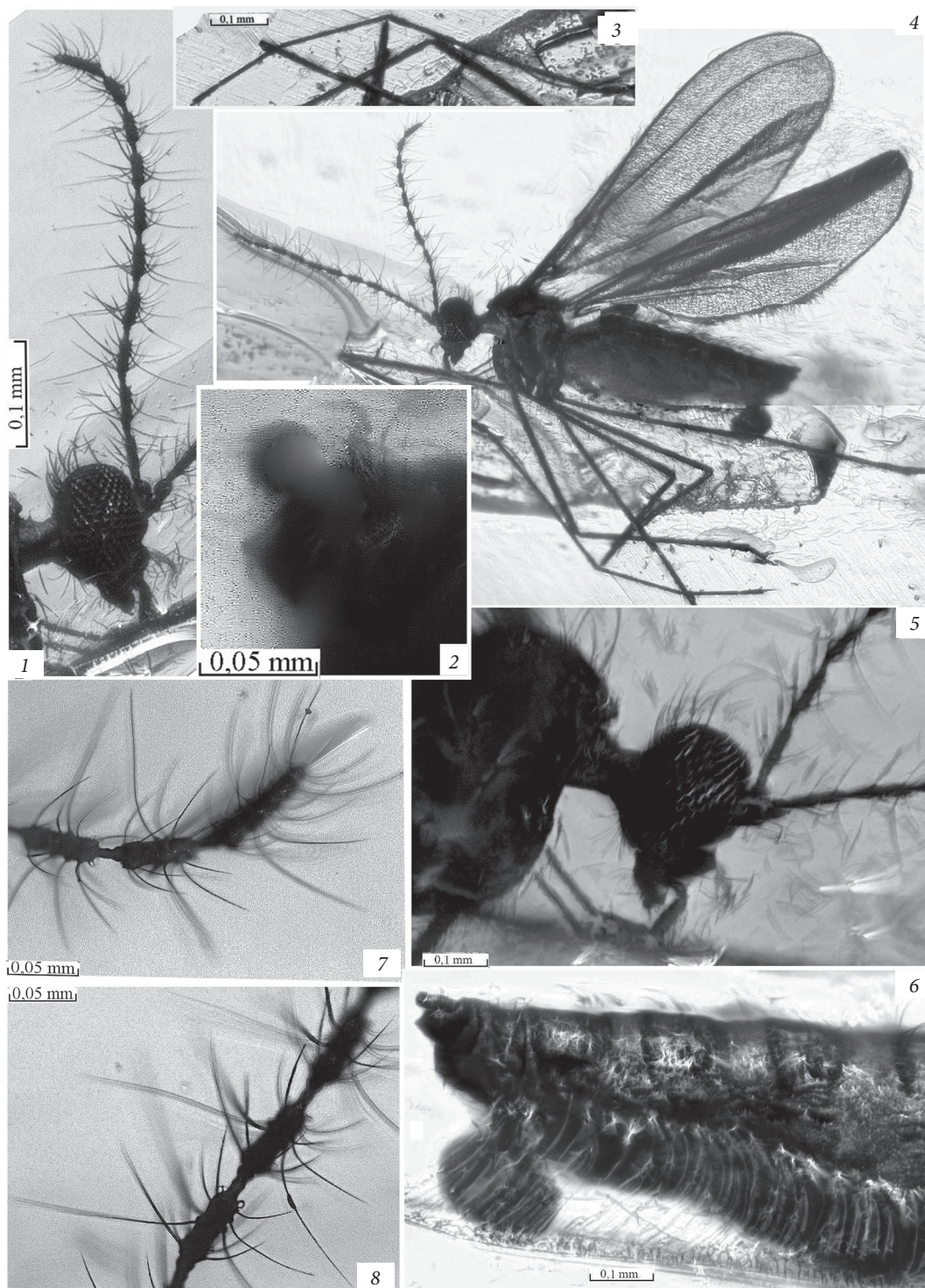


Fig. 4. *Rovnoholoneurus miyae*, female, holotype SIZK, OL-2: 1 — head and antenna ($\times 69$); 2 — apex of abdomen and ovipositor ($\times 360$); 3 — fore tarsi ($\times 39$); 4 — general appearance ($\times 30.6$); 5 — head, palpi, scapus, pedicel, flagellomeres 1 and 2 ($\times 90$); 6 — distal portion of the abdomen ($\times 90$); 7 — flagellomeres 8–10 ($\times 180$); 8 — flagellomeres 4–6 ($\times 190$).

***Rovnoholoneurus miyae* Fedotova et Perkovsky, sp. n.**

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M a t e r i a l . Holotype. SIZK OL-2, well preserved inclusion of a female with partly missing tarsi; Olevsk, Rovno amber; Late Eocene.

D e s c r i p t i o n . Female (fig. 3, 1–7, 4, 1–8). Body (with ovipositor) 1.7 times as long as antenna; wing 1.1 times as long as body. Wing 1.8 times as long as antenna. 1st flagellomere 5.0 times as long as wide, 1.2 times as long as 2nd; 5th flagellomere 3.9 times as long as wide, slightly shorter than 1st flagellomere; basal enlargement 2.7 times as long as wide, 0.42 times as long as neck; 10th flagellomere of left antenna 1.2 times as long as 9th, 0.83 times as long as 5th; 10th slightly narrowed to apex, rounded apically; 10th flagellomere of right antenna consisting of two fused segments. Palpi much longer than length or width of head, very narrow, parallel sided; 2nd, 3rd, 4th segments strongly prolonged, their ratio: 1 : 2.5 : 2.7 : 4.3. Wing 2.9 times as long as wide. Vein R_{1+2} is 0.48 times as long than wing length. All femora longer than corresponding tibiae. Ovipositor with large round apical plate, directed dorso-caudally, covered with short setae.

M e a s u r e m e n t s (mm): body length, 1.81; antennal length, 1.08; head length with mouth parts, 0.33; head length without mouth parts, 0.20; head width, 0.15; palpus length, 0.38; thorax length, 0.36; thorax width, 0.45; abdomen length, 1.16; wing length, 1.93; wing width, 0.66; vein R_{1+2} , 0.88; length of fore leg, 3.53; coxa, 0.12; trochanter, 0.06; femur, 0.85; tibia, 0.82; 1st tarsal segment, 0.07; 2nd, 0.79; 3rd, 0.44; 4th, 0.28; 5th, 0.10; length of middle: femur, 0.80; tibia, 0.57; 1st tarsal segment, 0.1; length of hind: coxa, 0.1; trochanter, 0.07; femur, 0.92, tibia, 0.47.

E t y m o l o g y . The species is named after Mirabel Khelemskyy, daughter of Genadiy Khelemskyy for his continuous help with the amber collection of the Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine.

A key to the species of the genus *Rovnoholoneurus* gen. n.

1. Male. Wing 3.5 times as long as wide (fig. 1, 1). 5th flagellomere 3.8 times as long as wide (fig. 1, 4). Fore and hind femora slightly shorter than tibia. Hind femora 0.78 times as long as tibia. Body length 1.43 mm..... *B. davidi* sp. n.
- Female. Wing 2.6 or 2.9 times as long as wide (fig. 3, 1). 5th flagellomere 3.9–4.9 times as long as wide, fore femora longer than tibia..... 2
2. Wing 2.6 times as long as wide. 5th flagellomere 4.9 times as long as wide. Hind femora 1.4 times as long as tibia. Body length 1.74 mm..... *B. laqueatus* (Fedotova) comb. n.
- Wing 2.9 times as long as wide (fig. 3, 1). 5th flagellomere 3.9 times as long as wide (fig. 3, 4). Hind femora almost 2.0 times as long as tibia. Body length 1.81 mm..... *B. miyae* sp. n.

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