

New Gall Midges (Diptera, Cecidomyiidae) from the Rovno Amber: Subfamily Lestremiinae, Tribes Stroblieellini and Campylomyzini; Subfamily Porricondylinae, Tribes Diadocidiini and Asynaptini

Z. A. Fedotova* and E. E. Perkovsky**

*Samara State Agricultural Academy, ul. Uchebnaya 2, Ust'-Kinel'skii, 446409 Russia
e-mail: sai@transit.samara.ru

**Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine,
ul. Bogdana Khmel'nitskogo 15, Kiev, 01601 Ukraine
e-mail: perkovsky@fromru.com

Received June 10, 2003

Abstract—Seven new species of gall midges belonging to the genera *Stroblieella*, *Campylomyza*, *Neurolyga*, *Diadocidia*, and *Camptomyia* are described from the Eocene Rovno amber.

INTRODUCTION

The gall midges were among the first insects recorded from the Rovno amber (mainly from the Klesov and Dubrovitsy excavations, Rovno Region, Ukraine). In an earlier contribution (Perkovsky and Fedotova, 2004), we reviewed the origin and age of the Rovno amber and described eight new gall midge species of the subfamily Lestremiinae, assigned to the genera *Micromyia*, *Aprionus*, and *Heterogenella* (tribe Micromyiini) and *Peromyia* and *Conarete* (tribe Peromyiini). Seven more new species of the genera *Stroblieella*, *Campylomyza*, *Neurolyga*, *Diadocidia*, and *Camptomyia*, of the subfamilies Lestremiinae and Porricondylinae, are described in the present paper.

MATERIAL

The material under study, including the types, is housed in the amber collection of the Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine (SIZC).

SYSTEMATIC PALEONTOLOGY

Tribe Stroblieellini Kieffer, 1898

Genus *Stroblieella* Kieffer, 1898

This is a monotypic Palearctic genus, the type species of which (*S. intermedia* Kieffer) is known from Great Britain and Austria (Skuhrová, 1986, 1997).

Stroblieella appropinquata Fedotova, sp. nov.

Etymology. From the Latin *appropinquata* (drawn closer).

Holotype. SIZC, UA-46, well-preserved but slightly deformed female inclusion with partially missing legs; Rovno amber; Late Eocene.

Description (Fig. 1). Female. The body is 4.6 times as long as the head. The antennae are 5.4 times as long as the head, 2 + 9-segmented, the scape is globular. The flagellomeres gradually become smaller apically. The fifth flagellomere is 2.5 times as long as wide, the basal node is 1.7 times as large as the stalk. The eighth flagellomere is 1.8 times as long as the ninth, which is egg-shaped. The palpi are four-segmented, the lengths of their segments are in a ratio of 4 : 5 : 3 : 2, the fourth segment tapers apically. All tarsi are five-segmented. The foreleg tarsomeres are in a ratio of 6 : 3 : 3 : 2 : 2, the claws are simple and weakly curved, the empodium is 0.5 times as long as a claw. The wing is 2.6 times as long as wide. R_{4+5} enters the wing margin beyond its apex. R_s is almost 0.5 times as long as the section of R_1 between their fusion and its end. M_{1+2} is indistinct, M_{3+4} and Cu are not forked. The sixth to eighth abdominal segments are distinctly narrowed. The tenth abdominal segment is 1.6 times the size of the ninth. The single apical plate of the ovipositor is elongated oval 3.2 times as long as it is wide.

Measurements, mm. Body length, 0.57; lateral head length, 0.143; lateral head width, 0.187; antennae length, 0.484; wing length, 0.902; wing width, 0.385; hindleg: femur length, 0.44; tibia length, 0.187; tarsus length, 0.264.

Comparison. This species differs from the type species in the elongated wings, closely spaced venation, and in the 2 + 9 antennal formula.

Material. Holotype.

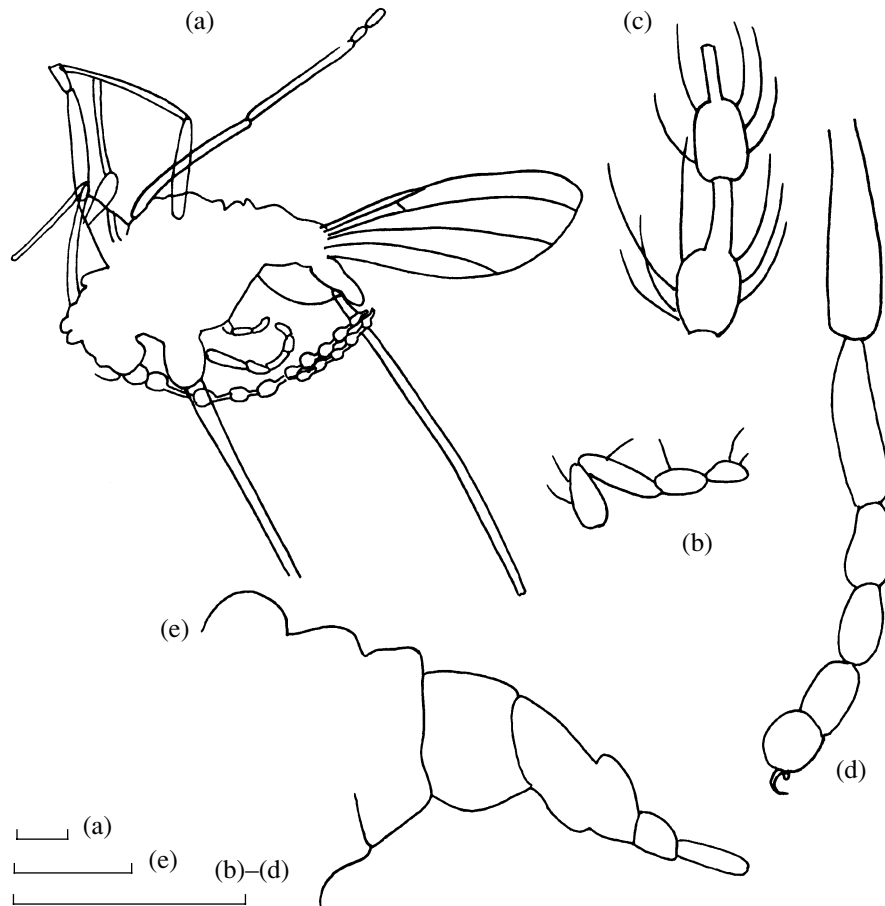


Fig. 1. *Strobliella appropinquata* sp. nov., female, holotype SIZC, UA-46; (a) general appearance, (b) palpus, (c) fifth and sixth flagellomeres, (d) fore tarsus, and (e) ovipositor tip. Scale bar 0.1 mm.

Strobliella capitata Fedotova, sp. nov.

Etymology. From Latin *capitata* (referring to the head).

Holotype. SIZC, UA-1294, well-preserved deformed female inclusion with partially missed legs; Rovno amber; Late Eocene.

Description (Fig. 2). Female. The body is 3.9 times as long as the head. The antennae are 2.8 times as long as the head, 2 + 11-segmented, the pedicel is globular. The first flagellomere has a slightly elongated basal node, which is ten times as long as the stalk. The second flagellomere is subequal to the first, its basal node is 3.5 times as long as the stalk. The basal nodes of the fifth and subsequent flagellomeres are almost rounded. The fifth flagellomere is 1.2 times as long as wide, its basal node is 3.6 times as long as the stalk. The 11th flagellomere is 1.4 times as long as the tenth and has a thin, attenuated oval apex. The anterior femur is 1.7 times as long as the anterior tibia, the middle femur is 1.2 times as long as the middle tibia. All tarsi are five-segmented. The lengths of anterior tarsomeres are in a ratio of 3 : 3 : 4 : 3 : 5. The lengths of posterior tarsomeres are in a ratio of 4 : 4 : 4 : 5 : 5,

the tarsal claws are simple and weakly curved, the empodium is barely visible. The wing is 3.4 times as long as wide, with the maximum width at its midlength. R_{4+5} enters the wing margin far beyond its apex. R_{1+2} enters the wing margin before its apex. M_{3+4} is simple, forms no forks with Cu, and terminates in the middle of the free margin of the wing. The ovipositor is indistinct.

Measurements, mm. Body length, 0.48; lateral head length, 0.11; lateral head width, 0.132; antenna length, 0.418; wing length, 0.715; wing width, 0.22; foreleg: femur length, 0.22; tibia length, 0.132; middle tibia length, 0.187.

Comparison. This species differs from *S. appropinquata* sp. nov. in the smaller head; in the shape of flagellomeres, in which the stalks are greatly reduced; in the smaller body, and the more elongated wings.

Material. Holotype.

Tribe Campylomyzini Kieffer, 1898

Genus Campylomyza Meigen, 1818

This genus includes 39 species recorded from the Palearctic (Europe and Asia) and Nearctic regions

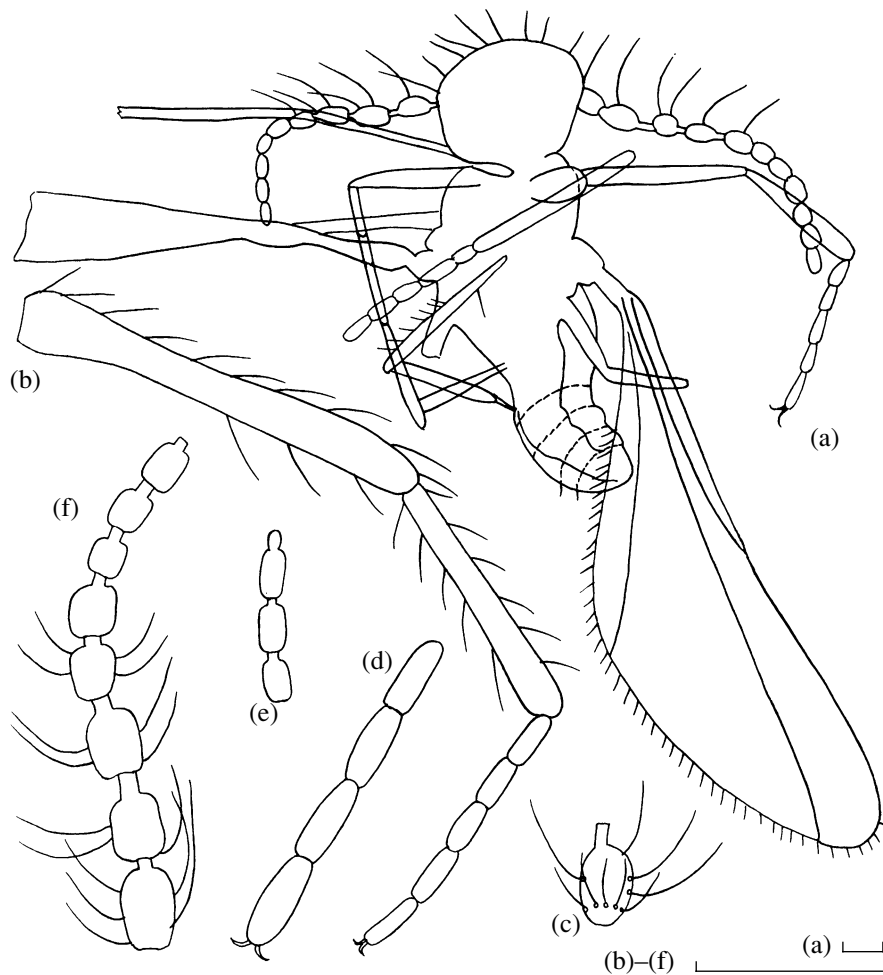


Fig. 2. *Strobliella capitata* sp. nov., female, holotype SIZC, UA-1294; (a) general appearance; (b) fore femur, tibia, and tarsus; (c) second flagellomere; (d) middle tarsus fragment; (e) 9th–11th flagellomeres; and (f) first to eighth flagellomeres. Scale bar 0.05 mm in Fig. 2a, otherwise 0.1 mm.

(Skuhrová, 1997; Mamaev, 1998a) and 20 species from Australia and Oceania. *C. crassitarsis* Meunier, 1904 was described from the Baltic amber (Evenhuis, 1994). The larvae of known members of this genus develop in decaying plant debris; for example, they have been found under a damp, decaying poplar log (Mamaev and Krivosheina, 1965).

Campylomyza superposita Fedotova, sp. nov.

Etymology. From Latin *superposita* (overlying).

Holotype. SIZC, UA-1072, deformed female inclusion with partially missed legs; Rovno amber; Late Eocene.

Description (Fig. 3). Female. The body is 7.7 times as long as the head. The antennae are 3.1 times as long as the lateral head width. The antennae are 2 + 10-segmented, the scape widens considerably in its distal half and is 1.2 times as long as the pedicel, which is globular. The basal node of the first flagellomere is elongated, 3.5 times as long as the stalk. The basal nodes of the middle flagellomeres are

rounded, the stalks shortening toward the apex. The fifth flagellomere is 1.8 times as long as wide, its basal node 2.3 times as long as the stalk. The tenth flagellomere is almost conical, with a rounded tip. The palpus is one-segmented, nearly parallel-sided and has a rounded tip; it is 5.1 times as long as wide. All tarsi are five-segmented and densely and evenly covered with scales. The lengths of the posterior tarsomeres are in a ratio of 5 : 4 : 6 : 8 : 12, the tarsal claws are simple and weakly curved in the proximal half, the empodium is barely visible. The wing is 2.5 times as long as wide. R_{4+5} enters the wing margin before its apex. The section of R_1 between the fusion with R_s and the wing margin is 4.6 as long as R_s . M_{1+2} is simple and almost indistinct. M_{3+4} and Cu form a fork, which is further from the wing base than the R_s and R_{1+2} fork. The apical (seventh to tenth) abdominal segments are distinctly narrowed, the seventh segment narrowing abruptly from base to apex. The ovipositor is elongated and attached to the seventh segment in the middle of its dorsal face and consists of three segments with lengths being in a

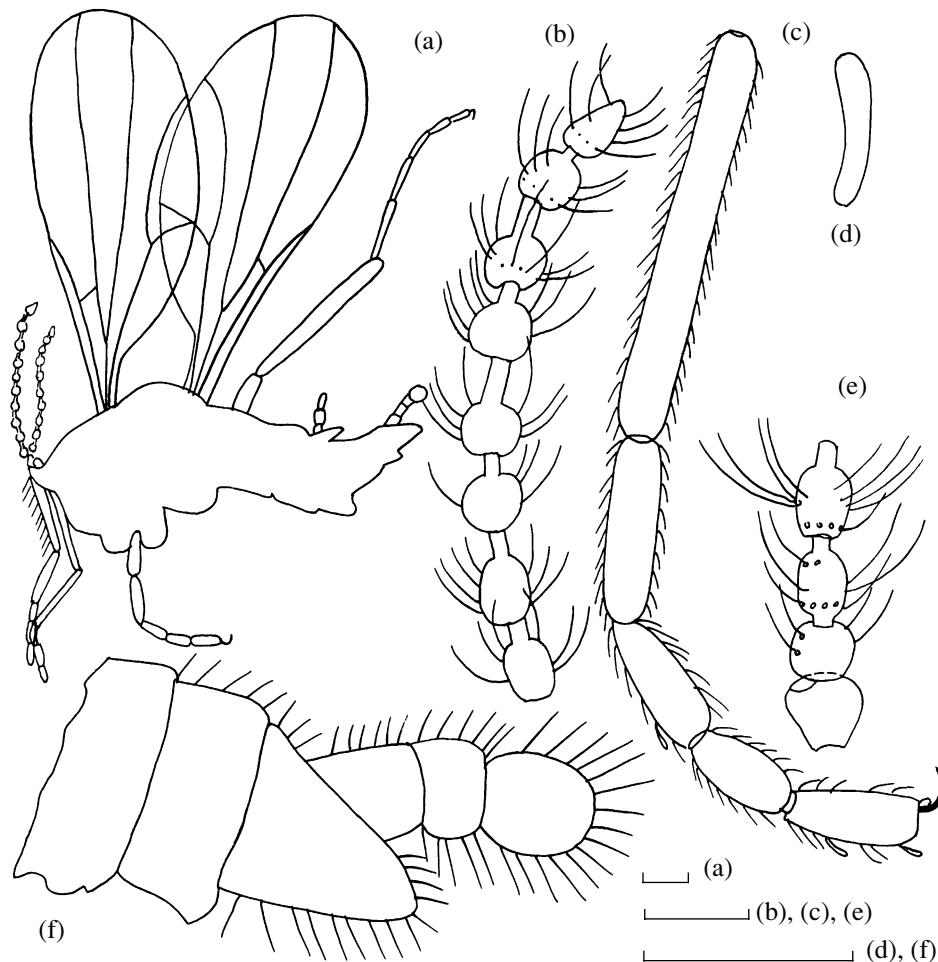


Fig. 3. *Campylomyza superposita* sp. nov., female, holotype SIZC, UA-1072; (a) general appearance; (b) third to tenth flagellomeres; (c) hind tarsus; (d) palpus; (e) scape, pedicel, and the first and second flagellomeres, and (f) abdomen tip. Scale bar 0.1 mm in Figs. 3–7.

ratio of 6 : 4 : 5, the apical segment is rounded, elevated above the apex of the abdomen, and densely and evenly covered with elongated bristles.

Measurements, mm. Body length, 1.02; antenna length, 0.385; fore tibia length, 0.269; fore tarsus length, 0.224; fifth flagellomere length, 0.039; length of its basal node, 0.028; length of its stalk, 0.011; ovipositor length, 0.157; length of three apical ovipositor segments, 0.129; length of apical segment, 0.045.

Comparison. This species differs from all known members of the genus in the apical plates of the ovipositor being raised high above the abdomen and covered with elongated bristles, and in nearly rounded basal nodes and shortened stalks of the flagellomeres.

Material. Holotype.

Campylomyza falciformis Fedotova, sp. nov.

Etymology. From Latin *falciformis* (falciform).

Holotype. SIZC, UA-1367, well preserved female inclusion; Rovno amber; Late Eocene.

Description (Fig. 4). Female. The body is 4.9 times as long as the head. The antennae are 3.9 times as long as the head and 2+12-segmented; the pedicel is globular; the first flagellomere has an elongated basal node and shortened stalk and is 1.4 times as long as the second, which has an oval basal node. The fifth flagellomere is 1.9 times as long as wide, its basal node is 4 times as long as the stalk. The flagellomeres have well-defined basal, medial, and apical circles of bristles. The eleventh flagellomere is 1.3 times as long as the twelfth, which is nearly conical. The three terminal segments of the palpi are visible; the penultimate segment is greatly swollen; the last segment narrows towards its apex, which is broadly rounded; the lengths of the segments are in a ratio of 4 : 5 : 6. The hind femur is 1.1 times as long as the hind tibia. All the tarsi are five-segmented; the claws are simple, falciform at the base and slightly curved apically; the empodium is indistinct. The lengths of the hind tarsomeres are in a ratio of 7 : 4 : 3 : 2 : 3. The wing is 2.6 times as long as wide. R_{4+5} enters the wing margin slightly beyond its

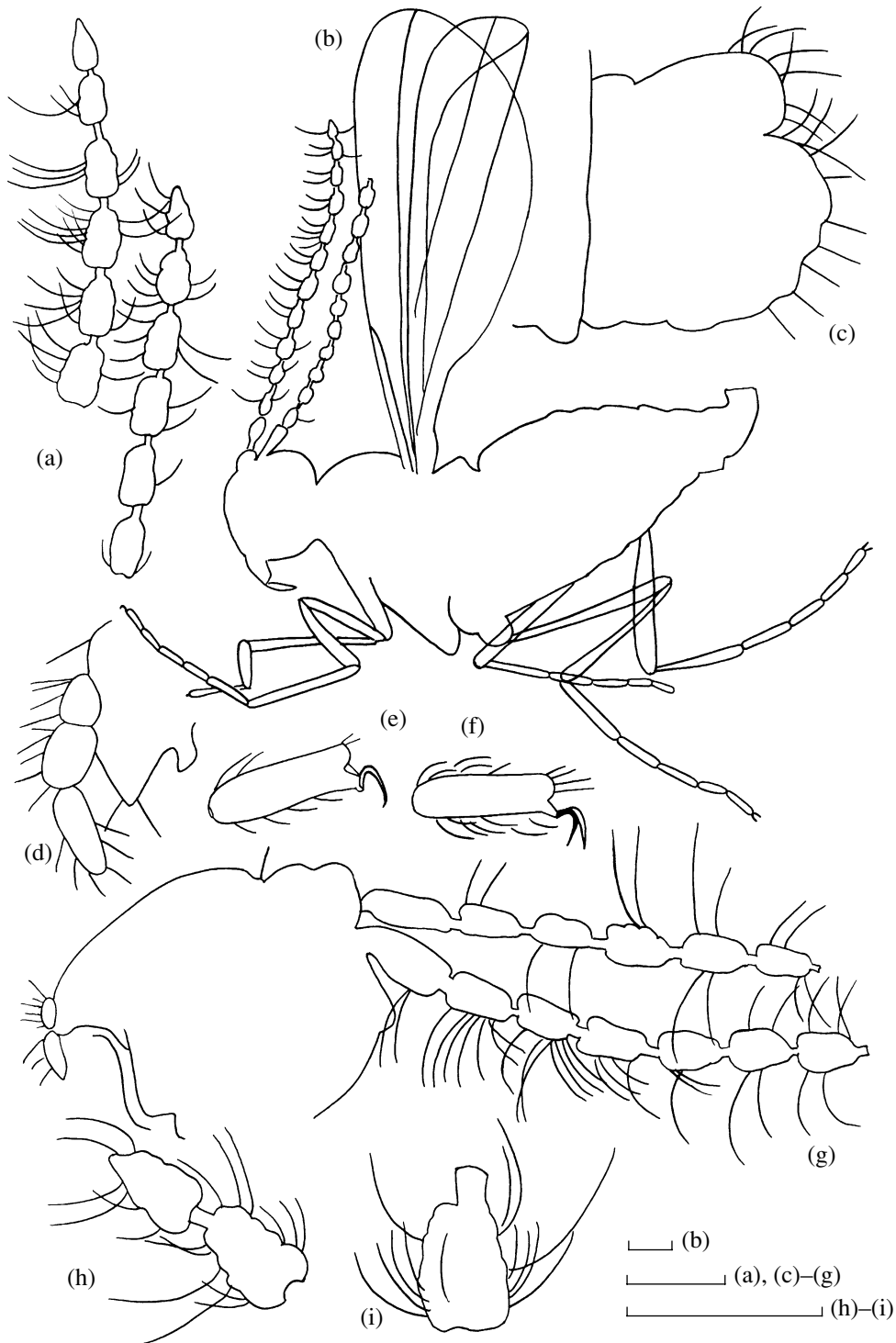


Fig. 4. *Campylomyza falciformis* sp. nov., female, holotype SIZC, UA-1367; (a) 6th–12th flagellomeres; (b) general appearance; (c) abdomen tip; (d) mouthparts, side view; (e) mid tarsal claw; (f) hind tarsal claw; (g) head, side view, scape, pedicel, and the first to sixth flagellomeres; (h) 11th and 12th flagellomeres; and (i) fifth flagellomere.

apex. R_1 enters the wing margin well before its midlength. Other veins are indistinct. The abdomen is distinctly swollen, the abdominal segments gradually narrow towards the tip. The ovipositor is densely cov-

ered with elongated hairs; laterally, it is 1.1 times as long as wide. The apical plate of the ovipositor, which is attached subapically on the dorsal side, is 2.1 times as long as wide.

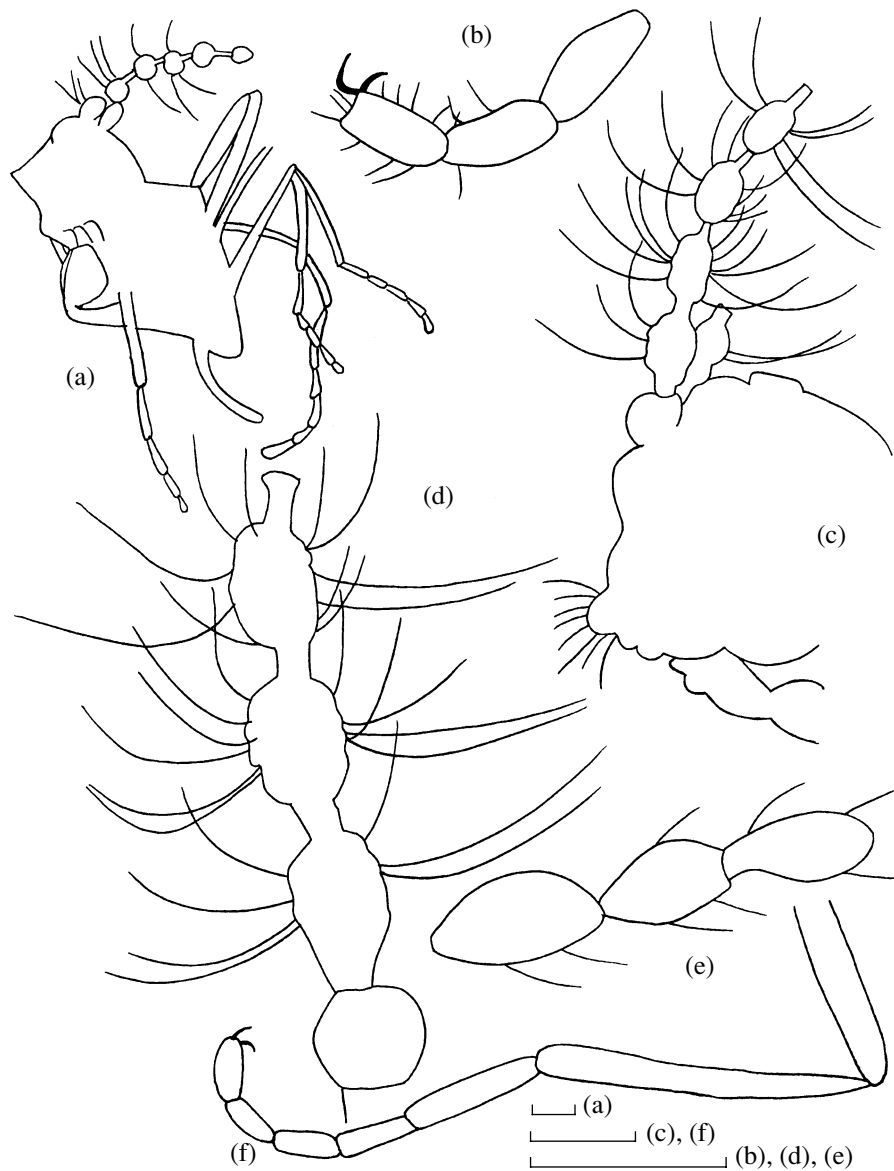


Fig. 5. *Neurolyga declinata* sp. nov., male, holotype SIZC, UA-223; (a) general appearance, (b) tarsal claws, (c) side view of the head, (d) pedicel and the first to third flagellomeres, (e) palpus, and (f) mid tarsus.

Measurements, mm. Body length, 1.41; lateral head length, 0.297; lateral head width, 0.22; antenna length, 0.913; first flagellomere length, 0.22; fifth flagellomere length, 0.143; its width, 0.077; basal node length, 0.121; stalk length, 0.022; palpus length, 0.066; wing length, 1.1; wing width, 0.44; foreleg: femur length, 0.286; tibia length, 0.253; tarsus length, 0.396; tarsomere lengths, 0.143, 0.066, 0.066, 0.055, and 0.066; hindleg: tibia length, 0.451; tarsus length, 0.516; tarsomere lengths, 0.231, 0.132, 0.099, 0.077, and 0.077.

Comparison. This species differs from *C. superposita* sp. nov. in the falciform claws, shortened stalks of the flagellomeres, barely visible stalk of the penultimate flagellomere, and the larger number of segments in the

palpi. Its three-segmented palpi separate it from all recent species, which have four-segmented palpi.

Material. Holotype.

Genus *Neurolyga* Rondani, 1840

This genus includes 28 described species worldwide, 24 in the Palearctic, 7 in the Nearctic (Mamaev, 1996; Jaschhof, 1998), and one in New Zealand.

Neurolyga declinata Fedotova, sp. nov.

Etymology. From Latin *declinata* (deflected).

Holotype. SIZC, UA-223, poorly preserved deformed inclusion of a male with partially missing antennae; Rovno amber; Late Eocene.

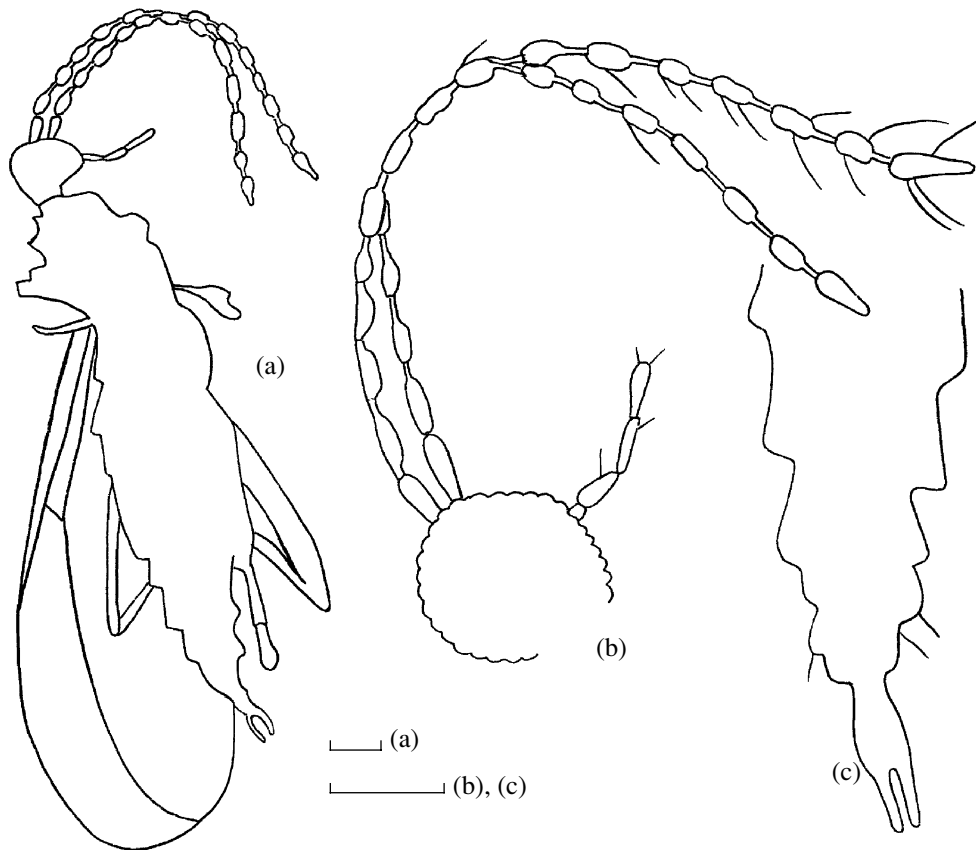


Fig. 6. *Diadocidia bifurcata* sp. nov., female, holotype SIZC, UA-1372; (a) general appearance, (b) head, and (c) abdomen tip.

Description (Fig. 5). Male. The pedicel is globular, the first flagellomere has an elongated basal node that is 4.7 times as long as the stalk. The first flagellomere is 1.2 times as long as the second. The basal node of the third and subsequent flagellomeres are oval. The third flagellomere is twice as long as wide, its basal node is 2.3 times as long as the stalk. The flagellomere stalks are elongated. The palpi consist of nearly equal segments, the lengths of which are in a ratio of 10 : 9 : 11; the first and second segments are most swollen at their midlengths; the third segment is thinner, slightly elongated, somewhat swollen in its distal half, and slightly broadened apically. The hind femur is 1.2 times as long as the hind tibia. All the tarsi are five-segmented. The middle tarsomeres are in a ratio of 3 : 2 : 1 : 1 : 1, the tarsal claws are simple and sharply curved at their midlength, the empodium is indistinct.

Measurements, mm. Body length, 0.682; lateral head length, 0.253; lateral head width, 0.264; fifth flagellomere length, 0.077; basal node length, 0.055; stalk length, 0.022; fore tarsomere lengths, 0.132, 0.077, 0.066, 0.055, and 0.044; midleg: femur length, 0.352; tibia length, 0.352; tarsus length, 0.407.

Comparison. This species differs from all known members of the genus in the large subequal segments of the palpus, and in the elongated flagellomere stalks in the male.

Material. Holotype.

Subfamily Porricondylinae Kieffer, 1913

Tribe Diadocidiini Winnertz, 1863

Genus *Diadocidia* Ruthe, 1831

This palearctic genus includes five species from Europe (Skuhrová, 1986, 1997; Mamaev, 1998b). The larvae develop in white rotten beech (Mamaev and Krivosheina, 1965) and in decaying birch wood (Mamaev, 1998b).

Diadocidia bifurcata Fedotova, sp. nov.

Etymology. From Latin *bifurcata* (bifurcate).

Holotype. SIZC, UA-1372, well-preserved deformed inclusion of a female with partially missing legs; Rovno amber; Late Eocene.

Description (Fig. 6). Female. The body is 10.7 times as long as the head. The antennae are

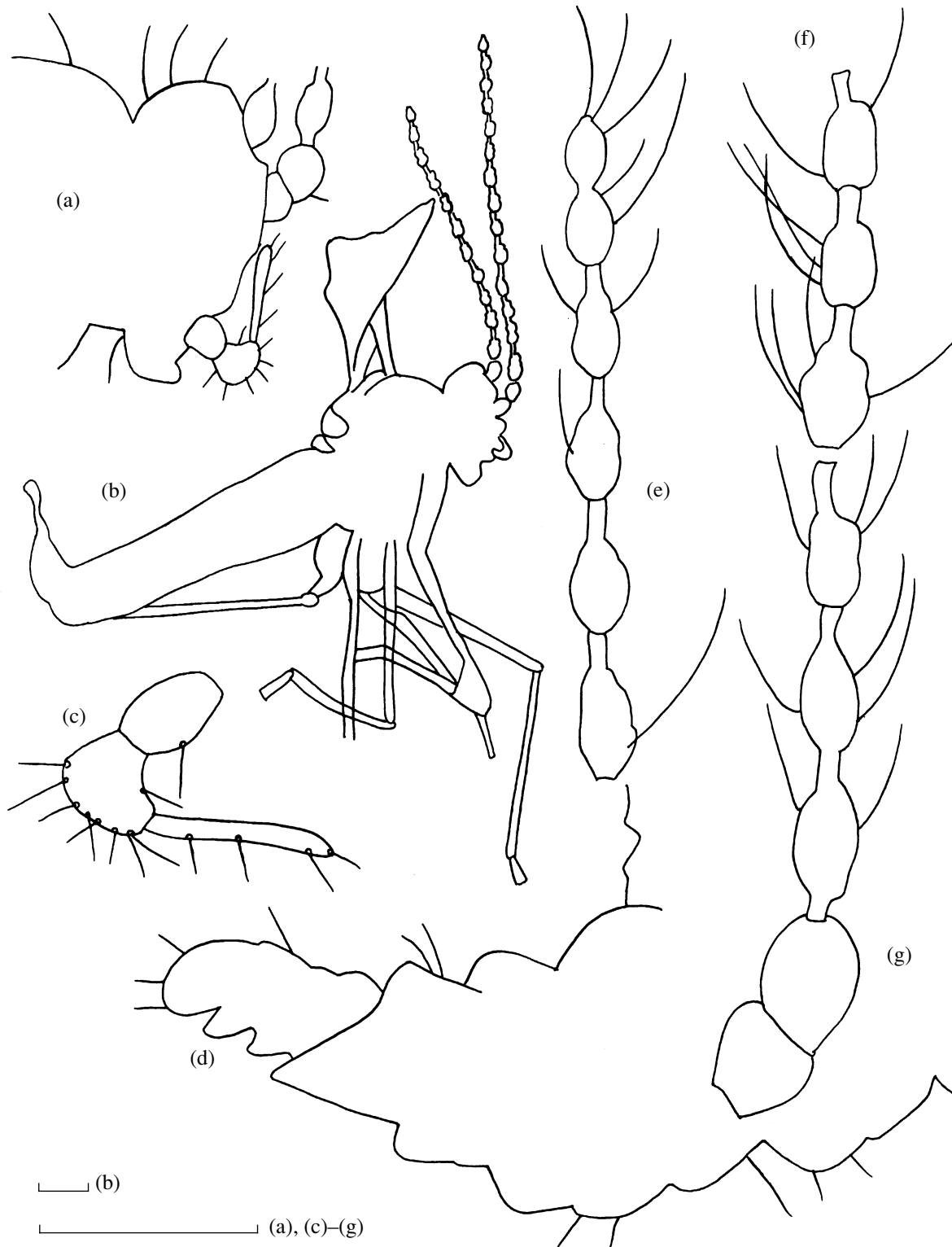


Fig. 7. *Camptomyia aufuga* sp. nov., female, holotype SIZC, UA-137; (a) head, side view; (b) general appearance; (c) palpus; (d) abdomen tip; (e) 9th–14th flagellomeres; (f) fourth to sixth flagellomeres; and (g) scape, pedicel, and the first to third flagellomeres.

6.6 times as long as the head and 2 + 14-segmented; the head is globular; the pedicel is elongated; the first flagellomere has an elongated basal node, which is

3.5 times as long as the stalk. The first flagellomere is 1.9 times as long as the second, which has the oval basal node. The basal nodes of the fifth and subsequent

flagellomeres slightly thicken towards their apices. The fifth flagellomere is 3.4 times as long as wide, its basal node is 3.5 times as long as the stalk. The flagellomeres gradually elongate toward the tip of the antennae. The fourteenth flagellomere gradually tapers, has a thin attenuated tip, and is 1.4 times as long as the thirteenth flagellomere. The palpi are four-segmented, the second segment is almost ovoid, the fourth is thin and slightly widened distally, the segment lengths are in a ratio of 1 : 2 : 4 : 4. The wing is 2.5 times as long as wide. R_{4+5} enters the wing margin well beyond its apex. The section of R_1 between its fusion with R_s and its end at the wing margin is 7.7 times as long as R_s . The apical sixth to eighth abdominal segments are strongly narrowed. The ovipositor is elongated (2.9 times as long as wide) and has bifurcate apical plates, which are separated and roller-like. Each apical plate consists of one parallel-sided segment, which is equal to the ninth abdominal segment in length and has a rounded tip.

Measurements, mm. Body length, 1.31; lateral head length, 0.143; lateral head width, 0.132; antenna length, 0.792; wing length, 1.397; wing width, 0.495; ovipositor length, 0.132.

Comparison. It differs from all known recent species in the very narrow flagellomere nodes and elongated stalks, the strongly curved R_{4+5} , and the separated, roller-like, apical plates of the ovipositor. It differs from *D. ocellaris*, which was described from Krasnodar krai (Mamaev, 1964), in the smaller body and shorter stalks of the central flagellomeres.

Material. Holotype.

Tribe Asynaptini Enderlein, 1920

Genus *Camptomyia* Kieffer, 1894

This cosmopolitan genus (unknown only from the Australian Region) includes 62 species. One undescribed species is known from the Miocene Dominican amber (Gagné, 1994). There are 39 species in the Palearctic (Europe and Asia) (Skuhravá, 1986, 1997). *C. sinuosa* Meunier, 1904 was described from the Baltic amber (Evenhuis, 1994). In the forest zone, members of this genus inhabit decaying bark, wood, and fruiting bodies of polypore fungi (Mamaev and Krivosheina, 1965). Species developing under bark at the early stages of its decay specialize on either coniferous or deciduous trees. Large colonies of larvae occur at the border with living phloem. *C. corticolis* (Loew), one of the commonest species of xylobiontic gall midges, develops under the bark of hornbeam, beech, oak, and birch, but its larvae have never been recorded from spruce, pine, or fir. By contrast, *C. maxima* Mamaev is associated exclusively with conifers such as spruce and fir.

Camptomyia aufuga Fedotova, sp. nov.

Etymology. From Latin *aufuga* (brought from).

Holotype. SIZC, UA-137, poorly preserved deformed inclusion of a female, with the wings and all tarsi missing; Rovno amber; Late Eocene.

Description (Fig. 7). Female. The body is 8.6 times as long as the head. The antennae are 1.3 times as long as the head and 2 + 14-segmented, the pedicel is elongate and 1.3 times as long as the scape. The first flagellomere has an elongated basal node, which is 4.5 times as long as the stalk. The first flagellomere is 1.2 times as long as the second, which has an oval basal node. The basal nodes of the fifth and the other central flagellomeres are slightly swollen basally. The fifth flagellomere is 2.1 times as long as wide, its basal node is 2.9 times as long as the stalk. The twelfth flagellomere has a distinct stalk, the thirteenth has a shortened stalk and is 1.2 times as long as the fourteenth. The clypeus is convex. The palpi are three-segmented, the first and second segments are heavily swollen, the third segment is slender, elongate, and parallel-sided. The first tarsomere is short. The sixth to eighth apical abdominal segments are curved upward and strongly narrowed. The ovipositor is elongate, distinctly three-segmented when viewed ventrally, and 1.6 times as long as wide.

Measurements, mm. Body length, 1.08; lateral head length, 0.143; lateral head width, 0.242; antenna length, 0.803; pedicel length, 0.039; first flagellomere length, 0.073; fifth flagellomere length, 0.056; its basal node length, 0.034; its stalk length, 0.022; thirteenth flagellomere length, 0.084; fourteenth flagellomere length, 0.022; palpus length, 0.145; lengths of its segments, 0.028, 0.039, and 0.078; foreleg: femur length, 0.374; tibia length, 0.385; hindleg: femur length, 0.506; tibia length, 0.451; ovipositor length, 0.22; ovipositor width, 0.132.

Comparison. This species differs from all known species (Mamaev, 1961) in the elongated petiolate flagellomeres in the female, the considerably reduced number of antennal segments (2 + 14 instead of more than 20, which is typical), the first flagellomere being shorter than the second (not 1.5–2 times as long), the three-segmented palpi, and the elongated ovipositor.

Material. Holotype.

REFERENCES

1. N. L. Evenhuis, *Catalogue of the Fossil Flies of the World (Insecta: Diptera)* (Backhuys Publ., Leiden, 1994).
2. R. J. Gagné, *The Gall Midges of the Neotropical Region* (Coms. Publ. Ass. Corn. Univ. Press, Ithaca, New York, 1994).
3. M. Jaschhof, "Revision der "Lestremiinae" (Diptera, Cecidomyiidae) der Holarctis," *Studia Dipterol.* (Suppl. 4), 1–552 (1998).

4. B. M. Mamaev, "Gall Midges of the USSR: New Species of the Genus *Camptomyia* Kieffer (Itonididae, Diptera)," *Zool. Zh.* **40** (11), 1677–1690 (1961).
5. B. M. Mamaev, "Checklist of Palaeartic Gall Midges of the Subfamily Lestremiinae (Diptera, Cecidomyiidae)," *Entomologica* **30**, 55–68 (1996).
6. B. M. Mamaev, "New Species of Gall Midges of the Subfamily Lestremiinae (Diptera, Cecidomyiidae)," *Publ. Vseros. Inst. Povysh. Kvalif. Ruk. Rabotn. i Spets. Lesn. Khoz., Pushkino*, No. 10, 1–10 (1998a).
7. B. M. Mamaev, "New Species of Gall Midges from Different Taxonomic Groups (Diptera, Cecidomyiidae)," *Publ. Vseros. Inst. Povysh. Kvalif. Ruk. Rabotn. i Spets. Lesn. Khoz., Pushkino*, No. 13, 1–10 (1998b).
8. B. M. Mamaev and N. P. Krivosheina, *Larvae of Gall Midges* (Nauka, Moscow, 1965) [in Russian].
9. E. E. Perkovsky and Z. A. Fedotova, "New Species of Gall Midges (Diptera, Cecidomyiidae) from the Rovno Amber: Subfamily Lestremiinae, Tribes Micromyiini and Peromyiini," *Paleontol. Zh.*, No. 4, 44–54 (2004) [*Paleontol. J.* **38** (4), 396–406 (2004)].
10. M. Skuhrová, "Family Cecidomyiidae," *Catalogue of Palaeartic Diptera* (Acad. Kiadó, Budapest, 1986), Vol. 4, pp. 72–297.
11. M. Skuhrová, "2.7. Family Cecidomyiidae," *Contribution to a Manual of Palaeartic Diptera* (Acad. Kiadó, Budapest, 1997), Vol. 2, pp. 71–205.