

Redescription of *Cyphomella cana* (Strobl, 1910) (Diptera, Chironomidae) from the Russian Far East

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The male imago, pupa, and larva of *Cyphomella cana* (Strobl, 1910) from the Russian Far East are redescribed and figured. The male imago *Cyphomella cornea* was described by Sæther in 1977 from South Dakota and Germany. The pupa was described by Langton & Visser in 2003 based on material deposited in the Zoologische Staatssammlung, Munich. Based on analysis of Strobl's holotype male imago by Dr. Spies (Zoologische Staatssammlung, Munich), *Cyphomella cornea* Sæther, 1977 is a junior synonym of *Cyphomella cana* (Strobl, 1910) (Vallenduuk 2019).

The genus *Kuzinia* was described by Shilova (2001) from the Eastern Pamirs (Ashil-Kul Lake) based on the morphology of the male imago is a junior synonym of the genus *Cyphomella*.

Currently, there is no detailed morphometric description of the male imago of *Cyphomella cana* (Strobl, 1910) from the Palaearctic region. The description of the pupal exuviae of *C. cana* is given only on the basis of material collected from Germany (Langton & Visser 2003). The morphological description of the larva of this species has not yet been published. Therefore, I consider it appropriate to publish an illustrated morphological description of the male imago, pupa, and larva of *Cyphomella cana* (Strobl, 1910) from watercourses in various regions of the Russian Far East.

The material was collected from the rivers of the Russian Far East, including Leonidovka, Tym, Belaya, Aldikon, Bolshaya Pera, the Amur River, Urgal River, Tunguska, and from the lakes Rybnoe and Beach-Khauni. Adult non-biting midges were collected using an entomological net. For sampling of zoobenthos, scrapers were used to sample the top layer of bottom sediments. This sample was then washed through a washing sieved. The collected material was fixed in 70% ethanol. Then the pupae and larvae of chironomids were placed on a glass slide in Faure-Berlese solution. Morphological terminology and abbreviations follow Sæther (1980).

The material is deposited in the Laboratory of Freshwater Hydrobiology Federal Scientific Center of East Asia Territorial Biodiversity.

The photographs were taken using an Olympus DP74 digital camera, and then stacked and post-processed for contrast and brightness using Adobe® Photoshop® software.

Systematics

Family: Chironomidae Newman, 1834

Subfamily: Chironominae Newman, 1834

Tribe: Chironomini Zavřel, 1917

Genus: *Cyphomella* Sæther, 1977

Chironomus Malloch, 1915: 482

Cryptochironomus Kieffer, 1923: 162, Kieffer 1925: 285, Freeman 1955: 18

Tendipes (*Cryptochironomus*) Goetghebuer, 1937–1954: 38

Harnischia (*Harnischia*) Townes, 1945: 165

Chironomus (*Cryptochironomus*) Freeman, 1957: 392

Kuzinia Shilova, 2001: 1276

Pamirocesa Kocak & Kemal, 2008:1, **syn. nov.**

Cyphomella Sæther, 1977: 101; Pinder & Reiss 1983: 309; Pinder & Reiss 1986: 316; Cranston *et al.* 1989: 372; Zorina 2006: 386, 542, 685; Epler, Ekrem & Cranston 2013: 404; Orel 2016: 188; Vallenduuk 2019: 167

Type species: *Cyphomella gibbera* Sæther, 1977.

Other included species: *Cyphomella ariadnae* (Shilova, 2001) (Palearctic—Tajikistan), *Cyphomella angusta* (Freeman, 1961) (Australia), *Cyphomella argentea* (Townes, 1945) (Nearctic), *Cyphomella cana* (Strobl, 1910) (Holarctic), *Cyphomella gibbera* Sæther, 1977 (Nearctic), *Cyphomella griseus* (Malloch, 1915) (Nearctic), *Cyphomella camelus* (Kieffer, 1925) (Afrotropical, Oriental, Palearctic—Egypt, North Africa).

***Cyphomella cana* (Strobl, 1910)**

Figs 1–28.

Chironomus canus Strobl, 1910: 266

Cyphomella cana (Strobl, 1910), Vallenduuk 2019: 167, Fig. 136

Cyphomella cornea Sæther, 1977: 105, Fig. 37 E–F; Langton & Visser 2003; Zorina 2006: 386; Moller Pillot 2009: 95

Material examined. 2 males, **RUSSIA**, SAKHALIN ISLAND, Poronaysky District, Leonidovka River 8 km below the village, 9–10.vii.2001 (Makarchenko E.A.); 1 male, same data, Nogliki district, Rybnoe Lake, 27.vii.2002 (Makarchenko E.A.); 1 male, same data, Tym River 2 km from the automobile bridge over the Parkata River, 02.viii.2003 (Makarchenko E.A.); 6 males, same data, Dolinsky district, “Sokol” biological station, Belaya River, 19–20.viii.2003 (Makarchenko E.A.); 1 male, AMUR REGION, Seledzha river basin, Aldikon River near the of Norsk Town, 16.vi.2004 (Tiunova T.M.); 1 mature pupa with larval exuviae, Zeya river basin, Bolshaya Pera River, 14.ix.2021 (Yavorskaya N.M.); 2 male, JEWISH AUTONOMOUS REGION, Amur River, Petrovskaya channel, 123rd km, 01.vii.2006 (Yavorskaya N.M.); 1 male, KHABAROVCK TERRITORY, Verkhnebureinsky district, Bureya river basin, Urgal River 4 km from the mouth, 21.ix.2006 (Tiunova T.M.); 1 mature pupa, Amur River, lower course, 05.vi.2018 (Yavorskaya N.M.); 1 immature pupa, Amur River basin, Tunguska River, 05.vi.2018 (Yavorskaya N.M.); 5 males, Anyuisky National Park, Amur River basin, Troitskoye village, unnamed stream near the ANP office, 26.v.2019 (Yavorskaya N.M.); 1 male Komsomolsky Nature Reserve, Beach-Khauni Lake, 21.v.2020 (Yavorskaya N.M.).

Diagnosis. Male: dark brown coloured species, with wing 1.91–2.40 mm long and AR 1.63–1.94; LR_{pl} 1.40–1.51; anal point narrow, apically widened and rounded; superior volsella with 4–7 setae and microtrichia on ventromedian margin; membranous apical part of the superior volsella may be curved dorsally; inferior volsella without setae. Pupa: total body length 3.0–4.4 mm; cephalic tubercles 75–84 µm long; Pedes spurii B on segment II present, hook rows with 59–71 hooks, sometimes narrowly interrupted medially and with a group of hooks medially. Larva: AR 1.36; antenna blade length 42 µm; mandible with light apical and three inner teeth; the first lateral teeth of the mentum are light.

Description. Adult male (n = 6)

Body size and proportions. Total length 3.2–3.8 mm. Wing length 2.12–2.40 mm. Total length/wing length ratio 1.45–1.58.

Colouration. Antenna and palps brown. Scutal vittae, scutellum and postnotum brown, ground colour of thorax and haltere yellow brown, legs and abdomen brown.

Head. Antenna 1020–1060 µm long; ultimate flagellomere 660–700 µm long; AR 1.65–1.94. Frontal tubercles subcylindrical/conical with round apex, 15–21 µm long, 9–15 µm wide (Fig. 1). Temporal setae 12–16 on each side. Clypeus with 8–14 setae. Lengths of 2–4 palpomeres (in µm): 48–54, 144–152, 136–160, 200–240.

Thorax. Aps 5–9, Ac absent, Dc 5–9 on each side, uniserial; Pa 2–4 on each side; Scts 8–12.

Wing 0.58–0.68 µm wide. R with 6–10 setae, R₄₊₅ with 2–7 setae (of which 2 are apical). Brachiolium with 2 setae; squama with 6–11 setae. VR 1.0–1.2.

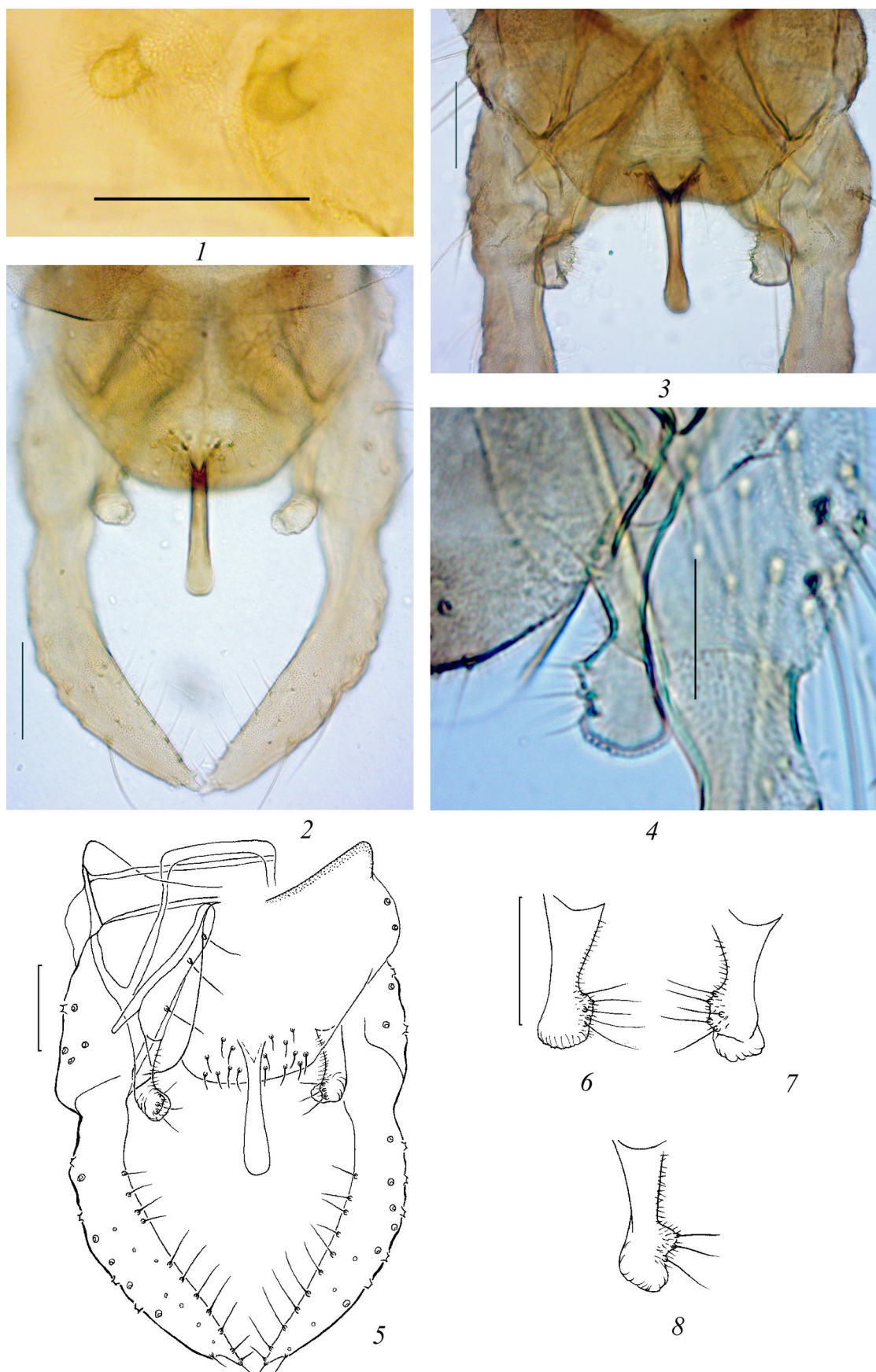
Legs. Tibial combs of mid and hind legs fused, with straight spur: 18–24 (mid leg) and 24–30 µm long (hind leg). Basitarsus of mid leg with 2–6 sensillum chaeticum (n=6).

Lengths and proportions of legs as in Table 1.

TABLE 1. Lengths (in µm) and proportions of leg segments of *Cyphomella cana* (Strobl, 1910) adult male.

P	f	t	Ta ₁	Ta ₂	Ta ₃	Ta ₄	Ta ₅
P ₁	760–880	560–700	840–1000	420–500	340–400	240–300	130–160
P ₂	700–820	680–800	340–400	220–260	160–200	100–130	80–100
P ₃	840–940	840–960	520–600	320–380	260–300	160–180	100–120

P	LR	SV	BV	BR
P ₁	1.42–1.50	1.56–1.60	1.71–1.98	2.5
P ₂	0.49–0.56	3.63–4.17	2.97–3.21	3.4–5.0
P ₃	0.62–0.67	3.00–3.23	2.55–2.80	4.5–5.9



FIGURES 1–8. Details of the structure of the male imago *Cyphomella cana* (Strobl, 1910). 1—frontal tubercles; 2–3, 5—hypopygium, dorsal view; 3, 6–8—superior volsella. Scale bar 50 µm.

Hypopygium (Figs 2–8). Tergite IX reticulated; with 8–12 setae on each side of anal point (2–4 setae may be located at the base of the anal point), tergite bands weakly expressed; laterosternites with 2–5 setae on each side. Anal point narrow, apically widened and rounded (69–81 µm long, 15 µm wide apically). Gonocoxite 105–135 µm long, with 3–4 setae along the inner margin. Phallapodeme 84–114 µm long; transverse sternapodeme 60–81 µm long. Superior volsella 42–60 µm long, with 4–7 setae and microtrichia on ventromedian margin; membranous apical part of the superior volsella may be curved dorsally. Inferior volsella without setae. Gonostylus 141–165 µm long, widened in the proximal part and gradually narrows apically. HR 0.7–0.9.

Pupa (n = 3) 3.0–3.3 mm long.

Cephalothorax. Frontal tubercles well-developed, conical, 75–84 µm long, 36–45 µm wide at base (Fig. 9). Frontal setae short (18–24 µm long) located subapically. Thorax granulose along median suture (Fig. 10). Anteprenotals 2 (median (105 µm long and lateral (120 µm long), taeniate). Precorneals 2 (60–75 µm long, taeniate). Dc₁₋₄ simple, 30–45 µm long. Distance between Dc₁ and Dc₂ 27–30 µm, Dc₃ and Dc₄ 12–24 µm, Dc₂ and Dc₃ 141–144 µm. Wing sheath 1000–1100 µm long. Prealar tubercle well-developed.

Abdomen (Figs 11–16) 2.7 mm long. Hook rows with 59–68 hooks, 336 µm wide, narrowly interrupted medially and with group of hooks medially. Tergite I bare; II–VI with median shagreen: weak anteromedian spines grading over into stronger posterior spines; VII in proximal part with transverse stripe of shagreen; VIII with anterolateral patches of shagreen. Sternite II–III with a medial longitudinal strip of shagreen; IV with a medial triangular strip of shagreen; V without of shagreen; VI–VIII with anterolateral patches of shagreen. Segment VIII with 5–12 strong dark spurs (6–30 µm long) (Figs 15–16). Segment II–IV with 3 L setae, V with 3 LS setae, VI–VII with 4 LS setae, and VIII with 4 (rarely 5) LS setae. Anal lobe well developed with two patches of shagreen and complete fringe of 38–50 taeniate setae. Anal segment 168–210 µm long and 195–270 µm wide, with shagreen.

Fourth instar larva (n = 1)

Colouration white (in alcohol), with yellowish head capsule.

Head. Head capsule 0.28 mm long, 0.24 mm wide. Dorsal surface smooth; sclerite 1 21 µm long and 12 µm wide; clypeus 21 µm long and 9 µm wide; S 3 39–45 µm long, apically divided into 2–3 branches (Fig. 24). Antenna 5-segmented (but only 4 segments are clearly visible) total length 168 µm, length of each segment (in µm): 45; 25.5; 4.5; 3. AR 1.36. Ring organ located at base of basal segment; wide of basal segment 1.5 µm. Blade 42 µm long, situated apically on basal segment, extending to apex of segment 4 (Figs 19, 25). Labrum (Figs 18, 23). S I 24 µm long, blade-like; S II 45 µm long, blade-like; S III 15 µm, simple; S IV 3-segmented, 24 µm long. Premandible 66 µm long, with 2 large apical and 2 shorter basal teeth; brush present. Mandible (Figs 20, 26) 90 µm long, 36 µm wide, with light apical and three inner teeth. Seta subdentalis 18 µm long, extending to apex the 2nd inner tooth. Seta interna consisting of 4 branches, 30–36 µm long. Ventral seta 30 µm long. Maxillary palp (Fig. 27) 1-segmented, 45 µm long, apically with 2–3 2-segmented setae, the rest setae simple. Mentum (Figs 21, 28) 103 µm wide, with pale a broad median tooth (27 µm) having a weak medial notch and with a pair of pale lateral teeth, and with 6 pairs brown lateral teeth. Ventromental plate 29 µm wide, 84 µm high, with about 40 striae; distance between ventromental plates 66 µm.

Body. Posterior parapods with 16 simple hooks (Fig. 22). Procercus 24 µm long and 39 µm wide. Anal setae nearly 400 µm long.

Remarks. The genus *Kuzinia* was described by Shilova in 2001 from the Eastern Pamirs (Ashil-Kul Lake) based on the morphology of the male imago, and included only one species—*Kuzinia ariadnae* Shilova, 2001. Later this genus was given a new name *Pamirocesa* Kocak & Kemal, 2008. According to Shilova's article, the genus *Kuzinia* has the following diagnostic characteristics: Ac absent, Aps present, frontal tubercles are well developed, superior volsellae are club-shaped, apically expanded, with setae, gonostylus with a short “spiny” seta. The above morphometric features fully correspond to the diagnostic characteristics of the genus *Cyphomella*. Therefore, I believe that *Kuzinia/Pamirocesa* is a junior synonym of the genus *Cyphomella*.

The males of *Cyphomella cana* (Strobl, 1910) from Russian Far East practically do not differ from American and Western European males' specimens in morphometric parameters and structure of the hypopygium (See Table 2). The male of *C. cana* is most similar to *C. ariadnae* (Shilova), but differs in the smaller body size, the presence of a dorsal tubercle on the scutum, as well as the structure of the hypopygium: the anal point is expanded near the apex, setae on the superior volsella are located ventromedially, the gonostylus is slightly expanded in the proximal part (See Table 2). In contrast male of *C. ariadnae* (Shilova) are larger, the dorsal tubercle on the scutum is absent, the anal point is expanded in the apical third, the setae on the superior volsella are located apicomediaally, and the gonostylus is strongly expanded in the proximal third (Shilova, 2001: 1278, Fig. 2).

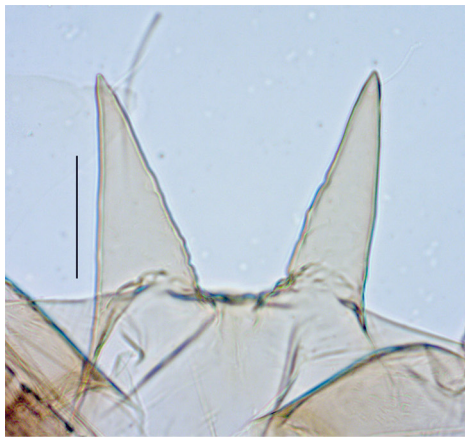
TABLE 2. Comparative morphological characteristics of the males of *Cyphomella* Sæther.

Characters	<i>Cyphomella cana</i> (Strobl, 1910) (from Sæther 1977, n = 3)	<i>Cyphomella cana</i> (Strobl, 1910) (our data, n = 6)	<i>Cyphomella ariadnae</i> (Shilova) (from Shilova 2001, n = 4)
Total length, mm	3.67–3.86	3.2–3.8	4.2–4.7
Wing length, mm	1.91–2.13	2.12–2.40	2.5–2.6
Tubercle on scutum	present	present	absent
Frontal tubercles length, μm	20–28	15–21	22–24
AR	1.63–1.85	1.65–1.94	2.0–2.2
Aps	3–4	5–9	8–10
Ac	0	0	0
Dc	8–9	5–9	6–10
Scts	6–8	8–12	up to 10
R	7–9	6–10	6–9
Sq	7–12	6–11	10–12
LR _{pt}	1.40–1.51	1.42–1.50	1.4–1.5
Sensilla chaetica on tP ₂	4	2–6	4–6
Anal point length, μm	70–72	69–81	78–90
Superior volsella	expanded near apex nearly without microtrichia	expanded near apex dense microtrichia present on ventromedian margin	expanded in apical third microtrichia present on the inner margin
Gonocoxite length, μm	159–170	105–135	-
Gonostylus length, μm	178–187	141–165	-

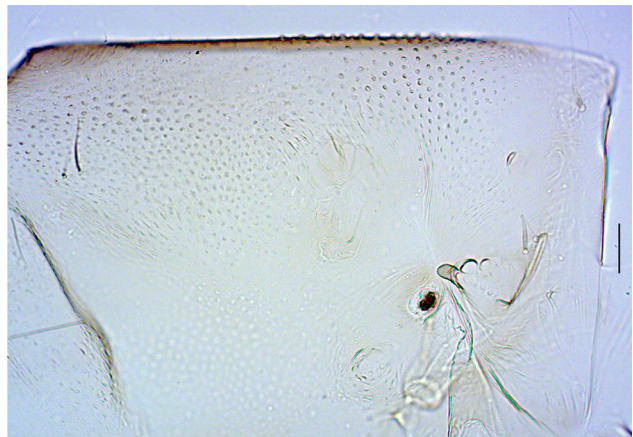
Far Eastern pupae of *C. cana* (Strobl) have slight morphometric differences from pupae described from Germany by Langton and Visser (2003), which are listed in Table 3. The pupa of *C. cana* (Strobl) is most similar to *Cyphomella* sp. (Sæther 1977: 107, Fig. 38), but differs from the latter by the following features: total body length 3.0–4.4 mm, cephalic tubercles 75–84 μm long, Pedes spurii B on segment II present, hook rows with 59–71 hooks. In contrast, the pupa of *Cyphomella* sp. has a total body length of 2.72 mm, cephalic tubercles 53 μm long, Pedes spurii B on segment II absent, and hook rows with 38 hooks.

TABLE 3. Comparative morphological characteristics of the pupae of *Cyphomella cana* (Strobl, 1910) and *Cyphomella* sp.

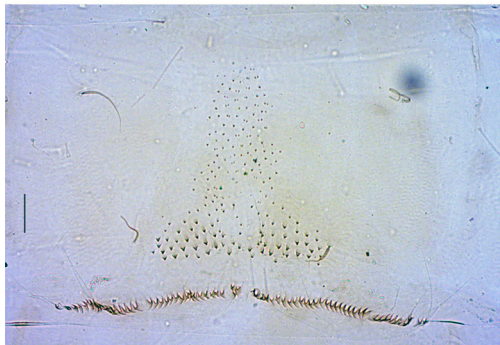
Characters	<i>Cyphomella</i> sp. (from Sæther 1977: 107, n = 1)	<i>Cyphomella cana</i> (Strobl, 1910) (from Langton & Visser 2003, n = 1–2)	<i>Cyphomella cana</i> (Strobl, 1910) (from our data, n = 3)
	USA, Western Europe	Western Europe	Russian Far East
Total length, mm	2.72	4.4	3.0–3.3
Cephalic tubercles length, μm	53	present	75–84
Frontal setae length, μm	14	short	18–24
Pedes spurii B on segment II	absent	present	present
Hook row on tergite II	continuous, 38	continuous, 70–71	with a group of medial hooks that are narrowly separated from the main hook row, 59–68
Anal comb	6–7 (0–2 vestigial) spurs	8–10 spurs	5–12 strong dark spurs
Fringe of anal lobe	38	44–48	38–50



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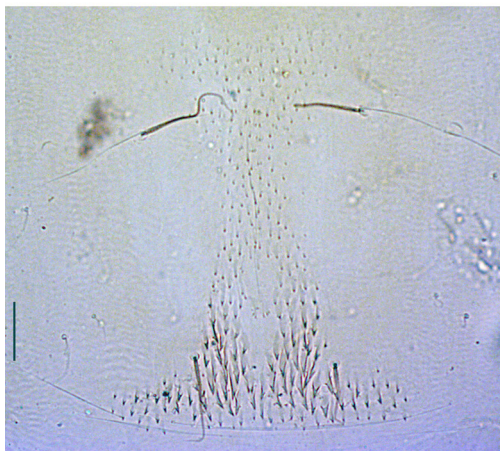
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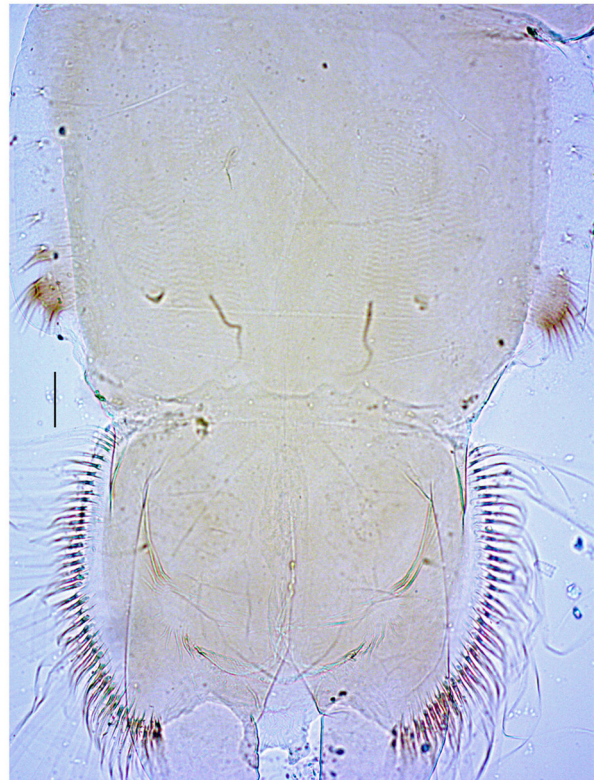
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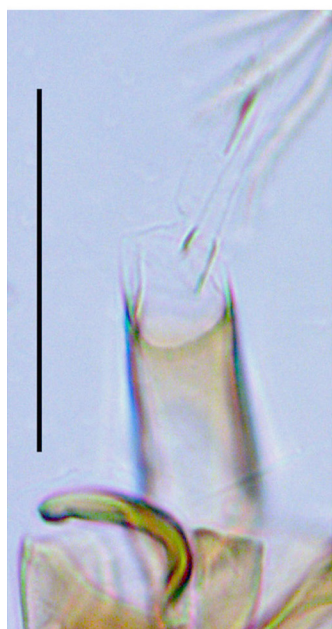
FIGURES 9–16. Details of the structure of the pupa *Cyphomella cana* (Strobl, 1910). 9—frontal tubercles; 10—thorax, lateral view; 11—tergite II; 12—tergites III; 13—tergite V; 14—tergites VIII–IX; 15–16—anal comb. Scale bar 20 μm (10–14) and 50 μm (9, 15–16).



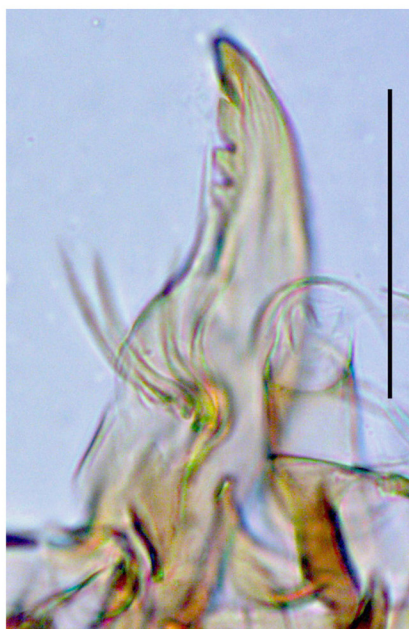
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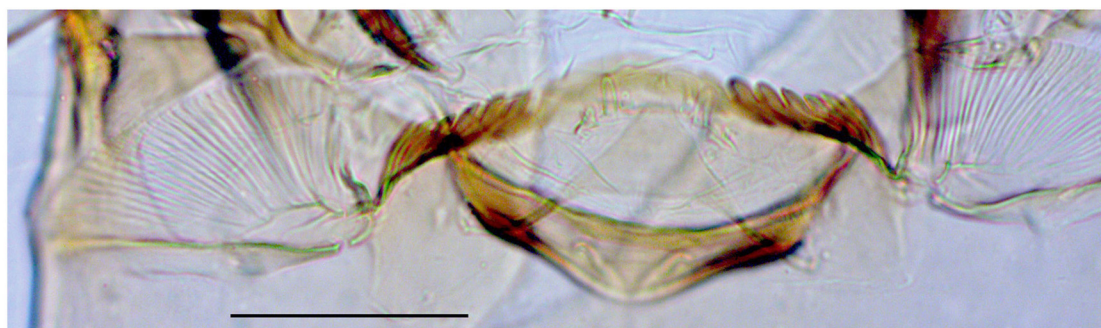
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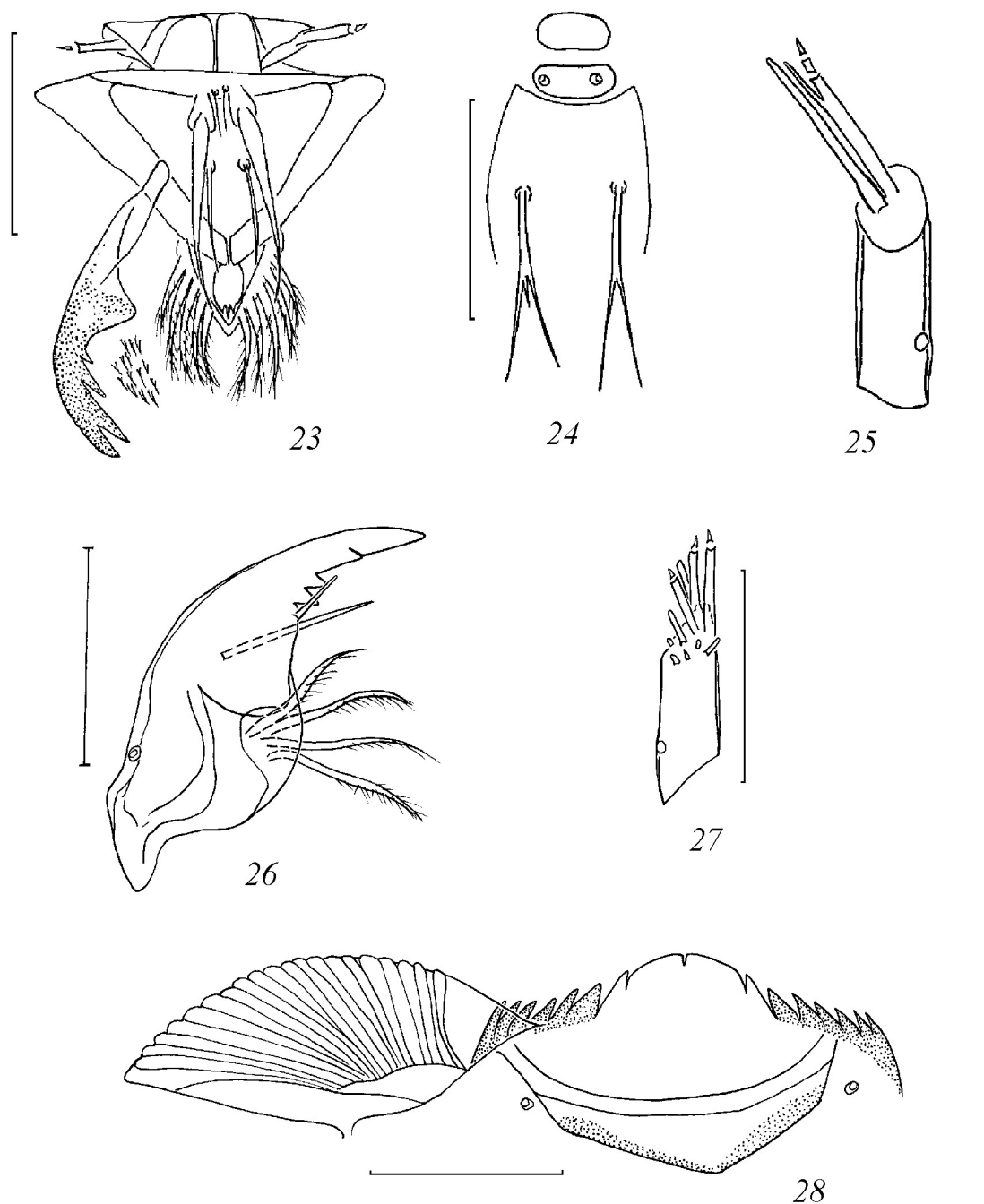


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FIGURES 17–22. Details of the structure of the larva *Cyphomella cana* (Strobl, 1910). 17—setae S 3; 18—labrum; 19—antenna; 20—mandible; 21—mentum and ventromental plates; 22—posterior parapods and procerci; Scale bar 20 μm (22) and 50 μm (17–21).



FIGURES 23–28. Details of the structure of the larva *Cyphomella cana* (Strobl, 1910). 23—labrum; 24—sclerite 1, clypeus and frontal apotome; 25—antenna; 26—mandible; 27—maxillary palp; 28—mentum and ventromental plates. Scale bar 50 μm .

TABLE 4. Comparative morphological characteristics of the larvae of *Cyphomella* Sæther.

Characters	<i>Cyphomella</i> sp. (from Sæther 1977: 107, n = 1)	<i>Cyphomella cana</i> (Strobl, 1910) (from our data, n = 1)
Length of head capsule, mm	0.27	0.28
Length of antennal segments, μm	48; 22; 2; 2; 1	45; 25.5; 4.5; 3
Width of basal segment, μm	17	15
AR	1.78	1.36
Length of blade, μm	24	42
Length of premandible, μm	68	66
Length of mandible, μm	102	90

The larva of *C. cana* (Strobl) is most similar to *Cyphomella* sp., but is distinguished by the pale teeth of the mandible and the first lateral teeth of the mentum, and an AR of 1.36 (See Table 4). *Cyphomella* sp. has dark teeth of the mandible and first lateral teeth of the mentum, and AR 1.78 (Saether 1977: 107, Fig. 38).

Distribution. Holarctic species. Widespread in the Russian Far East.

Acknowledgements

I am deeply grateful to all the colleagues who provided the collected material to me for further study. The research was carried out within the state assignment of the Ministry of Science and Higher Education of the Russian Federation (theme No. 124012400285-7).

References

- Cranston, P.S., Dillon, M.E., Pinder, L.C.V. & Reiss, F. (1989) The adult males of *Chironominae* (Diptera, *Chironomidae*) of the Holarctic region. Keys and diagnoses. In: Wiederholm, T. (Ed.), *Chironomidae of the Holarctic Region. Keys and Diagnoses. Part 3. Adult Males. Entomologica Scandinavia Supplement*, 34, pp. 353–502.
- Epler, J., Ekrem, T. & Cranston, P.S. (2013) The larvae of *Chironominae* (Diptera, *Chironomidae*) of the Holarctic Region—Key and diagnoses. In: Andersen, T., Cranston, P.S. & Epler, J.H. (Eds.), *Chironomidae of the Holarctic Region. Key and diagnosis—Larvae. Insect Systematics & Evolution Supplement*, 66, pp. 7–12.
- Freeman, P. (1955) *Chironomidae* (Diptera Nematocera). *Exploration du Parc National Albert - Exploratie van het Nationaal Albert Park - Mission/Zending Gaston-François de Witte*, 83, 3–40.
- Kieffer, J.J. (1925) *Chironomides d’Egypte* (Dipt.). *Bulletin de la Société Royale entomologique d’Egypte*, 8, 244–313.
- Kocak, A.O. & Kemal, M. (2008) Nomenclatural notes on some genus-group names in the order Diptera. *Centre for Entomological Studies Ankara miscellaneous papers*, 144, 1–3.
- Langton, P.H. & Visser, H. (2003) *Chironomidae exuviae. A key to pupal exuviae of the West Palaearctic Region*. Biodiversity Center of ETI, Amsterdam. [CD-ROM series]
- Moller Pillot, H.K.M. (2009) *Chironomidae larvae of the Netherlands and adjacent lowlands. Vol. II. Biology and ecology of the Chironomini*. KNNV Publishing, Utrecht, 270 pp.
- Orel, O.V. (2016) Fauna of non-biting midges of subfamily *Chironomidae* (Diptera, *Chironomidae*) of the Russian Far East. *Freshwater Life*, 2, 185–196. [in Russian]
- Pinder, L.C.V. & Reiss, F. (1983) 10. The larvae of *Chironominae* (Diptera, *Chironomidae*) of the Holarctic region—Keys and diagnoses. *Entomologica scandinavica Supplement*, 19, 293–435.
- Pinder, L.C.V. & Reiss, F. (1986) The pupae of *Chironominae* (Diptera, *Chironomidae*) of the Holarctic region—Keys and diagnoses. In: Wiederholm, T. (Ed.), *Chironomidae of the Holarctic Region. Keys and Diagnoses. Part 2. Pupae. Entomologica Scandinavica Supplement*, 28, pp. 299–456.
- Sæther, O.A. (1980) Taxonomic studies on *Chironomidae*: *Nanocladius*, *Pseudochironomus* and the *Harnischia* complex. *Bulletin of the Fisheries Research Board of Canada*, 1977, 1–204.
- Sæther, O.A. (1980) Glossary of chironomid morphology terminology (Diptera, *Chironomidae*). *Entomologica Scandinavica Supplement*, 14, 1–51.
- Shilova, A.I. (2001) A new genus and species of chironomid (Diptera, *Chironomidae*) from Yashil-Kul Lake, Eastern Pamir. *Zoological journal*, 80 (10), 1276–1280. [in Russian]
- Strobl, P.G. (1910) Die Dipteren von Steiermark. II. Nachtrag. *Mitteilungen des Naturwissenschaftlichen Vereines für Steiermark*, 46, 45–292.
- Zorina, O.V. (2006) Subfamily *Chironominae*. In: Lelej, A. (Ed.), *Key to the insects of Russian Far East. Vol. 6. Diptera and Siphonaptera. Pt 4*. Dal’nauka, Vladivostok, pp. 372–453 + 530–592 + 671–734. [in Russian]
- Vallenduuk, H.J. (2019) *Chironomini larvae of western European lowlands* (Diptera: *Chironomidae*). Keys with notes to the species. With an updated description of *Glyptotendipes* (*Caulochironomus*) *nagorskayae* new species and redescription of *Glyptotendipes* (*Caulochironomus*) *kaluginae* new species. Corrected reprint. *Lauterbornia*, 82, 1–217.