



Confirmation of a species status of *Diamesa leoniella* Hansen, 1976, stat. resurr. (Diptera, Chironomidae) from North America

EUGENYI A. MAKARCHENKO

Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, 100 let Vladivostoku 159, 690022 Vladivostok, Russia

✉ makarchenko@biosoil.ru; <http://orcid.org/0000-0003-2765-8729>

As a result of studying the Chironomid Reference Collection of USGS Great Lakes Science Center for genus *Diamesa* Meigen from North America, 5 species, including *D. leoniella* Hansen, 1976 from Alaska, were identified, which I synonymized with *D. japonica* Tokunaga, 1936 (Makarchenko 1981). At that time, the comparison of these two species was carried out mainly according to the descriptions of their adult males, since I did not have at my disposal *D. leoniella* material. After an analysis of *D. leoniella* males from Alaska, I realized that I made a mistake in my youth, because these are two good separate species, although very closely related. I decided to correct this error and to confirm of a species status of *D. leoniella*, with a redescription of both species below.

Material and methods

The present study is based on the collections of the Chironomid Reference Collection of USGS Great Lakes Science Center, U.S.A. and the Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia. The morphological terminology and abbreviations used below generally follow Sæther (1980). The males of *D. leoniella* were slide-mounted in Euparal[®], *D. japonica* in the liquid Fora-Berleze and in the polyvinyl lactophenol following the recommendations of Moubayed and Langton (2019). The photographs were taken using an Axio Lab. A1 (Karl Zeiss) microscope, and then stacked using Helicon Focus software. The final illustrations were post-processed for contrast and brightness using Adobe[®] Photoshop[®] software.

Descriptions

Diamesa leoniella Hansen, 1976, stat. resurr.

(Figs. 1–2)

Diamesa leoniella Hansen in Hansen & Cook 1976: 111.

Material examined. 1 adult male, U.S.A.: Alaska, Juneau City, Mendenhall Lake, N 58.4217 E 134.5388, 26.III.2013, leg. K. Frangos and P. Hudson; 1 adult male, the same data except Nugget Falls, N 58.4270 E 134.5373, 17.VII.2013, leg. P. Hudson.

Adult male (n = 2). Total length 4.7 mm. Wing length 2.56–3.44 mm. Total length/wing length 1.37.

Colouration. Head, thorax, legs and hypopygium dark brown; antenna brown; palpomeres light brown; abdomen light brown to brown; wing greyish, veins brownish.

Head. Eyes hairy, i.e., length of eye microtrichia about 1.5 or more times the height of ommatidial lenses and visible along lateral eye margin when head is viewed from front (Hansen & Cook 1976). Frontal tubercles 16–44 µm long, covered with microtrichia. Temporal setae including about 13–15 verticals, 8–12 preoculars, 5 postorbitals. Clypeus with 5–6 setae. Antenna with 8 flagellomeres and reduced plume of setae; flagellomeres 1–7 with 2–3 setae, 24–40 µm long; terminal flagellomere in basal part with 4–5 setae, 60–72 µm long and with 2 subapical setae, 16–20 µm long. Flagellomeres 1–8 length (µm): 88–104, 36–40, 40, 32, 32, 26–32, 32–44, 164–248; AR 0.41–0.78. Antennal length/palp length 1.09–1.21. Palpomeres lengths (in µm): 32–40; 56–64; 108; 84–100; 136–156. Palpomere 3 in distal part with sensilla capitata with diameter 20 µm. Palpomeres 1–5 length/head width 0.92.

Thorax. Antepnotum with 9–11 ventrolateral setae. Dorsocentrals 5–7, prealars 7, scutellars 9–11.

Wing. R and R₁ with 25–34 setae; R₄₊₅ with 18–19 setae. Costa extension 52–60 µm long. RM length/MCu length 2.8–3.5. Anal lobe slightly reduced, angularly. Squama with 14–17 setae, 52–68 µm long. VR 0.96–1.0.

Legs. Spur of fore tibia 40–44 µm long; spurs of mid tibia 44 µm long; of hind tibia 74–80 µm and 44–48 µm long. Hind tibial comb with 15–16 setae. Lengths and proportions of leg segments as in Table 1.

TABLE 1. Lengths (in µm) and proportions of leg segments of *Diamesa leoniella* Hansen, male (n=2)

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
P ₁	1607–2280	1591–2120	1082–1400	541–720	295–440	107–140	148–180
P ₂	1706–2160	1394–1760	763–960	377–440	230–360	98–140	148–180
P ₃	1738–2400	1624–2160	1033–1440	607–800	312–400	98–160	148–200

Continued.

	LR	BV	SV	BR
P ₁	0.66–0.68	3.92	2.96–3.14	0.8–1.2
P ₂	0.55	4.36–4.53	4.06–4.08	0.8–1.1
P ₃	0.64–0.67	3.77–3.85	3.17–3.25	0.8–1.2

Hypopygium (Figs. 1–2). Tergite IX with 11–13 setae (from one side), 16–24 µm long and wedge-shaped anal point 100–140 µm long, covered in basal half with numerous microtrichia forward and laterally directed. Laterosternite IX with 10–11 short setae. Transverse sternapodeme triangular 128 µm long. Gonocoxite 400–496 µm long. Inferior volsella finger-like, 40–48 µm long and 24 µm width, covered with short setae and microtrichia. Superior volsella collar-like, covered with microtrichia and short setae. Gonostylus slightly curved, 212–246 µm long, with numerous, proximally directed strong setae 48–64 µm long; megaseta 6–8 µm long. HR 1.65–1.93.

Diagnostic characters. Male of *D. leoniella* is very closely related to *D. japonica* and distinguished from later by the following main features: 1—antennal flagellomeres 1–7 with 2–3 short setae, 2—inferior volsella finger-like, covered with short setae and microtrichia, 3—superior volsella collar-like, covered with microtrichia and short setae. Male of *D. japonica*: 1—without setae on flagellomeres 4–7, 2—inferior volsella absent, 3—superior volsella in form of an angular tubercle.

Distribution. Nearctic species. Known from U.S.A.—California, Montana, Utah, Washington, Wyoming (Hansen & Cook 1976) and Alaska (recorded for the first time).

Diamesa japonica Tokunaga, 1936

(Figs. 3–4)

Diamesa japonica Tokunaga, 1936: 542; Makarchenko 1981: 110, 1985: 76, 2006: 260; Ashe & O'Connor 2009: 278.

Diamesa kurobemijikaia Sasa et Okazava, 1992: 60; Ashe & O'Connor 2009: 278.

Material examined. 2 adult males, Russia: Kurile Islands, Kunashir Island, Sernovodsk Village, Tiurino River, 24.IV.1978, leg. E. Makarchenko; 23 adult males, the same data except 26.IV.1978, leg. E. Makarchenko.

Adult male (n = 12). Total length 3.1–4.0 mm. Wing length 2.76–3.17 mm. Total length/wing length 0.90–1.38.

Colouration. Head, thorax, legs and hypopygium dark brown; antenna and palpomeres brown; abdomen light brown to dark brown; wing greyish, veins brownish.

Head. Eyes hairy. Temporal setae including 12–15 verticals, 6–12 preoculars, 4–5 postorbitals. Clypeus with 6–8 setae. Antenna with 8 flagellomeres and reduced plume of setae; number and length of these setae on 1–7 flagellomeres respectively: 2–3 (28–40 µm), 1–2 (28–36 µm), 1–2 (26–40 µm), 0, 0, 0, 0; terminal flagellomere in basal part with 5–6 setae, 60–80 µm long and with 2 subapical setae, 40–52 µm long. Flagellomeres 1–8 length (µm): 71–88, 34–38, 25–34, 25–30, 25–34, 25–34, 34–38, 193–218; AR 0.68–0.81. Antennal length/palp length 1.05–1.11. Palpomeres lengths (in µm): 36–40; 55–63; 88–105; 76–105; 105–147. Palpomere 3 in distal part with sensilla capitata with diameter 20–24 µm. Palpomeres 1–5 length/head width 0.80–0.84.

Thorax. Anteprenotum with 7–12 ventrolateral setae. Dorsocentrals 6–10, prealars 5, scutellars 11–24.

Wing. R and R₁ with 15–25 setae; R₄₊₅ with 8–12 setae. Costa extension ca 48 µm long. RM length/MCu length 2.0–3.6. Anal lobe well developed, rounded. Squama with 18–25 setae 28–52 µm long. VR 0.96–1.0.

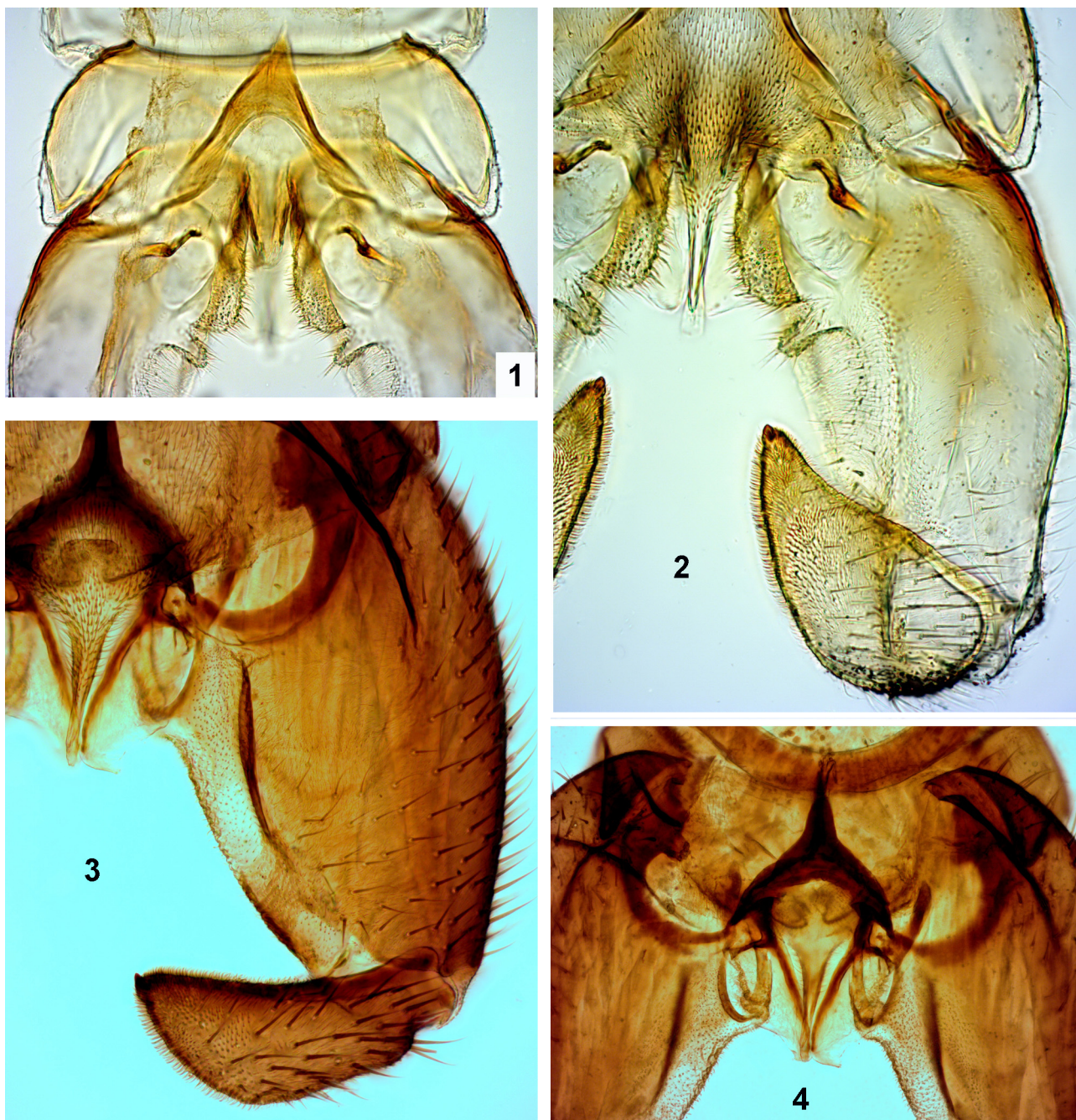
Legs. Spur of fore tibia 34–46 µm long; spurs of mid tibia 46–55 µm long; of hind tibia 50–71 µm and 34–50 µm long. Hind tibial comb with 16–20 setae. Lengths and proportions of leg segments as in Table 2.

TABLE 2. Lengths (in μm) and proportions of leg segments of *Diamesa japonica* Tokunaga, male (n=12)

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
P ₁	1496–1768	1513–1716	918–1105	425–527	255–306	102–136	136–153
P ₂	1496–1768	1292–1479	476–544	238–289	170–204	85–119	119–153
P ₃	1615–1872	1530–1768	850–1054	442–527	221–255	102–119	136–153

Continued.

	LR	BV	SV	BR
P ₁	0.57–0.64	4.05–4.42	3.15–3.41	0.9–1.3
P ₂	0.34–0.39	4.91–5.53	5.41–6.21	0.8–1.3
P ₃	0.53–0.60	4.31–4.84	4.31–4.84	0.8–1.2



FIGURES 1–4. Males of *Diamesa leoniella* Hansen (1–2) and *D. japonica* Tokunaga (3–4). 1, 4, central part of hypopygium without tergite IX; 2–3, hypopygium in dorsal view.

Hypopygium (Figs. 3–4). Tergite IX with 10–11 setae (from one side), 20–28 µm long and wedge-shaped anal point 63–136 µm long, covered in basal 2/3 with numerous microtrichia forward and laterally directed. Laterosternite IX with 9–10 short setae. Transverse sternapodeme triangular *ca* 128 µm long. Gonocoxite 350–476 µm long. Inferior volsella absent. Superior volsella in form of angular tubercle. Gonostylus slightly curved, 220–236 µm long, with numerous, proximally directed strong setae, 44–52 µm long; megaseta 6–8 µm long. HR 1.92–2.23.

Distribution. East Palaearctic island species. Known from Japan and Russian Far East (Kunashir Island, Kurile Islands (Ashe & O’Connor 2009).

Acknowledgements

The author are very thankful to Patrick L. Hudson, Emeritus Scientist (Great Lakes Science Center, Michigan, U.S.A.) for the opportunity to study Diamesinae of the Chironomid Reference Collection of USGS Great Lakes Science Center.

References

- Ashe, P. & O’Connor, J.P. (2009) *A World Catalogue of Chironomidae (Diptera). Part 1. Buchonomyiinae, Chilenomyiinae, Podonominae, Aphroteniinae, Tanypodinae, Usambaromyiinae, Diamesinae, Prodiamesinae and Telmatogetoninae*. Irish Biogeographical Society & National Museum of Ireland, Dublin, 445 pp.
- Hansen, D.C. & Cook, E.F. (1976) The systematics and morphology of the Nearctic species of *Diamesa* Meigen, 1835 (Diptera, Chironomidae). *Memoirs of the American Entomological Society*, 30, 1–203.
- Makarchenko, E.A. (1981) Taxonomy and distribution of some chironomids of Diamesinae (Diptera, Chironomidae) from the Far East of the USSR. *In: Invertebrates in the ecosystems of Far Eastern salmon rivers*. DVNC AN SSSR Press, Vladivostok, pp. 89–113. [in Russian]
- Makarchenko, E.A. (1985) *Chironomids of the Soviet Far East. Subfamilies Podonominae, Diamesinae and Prodiamesinae (Diptera, Chironomidae)*. DVNC AN SSSR Press, Vladivostok, 208 pp. [in Russian]
- Makarchenko, E.A. (2006) 3. Subfamily Diamesinae. *In: Lelej, A. (Ed.), Key to the insects of Russian Far East. Vol. 6. Diptera and Siphonaptera. Pt 4*. Dal’nauka, Vladivostok, pp. 253–276 + 468–480 + 607–621. [in Russian]
- Moubayed, J. & Langton, P.H. (2019) *Chaetocladius berythensis* sp.n., *C. calluensis* sp.n., *C. guardiolei* sp.n. and *C. parerai* sp.n., four relict species inhabiting glacial springs and streams in Eastern Pyrenees and Lebanon (Diptera: Chironomidae). *CHIRONOMUS Journal of Chironomidae Research*, 32, 42–59.
<https://doi.org/10.5324/cjcr.v0i32.3000>
- Sæther, O.A. (1980) Glossary of chironomid morphology terminology (Diptera, Chironomidae). *Entomologica Scandinavica*, Supplement 14, 1–51.
- Sasa, M. & Okazawa, T. (1992) Studies on the chironomid midges (Yusurika) of Kurobe River. *Toyama Prefectural Environmental Pollution Research Center*, 1992, 40–91.
- Tokunaga, M. (1936) Chironomidae from Japan (Diptera). VI. Diamesinae. *Philippine Journal of Science*, 59, 525–552.