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New Species and First Record of *Dannella* Edmunds 1959 (Ephemeroptera: Ephemerellidae) from the Eastern Palaearctic

TATIANA M. TIUNOVA
Federal Scientific Center of the East Asia Terrestrial Biodiversity, FEB, RAS, Prosp. 100-letiya Vladivostoka 159, Vladivostok 690022 Russia. *tiunova@biosoil.ru;* *https://orcid.org/0000-0002-9586-1502*

Abstract

A new species, *Dannella daurica* **sp. nov.** is described from the Far East of Russia, based on larvae. Characters of this new species agree with the diagnosis of *Dannella* Edmunds 1959 in the restricted sense. Comparison of the larva of *Dannella daurica* **sp. nov.** with other known larvae of *Dannella* is given. Until now, the genus *Dannella* was known only from the Nearctic Region. This is the first report of this genus from the East Palaearctic Region.

Key words: mayflies, systematic, diagnosis, Far East

Introduction

Dannella Edmunds, 1959 together with their closest relatives *Attennella* Edmunds, 1971, *Dentatella* Allen, 1980, *Eurylophella* Tiensuu, 1935 and *Timpanoga* Needham, 1927 belong to the subfamily Timpanoginae (Ephemeroptera: Ephemerellidae) (Jacobus & McCafferty 2008, Ogden *et al.* 2009; Kluge 2020). *Dannella* has heretofore been considered as a small Nearctic genus which includes three valid species: *Dannella simplex* (McDunnough, 1925), *Dannella lita* (Burks, 1947), and *Dannella provonshai* (McCafferty, 1977). These species are distributed across Canada and much of the central and eastern United States (Edmunds *et al.* 1976; Lehmkuhl 1976; Berner 1977; McCafferty & Provonsha 1978; Allen 1980; McCafferty & Randolph 1998; Parker *et al. 2007*; McCafferty *et al.* 2008, 2010; Zhou *et al.* 2010; Webb *et al.* 2012; Giberson & Burian 2017, Morse *et al.* 2017).

Larvae of *Dannella* can be distinguished from other genera of Ephemerellidae by the following combination of characteristics: gills I present and gills III absent; filamentous gills I originate at lateral margins of tergum; gills IV covering most of subjacent gills; maxilla with palp; abdominal terga without paired median tubercles; posterolateral abdominal processes not excessively long; claws without denticles (Allen 1977; McCafferty 1977; Jacobus & McCafferty 2008; Burian 2019).

A new species was found in the Far East of Russia, and is currently known only from two rivers. *Dannella daurica* **sp. nov.** is the first record of *Dannella* from the East Palaearctic.

The material is deposited in the collection of the Federal Scientific Center of the East Asia Terrestrial Biodiversity, Far Eastern Branch, Russian Academy of Sciences, Vladivostok. A morphological species concept is the basis for species hypotheses.

Dannella daurica sp. nov.

Figures 1–31

Material. HOLOTYPE: male larva, RUSSIAN FEDERATION, Amurskaya Oblast, Amur River basin, Talali River, tributary Belaya River, 51.541111° N 127.271944° E, 21.VII.2006, T. Tiunova. **Paratypes:** one larva, same data as holotype; 3 larvae, middle age, Khabarovskiy Kray, Bureinskiy district, Sinel' River, bridge, 7 km lower Talakan village, 50.241405° N 130.181227° E, 4.VII.2014, T. Tiunova.

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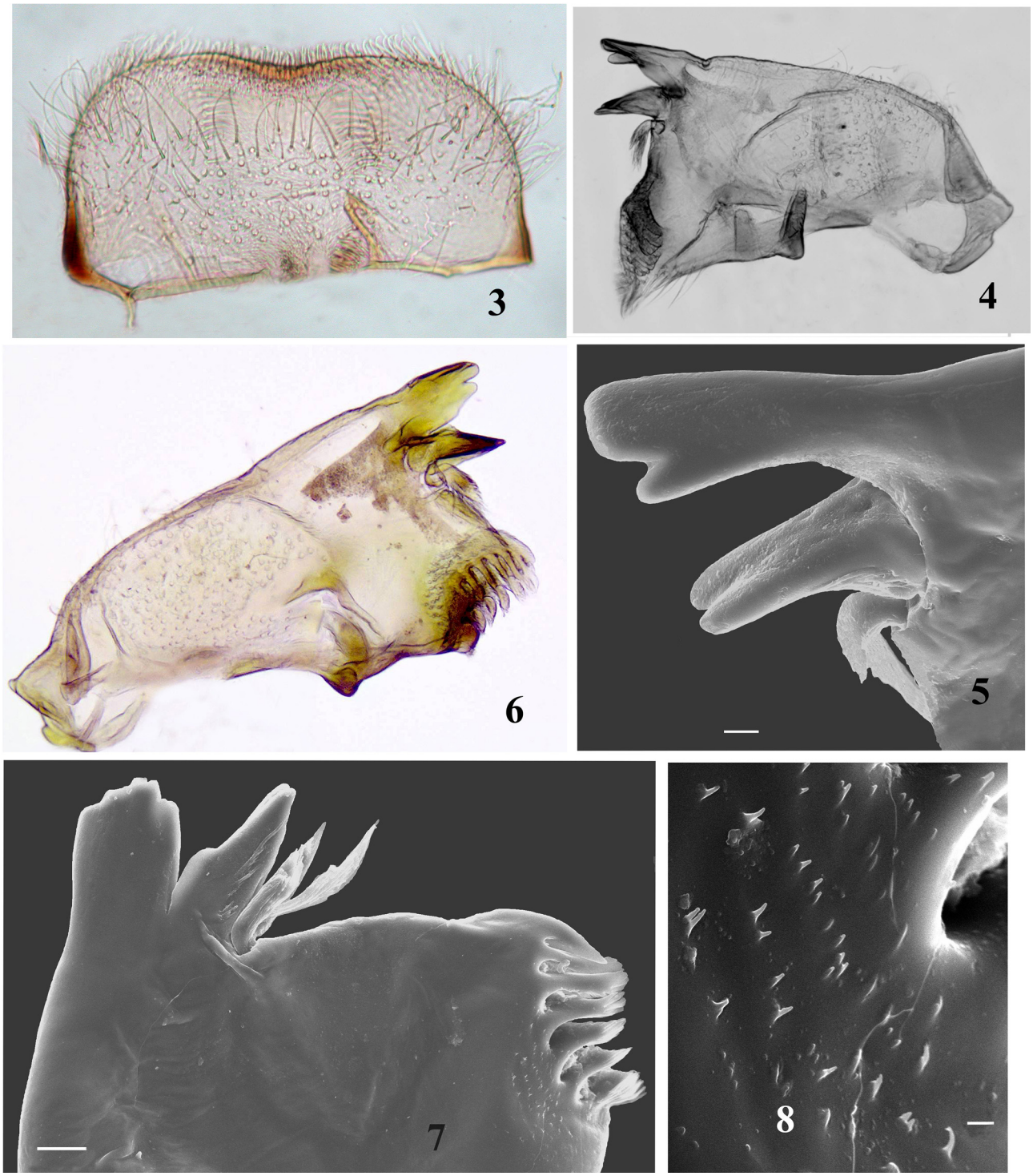
Description. *Mature larva*. Length (mm): body 5.6–5.7; cerci and paracercus 2.5–3.3. General body color light brown to brown with slightly pronounced maculation (Figs 1–2).

Head: brown with dark marking on vertex; frons and lateral margins with long hairlike setae; antennae brownish (Figs1–2).

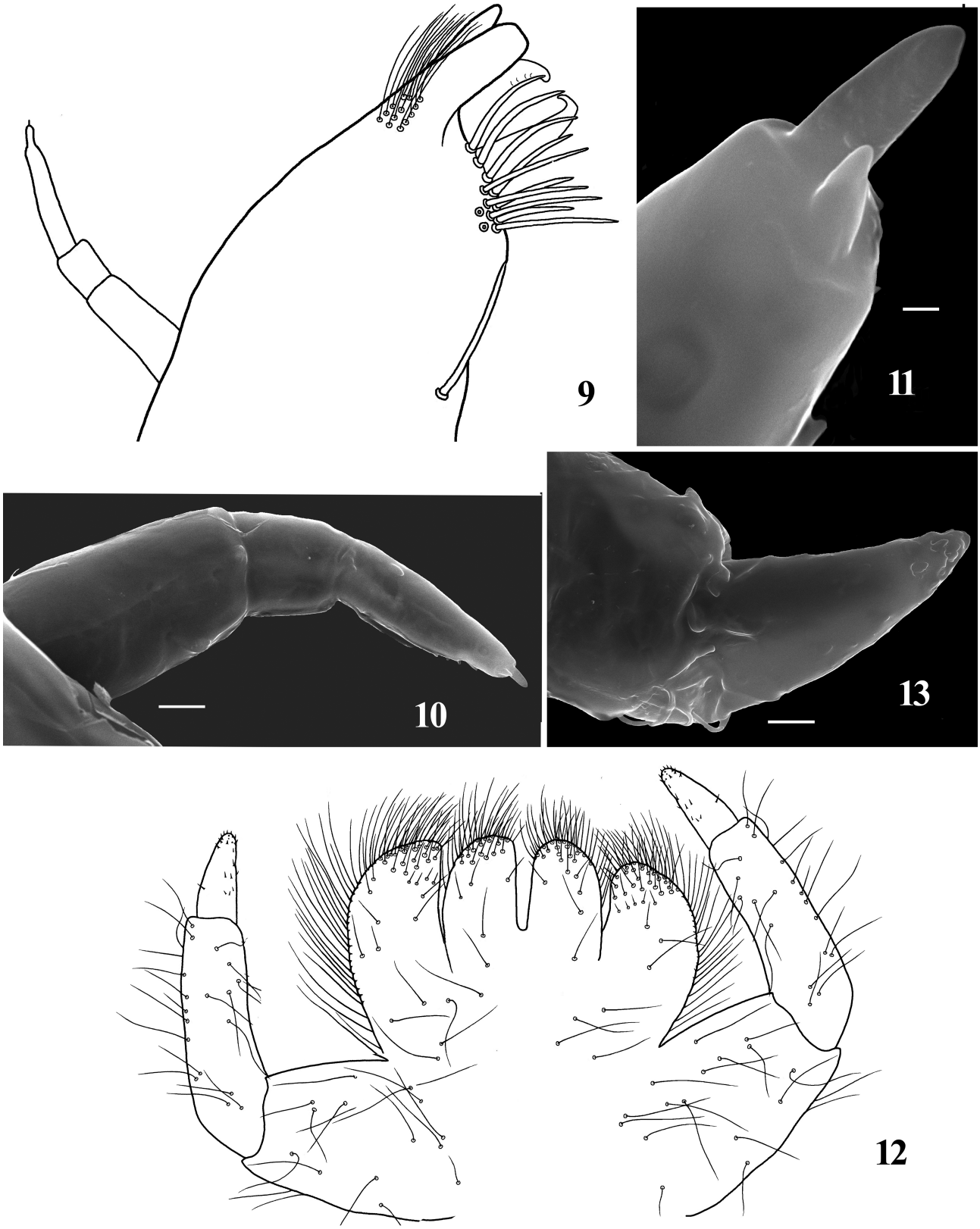
FIGURES 1–2. Color pattern of *Dannella daurica* **sp. nov.**, larvae, dorsal view, holotype (1) and paratype (2): 1, male; 2, female.

Mouthparts. Labrum wide, rectangular (width/length ratio of 1.9–2.0), anterior margin with shallow emargination medially and with cilialike setae; dorsal surface with long, stout and fine hairlike setae and pores; lateral margins with long setae (Fig. 3). Incisor of right mandible with two blunt and rounded teeth, one about two times wider than other (Figs 4–5); group of long setae under mola (Fig. 4); incisor of left mandible with five rounded teeth, third one largest (Figs 6–7); basal area of mandibles with long, fine, hairlike setae and pores; area near mola

serrated (Figs 7–8). Maxillary palp 3-segmented, well developed; first and third segments relatively equal length; second segment 2.5 times shorter than first and third segments (Figs 9–10); tip of third segment with short apical spine (Fig. 11); group of 9–10 long setae situated on inner side of maxilla (Fig. 9); lateral margins of maxilla with long fine hairlike setae. Paraglossae slightly shorter than glossae; surface of segments I and II of labial palps with long hairlike setae (Fig. 12); third segment smallest, conical, rounded apically, with short stout blunt setae more numerous on apex (Fig. 13).

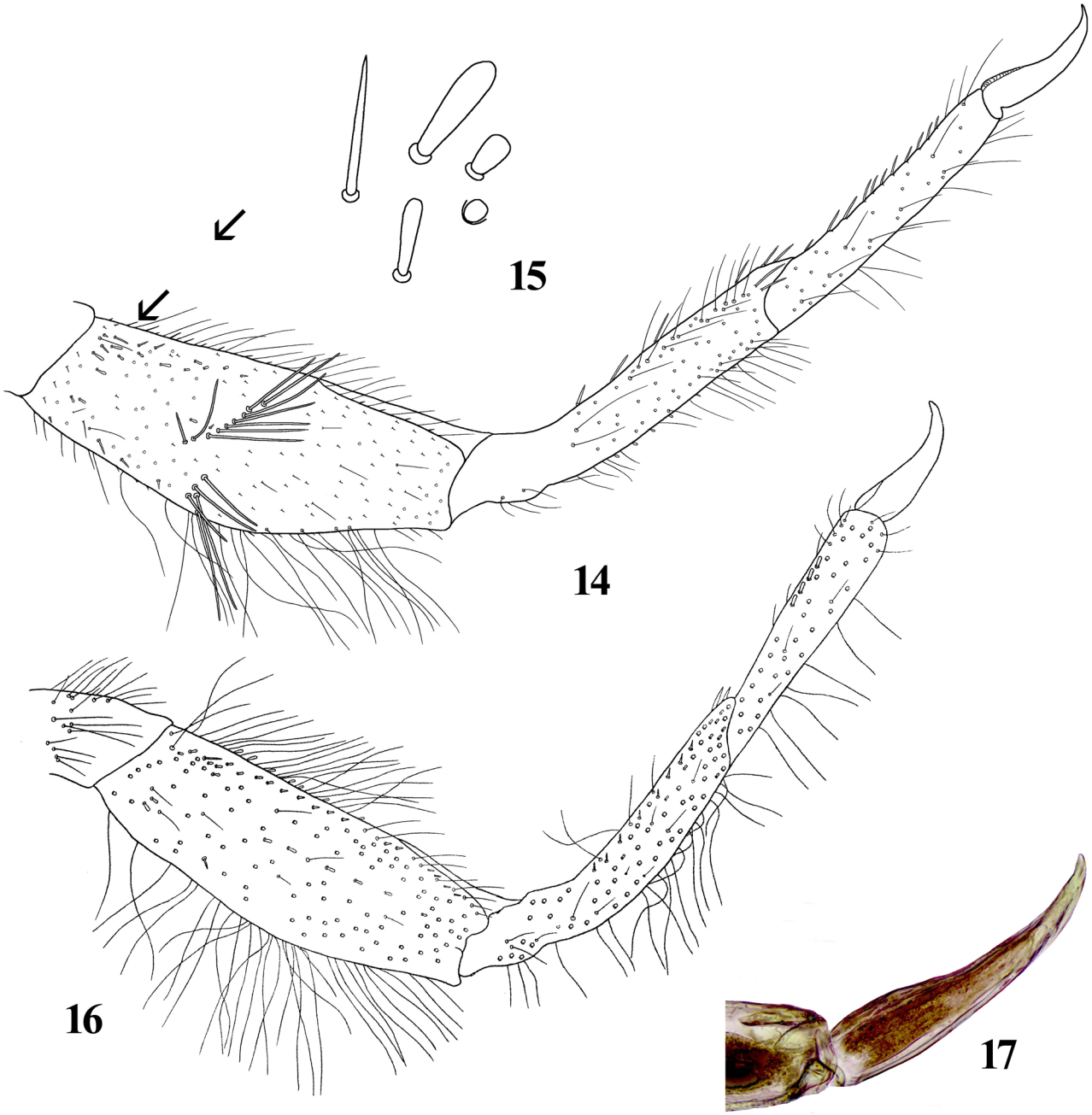


FIGURES 3–8. *Dannella daurica* **sp. nov**., larvae, details of mouthparts, dorsal view, paratypes: 3, labrum; 4, right mandible; 5, canines and prostheca of right mandible, scale bar 10 μm; 6, left mandible; 7, canines and prostheca of left mandible, scale bar 20 μm; 8, setae near mola of the left mandible, scale bar 2 μm.

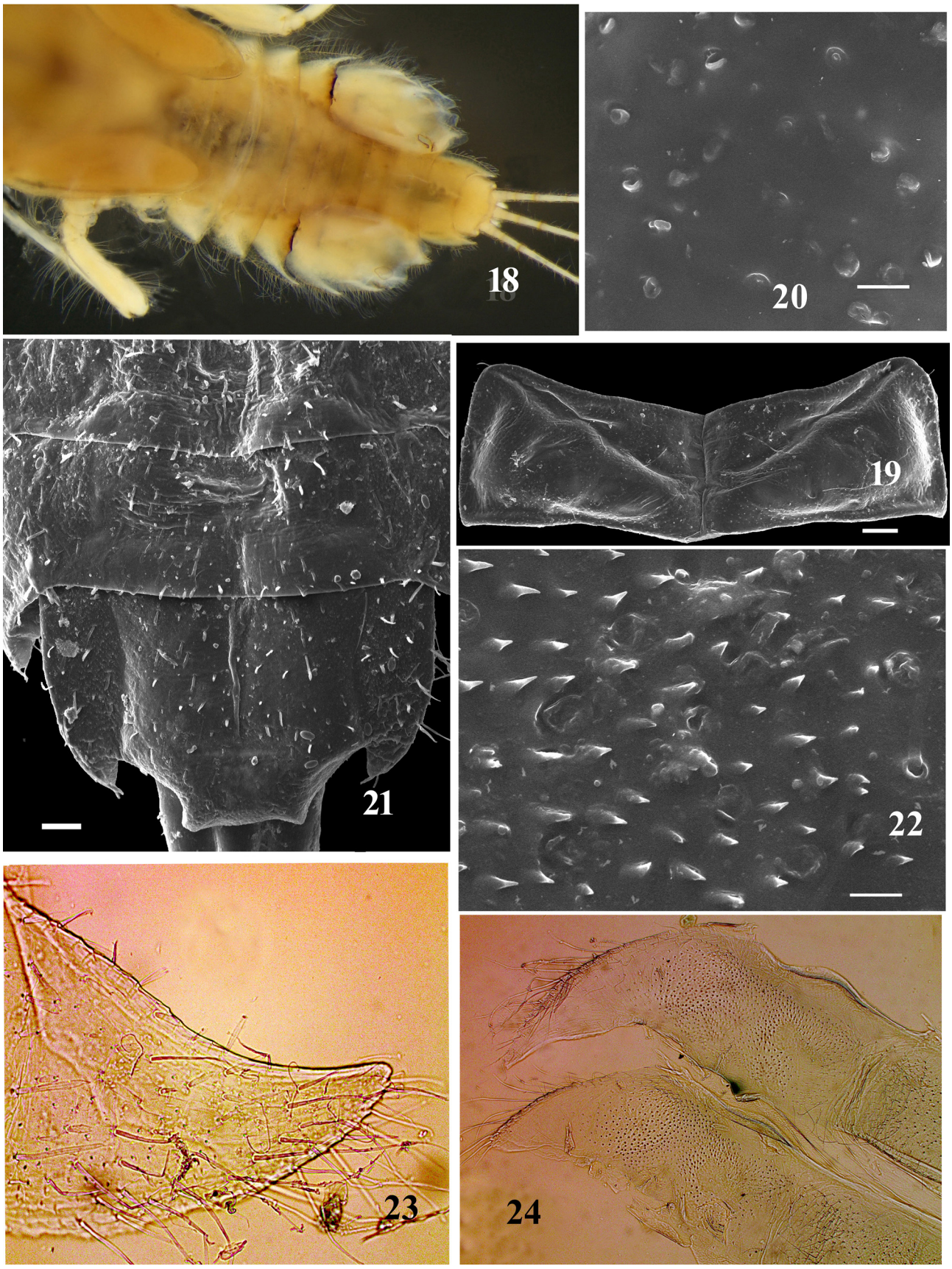


FIGURES 9–13. *Dannella daurica* **sp. nov**., larvae, details of mouthparts, dorsal view, paratypes: 9, maxilla, apical part; 10, maxillary palp, scale bar 10μm; 11, apex of third maxillary palp, scale bar 1 μm; 12, labium; 13, third segment of labial palps, scale bar 10 μm.

Thorax. Pronotum brown or light brown with lighter lateral margins. Mesonotum brown or light brown (Figs 1–*2)*. Surface of thorax densely covered with pores (Figs 19–20). All legs yellowish (Figs 1–2*)*. Femora of legs broadened slightly. Fore femur with transverse row of long, stout and pointed setae in mid-region; length of these setae ½ of width of femur (Fig. 14); inner margin of femur with row of long hairlike setae and small pointed setae; outer margin with long hairlike setae, length equal to width of femur; basal area with group of setae of various types and sizes: elongated setae widening and blunt apically, and short pointed setae (Fig. 15). Tibiae and tarsi with regular rows of stout, pointed setae on inner margins and with hairlike setae on outer margins (Fig 14). Femur of middle leg with small, spatulate setae and long hairlike setae on inner margin; regular row of pointed setae along margin; mid-region with regular row of 5–6 spatulate setae (Fig. 16). Tibia and tarsi with hairlike setae on outer margins; on inner margins setae not numerous; distal margins of tarsi with 4–5 blunt setae. Dorsal surface all legs densely covered small with scale-like setae (Fig. 15). Claws without denticles (Fig. 17).



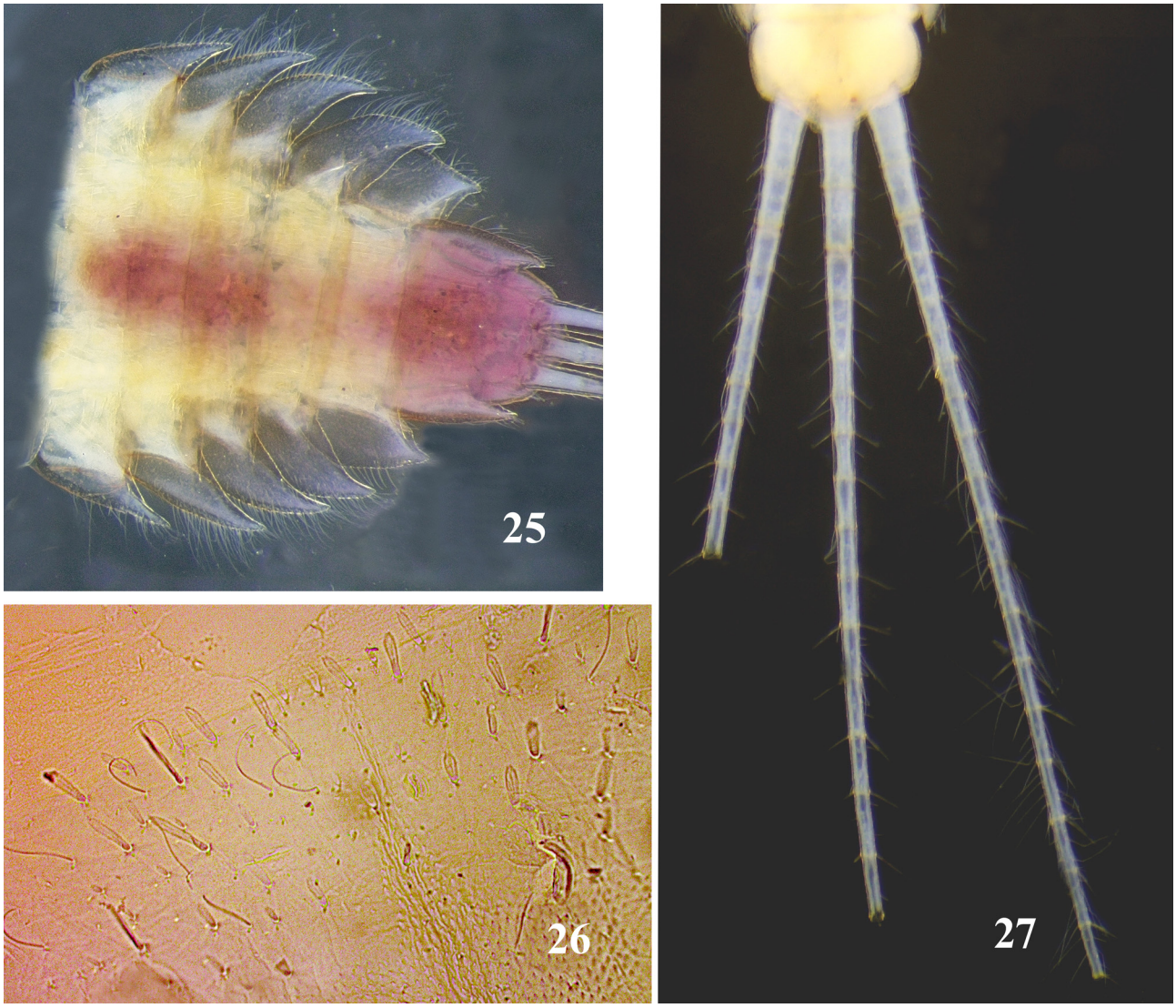
FIGURES 14–17. *Dannella daurica* **sp. nov**., larvae, dorsal view, paratypes: 14, fore leg; 15, shape of setae on surface of femur; 16, middle leg; 17, tarsus claw.



FIGURES 18–24. *Dannella daurica* **sp. nov**., larvae, dorsal view, paratypes: 18, abdomen; 19, pronotum, scale bar 100 µm; 20, pores on pronotum, scale bar 20 µm; 21, abdominal tergites IX–X, scale bar 100 µm; 22, surface of tergites, scale bar 10 µm; 23, setae on posterolateral projections; 24, setae on abdominal tergites.

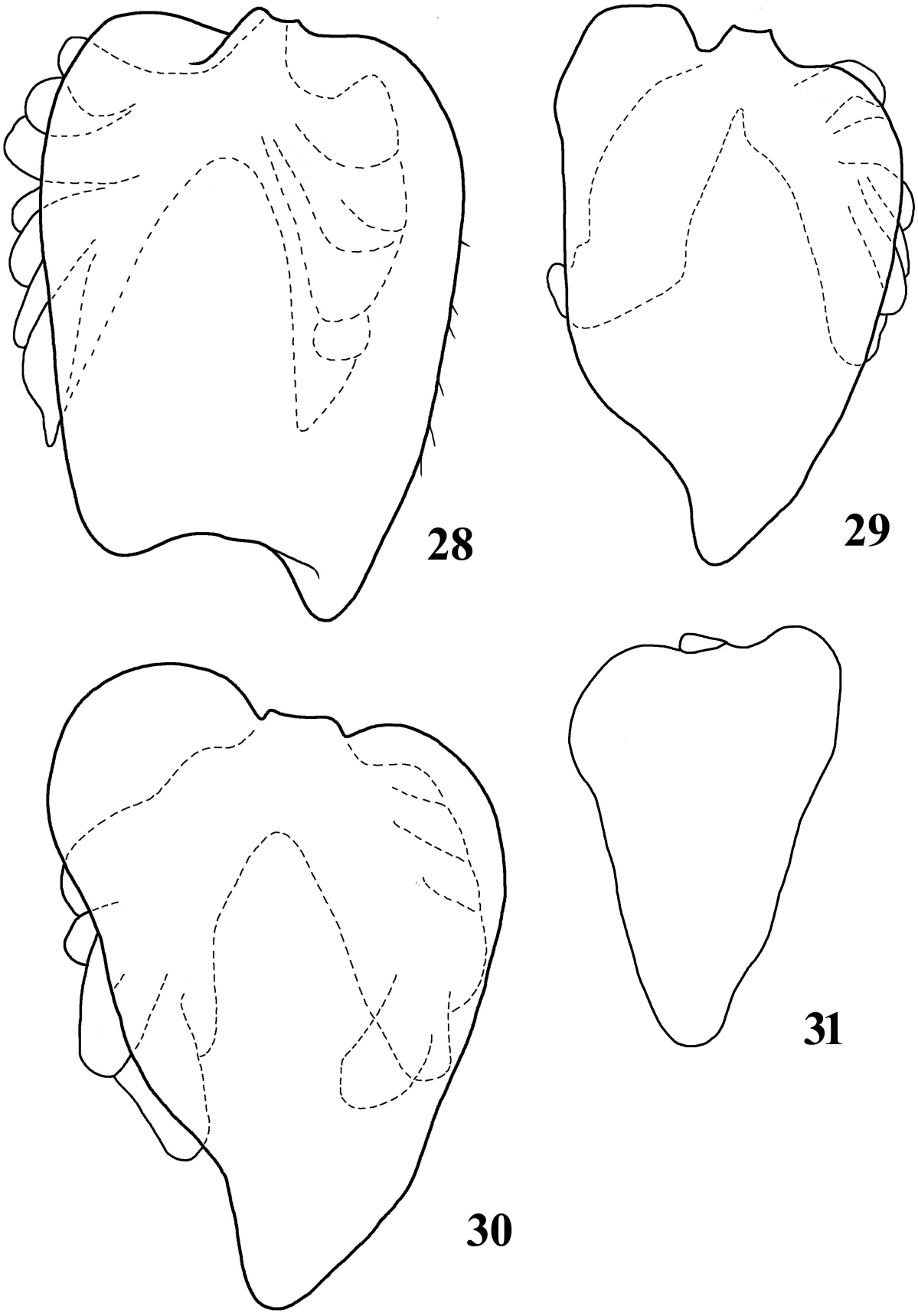
Lengths (mm) of leg segments. Fore leg: femur 0.8–0.9; tibia 0.55–0.6; and tarsus 0.55–0.6. Middle leg: femur 0.9; tibia 0.5–0.6; and tarsus 0.55–0.6. Hind leg: femur 0.9–1.0; tibia 0.6; and tarsus 0.5–0.55. Ratio of width to length of fore femur 0.38–0.39; middle femur—0.33–0.34, hind femur—0.30.

Abdomen. Tergites brown or light brown without maculation, lateral margins lighter. Tergum X lighter than others; tergites IV–VI with dark brown stripe at gills attachment (Figs 1, 18). All surfaces of tergites covered by small, stout, pointed setae (Fig. 19); posterior margins of tergites IV–IX with sparse row of spatulate setae (Fig. 20); tergites II–III without posterolateral projection (Figs 1–2, 18); posterolateral projection of tergites IV–IX well developed (Figs 1–2, 25); densely covered with strong, long and middle hairlike and spatulate setae of various sizes (Figs 21–22). Sternites yellowish without maculation; surfaces covered with scattered spatulate setae (Fig. 26). Gill I filament-like (Figs 1, 18); gill IV wide, slightly tapering distally; distal margin with shallow notch in middle part and rounded protrusion on outer side (Fig. 28); gills V and VI of same shape with strongly attenuated, rounded distal margin (Figs 29–30); gill VII subtriangular, with rounded distal margin (Fig.31); gills IV and VI subequal in length; gill V smaller then gills IV and VI; gill VII very small, covered by gill VI. Cerci and paracercus yellowish, of same length; brownish bands present on basal part of filaments (Fig. 27).



FIGURES 25–27. *Dannella daurica* **sp. nov**., larvae, paratypes: 25, sternites IV–X, ventral view; 26, setae on surface of sternites, ventral view; 27, setae on caudal filaments, dorsal view.

Diagnosis. Larva. Maxillary palp 3-segmented, well developed; first and third segments relatively equal length; second segment of maxillary palp 2.5 times shorter than first and third segments (Figs 9–10); third segment of labial palps smallest, conical, rounded apically, with short stout blunt setae more numerous on apex (Figs 12–13); fore femora with transverse row of long, stout and pointed setae in mid-femora; the length of the setae is ½ of the



FIGURES 28–31. *Dannella daurica* **sp. nov**., larvae, gills shape, dorsal view, paratypes: 28, gill IV; 29, gill V, 30, gill VI; 31, gill VII.

FIGURES 32–33. Localities of *Dannella daurica* **sp. nov**.: 32, Talali River (Amurskaya Oblast'); 33, Sinel' River (Khabarovskiy Kray).

width of the femora (Fig. 14); claws without denticles (Fig. 17); tergites II–III without posterolateral projection (Figs 1–2, 18); posterolateral projection of tergites IV–IX well developed (Figs 18, 25); gills on segment I consisting of a single filament (Fig. 1, 18); gill IV wide, slightly tapering by distally; distal margin with a shallow notch in middle part and rounded protrusion on the outer side (Fig. 28).

Distribution. *Dannella daurica* **sp. nov.** is known from two habitats in the Far East of Russia: Amurskaya oblast' and Khabarovskiy Kray (Figs 32–*33*). The larvae of the new species were found in relatively slow flow and in gravel-sand substrate. Water temperature was 17.8–22.0°C, depth 50–70 cm. The width of the rivers in the places of collection of larvae does not exceed 10 m; the length of these rivers is up to 50 km.

Etymology. The name of the new species is associated with its habitat (Amur River basin, the Bureya River basin), located in the Daurian botanical-geographical region.

Discussion. Among species of *Dannella* with available larvae description, *Dannella daurica* **sp. nov.** differs from the Nearctic species *Dannella lita* and *D. provonshai* by the absence of posterolateral processes on abdominal segment III (Figs 1–2, 18). In *D. lita*, posterolateral processes of segment III are well-developed (McCafferty 1977: Fig. 17); in *D. provonshai* segment III has small, rounded posterolateral processes (McCafferty 1977: Fig. 18). By the absence of posterolateral processes on the third abdominal segment, *Dannella daurica* **sp. nov.** is similar to *D. simplex*, but can be distinguished by the following features: (1) General body color light brown without visible maculation (Figs 1–2); in *D. simplex* general color tan to brown with dark brown marks on abdominal dorsum (Burks 1953). (2) Fore femora broadened slightly; the ratio of width to length is 0.38–0.39 (Fig. 14); in *D. simplex* the ratio of width to length is 0.42–0.44 (David Funk, unpublished).

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References

Allen, R.K. (1977) A review of *Ephemerella* (*Dannella*) and the description of a new species (Ephemeroptera: Ephemerellidae). *Pan-Pacific Entomologist*, 53, 215–217.

Allen, R.K. (1980) Geographic distribution and reclassification of the subfamily Ephemerellinae (Ephemeroptera: Ephemerellidae). *In*: Flannagan, J.F. & Marshall, K.E. (Eds.), Advances in Ephemeroptera Biology. *Proceeding of the 3rd International Conference of Ephemeroptera, 4–10 July 1979, Winnipeg, Canada*. Plenum Press, New York, New York, pp. 71–91. https://doi.org/10.2307/j.ctvcj2vs7.14

Allen, R.K. & Edmunds, G.F. Jr. (1962) A revision of the genus *Ephemerella* (Ephemeroptera: Ephemerellidae) IV. The subgenus *Dannella. Journal of the Kansas Entomological Society*, 35 (3), 333–338.

Berner, L. (1977) Distributional patterns of southeastern mayflies (Ephemeroptera). *Bulletin of the Florida State Museum*, Biological Sciences, 22 (1), 1–55.

Burian, S.K. (2019) Chapter 13. Ephemeroptera. *In*: Merritt, R., Cummins, K. & Berg, M.B. (Eds.), *An introduction to the aquatic insects of North America*. Kendall Hunt Publishing Company, Dubuque, Iowa, pp. 263–339. https://doi.org/10.2307/j.ctvcj2vs7.14

Burks, B.D. (1947) New species of *Ephemerella* from Illinois (Ephemeroptera). *Canadian Entomologist*, 79, 232–236. https://doi.org/10.4039/Ent79232-11

Edmunds, G.F. Jr. (1959) Subgeneric groups within the mayfly genus *Ephemerella* Ephemeroptera: Ephemerellidae). *Annals of the Entomological Society of America*, 52 (5), 543–547. https://doi.org/10.1093/aesa/52.5.543

Edmunds, G.F. Jr. (1971) A new name for a subgeneric homonym in *Ephemerella* (Ephemeroptera: Ephemerellidae). *Proceedings of the Entomological Society of Washington*, 73 (2), 152.

Edmunds, G.F. Jr., Jensen, S.L. & Berner, L. (1976) *The mayflies of North and Central America*. University Minnesota Press, Minneapolis, Minnesota, 330 pp.

Giberson, D.J & Burian, S.K. (2017) How valid are old species lists? How archived samples can be used to update Ephemerop-

tera biodiversity information for northern Canada. *The Canadian Entomologist*, 149 (6), 1–19. https://doi.org/10.4039/tce.2017.27
Jacobus, L.M. & McCafferty, W.P. (2008) Revision of Ephemerellidae genera (Ephemeroptera). *Transactions of the American Entomological Society*, 134 (1–2), 185–274. https://doi.org/10.3157/0002-8320(2008)134[185:ROEGE]2.0.CO;2
Kluge, N.J. (2020) Ephemeroptera of the world. http://insecta.bio.spbu.ru/z/Eph-spp/index.htm (accessed 3 May 2020)
Lehmkuhl, D.M. (1976) Mayflies. *Blue Jay* (Saskatchewan Natural History Society), 34 (2), 70–81.
McCafferty, W.P. (1977) Biosystematics of *Dannella* and related subgenera of *Ephemerella* (Ephemeroptera: Ephemerellidae). *Annals of the Entomological Society of America*, 70 (6), 881–889. https://doi.org/10.1093/aesa/70.6.881
McCafferty, W.P. & Provonsha, A.V. (1978) The Ephemeroptera of mountainous Arkansas. *Journal of the Kansas Entomological Society*, 51 (3), 360–379.
McCafferty, W.P. & Randolph, R.P. (1998) Canada mayflies: a faunistic compendium. *Proceedings of the Entomological Society of Ontario*, 129, 47–97.
McCafferty, W. P., Jacobus ,L.M., Webb, J.M. & Meyer, M.D. (2008) Insecta, Ephemeroptera: range extensions and new records for Ontario and Canada. *Check List*, 4 (4), 445–448. https://doi.org/10.15560/4.4.445
McCafferty, W.P., Lenat, D.R., Jacobus, L.M. & Meyer, M.D. (2010) The mayflies (Ephemeroptera) of the Southeastern United States. *Transactions of the American Entomological Society* (Philadelphia), 136 (3–4), 221–233. [https://www.researchgate.net/publication/232666323] https://doi.org/10.3157/061.136.0303
McDunnough, J. (1925) New*Ephemerella* species (Ephemeroptera). *The Canadian Entomologist*, 57 (2), 41–43. https://doi.org/10.4039/Ent5741-2
Morse, J.C., McCafferty, W.P., Stark, B.P. & Jacobus, L.M. (2017) Larvae of the southeastern USA mayfly, stonefly, and caddisfly species (Ephemeroptera, Plecoptera, and Trichoptera). *Biota of South Carolina*, 9, 1–478.
Needham, J.G. (1927) The Rocky Mountain species of the mayfly genus *Ephemerella*. *Annals of the Entomological Society of America*, 20, 107–117. https://doi.org/10.1093/aesa/20.1.107
Ogden, T.H., Osborne, J.T., Jacobus, L.M. & Whiting, M.F. (2009) Combined molecular and morphological phylogeny of Ephemerellinae (Ephemerellidae: Ephemeroptera), with remarks about classification. *Zootaxa*, 1991 (1), 28–42. https://doi.org/10.11646/zootaxa.1991.1.2
Parker, C.R., Flint, O.S., Jr., Jacobus, L.M., Kondratieff, B.C., McCafferty, W.P. & Morse, J.C. (2007) Ephemeroptera, Plecoptera, Megaloptera, and Trichoptera of Great Smoky Mountains National Park. *Southeastern Naturalist*, Special Issue 1, 159–174. https://doi.org/10.1656/1528-7092(2007)6[159:EPMATO]2.0.CO;2
Tiensuu, L. (1935) On the Ephemeroptera fauna of Laatokan Karjala (Karelia Ladogensis). *Suomen Hyonteistieteellinen Aikakauskirja*, 1 (1), 3–23.
Webb, J.M. Jacobus, L.M., Funk, D.H., Zhou, X., Kondratieff, B., Geraci, C.J., De Walt, R.E., Baird, D.J., Richard, B., Phillips, I. & Hebert, P.D.N. (2012) A DNA barcode library for North American Ephemeroptera: progress and prospects. *PLoS ONE*, 7 (5), e38063. https://doi.org/10.1371/journal.pone.0038063
Zhou, X., Jacobus, L.M., DeWalt, R.E., Adamowicz, S.J. & Hebert, P.D.N. (2010) The Ephemeroptera, Plecoptera, and Trichoptera fauna of Churchill (Manitoba, Canada): insights into biodiversity patterns from DNA barcoding. *Journal of the North American Benthological Society*, 29, 814–837. https://doi.org/10.1899/09-121.1