

Three new species of chironomids  
(Diptera: Chironomidae: Orthoclaadiinae)  
from the Russian Far East

Три новых вида хирономид  
(Diptera: Chironomidae: Orthoclaadiinae)  
с российского Дальнего Востока

Eugeniy A. Makarchenko & Marina A. Makarchenko  
Е.А. Макаρχенко & М.А. Макаρχенко

Institute of Biology and Soil Sciences, Russian Academy of Sciences, Far East Branch, 100 let Vladivostoku Avenue 159, Vladivostok 690022, Russia.

Биолого-почвенный институт ДВО РАН, пр. 100 лет Владивостоку, 159, Владивосток 690022, Россия.

KEY WORDS: Diptera, Chironomidae, Orthoclaadiinae, new species, Russian Far East

КЛЮЧЕВЫЕ СЛОВА: Diptera, Chironomidae, Orthoclaadiinae, новые виды, российский Дальний Восток

ABSTRACT. The male imagines of two new chironomid species *Chaetocladius tatyanae* sp.n., *Pseudorthocladus* (s. str.) *barbatus* sp.n. and male imagines, pupa and larva of *Tvetenia boreomontana* sp.n. (subfamily Orthoclaadiinae) from the Russian Far East are described and figured.

РЕЗЮМЕ. По материалам с российского Дальнего Востока приведены иллюстрированные описания имаго самцов двух новых для науки видов хирономид *Chaetocladius tatyanae* sp.n. и *Pseudorthocladus* (s. str.) *barbatus* sp.n., а также имаго самца, куколки и личинки нового вида *Tvetenia boreomontana* sp.n.

### Introduction

During the process of preparation for chironomid key book of the Russian Far East we studied material from North parts of the Far East, Kurile and Sakhalin Islands, Amur River basin, Primorye Territory and discovered 736 species of 155 genera and 6 subfamilies [Makarchenko et al, 2005], three species of them are new for science and described below.

### Materials and Methods

The morphological nomenclature follows Sæther [1980]. Material at first was fixed by 70% ethanol, later mounted on slides following the procedure outlined by Makarchenko [1985].

Holotypes of new species are deposited in the Institute of Biology and Soil Sciences, Far East Branch of the Russian Academy of Sciences, Vladivostok, Russia.

### Taxonomy

*Chaetocladius tatyanae*  
Makarchenko et Makarchenko, sp.n.  
(Fig. 1)

MATERIAL. Holotype: ♂, Ozernaya River, Kurilskoe Lake basin, Kamchatka Peninsula (South part), 24.VIII. 1997, leg. T. Travina. Paratypes: 18 ♂♂, the same data as holotype except, 26.VIII–13.IX. 1998, leg. T. Travina.

DESCRIPTION. *Male imago* (n=3). Total length 2.7–3.15 mm. Total length/wing length 1.19–1.29. Coloration dark brown.

Head. Eyes naked with short dorsomedial elongation. Temporal setae 10–11, including 6 inner verticals, 4–5 outer verticals. Clypeus with 5–6 setae. Antenna with 13 flagellomeres and well developed plume; AR 1.12–1.30. Lengths (µm) of palpomeres – 32–40 : 56–70 : 108–135 : 104–115 : 176–218 Head width/palp length 0.85–1.02.

Thorax. Anteprepronotum with 2–3 lateral setae. Acrostichals 13–17 (start from pronotum border), dorsocentrals 6–7, prealars 3–4. Scutellum with 8 setae in one row.

Wing. Length 2.3–2.5 mm. Coloration brownish. Anal lobe well developed. Squama with 9–13 setae. R with 7–8 setae, R<sub>1</sub> without setae, R<sub>4+5</sub> with 2–7 setae.

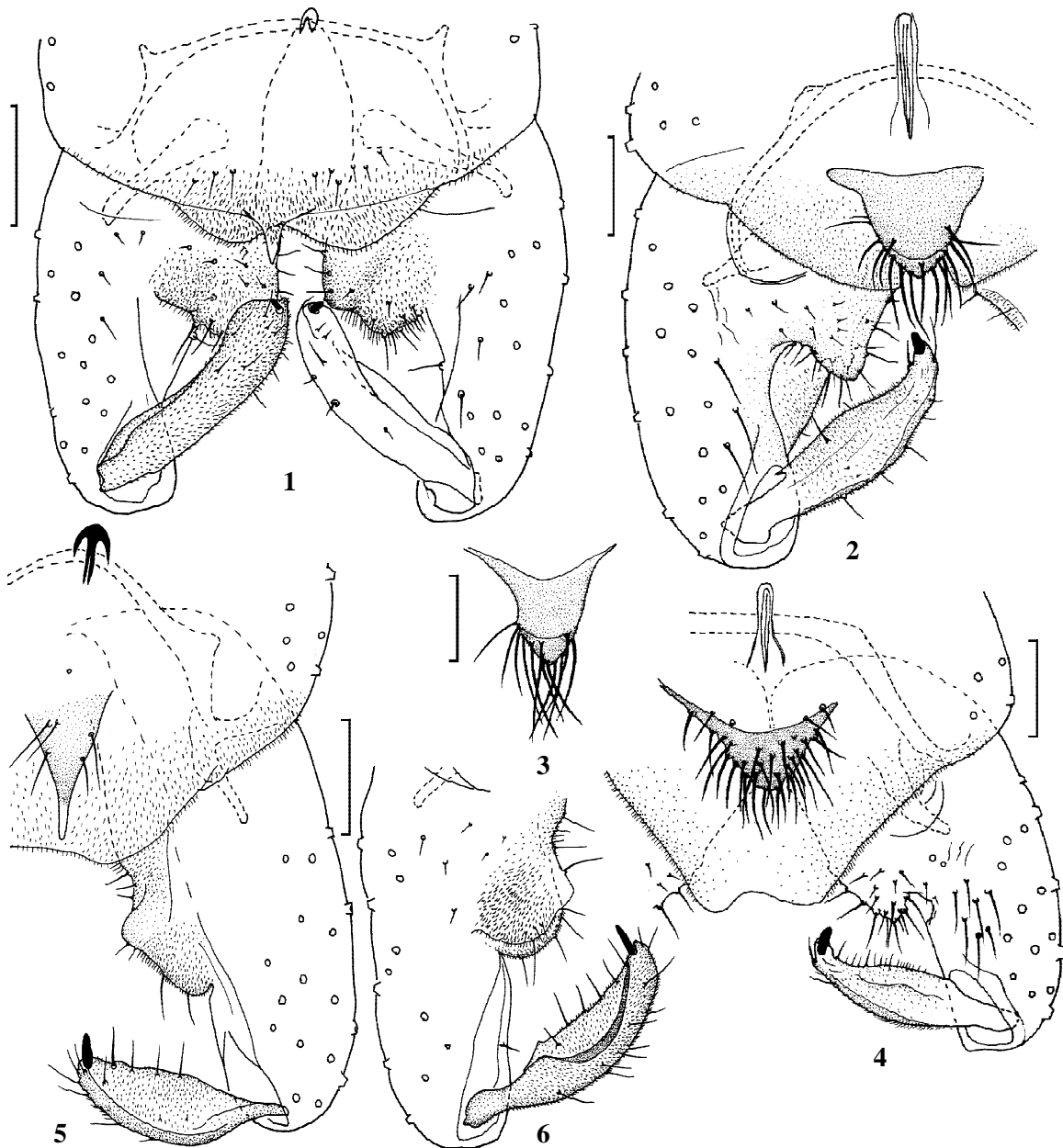
Legs. BR<sub>1</sub> 2.33–2.50, BR<sub>2</sub> 2.0–2.55, BR<sub>3</sub> 4.7–6.28. Spur of front tibia 52–58 µm long. Spurs of middle tibia 36–38 µm and 15–20 µm long, of hind tibia 56–63 µm and 13–20 µm long. Hind tibial comb with 13–14 setae. Length (µm) and proportions of legs as in Table 1.

Hypopygium (Fig. 1). Tergite IX with short and weak anal point 12–15 µm long and 7–9 setae; laterosternite IX with 2–3 setae. Transverse sternapodeme narrow, 100–120 µm wide. Virga 10–18 µm long. Gonocoxite 208–250 µm long. Inferior volsella with two subequal lobes, covered by short setae. Gonostylus 100–103 µm long, straight, in subapical part slightly enlarged. Megaseta 10 µm long. HR 2.1–2.4.

REMARKS. The male of *C. tatyanae* sp.n. is separated from other known species of *Chaetocladius* by short and

Table 1.  
Length ( $\mu\text{m}$ ) and proportions of leg segments of *Chaetocladius tatyanae* sp.n., male (n=3).  
Таблица 1.  
Длина члеников ног (мкм) и их индексы у самца *Chaetocladius tatyanae* sp.n. (n=3).

P	f	t	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR	SV	BV
P <sub>1</sub>	720–890	848–1037	640–730	384–430	288–310	176–210	112–130	0.70–0.75	2.45–2.64	2.26–2.46
P <sub>2</sub>	768–950	784–940	400–470	272–290	200–220	128–150	112–130	0.50–0.51	3.88–4.02	2.74–2.99
P <sub>3</sub>	848–1050	960–1175	544–610	352–390	256–290	160–170	112–130	0.52–0.57	3.32–3.65	2.63–2.89



Figs 1–6. Details of males of *Chaetocladius tatyanae* sp.n. (1), *Pseudorthocladius* (s. str.) *barbatus* sp.n. (2–4) and *Tvetenia boreomontana* sp.n. from Chukotski Peninsula (5–6): 1–2, 4–5 — total view of hypopygium, from above; 3 — anal point; 6 — gonocoxite and gonostylus. Scale bars 50  $\mu\text{m}$ .

Рис. 1–6. Детали строения самцов *Chaetocladius tatyanae* sp.n. (1), *Pseudorthocladius* (s. str.) *barbatus* sp.n. (2–4) и *Tvetenia boreomontana* sp.n. с Чукотского полуострова (5–6): 1–2, 4–5 — общий вид гипопигия, сверху; 3 — анальный отросток; 6 — гонококсит и гоностиль. Масштабные линейки 50 мкм.

Table 2.  
Length ( $\mu\text{m}$ ) and proportions of leg segments of *Pseudorthocladius* (s. str.) *barbatus* sp.n., male (n=3).  
Таблица 2.  
Длина члеников ног (мкм) и их индексы у самца *Pseudorthocladius* (s. str.) *barbatus* sp.n. (n=3).

P	f	t	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR	SV	BV
P <sub>1</sub>	816-864	928-992	576-624	336-352	224-256	152-160	96-120	0.62-0.63	2.97-3.03	2.71-2.87
P <sub>2</sub>	864-880	864-944	368-400	208-232	160-176	96-112	80-96	0.42-0.43	4.56-4.70	3.61-3.85
P <sub>3</sub>	912-976	1072-1104	608-656	320-352	240-272	128	96-112	0.57-0.59	3.17-3.32	3.09-3.31

weak anal point, by shape of gonostylus and inferior volsellae which with two subequal lobes

ETYMOLOGY. New species is named to honor of material collector Tatiana L. Travina from KamchatNIRO, Petropavlovsk-Kamchatsky.

DISTRIBUTION. Known only from type locality – South Kamchatka, Kurilskoe Lake basin.

*Pseudorthocladius* (s. str.) *barbatus*  
Makarchenko et Makarchenko, sp.n.  
(Figs 2–4)

MATERIAL. Holotype: ♂, Matrosskaya River in environs of Severo-Kurilsk Village, Paramushir Island (Kurile Islands), 11.VII. 1997, light trap, leg. E. Makarchenko. Paratypes: 1 ♂, the same data as holotype except, Utesnaya River, 15.VII. 1997, leg. E. Makarchenko; 2 ♂♂, unnamed stream in environs of Vitjaz' Bay, Khasansky district, Primorye Territory, 7.V.1995, leg. T. Vshivkova.

DESCRIPTION. *Male imago* (n =3). Total length 2.9–3.7 mm. Wing length 2.4–2.7 mm. Total length/wing length 1.42. Coloration dark brown.

Head. Eyes naked, with a short, wedge-shaped dorsomedial elongation. Temporal setae 11–13, including 6 inner verticals, 4–5 outer verticals and 1 postorbitals. Clypeus with 7 setae. Antenna with 13 flagellomeres and well developed plume; AR 1.50–1.62. Lengths ( $\mu\text{m}$ ) of palpomeres: 36–40 : 60–70 : 112–128 : 120–124 : 154–168; third palpomere with 4–5 sensilla clavata in distal part. Head width/palp length 1.01–1.05.

Thorax. Antepnotum with 3–6 lateral setae. Acrostichals 12–14 (in anterior half and in two rows), dorsocentrals 19–20, prealars 8–13. Scutellum with 18–22 setae in two rows.

Wing. Anal lobe rounded and well developed. Squama with 16–19 setae. R with 26–29 setae, R<sub>1</sub> with 14–15 setae, R<sub>4+5</sub> with 11–12 setae.

Legs. BR<sub>1</sub> 2.5–2.8, BR<sub>2</sub> 2.0–2.8, BR<sub>3</sub> 4.2–4.3. Spur of front tibia 76–76  $\mu\text{m}$  long. Spurs of middle tibia 32  $\mu\text{m}$  and 36  $\mu\text{m}$  long, of hind tibia 76–80  $\mu\text{m}$  and 28–30  $\mu\text{m}$  long. Hind tibial comb with 11–13 setae. Length ( $\mu\text{m}$ ) and proportions of legs as in Table 1.

Hypopygium (Figs 2–4). Tergite IX with 36–60  $\mu\text{m}$  long anal point, covered by 13–26 strong setae. Laterosternite IX with 5–7 setae. Transverse sternapodeme narrow, 150–176  $\mu\text{m}$  wide. Virga 48–60  $\mu\text{m}$  long. Gonocoxite 208–236  $\mu\text{m}$  long. Inferior volsella triangular, with some setae. Gonostylus 104–124  $\mu\text{m}$  long, with narrow subapical part and widest in middle part. Megaseta 12  $\mu\text{m}$  long. HR 1.9–2.0.

REMARKS. The male of *P.* (s. str.) *barbatus* sp.n. is separated from other known species by triangular shape of inferior volsella and by shape of anal point and virga.

ETYMOLOGY. From Latin *barbatus* – bearded. Anal point of male with numerous of setae look like beard.

DISTRIBUTION. Known from Paramushir Island (North Kuriles) and South part of Primorye Territory.

*Tvetenia boreomontana*  
Makarchenko et Makarchenko, sp.n.  
(Figs 5–18)

MATERIAL. Holotype: ♂, unnamed stream of Egvekinot-Iultin motorway in environs of 105 km, Chukotski Peninsula, Kresta Bay, 30.VIII.1976, leg. E. Makarchenko. Paratypes: 1 ♂, the same data as holotype except, unnamed stream in environs of 94 km, 28.VIII.1976, leg. E. Makarchenko; 2 ♂♂, Teplyi Stream in environs of Iultin Village, Chukotski Peninsula, 7.IX.1976, leg. E. Makarchenko; 3 ♂♂, Seutakan River, about 25 km upper of Seutakan Lake, Chukotski Peninsula, 14.VIII.1976, leg. E. Makarchenko; 1 ♂, 1 mature pupa, 1 larva, Takantsy River, Bureya River basin, Khabarovsk Territory, 20.IX.2005, leg. E. Makarchenko; 2 mature pupae, 1 larva, Bolshoi Chalbach Stream, Bureya River basin, Khabarovsk Territory, 20.IX.2005.

DESCRIPTION. *Male imago* (n =4). Total length 3.15–3.55 mm. Wing length 2.15–2.55 mm. Total length/wing length 1.34–1.47. Coloration dark brown.

Head. Eyes naked. Temporal setae 8–11, including 4–5 verticals and 4–6 postorbitals. Clypeus with 4–13 setae. Antenna with 13 flagellomeres and well developed plume; AR 1.03–1.50. Lengths ( $\mu\text{m}$ ) of palpomeres: 30–35 : 45–53 : 108–113 : 103–105 : 138–153. Head width/palp length 1.14–1.24.

Thorax. Antepnotum with 2 lateral setae. Acrostichals 8–13, dorsocentrals 6–9, prealars 3–4. Scutellum with 4–6 setae.

Wing. Anal lobe rounded and well developed. R<sub>2+3</sub> present. Squama with 11–16 setae. R with 9–10 setae, R<sub>1</sub> without setae, R<sub>4+5</sub> with 4–7 setae.

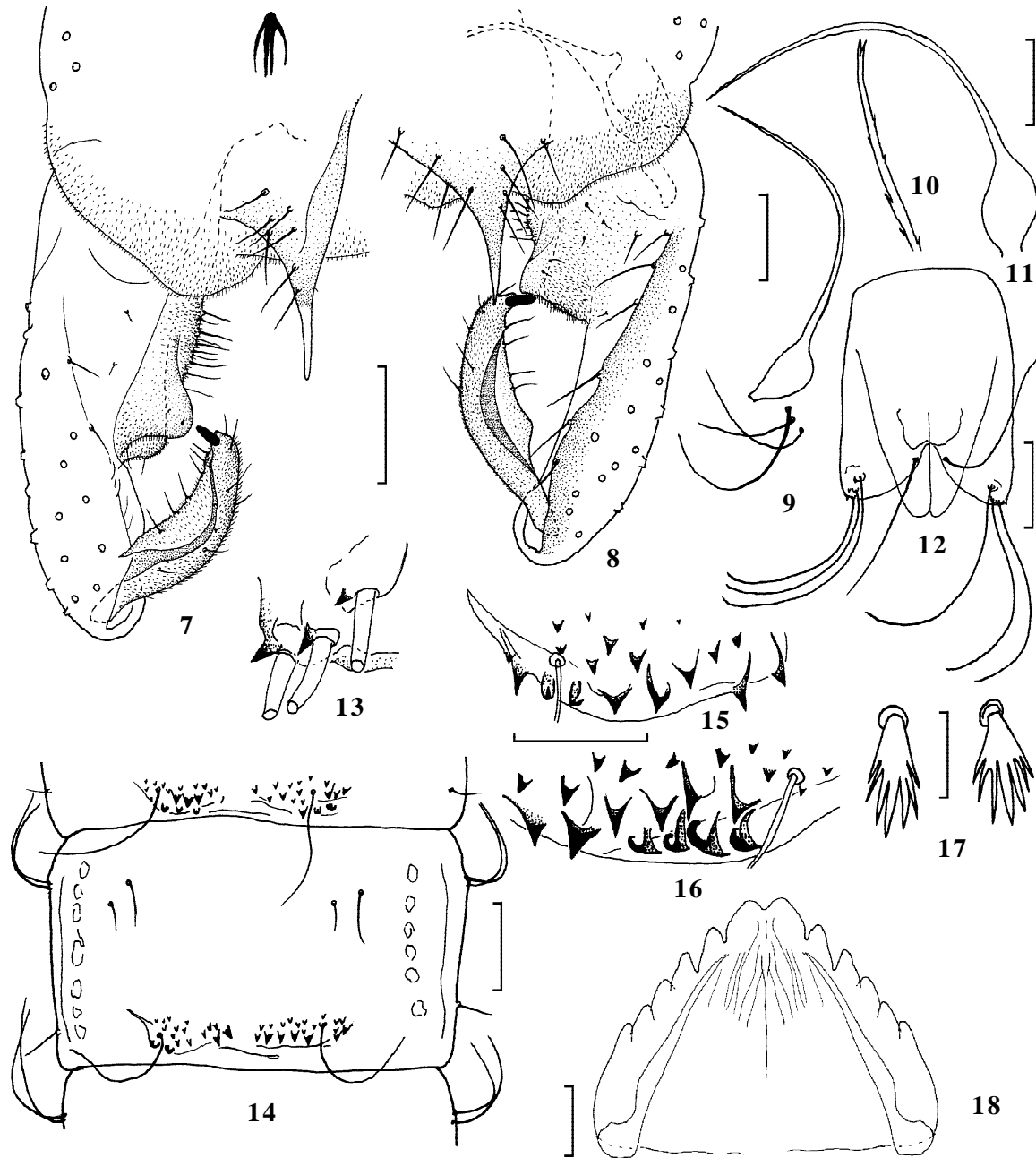
Legs. BR<sub>1</sub> 1.8–2.2, BR<sub>2</sub> 3.2–3.3, BR<sub>3</sub> 5.8–6.0. Spur of front tibia 63  $\mu\text{m}$  long. Spurs of middle tibia 35–38  $\mu\text{m}$  and 18  $\mu\text{m}$  long, of hind tibia 60–68  $\mu\text{m}$  and 20–22  $\mu\text{m}$  long; ta<sub>1</sub> of middle and hind legs with 2 pseudospurs. Hind tibial comb with 15–16 setae. Length ( $\mu\text{m}$ ) and proportions of legs as in Table 3.

Hypopygium (Figs 5–8). Tergite IX with 50–75  $\mu\text{m}$  long anal point, covered by 6–10 setae, in distal part narrow and naked of microtrichia. Laterosternite IX with 6–10 setae. Transverse sternapodeme narrow, 112–115  $\mu\text{m}$  wide. Virga 15–25  $\mu\text{m}$  long, consisting of 2 middle and 2 lateral setae. Gonocoxite 218–245  $\mu\text{m}$  long. Inferior volsella double. Gonostylus 88–103  $\mu\text{m}$  slightly curved. Megaseta 13–15  $\mu\text{m}$  long. HR 1.9–2.0.

*Pupa* (n=3). Total length 3.4–3.5 mm. Coloration brownish-green. Exuviae brownish.

Cephalothorax. Frontal apotome with pair setae 138  $\mu\text{m}$  long. Thorax smooth. Thoracic horn (Figs 9, 11) 420–563  $\mu\text{m}$  long, bulbous part 100–123  $\mu\text{m}$  long, whip-shape part 320–440  $\mu\text{m}$  long; in distal part with small spines (Fig. 10). Pc-setae lengths ( $\mu\text{m}$ ): Pc<sub>1</sub> – 240–268, Pc<sub>2</sub> – 90–150, Pc<sub>3</sub> – 170–207 (Fig. 9). Wing sheath in distal part with 1–2 rows of very small spinules along the edge.

Abdomen. Tergite I without shagreenation and spines; tergites II–VIII with posterior two groups of moderately



Figs. 7-18. Details of *Tvetenia boreomontana* sp.n.: 7-8 — males imagines (7 — Chukotski Peninsula; 8 — Amur River basin), 9-16 — pupa; 17-18 — larva. 7-8 — total view of hypopygium, from above; 9, 11 — thoracic horn; 10 — distal part of thoracic horn; 12 — anal segment; 13 — basal part of anal macrosetae; 14 — tergite IV; 15 — posterior group of spines of tergite IV, male; 16 — the same, female; 17 —  $S_1$  of labrum; 18 — mentum. Scale bars for figs 7-8, 13, 15-16 — 50  $\mu$ m, for figs 9, 11-12, 14 — 100  $\mu$ m, for fig. 17 — 10  $\mu$ m, for fig. 18 — 20  $\mu$ m.

Рис. 7-18. Детали строения *Tvetenia boreomontana* sp.n.: 7-8 — самцы имаго (7 — Чукотский полуостров, 8 — бассейн р. Амур); 9-16 — куколка; 17-18 — личинка. 7-8 — общий вид гипопигия, сверху; 9, 11 — торакальный рог; 10 — дистальная часть торакального рога; 12 — анальный сегмент; 13 — основание вершинных макрощетинки анальной лопасти; 14 — тергит IV; 15 — шипы задней части тергита IV у самца; 16 — то же, у самки; 17 —  $S_1$ -щетинки лабрума; 18 — ментум. Масштабные линейки для рис. 7-8, 13, 15-16 — 50 мкм, рис. 9, 11-12, 14 — 100 мкм, рис. 17 — 10 мкм, рис. 18 — 20 мкм.

long spines; tergite II with group of 3-10 simple posterior spines; tergites III-VIII with groups of 10-27 simple posterior spines; tergites III-IV also have 1-4 hooklets to posterior group of spines (Figs 14-16). Tergites I-VIII in posterior part with pair D-setae, 143-262  $\mu$ m long. Sternites I-III without shagreenation and spines; sternites IV-VIII with

band of 18-29 posterior spines and in posterior part with pair D-setae, 60-107  $\mu$ m long; sometimes sternite VIII of female without posterior spines. Pedis spurii absent. Segment I without lateral setae. Segments II-VII with 2 pairs of strong and long lateral setae of different thickness in anterior part and 1 pair of capilliform and short lateral setae in

Table 3.  
Length ( $\mu\text{m}$ ) and proportions of leg segments of *Tvetenia boreomontana* sp.n., male (n=3).  
Таблица 3.  
Длина члеников ног (мкм) и их индексы у самца *Tvetenia boreomontana* sp.n. (n=3).

P	f	t	ta <sub>1</sub>	ta <sub>2</sub>	ta <sub>3</sub>	ta <sub>4</sub>	ta <sub>5</sub>	LR	SV	BV
P <sub>1</sub>	790–925	860–1100	620–713	420–500	310–340	190–220	120–130	0.65–0.72	2.32–2.72	2.18–2.84
P <sub>2</sub>	790–900	830–1025	410–480	250–290	190–230	140–150	110–120	0.47–0.49	2.98–4.02	2.94–3.91
P <sub>3</sub>	900–1050	990–1200	530–625	320–370	250–290	160–200	120–135	0.52–0.55	2.95–3.57	2.85–3.60

posterior part (Fig. 14); length of lateral setae of segments II–VII ( $\mu\text{m}$ ): L<sub>1</sub>–200, L<sub>2</sub>–163, L<sub>3</sub>–30. Segment VIII with 1 pair of strong lateral setae, 183  $\mu\text{m}$  long and 1 pair of thin lateral setae, 50  $\mu\text{m}$  long; all setae situated in posterior edges of segment. Anal lobe 320  $\mu\text{m}$  long and 310–340  $\mu\text{m}$  width, with 3 anal macrosetae, 260–300  $\mu\text{m}$  long and 1 median seta 230  $\mu\text{m}$  long (Fig. 12); each anal macroseta in basal part with spine (Fig. 13). Genital sac of male extending beyond anal lobe.

**Fourth instar larva** (n=2). Coloration brownish-green or greenish. Total length 3.7–3.8 mm.

**Head.** Head capsule yellow. S<sub>1</sub> setae of labrum with 7 branches (Fig. 17). Premandible typical for genus. Antenna yellow, large ring organ situated in basal quarter of first segment; antennal blade ending near base of 5<sup>th</sup> segment; AR 2.14–2.21. Lauterborn organs distinct and as long as segment 3. Lengths ( $\mu\text{m}$ ) of antennal segments 1–5 — 75–77.5 : 17.5–20 : 3.75–5 : 6.25–7.5 : 5. Mandible 123  $\mu\text{m}$  long, dark brown or black in distal part; apical tooth longest; seta interna with 4–6 branches, seta subdentalis peg-like; mola without spines. Mentum 90–95  $\mu\text{m}$  width, with 2 median and 5 pairs of lateral teeth; ventromental plate narrow (Fig. 18).

**Abdomen.** Procercus strongly sclerotized, with 7 anal setae. Pair of supraanal setae well developed, 268–270  $\mu\text{m}$  long. Dorsal pair of anal tubules 168  $\mu\text{m}$ , ventral pair – 140  $\mu\text{m}$ . Each segment of body with 4–5 pair of setae, 163–183  $\mu\text{m}$  long.

**REMARKS.** The male of *T. boreomontana* sp.n. is separated from other known species by presence of R<sub>2+3</sub>, by shape of anal point and inferior volsella. Pupa is close related to *T. tamaflava* Sasa from Japan but can be distinguished from last by presence near each anal macroseta in basal part spine and by length of lateral setae in anterior part of segments. Pupa of *T. tamaflava* without spines in basal part of anal macrosetae and L<sub>1</sub> is more strong and more a long as L<sub>2</sub> [Sasa, 1981], while *T. boreomontana* sp.n. with subequal of

L<sub>1</sub> and L<sub>2</sub>. Larva is typical member of *bavarica*-group but without spines on mola and with 7 branches of S<sub>1</sub>.

**ETYMOLOGY.** From Latin *borea* (northern) and *montana* (mountain). Name of new species is mean type of distribution of this one.

**DISTRIBUTION.** Known from Chukotski Peninsula and mountain rivers of Bureya River basin (Amur River basin).

**ACKNOWLEDGMENTS.** This investigation was supported by grants of Presidium Far East Branch of the Russian Academy of Sciences № 06–III–A–06–140, № 06–III–A–06–148 and the RFBR № 06-04-96017. We are grateful to all the collectors for making material available to us.

## References

- Makarchenko E.A. 1985. Chironomids of the Soviet Far East. Subfamilies Podonominae, Diamesinae and Prodiamesinae (Diptera, Chironomidae). DVNC AN SSSR Press. Vladivostok, p.1–208 [in Russian].
- Makarchenko E.A., Makarchenko M.A., Zorina O.V. & Sergeeva I.V. 2005. Preliminary data on fauna and taxonomy of chironomids (Diptera, Chironomidae) of the Russian Far East // In: Vladimir Ya. Levanidov's Biennial Memorial Meetings. Vol.3. Vladivostok: Dalnauka, p.394–420 [in Russian].
- Sæther O.A. 1980. Glossary of chironomid morphology terminology (Diptera, Chironomidae) // Entomologica Scandinavica. Suppl.14. P.1–51.
- Sasa M. 1981. Studies on chironomid midges of the Tama River. Part 3. Species of the subfamily Orthoclaadiinae recorded at the summer survey and their distribution in relation pollution with sewage waters // Research report from the National Institute for Environmental Studies. No.29. P.1–76.