



<http://dx.doi.org/10.11646/zootaxa.3974.3.8>

<http://zoobank.org/urn:lsid:zoobank.org:pub:D93EF759-9314-4FA1-9804-FDD37B934BCA>

A review of the genus *Parorthocladius* Thienemann, 1935 (Diptera: Chironomidae: Orthoclaadiinae) from the Russian Far East

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Abstract

Three new species of the genus *Parorthocladius* Thienemann, *P. lazovskiensis* sp. nov., *P. plolabius* sp. nov., and *P. tyurkini* sp. nov. from the Russian Far East are described and figured. Descriptions of pupae and larvae of one indeterminate species, *Parorthocladius* sp. 1, are also presented. Keys to determination of adult males, pupae and fourth instar larvae of Far-Eastern species *Parorthocladius* are provided.

Key words: Chironomidae, Orthoclaadiinae, *Parorthocladius*, new species, key, Russian Far East

Introduction

The genus *Parorthocladius* was established by Thienemann (1935) for *Dactylocladius nudipennis* Kieffer, 1908, mainly based on the original structure of the larva and pupa. At the present time the genus includes 7 species distributed in the Palaearctic and Oriental regions—*P. concretus* Liu et Wang, *P. cristatus* Liu et Wang, *P. furudoquartus* (Sasa et Arakawa), *P. korneyevi* Baranov, *P. negoroi* Yamamoto, *P. nudipennis* (Kieffer) and *P. unidentatus* Liu et Wang (Brundin 1956; Rossaro 1978; Serra-Tosio 1981; Liu & Wang 2005; Baranov 2011; Yamamoto 2004, 2011; Ashe & O'Connor 2012). Three indeterminate species are recorded from Nearctic, Oriental and Afrotropical regions (Cranston et al. 1983, Roback & Coffman 1987, Oliver et al. 1990, Ashe & O'Connor 2012). Immature stages were known only for *P. nudipennis* (Kieffer & Thienemann 1908, Dorier 1933, Pankratova 1970, Schmid 1993, Langton & Visser 2003) and, therefore, all species of *Parorthocladius*, we have defined earlier in the Far East based on larvae, were incorrectly ascribed to *P. nudipennis* (Makarchenko & Makarchenko 2011). In this paper we present a systematic revision of *Parorthocladius* from the Russian Far East. As a result of our study, three new species: *P. lazovskiensis*, *P. plolabius*, *P. tyurkini* are described and figured. The first species has been described only as adult male, for *P. plolabius* and *P. tyurkini* pupae and larvae are herein presented as well. Also, descriptions of pupae and larvae for indeterminate species *Parorthocladius* sp. 1 are given. Keys to adult males, pupae and fourth instar larvae of the *Parorthocladius* species of the Russian Far East are provided.

Material and methods

The adult specimens were collected mainly with a sweep net near rivers and streams; a few specimens were taken in emergence traps and some pupae and exuviae - in drift net. The larvae were associated with pupae based on larval heads sticking to the mature pupae; the males were associated with pupae based on hypopygia extracted from mature pupae.

The material was preserved in 70% ethanol and Oudemans' mixture, and mounted on slides following the procedure outlined by Makarchenko (1985). The terminology follows Sæther (1980).

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

Genus: *Parorthocladius* Thienemann

Parorthocladius Thienemann, 1935: 213.

Type species: *Dactylocladius nudipennis* Kieffer, 1908, by original designation.

Key to species of *Parorthocladius* Thienemann from the Russian Far East

Males

1. Eyes pubescent. Dorsal part of inferior volsella roundish-triangular, with setae and microtrichia (Figs. 18, 22). Crista dorsalis of gonostylus and virga absent *P. tyurkini* sp. nov.
- Eyes bare. Dorsal part of inferior volsella hyaline, without setae and microtrichia. Gonostylus with preapical crista dorsalis, virga present 2
2. Scutum dark brown. Dorsal part of inferior volsella roundish; ventral part of inferior volsella placed below its dorsal part (Fig. 10). Superior volsella reduced. Subapical crista dorsalis well developed and high. AR 1.46–1.65 *P. plolabius* sp. nov.
- Scutum with 3 dark brown vittae in lighter background. Dorsal part of inferior volsella nose-like; ventral part of inferior volsella partly placed above its dorsal part (Fig. 1). Superior volsella developed (Fig. 2). Preapical crista dorsalis low, roundish-triangular. AR 1.0–1.1 *P. lazovskiensis* sp. nov.

Pupae

1. Tergite I with shagreen of spinules. Tergite II almost completely covered with shagreen (Fig. 13). Antepronotals absent *P. plolabius* sp. nov.
- Tergite I naked. Tergite II with only one or two small spots of shagreen. Antepronotals present 2
2. Thoracic horn present. Tergite II with 2 small spots of shagreen in anterior quarter (Fig. 31). Sternites without shagreen of spinules. Anal macrosetae length/anal lobe length 0.42 *Parorthocladius* sp. 1
- Thoracic horn absent. Tergite II with small spot of shagreen in middle part at the posterior edge (Fig. 24). Sternites V–VII with shagreen of spinules. Anal macrosetae length/anal lobe length 0.30–0.31 *P. tyurkini* sp. nov.

Larvae of fourth instar

1. 3rd antennal segment 1.5–2.0 times as long as 4th segment and if 3rd segment equal to 4th, then length of antenna 96–104 μm *P. plolabius* sp. nov.
- 3rd antennal segment slightly shorter of 4th segment. Length of antenna 81–85 μm 2
2. Apical setae of procercus subequal, ca 220–260 μm long. All abdominal setae simple *P. tyurkini* sp. nov.
- Apical setae of procercus of different size, ca 220–480 μm long. Abdominal setae simple and plumose *Parorthocladius* sp. 1

Parorthocladius lazovskiensis Makarchenko et Makarchenko, sp. nov.

(Figs. 1–3)

Material. Holotype: adult male, Russian Far East, Primorye Territory, Lazovsky District, Lazovsky State Nature Reserve, Priamushka River, 19–20.V. 2007, leg. O. Zorina. Paratypes: 1 adult male, Primorye Territory, Ussuryisky District, Ussuryisky State Nature Reserve, Peishula River, 28.VII. 1998, leg. T. Vshivkova; 1 adult male, Sakhalin Island, Tymovsky Region, Khrebtovy Stream (Chamgu River basin), 28.VII. 2003, leg. E. Makarchenko.

Adult male (n=3). Total length 2.65–3.25 mm. Wing length 2.0–2.08 mm. Total length/wing length 1.3–1.6.

Head. Temporal setae 13–14, including 10 verticals and 3–4 postorbitals. Clypeus with 7 setae. Antenna with 13 flagellomeres and well developed plume; AR 0.96–1.1. Palp with 5 palpomeres. Length of distal 4 palpomeres (in μm): 48, 92, 84, 140 (n=1).

Thorax. Scutum with 3 dark brown stripes on yellowish or brownish yellow surface. Antepronotum with 2–3 lateral setae. Dc 6–8; Pa 4; scutellum without setae.

Wing. R with 5–6 setae, R₁ and R₄₊₅ without setae. Cu₁ slightly curved in distal part. R₄₊₅ ending slightly distal or above apex of M₃₊₄. Costa extension 40 μm . Anal lobe well developed, rectangular-rounded. Squama with 10–16 setae.

Legs. Spur of fore tibia 56 μm . Spurs of mid tibia 20 μm and 24 μm long, of hind tibia 24 μm and 56 μm long. Hind tibial comb with 10 setae. Fore leg without pseudospurs on ta₁; mid and hind legs with 2 apical pseudospurs on ta₁. Sensilla chaetica on mid leg absent. Lengths and proportions of leg segments as in Table 1.

TABLE 1. Lengths (in μm) and proportions of leg segments of *Parorthocladius lazovskiensi* sp. nov., male (n= 2).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
P ₁	688	784–816	576–592	416	288–304	208–224	128
P ₂	672–704	736	384–416	256	208	160	128
P ₃	752–768	864–880	488–512	304	240	160	128

continued

	LR	BV	SV	BR
P ₁	0.71–0.75	1.93–2.0	2.49–2.61	2.6
P ₂	0.52–0.56	2.38–2.47	3.46–3.67	3.0
P ₃	0.55–0.59	2.55–2.58	3.19–3.34	3.8–4.0

Hypopygium (Figs. 1–3). Tergite IX and anal point with 10–15 setae. Anal point 24–36 μm long and 8–12 μm wide near apex. Laterosternite IX with 4–7 setae on each side. Transverse sternapodeme 80–92 μm long, with triangular oral projections. Virga 24–28 μm long, consists of 2 short setae. Gonocoxite 184–196 μm long; dorsal part of inferior volsella nose-like; ventral part of inferior volsella located at dorsal part of inferior volsella (Fig. 1). Superior volsella developed and rounded (Fig. 2). Gonostylus 80 μm long, with low preapical crista dorsalis; megaseta 8 μm long.

Diagnostic characters. The new species is most closely related to the Palaearctic species *P. nudipennis* and can be distinguished from the latter by the presence of virga, double inferior volsellae, well-developed superior volsellae, the absence of scutellars, the presence of vertical setae of the head, as well as by the shape of crista dorsalis (preapical and triangular) and the shape of the anal point - tapering towards slightly rounded tip. Adult male of *P. nudipennis* differs from *P. lazovskiensi* in having no virga, inferior volsellae simple, superior volsellae indistinct, scutellars present, vertical setae of the head absent, crista dorsalis weak and low, and anal point parallel-sided (Brundin 1956, Serra-Tosio 1981, Liu & Wang 2005).

Etymology. The species is named *lazovskiensi* in honour of the Lazovsky State Nature Reserve.

Distribution. Known from the type locality in Sakhalin Island, Primorye and Khabarovsk Territories of the Russian Far East.

Parorthocladius plolabius Makarchenko et Makarchenko, sp. nov.

(Figs. 4–17)

Material. Holotype: adult male, Russian Far East, Jewish Autonomous Region, Obluchie District, Fedotkin Spring of Bidzhan River basin (Amur River basin), N 48°38'409", E 131°37'217", 27.III. 2013, leg. E. Makarchenko. Paratypes: 3 males, the same data as holotype except 10–12.IV. 2012, leg. E. Makarchenko; 2 males, 8 larvae, the same data as holotype except 5–6.IV. 2014, leg. E. Makarchenko; 3 males, the same data as holotype except Lopatinskyi Spring, N 48°37'810", E 131°39'114", 7.IV. 2014, leg. E. Makarchenko; 2 males, Kamchatka Peninsula, Ozernaya River, 9.VI. 1998, leg. T. Travina; 1 mature pupa, 7 pupae, 1 pupal exuviae, 3 larvae, 1 larval skin from pupa, the same region, Plotnikova River, 24–26.IV. 2004, leg. T. Travina; 1 larva, Magadan Region, Ol'sky District, Uglikan River (Ola River Basin), 7.IV. 2013, E. Khamenkova; 3 mature pupae, the same region, Ola River, 12–13.V. 2013, E. Khamenkova; 1 larva, the same place, 8.VII. 2013, E. Khamenkova.

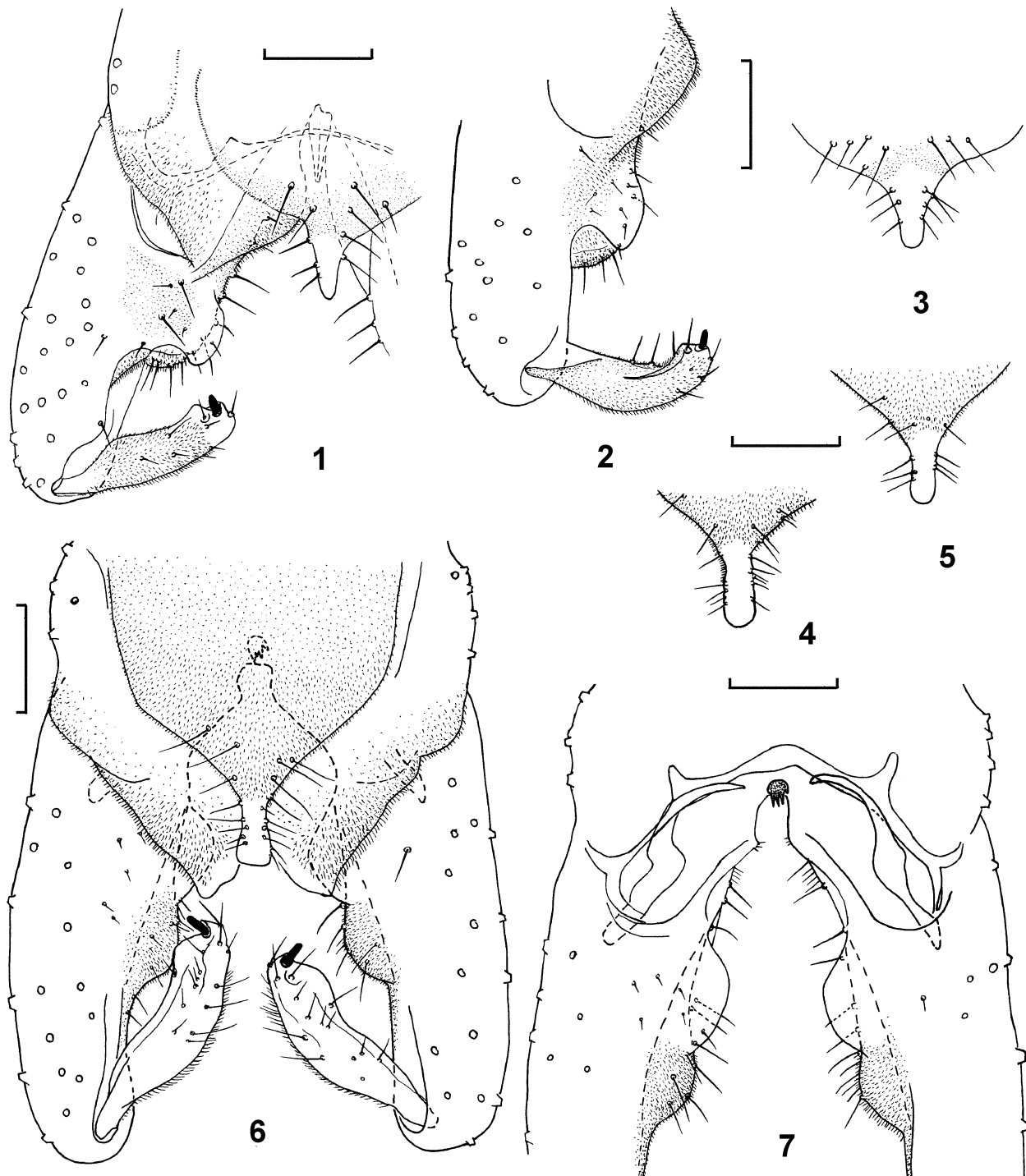
Adult male (n=4)

Total length 2.75–4.15 mm. Wing length 2.32–2.74 mm. Total length/wing length 1.2–1.5.

Head. Temporal setae 9–13, including 5–9 verticals and 4 postorbitals. Clypeus with 8–10 setae. Antenna with 13 flagellomeres and well developed plume; AR 1.46–1.85. Palp with 5 palpomeres, length of 4 distal palpomeres (in μm): 48–64, 88–112, 56–112, 172–200.

Thorax. Dark brown. Anteprenotum without lateral setae. Dc 6–7, Pa 3–4, scutellum without setae.

Wing. R and R₁ with 7–8 setae, R₄₊₅ with 0–1 setae subapically. R₄₊₅ ending distal of apex M₃₊₄. Costa extension 12–80 μm . Anal lobe well developed, rounded. Squama with 14–19 setae.



FIGURES 1–7. *Parorthocladius lazovskiensis* sp. nov., male (1–3) and *P. plolabius* sp. nov., male (4–7). **1, 6**, hypopygium in dorsal view; **2**, gonocoxite and gonostylus in dorsal view; **3–5**, anal point; **7**, part of hypopygium without tergite IX in dorsal view. **1**, male from Sakhalin Island; **2–3**, male from Primorye Territory; **4–7**, males from Amur River basin. Scale bars –50 μ m.

Legs. Spur of fore tibia 52–60 μ m long. Spurs of mid tibia 24–28 μ m and 20 μ m long. Spurs of hind tibia 60 μ m and 20–24 μ m long. Hind tibial comb with 11–13 setae. Fore leg without pseudospurs on ta_1 ; mid and hind legs with 2 apical pseudospurs on ta_1 and ta_2 ; sometimes hind legs with 1 apical spur on ta_2 . Mid leg on ta_1 in basal part with 0–8 sensilla chaetica. Lengths and proportions of leg segments as in Table 2.

TABLE 2. Lengths (in μm) and proportions of leg segments of *Parorthocladius plolabius* sp. nov., male (n = 4).

	fe	ti	ta ₁	ta ₂	ta ₃	ta ₄	ta ₅
P ₁	752–1072	832–1136	624–800	416–576	320–400	224–288	112–136
P ₂	752–992	784–1008	432–576	304–368	224–288	176–224	128–144
P ₃	816–1104	944–1216	544–688	320–432	256–288	176–240	128–144

continued.

	LR	BV	SV	BR
P ₁	0.70–0.79	2.01–2.24	2.54–2.76	3.0
P ₂	0.54–0.57	2.36–2.52	3.47–3.69	3.2–3.8
P ₃	0.57–0.60	2.61–2.72	3.24–3.37	4.4–5.4

Hypopygium (Figs. 4–12). Tergite IX and anal point with 12–17 setae. Anal point nearly parallel-sided, 28–36 μm long and 10–12 μm wide near apex. Laterosternite IX with 5–8 setae on each side. Transverse sternapodeme 100–112 μm long, with sharply triangular oral projections. Virga 8–16 μm long, like comb, consisted of 5–7 short setae. Gonocoxite 200–240 μm long; inferior volsella with roundish naked dorsal part and roundish ventral part placed below its dorsal part, covered by microtrichia and several setae (Figs. 7, 10). Gonostylus 96–100 μm long, with well developed high preapical crista dorsalis (Fig. 6); megaseta 12 μm long.

Pupa (n=4). Total length 3.50–4.45 mm. Colouration brown. Exuviae brownish, with darker lateral parts of tergites VI–IX.

Cephalothorax. Frontal apotome without tubercles and frontal setae. Thoracic horn absent but present pore and 3 precorneals (length in μm): Pc₁ 108–128, Pc₂ 60–68, Pc₃ 28–32. Distance between Pc₁ and Pc₂ 40–88 μm ; distance between Pc₂ and Pc₃ 12–32 μm . Anteprepronotum without setae. Dorsal surface of mesonotum rugose, in the middle part with 1–2 rows of pointed tubercles. Three dorsocentrals weak and hair-like; distance between Dc₁ and Dc₂ 180–200 μm ; between Dc₂ and Dc₃ 12–16 μm .

Abdomen. Tergite I with shagreen of small spinules in middle part. Shagreen of tergite II covers almost its entire surface and consists of spinules almost the same size, sometimes at the posterior edge they are slightly larger. Shagreenation of tergites III–VIII as in Fig. 13, namely spinules of anterior and posterior parts larger than spinules deposited between these parts. Sometimes spinules in middle part very small and sparse. Sternites II–III with shagreen composed of small spinules in middle part and with lateral longitudinal stripes of spinules. Sternites I–IV, IX without shagreen. Sternites VI–VIII with weak shagreen in some parts. Segment I without lateral setae or sometimes with 1 pair of setae. Segments II–V with 2–3 pairs of lateral setae; segments VI–VIII with 3 pairs of lateral setae; all lateral setae hair-like. Anal lobe 304–340 μm long. Male genital sac overreaching anal lobe. Anal macrosetae 112 μm long (Fig. 13). Anal macrosetae length/anal lobe length 0.33–0.37.

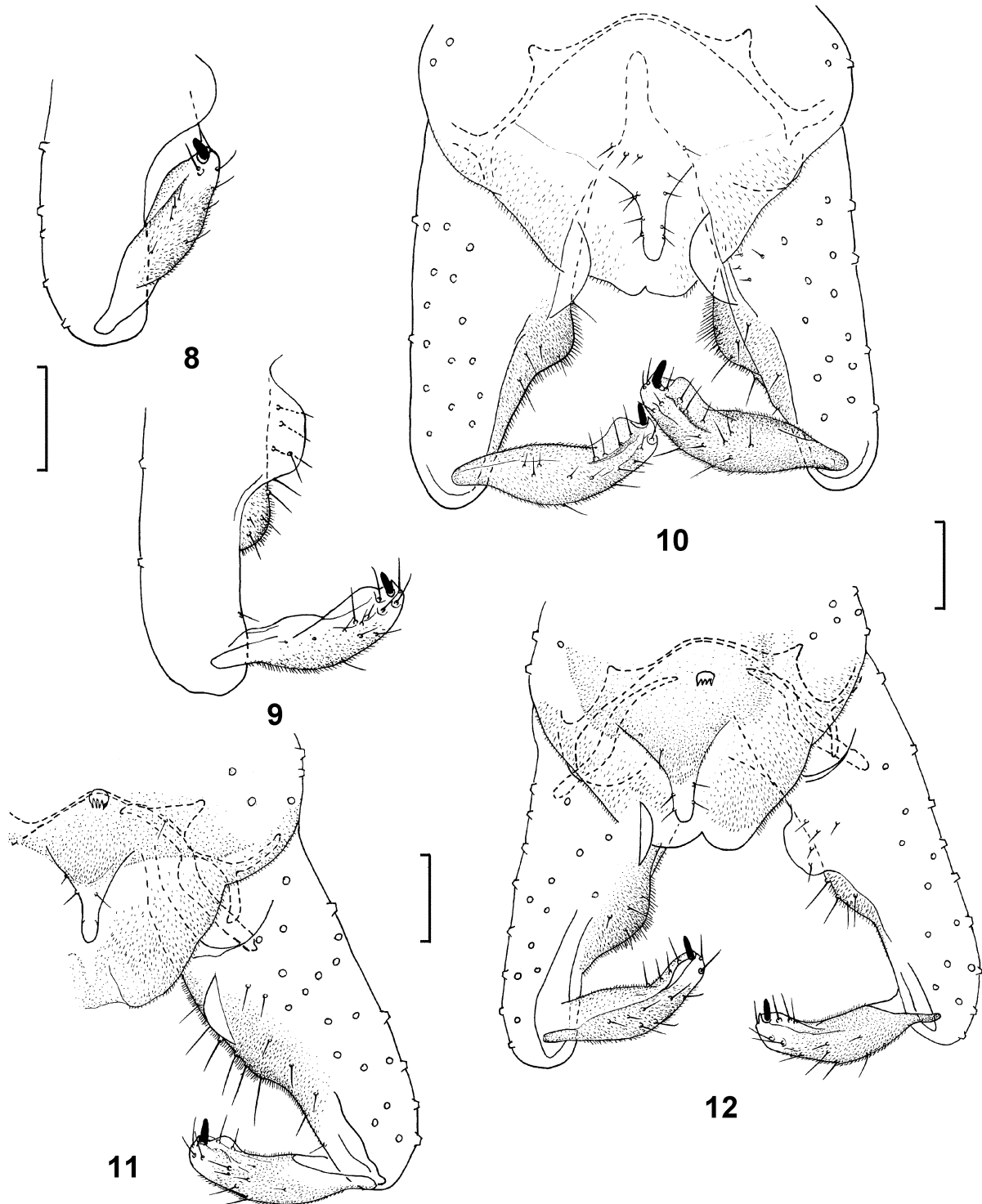
Fourth instar larva (n = 5). Total length 2.8–3.4 mm.

Head. Head capsule brown or dark brown, postoccipital margin black. Head length 300–325 μm , head width 225–250 μm . S_{I–III} of labrum simple and hair-like, S_{IV} like small tubercles. Pecten epipharyngis consisting of 3 scales, middle scale narrowest. Premandible 76 μm long, in apical part expanded and rounded, with 1 tooth. Antenna with 5 segments, length of segments 1–5 (in μm): 52–56 : 20–24 : 10–12 : 6–10 : 4–8; segment 3 longer than segment 4, rarely segments 3 and 4 of equal length (n=1); one large and two small ring organs in proximal 1/4 of basal segment; apex of segment 2 with stylus 12 μm long and lauterborn organs as long as 3rd segment; blade ending at base of segment 5 (Fig. 17); AR 1.17–1.30. Mandible 104–112 μm long, with 3 inner teeth and 1 apical tooth equal to first inner tooth or somewhat longer; other 2 inner teeth equal; seta subdentalis stout, with pointed apex (Fig. 16). Mentum high and subtriangular, with 3 equal median teeth and 4 pairs of lateral teeth. Beard of ventromental plates consisted of a tuft of long setae (Fig. 14). Very often apical part of mentum in mature larvae erased (Fig. 15). Posterior parapods slightly shorter than anal tubules or both structures of equal length. Anal tubules of one pair wider than anal tubules of other pair. Procercus 16 μm long and 24–28 μm wide, with 2 short lateral setae and 6 apical setae 432–608 μm long; rarely 5 apical setae present (n=1). Body segments I–VII with 2 pairs of lateral setae: one pair of setae simple and one pair plumose (sometimes bifid); plumose setae placed at posteroventral corner of segment. Segment VIII with 1 pair of simple setae. Sometimes simple on one side and plumose seta on opposite side of the same segment.

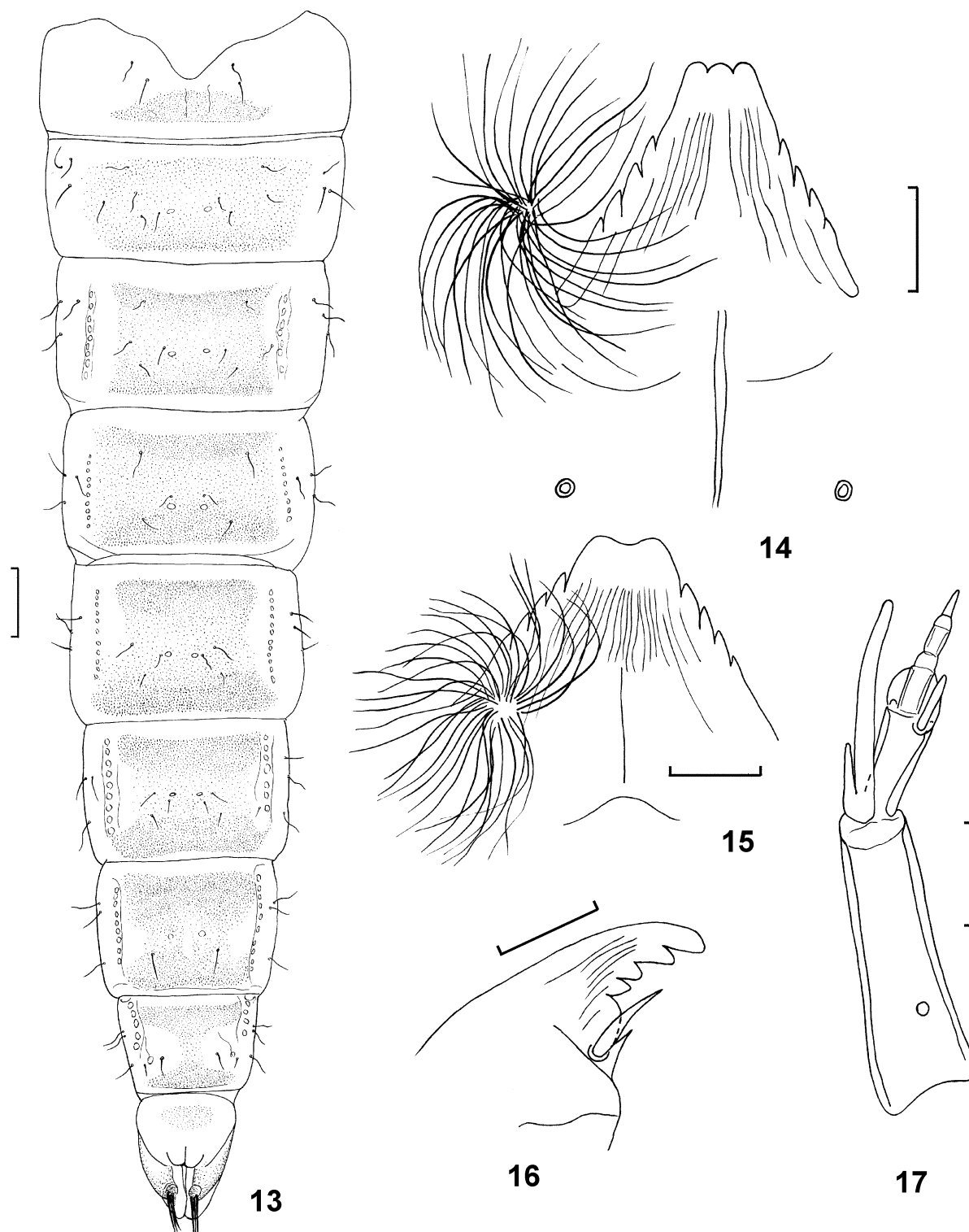
Diagnostic characters. See the keys.

Etymology. The specific epithet is derived from first letters of the names of rivers in the basin, where the new species was collected: *pl*—Plotnikova River, *ola*—Ola River, *bi*—Bidzhan River.

Distribution. Known from the type locality in Kamchatka and Magadan Regions, Amur River basin of the Russian Far East.



FIGURES 8–12. *Parorthocladus plolabius* sp. nov., male. 8–9, gonocoxite and gonostylus in dorsal view; 10–12, hypopygium in dorsal view. 8–9, 11, males from Amur River basin; 11, male from Kamchatka Peninsula; 12, male from Magadan Region. Scale bars—50 μ m.



FIGURES 13–17. *Parorthocladius plolabius* sp. nov., pupa (13) and larva of fourth instar (14–17). **13**, tergites I–VIII and anal segment of male; **14–15**, mentum; **16**, mandible; **17**, antenna. Scale bars: Fig. 13—200 μ m; Figs. 14–17—20 μ m.

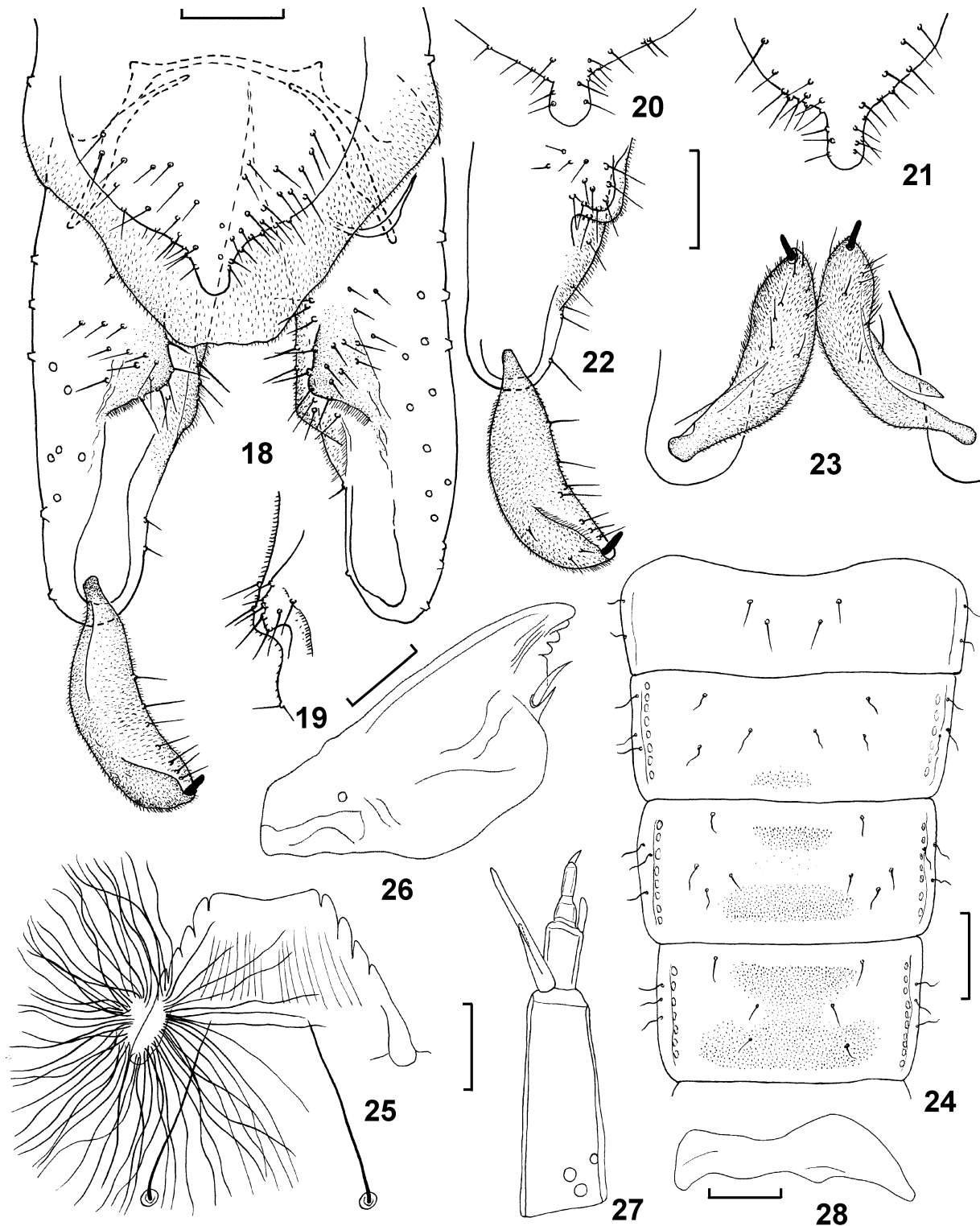
***Parorthocladius tyurkini* Makarchenko et Makarchenko, sp. nov.**

(Figs. 18–28)

Material. Holotype: adult male, extracted from mature pupa, Russian Far East, Chukotka Autonomous Okrug, Iul'tinsky District, Egvekinot Village region, unnamed stream of Seutakan Lake basin, 20.VII. 1976, leg. E. Makarchenko. Paratypes: 4 mature pupae (males) and 2 larval skins, same data as holotype.

Adult male (n=2). Total length *ca* 3 mm.

Head. Eyes pubescent. Temporal setae 9–10, including 5–6 verticals and 3–4 postorbitals. Clypeus with 11 setae. Antenna with 13 flagellomeres and well developed plumage; AR 0.69–0.73. Palp with 5 palpomeres. Length of distal 4 palpomeres (in μm): 40, 72, 64, 100 (n=1).



FIGURES 18–28. *Parorthocladius tyurkini* sp. nov., male (18–23), pupa (24) and larva of fourth instar (25–28). 18, hypopygium in dorsal view; 19, inferior volsella; 20–21, anal point; 22, gonocoxite and gonostylus in dorsal view; 23, gonostylus; 24, tergites I–IV; 25, mentum; 26, mandible; 27, antenna; 28, premandible. Scale bars: Figs. 18–23—50 μm ; Fig. 24—200 μm ; Figs. 25–28—20 μm .

Thorax. Scutum with 3 dark brown stripes in lighter background. Antepronotum with 1–2 lateral setae. Dc 7–8; Pa 4; scutellum without setae.

Wing. Not spread.

Legs. LR₁ 0.62.

Hypopygium (Figs. 18–23). Tergite IX and anal point with 28–38 setae. Anal point 20–24 µm long and 16–20 µm wide near apex. Laterosternite IX with 1–2 setae on each side. Transverse sternapodeme 92–100 µm long, with triangular oral projections. Virga absent. Gonocoxite 252–304 µm long; dorsal and ventral parts of inferior volsella triangular or rounded-triangular, both covered with microtrichia and setae (Figs. 18–19, 22). Superior volsellae absent. Gonostylus 104–116 µm long, without crista dorsalis (Fig. 23); megaseta 12 µm long.

Pupa (n=5). Total length 2.9–3.1 mm. Colouration brown. Exuviae brownish, transparent.

Cephalothorax. Frontal apotome without tubercles and frontal setae. Thoracic horn absent but present pore and 3 precorneals (length in µm): Pc₁ 32, Pc₂ 28–32, Pc₃ 24; precorneals weak and hair-like, arranged one behind the other. Distance between Pc₁ and Pc₂ 14–28 µm; distance between Pc₂ and Pc₃ 6–34 µm. Antepronotum with 2 middle setae and 1 lateral seta. Dorsal surface of mesonotum rugose, in anterior 1/3 with row of pointed tubercles. Three dorsocentrals hair-like; distance between Dc₁ and Dc₂ 148 µm; between Dc₂ and Dc₃ 10–22 µm.

Abdomen. Tergite I without shagreen. Tergite II with group of small spinules at posterior margin or sometimes naked. Tergite III with posterior and anterior groups of spinules; posterior group wider and with larger spinules than in anterior part; between these groups shagreenation with very rare spinules. Shagreenation of tergites IV–VII same or similar to that of tergite III but areas of shagreen more extensive and broader, anterior and posterior groups interconnected as shown in Fig. 24. Tergite VIII with strip of small spinules along posterior edge and with group of spinules in anterior half of tergite. Sternites I–IV, VIII–IX without shagreen. Sternites V–VI with small spinules in antero-median part and with stripe of spinules in posterior part. Sternite VII with sparse spinules in antero-median part. Segment I with 2 pairs of lateral setae, segments II–VIII with 3 pairs of lateral setae; all lateral setae short and hair-like. Anal lobe 260–296 µm long. Male genital sac overreaching anal lobe. Anal macrosetae 80–88 µm long. Anal macrosetae length/anal lobe length 0.30–0.31.

Fourth instar larva (2 larval skins).

Head. Head capsule dark brown. S_{I–IV} of labrum simple and hair-like. Pecten epipharyngis consisted of 3 scales. Premandible 64 µm long, in apical part expanded and rounded, with 1 tooth (Fig. 28). Antenna with 5 segments, length of segments 1–5 (in µm): 48 : 16 : 5 : 8–9 : 6–7; segment 3 shorter than segment 4; three ring organs in proximal 1/4 of basal segment; apex of segment 2 with stylus 8 µm long; lauterborn organs weak or absent; blade ending at apex of segment 5 (Fig. 27); AR 1.33. Mandible 92–96 µm long, with 3 equal inner teeth and 1 apical tooth; seta subdentalis long and strong, with pointed apex (Fig. 26). Mentum with broken apical part and 4 pairs of lateral teeth. Beard of ventromental plates consisted of a tuft of long setae (Fig. 25). Procercus 8 µm long and 16–20 µm wide, with 2 short lateral setae and 6 apical setae 220–260 µm long. Body segments only with simple setae.

Diagnostic characters. See the keys.

Remarks. In this paper, we did not plan the revision of all species of the genus *Parorthocladius*, but studying the larvae of *P. tyurkini* indicate that all abdominal setae are simple. Consequently, the generic diagnosis (Cranston *et al.* 1983; Andersen *et al.* 2013) should be complemented with this character.

Etymology. The species is named in memory of Anatoly Tyurkin, for his help in accommodation and collecting the material in the Seutakan Lake of the Chukchi Peninsula.

Distribution. Known from the type locality in Seutakan Lake basin of Chukotka Region, the Russian Far East.

***Parorthocladius* sp. 1**

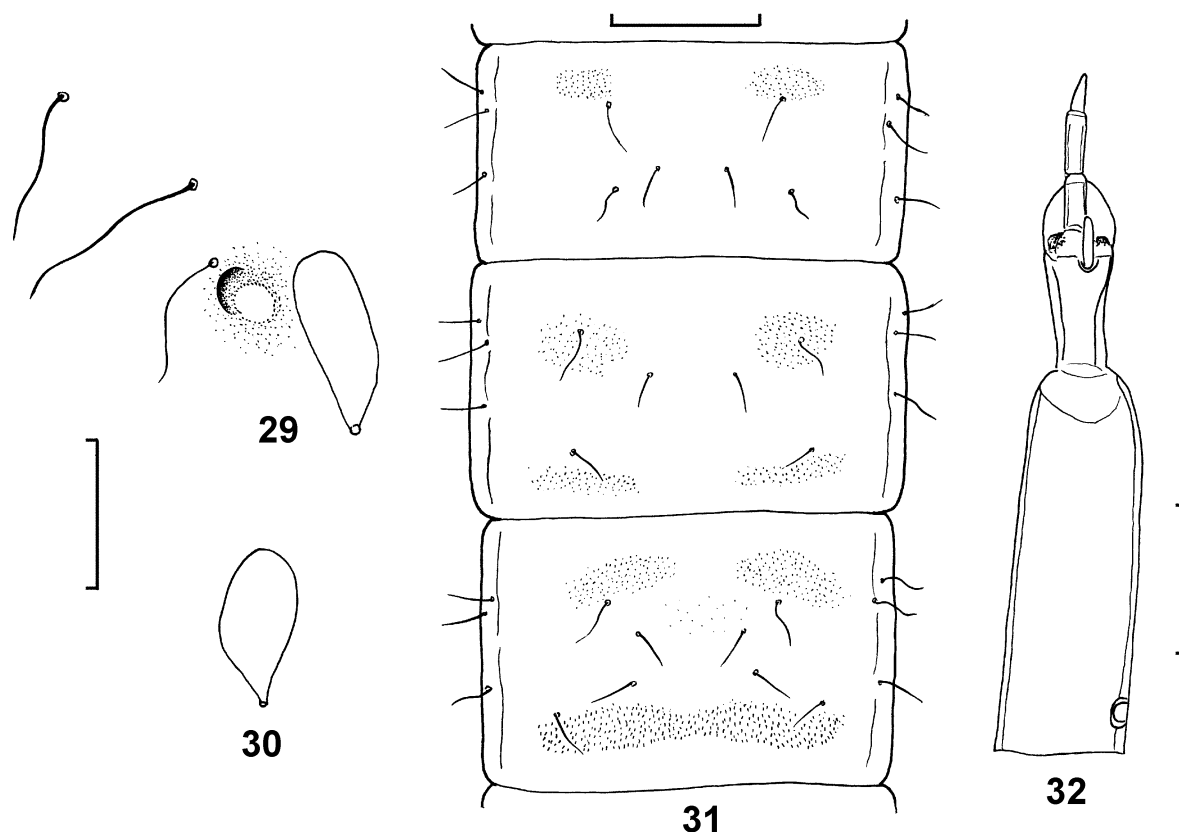
(Figs. 29–32)

Material: 1 pupa with larval skin, Primorye Territory, Terneisky District, Sikhote-Alin'sky State Nature Reserve, Zimoveiny Stream of Serebrianka River basin, 23.VIII. 2006, leg. O. Zorina.

Pupa (n=1). Colouration dark brown.

Cephalothorax. Frontal apotome without tubercles and frontal setae. Thoracic horn 52–56 µm long, 24 µm wide, oblong-rounded, transparent and naked (Figs. 29–30). Pore and 3 precorneals placed near thoracic horn (Fig. 29). Distance between Pc₁ and Pc₂ 52–80 µm; distance between Pc₂ and Pc₃ 12–24 µm. Antepronotum with 2

middle setae and 1 lateral seta. Dorsal surface of mesonotum rugose, with 1–2 rows of pointed tubercles. Three hair-like dorsocentrals; distance between Dc_1 and Dc_2 136–140 μm ; between Dc_2 and Dc_3 14–24 μm .



FIGURES 29–32. *Parorthocladius* sp.1, pupa (29–31) and larva of fourth instar (33). **29**, thoracic horn and precorneals; **30**, thoracic horn; **31**, tergites II–IV; **32**, antenna. Scale bars: Figs. 29–30—50 μm ; Fig. 31—200 μm ; Fig. 32—20 μm .

Abdomen. Tergite I missing. Tergite II with two spots of small spinules in anterior part. Tergite III with two spots of small spinules in anterior part and two spots in posterior part. Tergite IV–V with two spots of small spinules in anterior part and with transverse stripe of larger spinules at posterior edge; spinules sparse between anterior and posterior shagreen (Fig. 31). Shagreenation of tergite VI as on tergites IV–V but size of spinules in anterior part almost equal to that of posterior part. Tergites VII–VIII with anterior and posterior stripes of spinules of almost equal size. Sternites without shagreen. Segments II–VIII with 3 pairs of short and hair-like lateral setae. Male genital sac overreaching anal lobe. Anal lobe length 216 μm . Anal macrosetae 92 μm long. Anal macrosetae length/anal lobe length 0.42.

Fourth instar larva (1 larval skin). Head. Head capsule dark brown. S_{I-IV} of labrum simple and hair-like. Pecten epipharyngis consisted of 3 scales. Premandible *ca* 60 μm long, with 1 tooth. Antenna with 5 segments, length of segments 1–5 (in μm): 49–50 : 15–16 : 6 : 8 : 5; segment 3 shorter than segment 4; large ring organs in proximal 1/4 of basal segment; apex of segment 2 with stylus; lauterborn organs well developed; blade ending at apex of segment 5 (Fig. 32); AR 1.37–1.43. Mandible 92–96 μm long, with 3 equal inner teeth and 1 apical tooth. Mentum with broken apical part and 4 pairs of lateral teeth. Procercus with 2 short lateral setae and 6 apical setae 224–480 μm long. Body segments with 6 pairs of branched setae.

Remarks. Among all species of the genus *Parorthocladius* recorded from the Far East this is the only pupa having the thoracic horn, which is similar to that of *P. nudipennis*. However, shagreenation of tergites and sternites of these two species is different. Larva is similar to those of other known species and can be separated only on the basis of antennal characters (see key above).

Distribution. Known from Primorye Territory of the Russian Far East.

Acknowledgments

We thank all collectors for making the material available to us. We wish also to acknowledge Dr. Martin Spies for sending us copies of hard-to-reach taxonomical articles and Dr. Wojciech Gilka for editing of English.

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