



## New records of the East-Asian *Nemoura* species (Plecoptera: Nemouridae) for South of the Russian Far East with description of the larvae

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### Abstract

Three species of the *Nemoura*, *N. jejudoensis* Zwick & Baumann, 2011 and *N. jilinensis* Zhu & Yang, 2003, and *N. tripotini* Zwick, 2010 are reported in the South of the Russian Far East for the first time. The larvae of the three species are described and illustrated. The larvae were associated with adults by rearing or by preemergent male larva. The main diagnostic features of the larvae are based on the differences in the chaetotaxy the pronotum, legs, abdominal, and cercal segments.

**Key words:** Plecoptera, *Nemoura*, larvae, south of the Russian Far East, new records

### Introduction

*Nemoura* Latreille, 1796 is the largest genus in the family Nemouridae occurring in the Oriental and Holarctic regions (DeWalt *et al.* 2015). According to available data, approximately half of the known *Nemoura* species inhabit Eastern Palearctic streams, mainly in East Asia (Mongolia, China, South of the Russia Far East, Korea, and Japan). Intensive studies of streams in the urban vicinity of Vladivostok, Russia revealed for the first time for the Russian Far East the occurrence of three *Nemoura* species previously known only from Korea and China. The new records substantially increase the known geographical distribution of these three species of *Nemoura*. Larvae were associated with adults through rearing. *Nemoura* adults are well-recognized by genitalic structures; the larvae remain almost completely unknown due to lack of suitable distinguishing morphological characteristics. However, Zwick (2004) using Raušer's experience (Raušer 1980), presented a preliminary key for the *Nemoura* larvae of the German species based on the differences in the chaetotaxy of the pronotum, legs, abdomen, and cerci. These same characters are considered for the following descriptions of three East Asian *Nemoura* larvae.

### Material and methods

The association of the larvae with adults was established by rearing mature larvae in plastic bags with moss covered by cotton held in a dark, cool outside area. Specimens were examined with the aid of the Labor microscope using transmitted light. Illustrations were produced using digital cameras Nikon Coolpix 995 and Toup View 3.7. Abdomens were removed and soaked in 10% NaOH overnight and rinsed with distilled water. The morphological terminology follows that of Zwick (1975), Shimizu (1997), and Murányi (unpublished data).

### Results and discussion

#### *Nemoura jejudoensis* Zwick & Baumann 2011

(Figs. 1–12)

Zwick & Baumann 2011:149 (original description of the male and female)

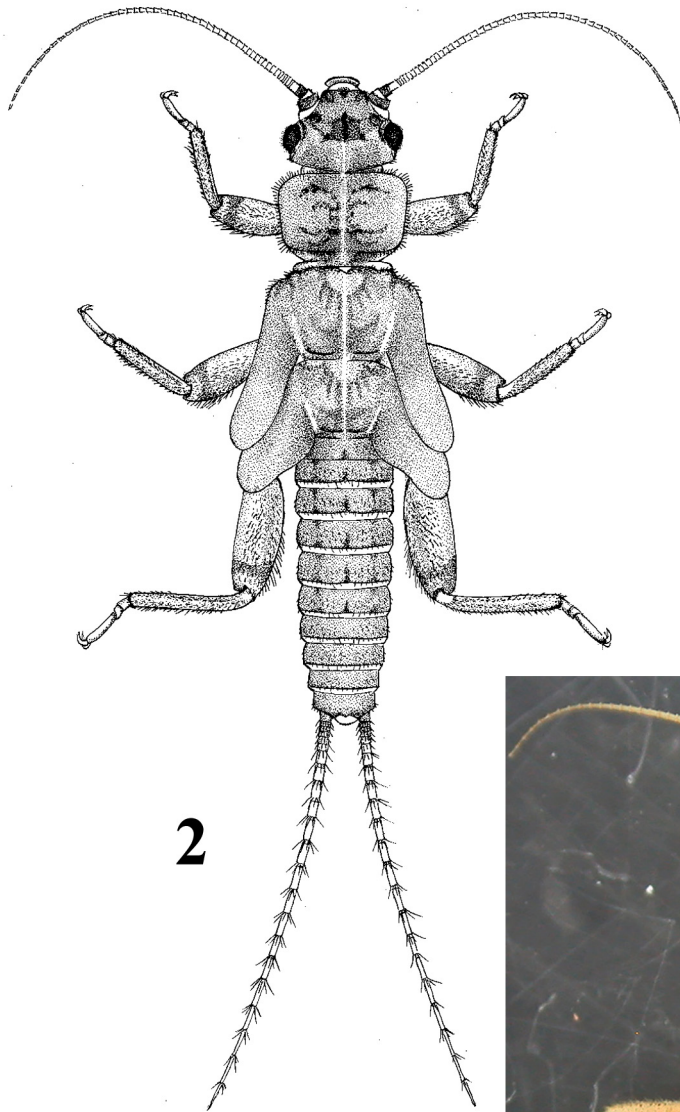
**Material examined.** Russian Far East, Primorskyi Region: 10 males, 7 females, 15 nymphs, Vladivostok, Rybachi Sett., Meortvaya Pad Stream, N 42°080.417' E132°021.346', 28.07.–16.08.2015, rearing, coll. Teslenko V.; Khabarovskiy Region: 6 males, 26 females, Fedotkin Spring, Bira R. Basin, Amur R. Basin, N 48°38.446' E131°37.183', 17.09.2015, coll. Makarchenko Eu.

**Description.** Males of *N. jejudoensis* of the Russian Far Eastern (RFE) specimens agree well with original description and excellent illustrations by Zwick and Baumann (2011). The RFE males show slight variations as compared to Korean specimens in number of teeth on the prong of the epiproct. Zwick & Baumann (2011) mentioned that each turned claw-like plate (prong) has four marginal bare teeth (figs. 1, 2 in Zwick & Baumann 2011). Sometimes in RFE males, the number of teeth on the prong may vary from three to five (Fig. 1).

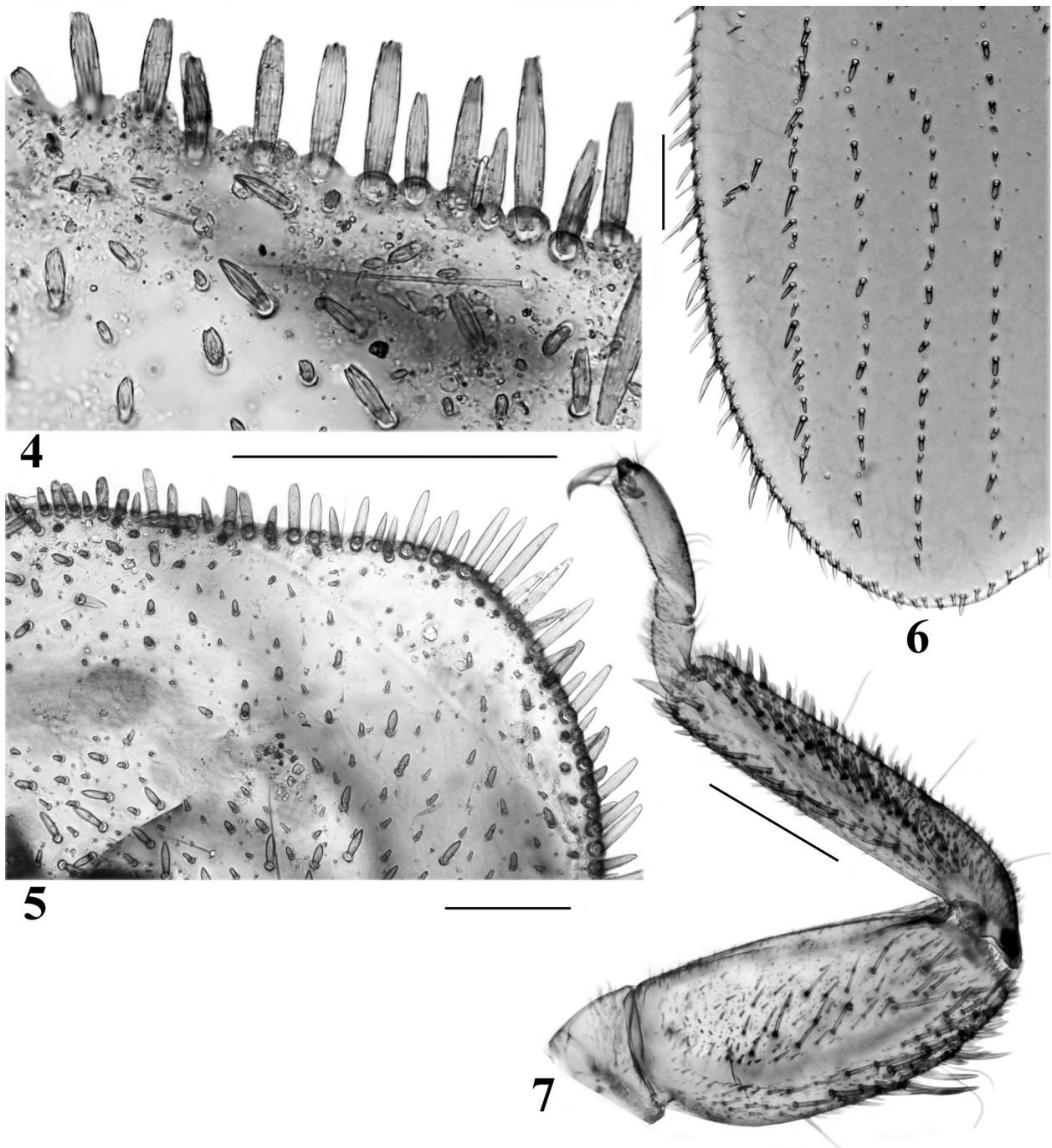


**FIGURE 1.** *Nemoura jejudoensis*, epiproct in dorsal view. Scale 0.1 mm.

**Mature larva** (Figs. 2–12). Body relatively stout, the body length 5.3–7.0 mm in males; 6.0–7.0 mm in females. General color brown with a dark brown pattern (Fig. 3). Head stout with dark brown tentorial callosities connected with a dark brown interocellar patch slightly extended sideways beyond each posterior ocellus; a small black longitudinal line between lateral ocelli medially (Figs. 2, 3). Occiput distinctly paler than middle of head due to a pair of small pale patches near epicranial stem, the epicranial arms also pale (Fig. 3). Antenna pale, scape, pedicel, and apical antennal segments dark brown. Pronotum trapezoidal, approximately 1.5 X wider than long, light brown, slightly narrowed towards the posterior margin; corners rounded. Pattern on the pronotum diffuse, consisting of small dark brown spots that form an X-shaped figure with rounded anterior and posterior branches and transversal medial line of spots (Figs. 2, 3). Mesonotum and metanotum with V-shaped dark brown pattern anteromedially, dissected by finger-like light brown patches; the posterior margins are dark brown. Legs pale. Femora with an apical diffuse dark ring, semi-oval pale patch close to inner edge basally, more pronounced on the fore leg, than on hind leg (Figs. 3, 7). The fore femur 2.3 X longer than wide and the hind femur about 2.5–2.9 X longer than wide. Abdomen relatively slender, integument light, matte in appearance, terga brown. Rows of dark brown small patches on terga II–VI form three longitudinal bands, a mesal and two lateral bands (Figs. 2, 3). Lateral longitudinal bands sometimes missing on terga 7–10; medial longitudinal band continue to tergum 10 and interrupted by pale patch on terga 7–10 medioposteriorly. Ventral surface pale with brown patches medially and laterally. Cerci pale with approximately 23 segments slightly darkened distally, length equals approximately 65% of body length, edges of basal and middle segments nearly parallel laterally (Figs. 9–12).

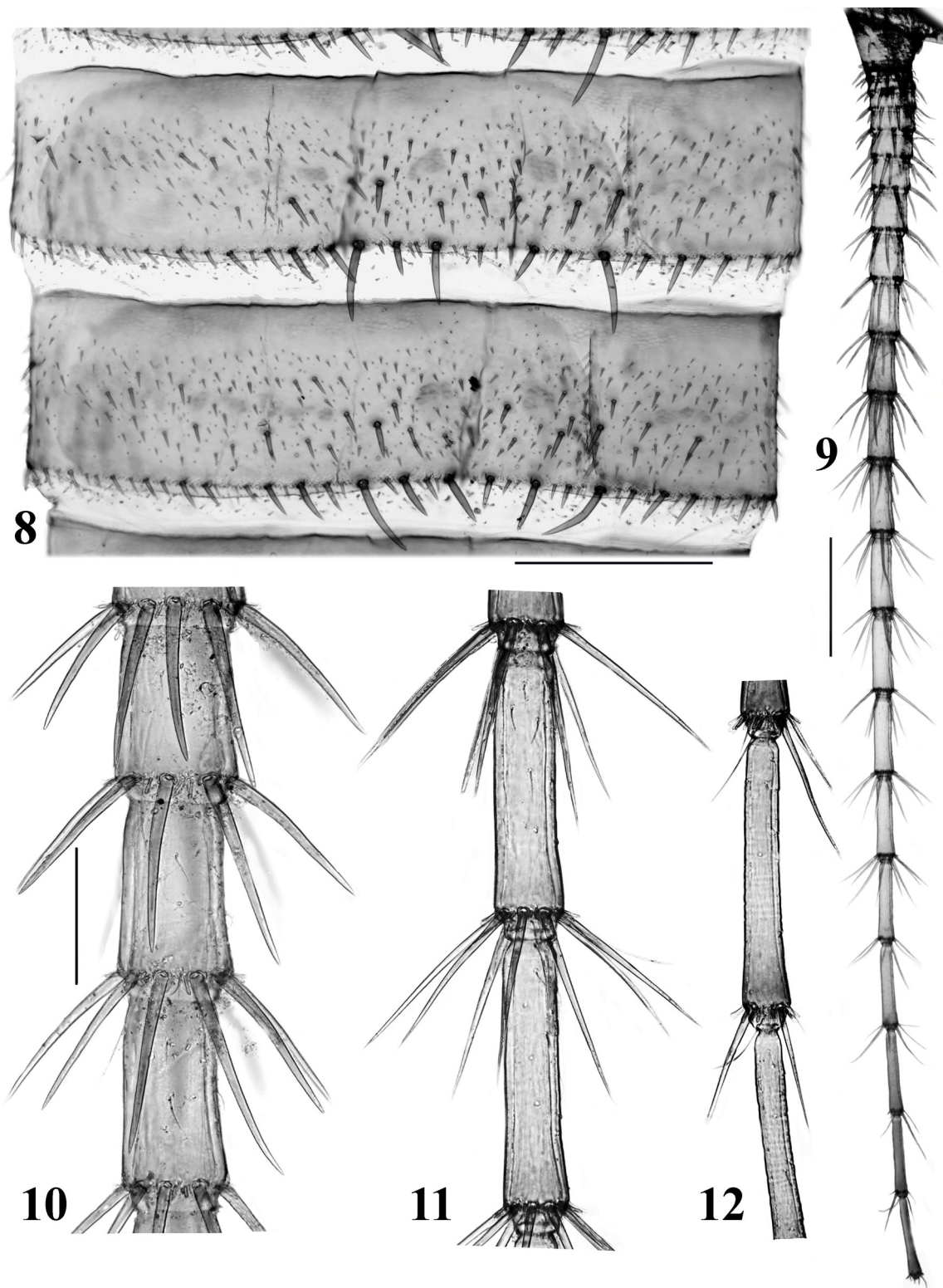


**FIGURES 2–3.** Larva of *Nemoura jejudoensis*, habitus, not to scale.



**FIGURES 4–7.** Larva of *Nemoura jejudoensis*. 4. Irregularly notched bristles near midline on anterior margin of pronotum. 5. Setae on disc and setal fringe of right anterior corner of pronotum. 6. Bristles on outer margin and rows of tiny setae on wing pad. 7. Right fore leg. Scale (mm): 4–6=0.1; 7=0.3.

Chaetotaxy distinctive, sometimes black in color, especially on the legs (Fig. 3). Dorsally, head with fine procumbent setae and dense tiny oval setae with apex narrowed to a short point; small acute setae occur on occipital margin. Antennal segments with short and sharp setae. Setal fringe around the pronotum wavy and consists of setae of the different lengths (Fig. 5) and configuration: relatively short stout oval, irregularly notched bristles present on anterior and posterior margins medially (Fig. 4); long irregularly notched bristles narrowed apically occupy the lateral margins sporadically (Fig. 5). The longest bristles are observed mostly at anterior and posterior pronotal corners, where the longest bristles alternate with shorter ones and form an undulate fringe (Fig. 5). Few of the longest bristles at the posterior corners, the length of the longest bristles approximately equals 6.0–6.3% of pronotum width. The pronotum disc with tiny oval setae, narrowed to a short acute apex; with small



**FIGURES 8–12.** Larva of *Nemoura jejudoensis*. 8. Chaetotaxy of terga 5–6. 9. Left cercus. 10. Cercus segments 8–10. 11. Cercus segments 15 & 16. 12. Apical cercus segments. Scale (mm): 8, 9=0.3; 10–12=0.1.

irregularly notched setae, fine procumbent setae, and occasional long hairs (Figs. 4, 5). The outer wing pad margin covered with acute bristles (Fig. 6). Tiny oval setae with apex narrowed to a short point in the lines on wing-pads same type as head and pronotum (Fig. 6). Legs with markedly heterogeneous chaetotaxy (Fig. 7). Setal fringe on outer femur margin starts from  $\frac{2}{3}$  of its length. All femora with fine procumbent setae, short and long spine-like bristles and occasionally with thin long hairs (Fig. 7). Long spine-like bristles occur in the apical half in an

irregular arrangement (Fig. 7). The longest spine-like bristles reach 40% of the width of femur on fore leg and 27% of the hind leg. A conspicuous bald median line on the dorsal surface of all femora, covered with rounded scales. An apical row of short setae on all femora. Tibia with sporadic fine procumbent setae, dense and strong spine-like bristles along the outer and inner edges; the bristles not longer than width of tibia (Fig. 7). Tarsi covered with thin hairs; tibial spurs short. Terga covered with short acute bristles and fine procumbent setae. The posterior terga margins feature mostly short acute bristles and two pairs of conspicuous long slightly curved spine-like bristles: lateral bristle pair much longer than central pair (Fig. 8), length of the longest bristles on terga 5–6 reaches 45% length of segment (Fig. 8). Cercal segments with an apical whorl of bristles and a few short and tiny intercalary setae, intercalary setation sparse (Figs. 10–12). The apical whorl comprises a set of short, oval bristles with rounded apex, a few thin hairs mixed with long, acute bristles; their number does not exceed 8 in the basal and middle cercal segments (Figs. 10–11). The longest bristles reach 77% of the segment's length at cercal segments 14–16 (Fig. 11).

**Diagnosis.** Setal fringe on pronotum of variable length, slightly irregular, comprises stout irregularly notched bristles and oval bristles with apex narrowed to a short point, the bristles on anterior and posterior pronotal corners longer than rest, and the length of the longest bristles reach 6.3% of pronotum width. Long spine-like bristles on femora in irregular arrangement; the longest bristles reach 40% of the femur's width on the fore leg. Paired spine-like bristles on terga 5–6 margins reach 45% the length of segment, other bristles much finer and spaced, sparse. Tiny intercalary setae on cercal segments sparse, the apical whorl comprises not more than 8 long, acute bristles, the longest bristles reach 77% of length of segment at cercal segments 14–16.

*Nemoura jejudoensis* and *N. geei* Wu, 1929 are closely related species. Adults are extremely similar, separable only in the details of the epiproct (Zwick & Baumann 2011). The larvae of the both species are also very similar, especially in the pattern of the abdomen (Murányi & Park 2011). Both species belong to the *N. ovocercia* group (Baumann 1975, Shimizu 1997, Zwick & Baumann 2011). The larvae of this group can be separated from other species of *Nemoura* by three dark longitudinal bands (a mesal and two lateral bands) on abdominal terga 2–8 or 9. The bands are distinctive in mature nymphs and most teneral adults, but they are sometimes indistinct (Shimizu 1997). In addition to body pattern, both species have similar chaetotaxy on legs, posterior margin of the abdomen and cerci. The pronotal fringe of *N. jejudoensis* is also very similar to *N. geei* but has not been described in detail.

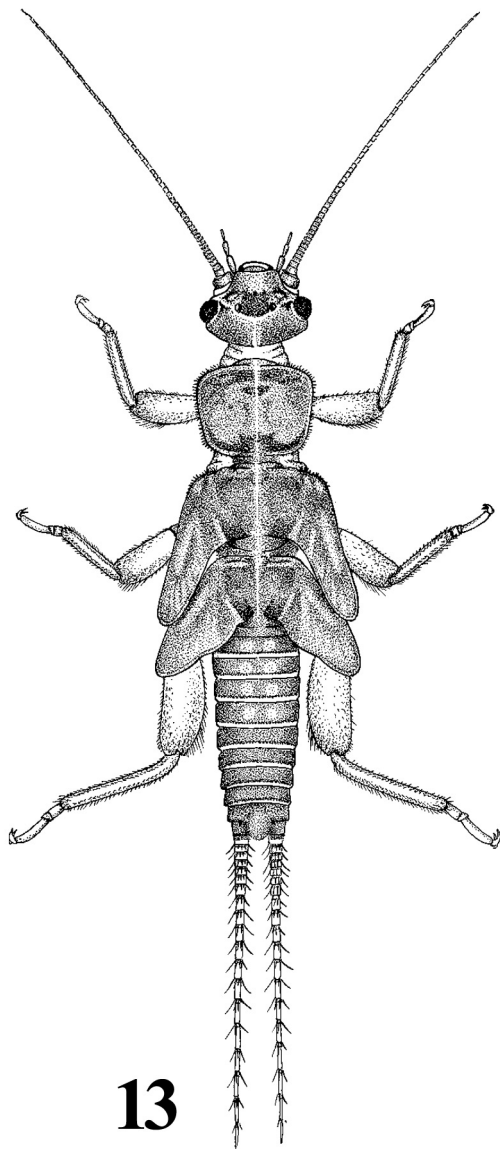
**Distribution.** The type locality of *N. jejudoensis* is the waterfalls near Seogwipo City on Jeju Island, South Korea, situated in the Korea Strait between the Sea of Japan and the South China Sea. The species was collected in December. The RFE specimens of *N. jejudoensis* were found in the small tributary stream of the Amur River Basin and streams flowing into the Sea of Japan in the vicinity of Vladivostok. Adult flight period extended from July to August. Single females were found until November. Presently, the distribution of *N. jejudoensis* may include forested streams on the southern mainland coast of the Sea of Japan.

### ***Nemoura jilinensis* Zhu & Yang 2003**

(Figs. 13–25)

Zhu & Yang 2003. Acta Zootaxon. Sin., 28(3): 474 (original description of male and female); Zwick 2010. Illiesia, 6(9): 83 (supplementary description of the epiproct and the male cerci; Yang *et al.* 2014:363.

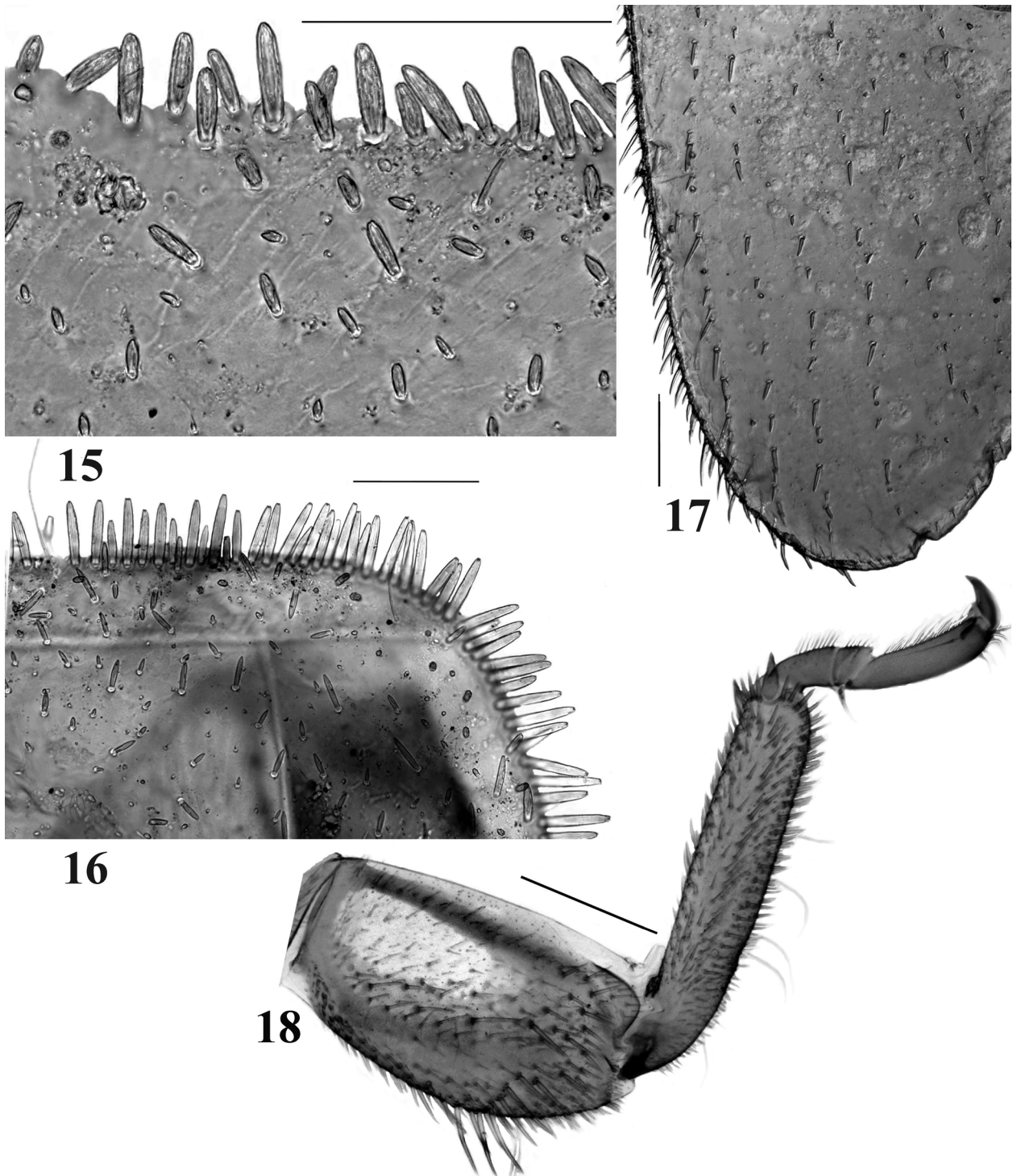
**Material examined.** Russian Far East, Khabarovskiy Region: 3 males, 3 females, Ussuri River Basin, unnamed creek on the right side of the Khor River near Srednekhorskiy Sett., N 47°40.572' E 136°155.595', 13.06.1995, coll. Tiunova T.; Primorskiy Region: 3 males, "Kedovaya Pad" Reserve, 19.08.1975, on light, coll. Klestov N.; 1 male, "Kedovaya Pad" Reserve, Kaskadnyi stream, tributary of the Kedrovaya R., 11.07.1977, coll. Nikolajeva E.; 2 males, Far Eastern Marine Biosphere Reserve, Gorshkova Bay, small unnamed stream, N 42°400.727' E 131°124.833', 1.07.1997, coll. Vshivkova T.; 2 males, 2 females, 2 nymphs, , creek Serebryannyi, near road to Slavyanka Sett., N 42°530.078' E 131°183.857', 29.05.2015, coll. Drozdov G.; 4 males, 4 females, 17 male larvae, 13 female larvae, 4 exuviae, Vladivostok, Kirova street, small urban forested stream, N 43°110.956' E 131°544.300', 18.04.–1.06.2015, rearing, coll. Teslenko V.; 1 male, 3 females, the same place, 1.05.2015, sweeping, coll. Teslenko V.; 1 male, 2 female larvae, Vladivostok, Rybachiy Sett., Meortvaya Pad Stream, N 42°080.417' E 132°021.346', 28.07.2015, coll. Teslenko V.; 1 female larvae the same place, 16.08.2015, coll. Teslenko V.



FIGURES 13–14. Larva of *Nemoura jilinensis*, habitus, not to scale.

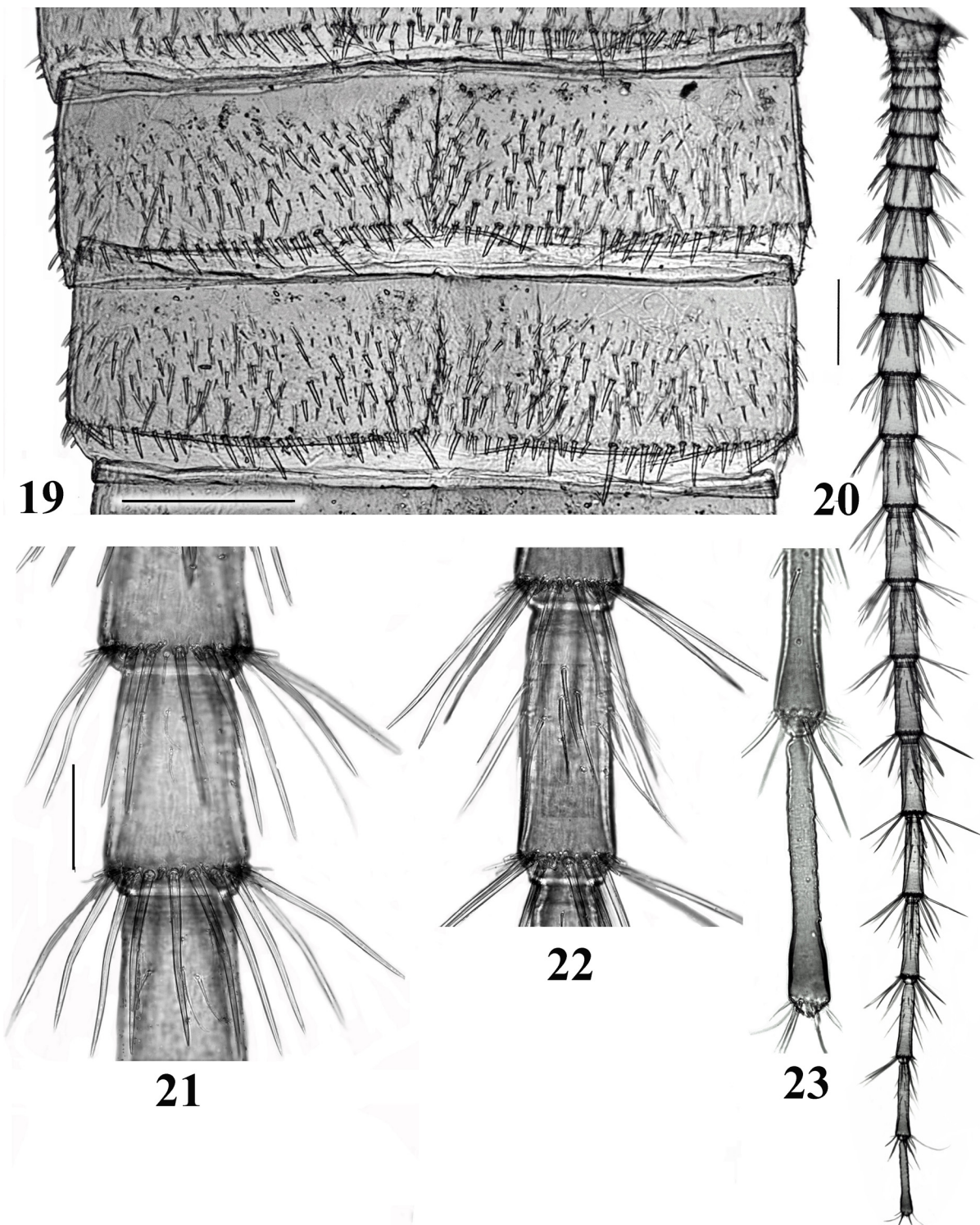
**Mature larva** (Figs. 13–23). Body stout, the male body length 7.4–8.2 mm; 7.8–9.5 mm in females. Body red-brown with no conspicuous pattern. Head stout with narrow red-brown stripes anteriorly on the tentorial callosities connected with a triangular red-brown spot in the interocellar area (Figs. 13, 14). Interocellar triangular spot with a short, longitudinal, narrow dark mark backward anterior ocellus. Epicranial arms and stem pale; a triangular, oblique red-brown patch near each compound eye and vertex forming a triangular patch directed toward the lateral ocellus. Occiput brown and slightly red-brown at the base. Antenna and pronotum as in *N. jejuensis*. Pronotum approximately 1.6 X wider than long. Pattern on the pronotum indistinct, with small red-brown spots that form a figure with a butterfly-like-shaped contour; a pair of triangular red-brown patches medially close to the posterior margin, and the anterior and posterior margins are medially darkened (Figs. 13, 14). Mesonotum and metanotum with V-shaped dark brown patches anteromedially, and a pattern not pronounced (Fig. 14). Legs pale. Femora lack an apical dark ring and a semi-oval pale patch close to inner edge basally (Fig. 14). The fore femur 1.9 X longer than wide (Fig. 18), and the hind femur 2.6 X longer than wide. Abdomen relatively slender, integument light and dull. Terga brown, posterior margins darkened, a pair of medial rounded pale spots on terga 1–8 forms a mesal

longitudinal band, and no lateral bands lacking (Figs 13, 14). Ventral surface of the body pale with brown patches. Cerci pale with 22-24 segments (Fig. 20); the cerci length equals 56–60% of body length; laterally segments of basal and middle subparallel, apical cercal segments club-like (Fig. 23).



**FIGURES 15–18.** Larva of *Nemoura jilinensis*. 15. Oval bristles near midline on anterior margin of pronotum. 16. Setae on disc and setal fringe of right anterior corner of pronotum. 17. Bristles on outer margin and rows of tiny setae on wing pad. 18. Right fore leg. Scale (mm): 15–17=0.1; 18=0.3.

Chaetotaxy of the head dorsally and antennal segments almost similar to *N. jejudensis*. Setal pronotal fringe relatively regular, consists of oval bristles slightly narrowed and rounded at the apex; short oval bristles present on the anterior and posterior margins medially (Fig. 15). Long, oval bristles occupy the anterior corners and lateral margins, where arranged close to each other and form an almost regular line (Fig. 16). Few longest bristles



**FIGURES 19–23.** Larva of *Nemoura jilinensis*. 19. Chaetotaxy of terga 5–6. 20. Left cercus. 21. Cercus segments 8–10. 22. Cercus segment 14. 23. Apical cercus segments. Scale (mm): 19, 20=0.3; 21–23=0.1.

occasionally at the posterior corners, the length of the longest cylindrical bristles equals 4.2% of pronotum width. The pronotum disc with occasional long hairs; patchy, tiny procumbent setae; and short, thin oval setae of various lengths and acute at the apexes (Figs. 15, 16). The outer wing pad margin with long sharp bristles (Fig. 17). Tiny setae in the sutures on the wing-pads and at the inner wing-pad margins small and pointed (Fig. 17). All femora have almost the same types of setae as in *N. jejudoensis*, except long, spine-like bristles in a regular arrangement forming a narrow, semi-ring near the apical  $\frac{1}{3}$  of the femur on the foreleg (Fig. 18); the middle leg and hind leg

have long spine bristles in an irregular arrangement. The longest spine-like bristles reach 36% of femur width on the fore leg and 26% on the hind legs (Fig. 18). Chaetotaxy of tibia and tarsi similar with *N. jejudoensis*. Terga are covered with numerous, densely placed acute bristles at variable lengths and a few fine, procumbent setae. The posterior terga margins feature acute bristles that are mostly short with one conspicuous lateral pair of relatively long, slightly curved, spine-like bristles that reach 35% of the segment's length on the posterior margin terga 5–6 (Fig. 19). Cercal segments have an apical whorl of bristles and apparent long, intercalary setae (Figs. 20, 22, 23). The apical whorl as in *N. jejudoensis* except number of long acute bristles, reaching 11 in the basal and middle cercal segments (Figs. 21, 22). The longest bristles reach 72% of the segment's length at cercal segments 14–16 (Fig. 22). Thin intercalary hairs increase in size from the basal to the middle portion of the cerci and then decrease at the distal cercal segments. The longest intercalary hairs reach 52% of the segment's length at cercal segments 13–19, where their number is approximately 10 (Fig. 22). Setal ring of apical cercal segments sparse, intercalary hairs noticeable (Fig. 23).

**Diagnosis.** Pronotal fringe relatively regular, not irregularly notched, oval bristles, narrowed and rounded at the apex with different lengths, the length of the longest cylindrical bristles at the posterior corners shorter than in *N. jejudoensis*, not exceeding 4.2% of pronotum width. On the foreleg, the long, spine-like bristles in a regular arrangement; the medium and hind legs have long, spine-like bristles in an irregular arrangement. The longest spine-like bristles reach approximately 36% of the femur's width on the fore and 26.0% on the hind leg. Paired spine-like bristles on terga 5–6 margins reach 35% the length of segment, other bristles short and densely placed. Cercal segments with conspicuous long intercalary thin hairs, the longest intercalary hairs reach 52% of the segment's length on cercal segments 13–19, where their number is approximately 10. In apical whorl the long acute bristles reach 72% of the segment's length at cercal segments 14–16, the number equals 11.

**Distribution.** The species was described from northeastern China. Type locality is Jilin, Hunjiang District (Zhu & Yang 2003). *Nemoura jilinensis* is also known from South Korea (Kangwondo) (Zwick 2010). Both of the above sites are in the Changbai Shan Mountains. The extreme northeastern spurs of the Changbai Shan Mountains form elevated areas of the Black Mountains Range on the South of the Russian Far East where the “Kedrovaya Pad” Reserve is located. My new record for *N. jilinensis* in the “Kedrovaya Pad” Reserve streams near small forested creeks near Slavayanka Sett. in the Far Eastern Marine Reserve in the urban vicinity of Vladivostok seems predictable. Additional collections of *N. jilinensis* from the Khor River indicate that this taxon is distributed in streams flowing from the western slopes of the Sikhote-Alin Mountain Range into the Amur River Basin. Mature nymphs were found in May–July, suggesting a flight period that extends to August in the Russian Far East. Specimens were collected from forested streams and springs, both with fast or slow discharge with a substrate of stones or gravel mixed with allochthonous material.

### ***Nemoura tripotini* Zwick 2010**

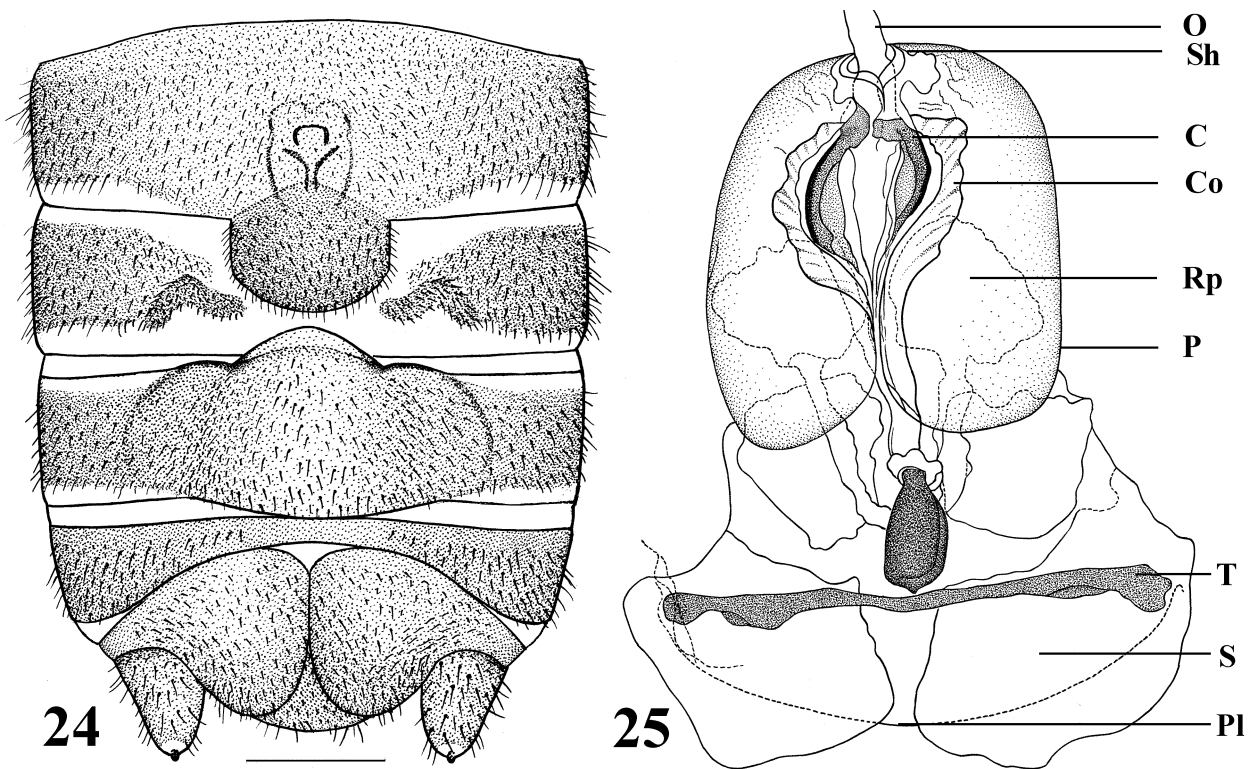
(Figs. 24–32)

Zwick 2010. *Illiesia*, 6(9):86 (original description of the male including epiproct, cercus and paraproct). Female unknown.

**Material examined.** Russian Far East, Primorskyi Region: 1 mature larva of male, Vladivostok, Rybachyi Sett., Meortvaya Pad Stream, N 42°08.417' E132°021.346', 23.07.2015, coll. Gorovaya E.; 1 male, 1 female, the same place, 28.07.2015, coll. Teslenko V.

**Description. Female** (Figs. 24, 25). Light brown, no pattern. Forewings 8.9 mm long. Sterna 1–6 are membranous. Sternum 7 extended medially and forms relatively small and narrow weakly sclerotized pregenital plate that covers the middle of sternum 8 completely (Fig. 24). Posterior margin of the pregenital plate is slightly arcuate, lateral margins straight, anterior edge triangular elongated and poorly defined (Figs. 24, 25). Sternum 8 shortened, a pair of triangular slightly sclerotized sclerites on the posterior margin arranges the paragenital plate. Sternum 9 extended medially due to rounded triangular projection on the anterior margin. In cleared slide mounted genitalia (Fig. 25), two vaginal unpigmented lobes (S) with curved posterior edges are faintly visible. Subgenital plate consists of a narrow transversal weakly sclerotized sclerite (T) connected with a short tear-shaped, heavily sclerotized sclerite. A pair of rounded internally sclerotized rough pockets (Rp) inside of the pouch may be visible by transparency. Pouch (P) large, bean-shaped; its dorsal face anteriorly with a small rounded collar-like shield

(Sh) and oviduct (O). Below small collar-like shield (Sh) an additional shield with large shawl collar (Co) and wavy margins are visible. A shawl collar of the pouch rounds laterally a pair of cap-shaped vaginal sclerites (C) strongly sclerotized dorsally (Fig 25). Additional details of the internal folds and vaginal sclerites are presented in Fig. 25.



**FIGURES 24–25.** Female of *Nemoura tripotini*. 24. Abdominal tip, cleared, ventral. 25. Vaginal complex, cleared, dorsal. C—cap-shaped vaginal sclerite, Co—shawl collar with wavy margins; O—oviduct, P—bean-shaped pouch, PI—pregenital plate, Rp—rounded roughened pocket, S—vaginal lobe, Sh—collar-like shield, T—transverse vaginal sclerite of subgenital plate. Scale (mm): 24=0.3; 25=0.1.

**Mature larva** (Figs. 26–32), preliminary description. Body relatively slender, the male body length is 6.8 mm. Color brown with no conspicuous pattern. Head with dark-brown tentorial callosities, the interocellar area without spot, occiput is darker (Fig. 26). Pronotum lacking a pattern; rectangular with rounded corners, approximately 1.5 X wider than long. Mesonotum and metanotum brown with U-shaped dark brown band connected scutellum area and base of the wing pads. Legs mainly pale, femora pale, tibia darkened on  $\frac{2}{3}$  of the length. The fore femur is 2.6 X longer than wide, and the hind femur 3.3 X longer than wide. Abdomen relatively slender, terga brownish, without a distinct pattern.

**Chaetotaxy** distinct. Dorsally, chaetotaxy of the head and antennal segments similar to *N. jejudoensis* and *N. jilinensis* except numerous tiny cylindrical setae of various sizes with blunt apices. Setal fringe around the pronotum wavy, consisting of occasional long hairs, slender cylindrical bristles of the different length that are slightly narrowed to the apex, apex irregularly notched (Figs. 27, 28). Long, irregularly notched bristles observe on the anterior and posterior pronotal corners, the length of the longest bristles long reach 8% of the pronotal width. The pronotal disc with occasional long hairs and tiny cylindrical setae of various lengths with blunt apices (Figs. 27, 28); most of the head surface covered in the same kind of setae. The outer wing pad margin covered with slender irregularly notched bristles (Fig. 29), tiny oval setae in the lines on the wing-pads; on the inner wing-pad edge are blunt. All femora with fine procumbent setae, short and long slender blunt bristles. Setal fringe on the outer femur margin begins from the second  $\frac{1}{2}$  of the length on the fore leg (Fig. 30) and from the base of the length on the hind leg; setal fringe includes a few thin, long hairs; the longest, slender irregularly notched bristles occur in the apical  $\frac{1}{2}$  in an irregular arrangement. The longest slender irregularly notched bristles reach approximately 67% of the femur's width on the fore leg and 50% on the hind leg. Chaetotaxy of tibia and tarsi very similar with *N. jejudoensis* and *N. jilinensis*, including the length of the spine-like bristles along outer and inner edges, except the

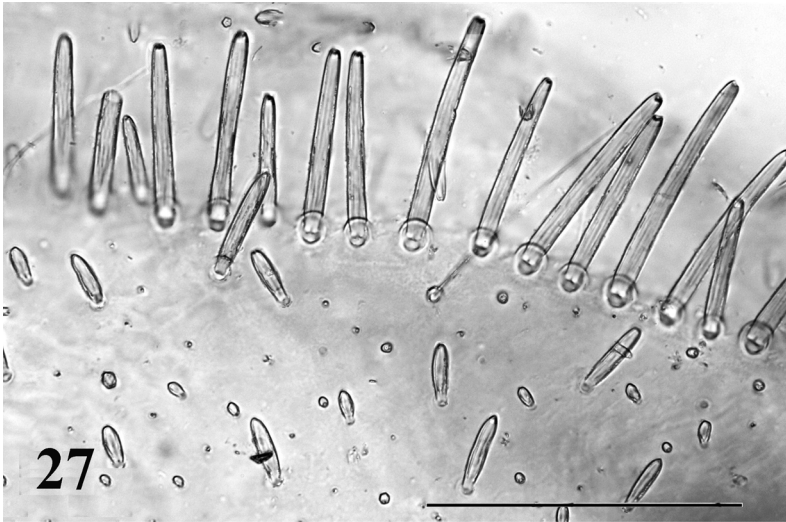
hind leg, where setal fringe along the outer tibia's edge includes spine-like bristles with length equals the tibia width. Terga covered with slender irregularly notched bristles of variable lengths (Fig. 31). The posterior tergal margins feature slender irregularly notched bristles that are mostly short, there is one conspicuous pair of long, slightly curved, and slender irregularly notched bristles reaching 50% of the length of segment on the posterior margin of terga 5–6 (Figs. 31, 32).

**Diagnosis.** Pronotal setal fringe irregular comprising slender cylindrical bristles slightly narrowed and irregularly notched at the apex; the longest bristles at the posterior corners longer than in the other species reaching 8% of the pronotal width. On the leg, the long, slender irregularly notched bristles in an irregular arrangement, also longer than in other species, and reach approximately 67% of the femur's width on the fore leg and 50% of the length on the hind leg. Paired long slender irregularly notched bristles on terga 5–6 margins reach 50% of length of the segment, other bristles short, innumerable and sparsely placed.

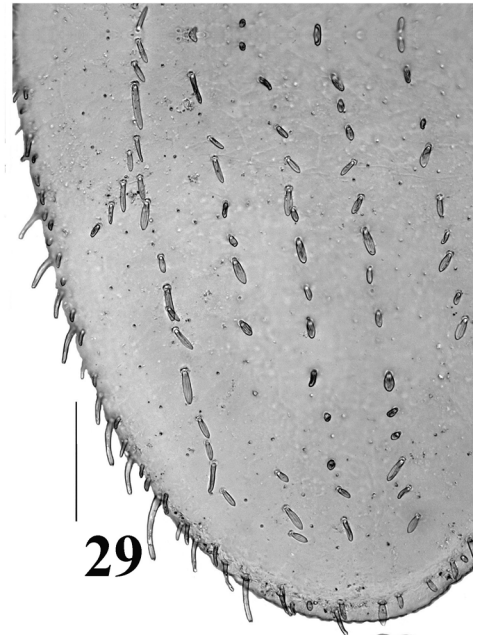
**Distribution.** This species was known only from the type locality streams on Jirisan Mountain in the southern South Korea and were collected by a Malaise trap at alt. 400-700 m from June to August (Zwick 2010). The RFE specimens of *N. tripotini* were collected from a forested stream with moderately fast flow and stony substrate mixed with sandy patches. At this site, *N. tripotini* was sympatric with *N. jejuensis* and *N. jilinensis*. *Nemoura tripotini* was not common in the urban Meortvaya Pad Stream. Repeated surveys failed to collect additional material.



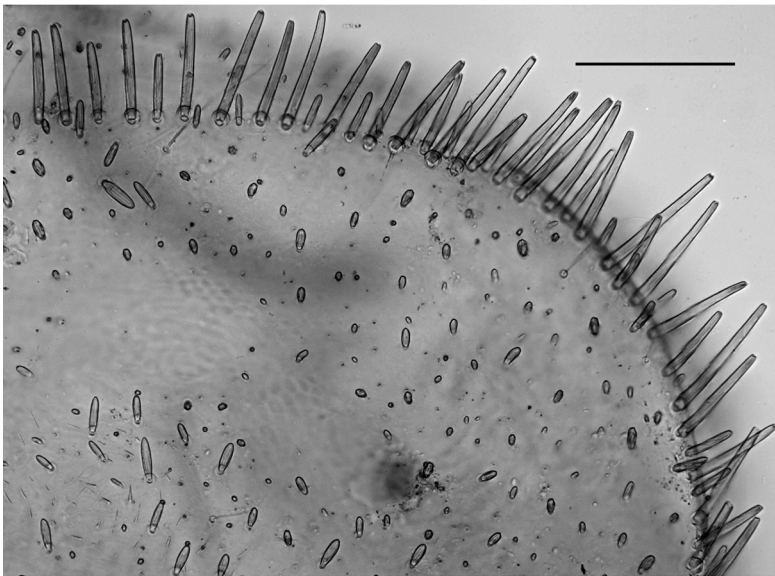
**FIGURE 26.** Larva of *Nemoura tripotini*, male in dorsal view, not to scale.



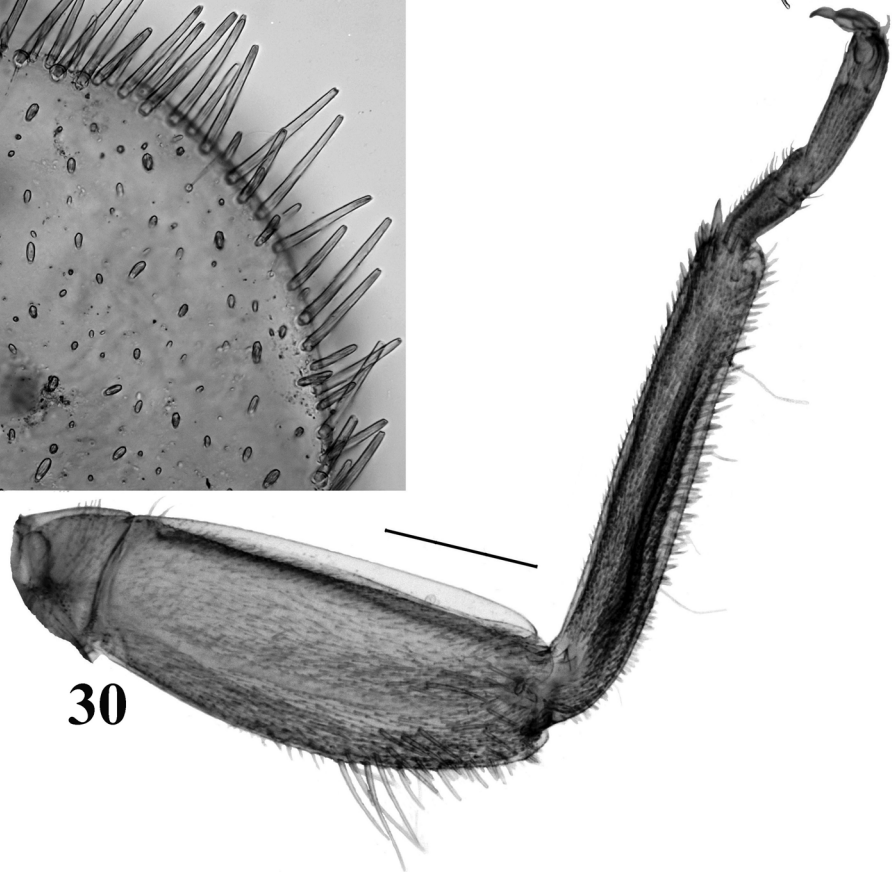
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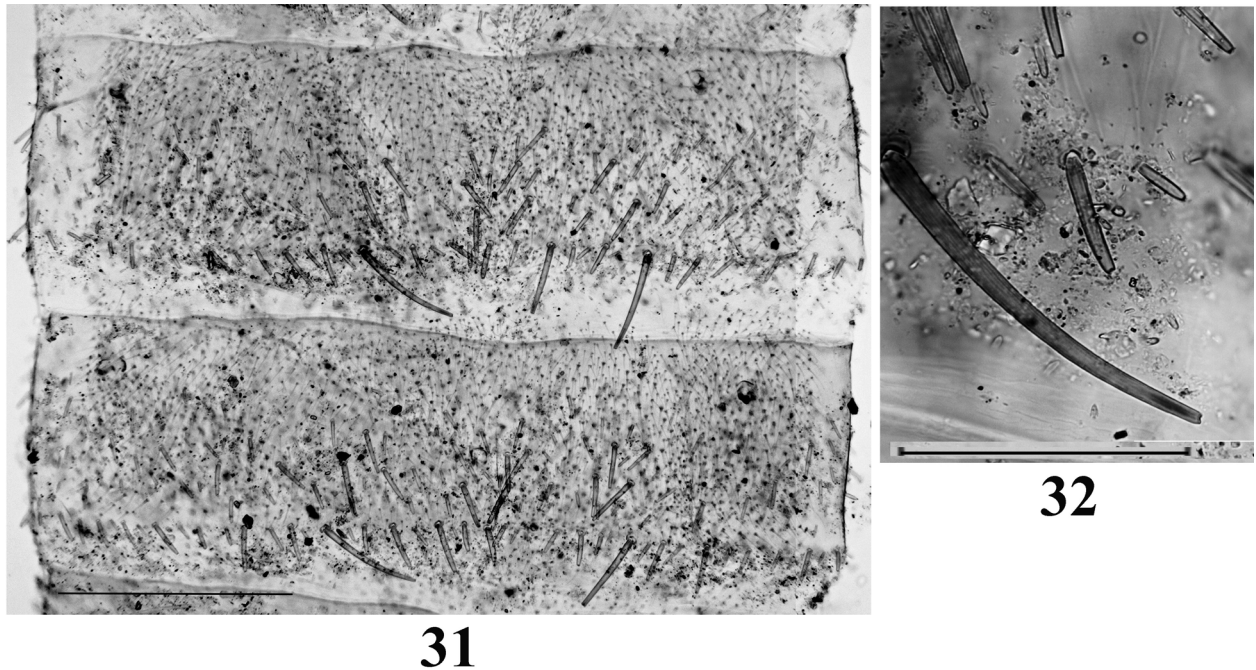


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30

**FIGURES 27–30.** Larva of *Nemoura tripotini*. 27. Cylindrical irregularly notched bristles near midline on anterior margin of pronotum. 28. Chaetotaxy on disc and irregular setal fringe of right anterior pronotal corner. 29. Cylindrical irregularly notched bristles on outer margin and rows of tiny oval setae on wing pad. 30. Right fore leg. Scale (mm): 27–29=0.1; 30=0.3.



**FIGURES 31–32.** Larva of *Nemoura tripotini*. 31. Chaetotaxy of terga 5–6. 32. The longest slender irregularly notched bristles on posterior margin of terga 5–6. Scale (mm): 31=0.3; 32=0.1.

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