



УДК 576.895.771(575.2)

TO SYSTEMATICS OF THE GENUS *STEGOPTERNA* ENDERLEIN, 1930 (DIPTERA: SIMULIIDAE)

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ABSTRACT

The collection of blackflies (Diptera: Simuliidae) of the Zoological Institute of the Russian Academy of Sciences is revised. Redescriptions of 11 species of the genus *Stegopterna* Enderlein, known from the territory of the former USSR are given. A new species, *S. tundrensis* sp. nov. is described. Key to all 18 species of the genus is provided.

Key words: blackflies, distribution, morphology, Simuliidae, *Stegopterna*, systematics

Submitted December 20, 2008; accepted May 15, 2009.

К СИСТЕМАТИКЕ РОДА *STEGOPTERNA* ENDERLEIN, 1930 (DIPTERA: SIMULIIDAE)

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РЕЗЮМЕ

Проведена ревизия фондовой коллекции мошек (Diptera: Simuliidae) Зоологического института Российской академии наук. Выполнены переписания 11 видов рода *Stegopterna* Enderlein, 1930, известных с территории бывшего СССР. Описан новый вид *S. tundrensis* sp. nov. Приведен определительный ключ для всех 18 видов рода.

Ключевые слова: мошки, распространение, морфология, Simuliidae, *Stegopterna*, систематика

Представлена 20 декабря 2008; принята 15 мая 2009.

INTRODUCTION

The monobasic genus *Stegopterna* with the type species *Stegopterna richteri* Enderlein, 1930 was described by Enderlein (1930). Later on, this species was considered as a junior synonym of *Melusina trigonium* Lundström, 1911 (Crosskey and Howard 1997). The original description of the genus and its type species was very incomplete, and did not include

all stages of development. Species included to the genus *Stegopterna* by different authors were genera – *Cnetha*, *Cnephia*, and *Prosimulium* (Malloch 1914; Enderlein 1929; Rubzov 1940; Stone 1952). Some descriptions and drawings (especially of early authors) are incomplete. Moreover, several subspecies of *S. richteri* (= *trigonium*) described by Rubzov and Carlsson (1965) and Rubzov (1971) were recognized as full species later (Yankovsky 2002). In the latter work, the characters of these subspecies were given very briefly.

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In this paper, the detailed re-descriptions and drawings of *Stegopterna* spp. from the territory of the former USSR are given. A new species *S. tundrensis* sp. nov. from Yakutia and Chukotka is described.

MATERIAL AND METHODS

171 simuliid specimens of 11 *Stegopterna* spp. inhabiting territory of the former USSR were examined. For all these species (except for *S. trigonium* Lundström, 1911) the type series housing in the collection of the Zoological institute of the Russian Academy of Sciences, Saint Petersburg, Russia (hereinafter ZIN) were examined.

SYSTEMATICS

Family Simuliidae Newman, 1834

Genus *Stegopterna* Enderlein, 1930

Enderlein 1930: 89; Rubzov 1956: 270, 1961: 205; Rubzov and Yankovsky 1984: 64; Yankovsky 2002: 172; Adler et al. 2004: 283.

Type-species: Stegopterna richteri Enderlein, 1930 (= *Melusina trigonium* Lundström, 1911), by original designation.

Diagnosis. *Imago.* Antennae with 11 articles. Body black, dark-gray or brown, scutum without silvery reflecting spots. Wings with elongated ($\frac{1}{3}$ of wing length) basal radial cell and small basal medial cell. Vein Rs not bifurcated, Sc and R1 with both hairlike and spiniform setae. Legs usually dark. Calcipala large, $\frac{1}{3}$ – $\frac{3}{4}$ of width of distal part of hind leg, pedisulcus not developed or in form of few weak wrinkles. Fore basitarsi thin, cylindrical.

Male. Gonocoxites longer than gonostyli, gonostyli conical, sometimes curved inwards in distal part, armed with 2 apical spinules. Ventral plate lamellate, weakly curved, in some species with small medial keel. Median sclerite bifurcated in distal part, its length more than width. Parameres of numerous very fine spines, in several species some of them distinctly larger than others.

Female. Claws with very small basal tooth or toothless. Hypogynal valves, as a rule, simple, without projections. Branches of genital fork with longitudinal comblike anterolateral apodeme. Surface of spermatheca smooth or with polygonal pattern.

Larva. Hypostomal teeth arranged in 3 distinct groups, so it seems that fore side of hypostoma bears 3 large apodemes. Postgenal cleft shallow, triangular, rectangular or rounded anteriorly. In primary fan of premandibles 38–55, in secondary fan 13–28, in median fan 8–15 rays. Mandible serration saw-like. Abdominal posterior circlet of 50–78 rows with 7–17 hooklets in each row. Segment IX of addomen with transverse midventral bulge. Rectal organ of 3 simple lobes.

Pupa. Gills of 12, rarely 10, thin filaments, arranged in 2 or 3 divergent groups. Caudal spines long and curved. Laterally on last abdominal segment large curved hooks. Cocoon shapeless, friable woven, as a rule partly or completely covering abdomen.

Distribution. Holarctic.

Species included: *S. acra* Currie et al., 2004, *S. asema* Rubzov, 1956, *S. byrrangii* Yankovsky, 2000, *S. decafilis* Rubzov, 1971, *S. dentata* Rubzov et Carlsson, 1965, *S. diplomutata* Currie et Hanter, 2003, *S. duodecimata* (Rubzov, 1940), *S. emergens* (Stone, 1952), *S. haematophaga* Rubzov et Carlsson, 1965, *S. hamuligera* Yankovsky, 1977, *S. longicoxa* Rubzov, 1971, *S. majalis* Rubzov et Carlsson, 1965, *S. mutata* (Malloch, 1914), *S. nukabirana* Ono, 1977, *S. permutedata* (Dyar et Shannon, 1927), *S. takeshii* Takaoka, 2005, *S. trigonium* (Lundström, 1911), *S. tshukotensis* Rubzov, 1971, *S. tundrensis* Yankovsky et Aybulatov sp.nov., *S. xantha* Currie et al., 2004.

1. *Stegopterna asema* Rubzov, 1956

(Fig. 1)

Stegopterna asema Rubzov 1956: 275, fig. 88, 1961: 207.
Simulium sibirica Enderlein, 1930 sensu Rubzov 1940: 309.

Description. *Male.* unknown.

Female. Body length 2.5–3 mm. Scutum greyish black, with dense rough silvery hairs; legs completely black, with silvery hairs. Calcipala very large, more than $\frac{3}{4}$ as wide as distal part of basitarsus and only half as long as hind tarsomere I; claws toothless. Antennae short, completely black. Frons and clypeus grey, with dense long silvery hairs; frons relatively narrow, its width twice the height. Mouthparts haematophagous, mandible with $25\text{--}26 \times 12\text{--}13$, maxillar lacinia with $10\text{--}11 \times 15\text{--}16$ teeth. Maxillar palpi thickened, palpomere V half as long as palpomeres III+IV combined, palpomere III widened; sensory vesicle more than $\frac{1}{3}$ the length of palpomere III. Abdomen

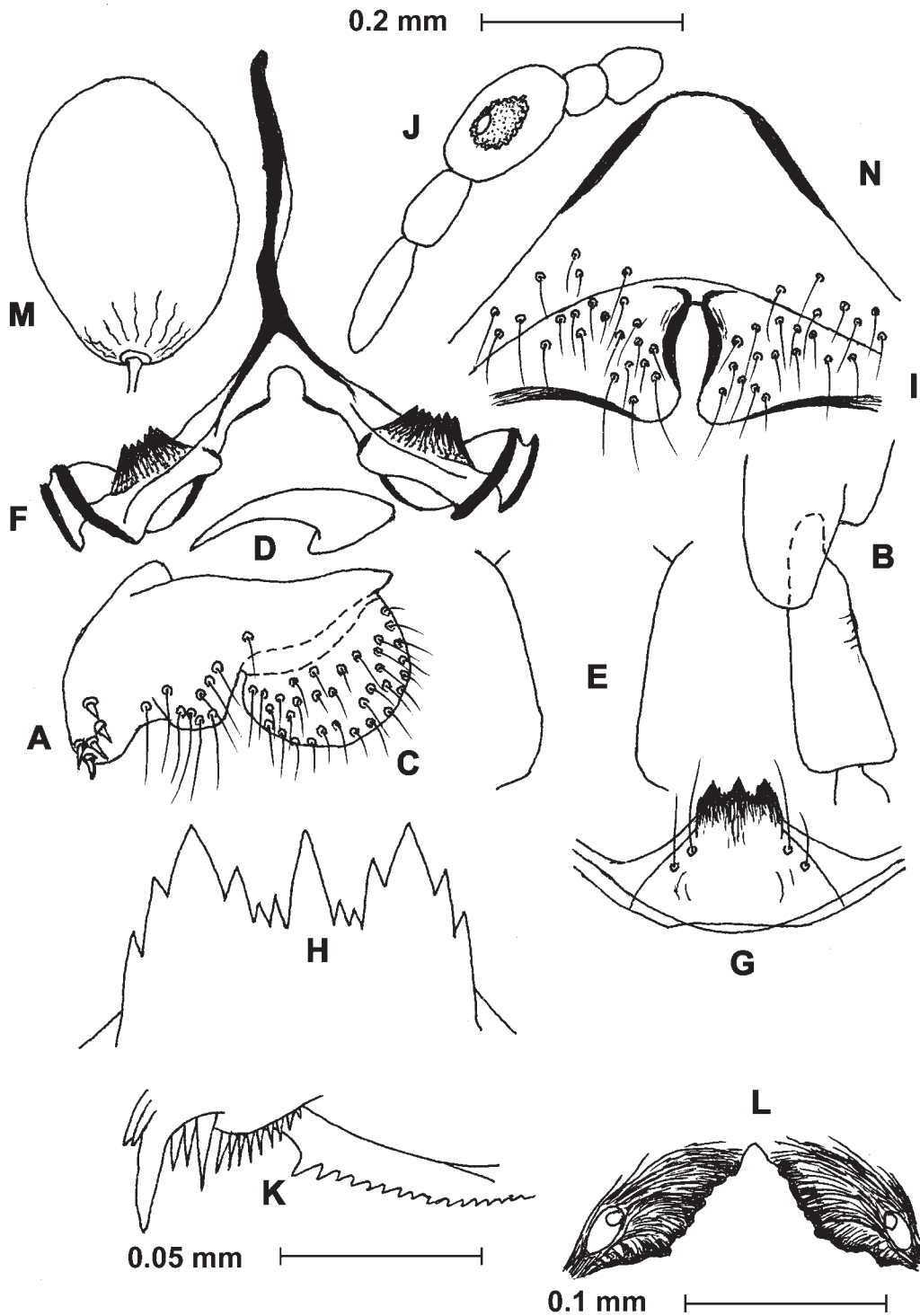


Fig. 1. *Stegopterna asema* Rubzov, 1956, female lectotype (A – F, I, J, M, N): A – anal lobes; B – calcipala; C – cerci; D – claws; E – frons; F – genital fork; I – hypogynal valves; J – maxillary palp; M – spermatheca; N – abdominal sternite VIII. Larva, lectotype (G, H, K, L): G – hypostoma; H – hypostomal teeth; K – mandibular teeth; L – postgenal cleft. Scale bar: 0.2 mm = E, G, J, L; 0.1 mm = A, B, C, F, I, M, N; 0.05 mm = H, K.

completely black. Stem of genital fork not widened distally, subequal to branches in length, anterolateral apodeme of branches elongated, comblike, with 4–6 notches, half of branch in length; posteromedial apodeme weakly developed; posterior cleft of genital fork wide, semioval, 1.2–1.3 times as wide as long. Abdominal sternite VIII weakly sclerotized, moderately protruding anteriorly. Hypogynal valves half as long as width of median part of sternite VIII; posteromedial angles rounded and moderately extended posteriorly, anteromedial angles and medial edges of valves distinctly sclerotized. Anal lobes 2–2.5 times as high as long, anal lobes twice as high and 1.5 times as long as cerci, cerci twice as high as long; lower blade of anal lobes with 4–5 spiniform setae. Spermatheca oval, 1.3 times as long as wide, surface smooth, only with short longitudinal wrinkles proximally.

Larva. Body length 6.0–6.5 mm. Head capsule yellow to brown, head pattern dark brown. Antennae slightly shorter than stalks of premandibles. Primary fan of premandibles with 42–45 rays, secondary fan with 21–23, median fan with 10–12 rays. Median and lateral hypostomal teeth subequal in length; either side of hypostoma with 2 sublateral setae. Postgenal cleft moderately developed, triangular, deep as compared to that in most of *Stegopterna* species. Mandible with outer teeth small, apical tooth 3–4 times as long as, outer teeth, and 1.6–1.7 times as long as the width of preapical tooth I; preapical tooth III slightly longer than preapical teeth I and II; inner mandibular teeth 8–9; mandibular serration of 15–17 notches gradually decreasing posteriorly. Posterior circlet of 54–56 rows with 7–12 hooklets per row; lower branches of anal sclerite extended as far as row X–XI; hooklets near anal sclerite not developed.

Pupa. Body length 3–4 mm. Gills of 12 filaments, 1.5 times as long as body of pupa, scheme of divergence (2+2)+(2+2+2+2), in shape of a narrow cluster; angle between basal parts of upper and lower filaments about 30°; distal parts of filaments not threadlike. Head and thorax with dense microtubercles; trichomes unbranched. Cocoon completely covering abdomen of pupa.

Type material. Female lectotype (ZIN, slide 4080), Primorskiy Territory, Ussuriysk District, Krivoy Spring, 25 May 1939, coll. A.S. Monchadskiy.

Paralectotypes: 1 female (ZIN, slide 4078), same data; 2 June 1939; 2 females (ZIN, slides 4081, 4083), same data, 26 May 1939, coll. A.S. Monchadskiy.

Additional material. 1 larva with gill histoblast (ZIN, slide 17085), Khabarovsk Territory, affluent of Nimakan River, Elga, July – August 1963, coll. Shimanskiy; 7 females (pinned), Primorskiy Territory, Krivoy Spring, 21 May – 10 June 1939, coll. A.V. Gutsevich.

Distribution. Russia: SE Asiatic part (Yankovsky 2002).

2. *Stegopterna byrrangii* Yankovsky, 2000 (Fig. 2)

Stegopterna byrrangii Yankovsky 2000: 380, fig. 1.

Description. *Male.* Body and legs completely dark. Hind basitarsi not widened, 5–6 times as long as wide; calcipala small, half as wide as distal part of basitarsus. Gonocoxites 2 times as long as gonostyli, slightly longer than wide. Gonostyli tapered and curved inwards (width in basal part 1.7 times the width in distal part), in ventral view 1.2–1.3 times as long as wide at base. Ventral plate 1.6–1.7 times as long as wide (ventral view), medial keel moderately developed. Gonopleurites narrowly triangular; parameres with 3 large setae and numerous very fine spinelets. Length of median sclerite 6–7 times its minimum width; sclerite bifurcated in apical one-fourth, branches pointed.

Female. Body completely black; legs dark. Calcipala small, slightly narrower than half-width of basitarsus in distal part and shorter than $\frac{1}{4}$ the length of hind tarsomere I; claws with very small but distinct pointed basal tooth. Frons relatively wide, its height slightly exceeding the minimum width. Mouthparts not haematophagous. Maxillar palpi thin, palpomeres III+IV 1.4–1.6 times as long as palpomere V, palpomere III narrow; sensory vesicle less than $\frac{1}{4}$ of segment length. Abdomen completely black. Stem of genital fork moderately widened distally, 3 times as long as branches. Anterolateral apodeme of branches compact, heavily sclerotized, comb-like with 9–10 notches, somewhat shorter than one-third of branch length. Genital fork with a large tapered blade between anterolateral apodeme and basal part of stem; branches broadly divergent, posteromedial apodeme not developed; posterior cleft of genital fork very wide, rounded anteriorly. Abdominal sternite VIII strongly sclerotized, not protruding anteriorly. Hypogynal valves very large, twice as long as median part of sternite VIII; anteromedial angles of valves rostriform, strongly sclerotized.

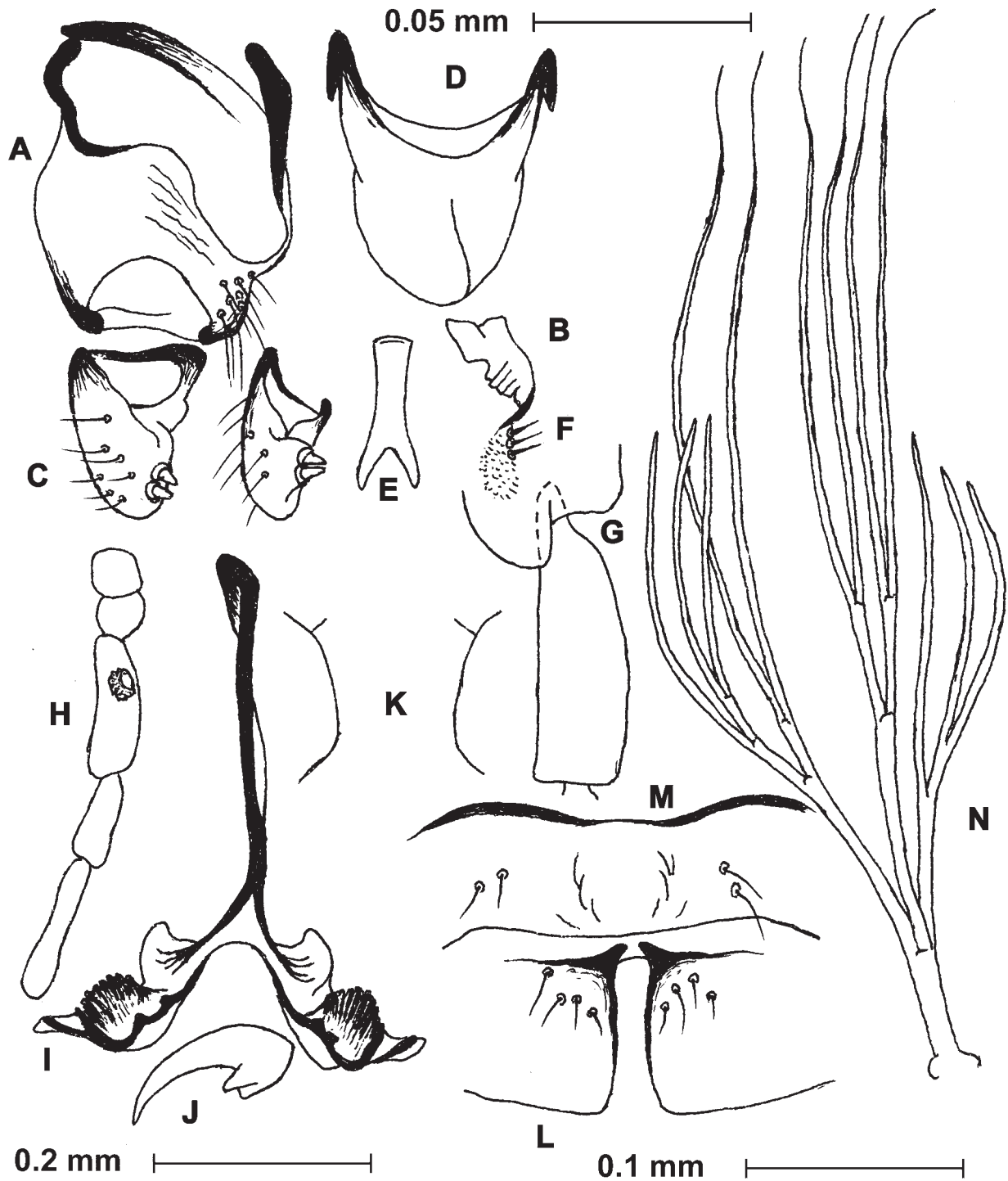


Fig. 2. *Stegopterna byrrangii* Yankovsky, 2000, male paratype (A–F): A – gonocoxite; B – gonopleurites; C – gonostylus; D – ventral plate; E – median sclerite; F – paramere. Female, holotype (G–M): G – calcipala; H – maxillary palp; I – genital fork; J – claws; K – frons; L – hypogynal valves; M – abdominal sternite VIII. Pupa, paratype: N – gills. Scale bar: 0.2 mm = H, K, N; 0.1 mm = A, B, C, D, E, F, G, L, M; 0.05 mm = J.

Larva. unknown.

Pupa. Gills of 12 filaments on 3 stems, scheme of divergence 3+(2+2)+(2+3), angle between basal parts of upper and lower filaments about 45°. Filaments IV–IX very long, 2.5–3 times as long as body of pupa, distal parts of filaments threadlike; remaining filaments half as long as IV–IX, distal parts not thread-like. Cocoon completely covering abdomen of pupa.

Type material. Female holotype (reared from pupa) (ZIN, slide 20039), Taymyr Peninsula, Kondoy River, 5 August 1968, coll. N.P. Mezenev.

Paratype: 1 male (reared from pupa), (ZIN, slide 20040), same data.

Distribution. Russia: Taymyr Peninsula (Yankovsky 2002).

3. *Stegopterna decafilis* Rubzov, 1971

(Fig. 3)

Stegopterna sibirica decafilis Rubzov 1971: 177, fig. 6.

Stegopterna decafilis Adler et al. 2004: 285, figs. 10.129, 10.283, 10.574, 10.724.

Description. *Male*. Body length 2.5–3 mm. Scutum velvet black; legs completely brown. Hind basitarsus not widened, about 6 times as long as wide; calcipala large. Gonocoxites elongated, 1.5 times as long as gonostyli, twice as long as wide. Gonostyli not curved inwards, in ventral view 2.5 times as long as as wide at base, posterior margin transversely cut. Ventral plate 1.6 times as wide as long (ventral view), medial keel not developed. Gonopleurites widely triangular, parameres with 11–12 short, but clear spines, and numerous very fine spinelets.

Female. Body completely black; legs dark. Calcipala very large, about 0.75 times as wide as basitarsus in distal part and slightly shorter than half-length hind tarsomere II; claws with small but clear pointed basal tooth. Mouthparts not haematophagous. Maxillar palpi thin, palpomeres III+IV 1.4 times as long as palpomere V, palpomere III narrow; sensory vesicleless than ¼ length of palpomere III. Stem of genital fork moderately widened distally, slightly longer branches. Anterolateral apodeme of branches elongate, heavily sclerotized, comb-like with 5–6 notches, half as long as branch. Posteromedial apodeme distinct; posterior cleft of genital fork peculiarly deep, rounded anteriorly, its length sub equal to width. Abdominal sternite VIII strongly sclerotized < moderately protruding anteriorly. Hypogynal valves simple, 0.77 times as long

as median part of sternite VIII; antteromedial angles of valves elongate, moderately sclerotized. Anal lobes 1.6–1.8 times, cerci twice as high as long; lower blade of anal lobes with 7 spiniform setae. Spermatheca rounded (length subequal to width).

Larva. Body length about 6 mm. Head capsule yellow to brown, head pattern dark brown. Antennae longer than stalks of premandibles, segments I+II combined 1.3 times as long as segment III. Primary fan of premandibles with 42–45 rays, secondary fan with 23–25, median fan with 8–10 rays. Median hypostomal tooth markedly shorter than lateral teeth; either side of hypostoma with two sublateral setae. Postgenal cleft small, triangular. Mandibles with small outer teeth; apical tooth 2–3 times as long as outer teeth; preapical teeth I and II small, preapical tooth III large, about 0.5 times as long as apical tooth, 3 times as long as preapical teeth I and II; inner mandibular teeth 8–10; mandibular serration of 1–2 large and 10–12 very small notches gradually decreasing posteriorly. Posterior circlet of 72–78 rows with 9–12 hooklets in each row; lower branches of anal sclerite extended as far as to rows IX–X; hooklets near anal sclerite not developed.

Pupa. Body length 2.5–2.6 mm. Gills 1.5 times as long as pupal body, of 10 filaments on 3 long and narrow stems (length of median and lower stems 10–15 times their diameter), scheme of divergence (2+2)+2+(2+2), angle between basal parts of upper and lower filaments 60–90°; all filaments subequal in length, distal parts of filaments threadlike. Cocoon shapeless, completely or partly covering abdomen of pupa.

Type material. Larva holotype with gill histoblast (ZIN, slide 19716), Yakutia, Kular village, Ilistiy Spring, 15 August 1968, coll. E.I. Worobez.

Paratypes: 1 larva with gill histoblast (ZIN, slide 19736), Yakutia, Ust'-Yansk District, Kular village, Kiyeng-Yurokh Spring, 22 July 1968, coll. Vorobez; 1 larva with gill histoblast (ZIN, slide 19737), Yakutia, Ust'-Yansk District, Kular vilage, Pologiy Spring, 5 July 1968, coll. E.I. Worobez.

Additional material. 1 female (reared from pupa) (ZIN, slide 21149), Yakutia, Olyokmin District, Troitskoye village, 31 July 1972, coll. E.I. Worobez; 3 larvae with gill histoblast (ZIN, slides. 1963, 1970, 1976), Khabarovsk Territory, Okhotsk, spring 12 km, 13 July 1947, coll. Chagin; 1 larva with gill histoblast (ZIN, slide 19734), Yakutia, Omoloy, Mamanya River, 13 July 1968, coll. E.I. Worobez; 1 larva with gill

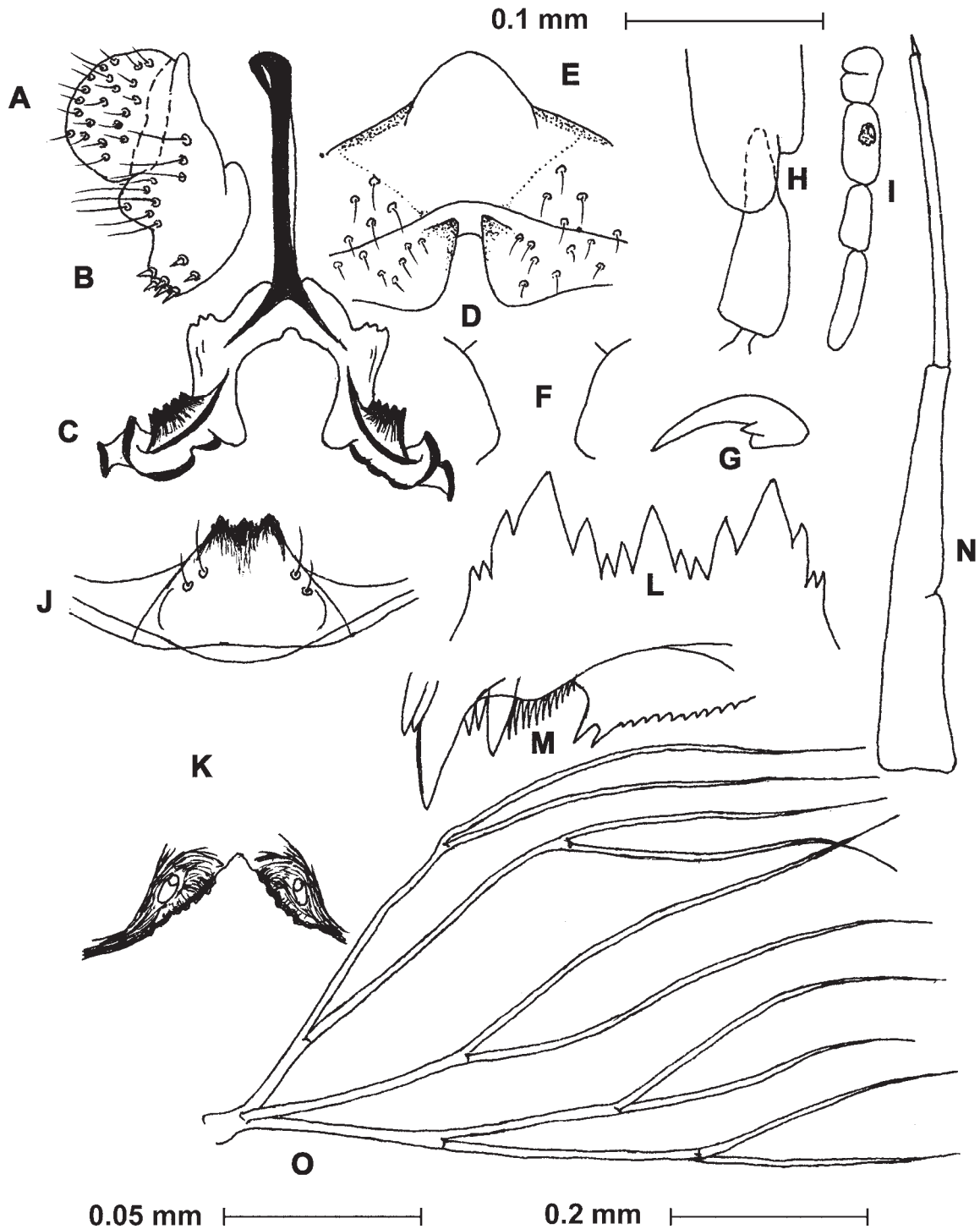


Fig. 3. *Stegopterna decafilis* Rubzov, 1971, female (A–I): A – cerci; B – anal lobes; C – genital fork; D – hypogynal valves; E – abdominal sternite VIII; F – frons; G – claws; H – calcipala; I – maxillary palp. Larva, holotype (J–N): J – hypostoma; K – postgenal cleft; L – hypostomal teeth; M – mandibular teeth; N – antenna. Pupa: O – gills. Scale bar: 0.2 mm = F, I, J, K, O; 0.1 mm = A, B, C, D, E, H, N; 0.05 mm = G, L, M.

histoblast (ZIN, slide 19738), Yakutia, Ust'-Yansk Dist, Kular village, Pologiy Spring, 5 July 1968, coll. E.I. Worobez; 1 larva with gill histoblast (ZIN, slide 20067), Yakutia, Omoloy, Suor-Utalaakh Spring, 15 July 1967, coll. E.I. Worobez; 1 larva with gill histoblast (ZIN, slide 21510), Magadan Province, near Bilibino, 1971, coll. U.D. Bodrova.

Distribution. Russia: Yakutia, Chukotka (Yankovsky 2002); USA: Alaska; Canada: Yukon (Adler et al. 2004).

Remarks. In the original description (Rubzov 1971), *Stegopterna sibirica decafilis* was erroneously designated as "sp. n.", though from the name proposed it was clear, that a new subspecies had been described. Later, *decafilis* was always considered as a species name (by Rubzov and other authors). Males of this species were not recorded in the Palearctic and known only from the Nearctic. Description of males was based on Adler et al. (2004), because of males of *S. decafilis* are absent in the ZIN collection.

4. *Stegopterna dentata* Rubzov et Carlsson, 1965 (Fig. 4)

Stegopterna richteri dentata Rubzov and Carlsson 1965: 15, fig. 6.

Stegopterna dentata Yankovskiy 2000: 174, figs. 44, 45, 46, 47.

Description. *Male.* Body length 3 mm. Scutum and legs completely black. Hind basitarsi distinctly widened, 3 times as long as wide; calcipala medium-sized, half as wide as distal part of hind basitarsus. Gonocoxites widened, 1.3 times as long as gonostyli, 1.5 times as wide as long. Gonostyli tapered, not curved inwards, in ventral view 1.6–1.7 times as long as wide at base. Ventral plate wide, 1.6–1.7 times as wide as long (ventral view), medial keel distinct. Gonopleurites peculiar elongate, strongly sclerotized at basal margin, and distally with 12–14 very long setae; parameres with 9–10 clearly distinguishable sclerotized spines of moderate length. Length of median sclerite 3 times its minimum width; sclerite bifurcated at half-length, branches thin.

Female. Body length 3 mm. Body completely black; legs dark brown. Calcipala moderate, half as wide as distal part of hind basitarsus, one-third as long as hind tarsomere II; claws toothless. Frons relatively narrow, its height twice the minimum width. Mouthparts haematophagous; mandible with 23–25 × 15–16, maxillar lacinia with 8–10 × 13–15 teeth. Maxillar palpi thin, palpomeres III+IV com-

bined, 1.3 times as long as palpomere V; palpomere III narrow; sensory vesicle one-third the length of palpomere III. Stem of genital fork widened distally, 1.7–1.8 times as long as branches, anterolateral apodeme of branches elongate, weakly sclerotized, half as long as branch, comb-like, with 7–8 notches; posteromedial apodeme vestigial; posterior cleft of genital fork deep, rectangular, its length subequal to width. Abdominal sternite VIII weakly sclerotized, not protruding anteriorly. Hypogynal valves simple, very large, 3 times as long as median part of sternite VIII; anteromedial angles of valves not sclerotized. Anal lobes 1.7–1.8 times as high and 3 times as long as cerci, anal lobes and cerci twice as high as long; lower blade of anal lobes with 3 spiniform setae. Spermatheca rounded, length subequal to width, surface with distinct polygonal pattern.

Larva. Body length about 6 mm. Head capsule yellow to brown, head pattern dark brown. Antennae peculiar small, distinctly shorter than stalks of premandibles, segment III 1.5 times as long as segments I+II combined. Primary fan of premandibles with 42–44 rays, secondary fan with 15–17, median fan with 12 rays. Hypostoma weakly sclerotized; median hypostomal tooth subequal in length to lateral teeth; either side of hypostoma with two sublateral setae (1 large and 1 very small). Postgenal cleft small, wide, rectangular, its lateral sides unusually weakly sclerotized. Mandible with small outer teeth peculiar, large and long (only slightly shorter than thin and long apical tooth); preapical tooth I and II moderately large; preapical tooth III large, about one-third as long as apical tooth, larger but hardly longer than preapical teeth I and II; inner mandibular teeth 5–7; mandibular serration of 4–5 large and numerous very small hardly visible notches. Posterior circlet of 50–52 rows with 7–8 hooklets per row; lower branches of anal sclerite extended as far as to row. X; hooklets near anal sclerite not developed.

Pupa. Body length 3 mm. Gills distinctly longer than pupal body (except for 2 upper short filaments being 0.5–0.67 times as long as others), of 12 filaments on 3 short stems, angle between basal parts of upper and lower filaments 30–45°, distal parts of filaments not threadlike, Cocoon shapeless, consisting of few thick threads, covering abdomen and posterior part of thorax of pupa.

Type material. Female holotype (ZIN, slide. 17319), Sverdlovsk Province, Shalin District, unnamed spring, 4 June 1962, coll. Kotelnikova.

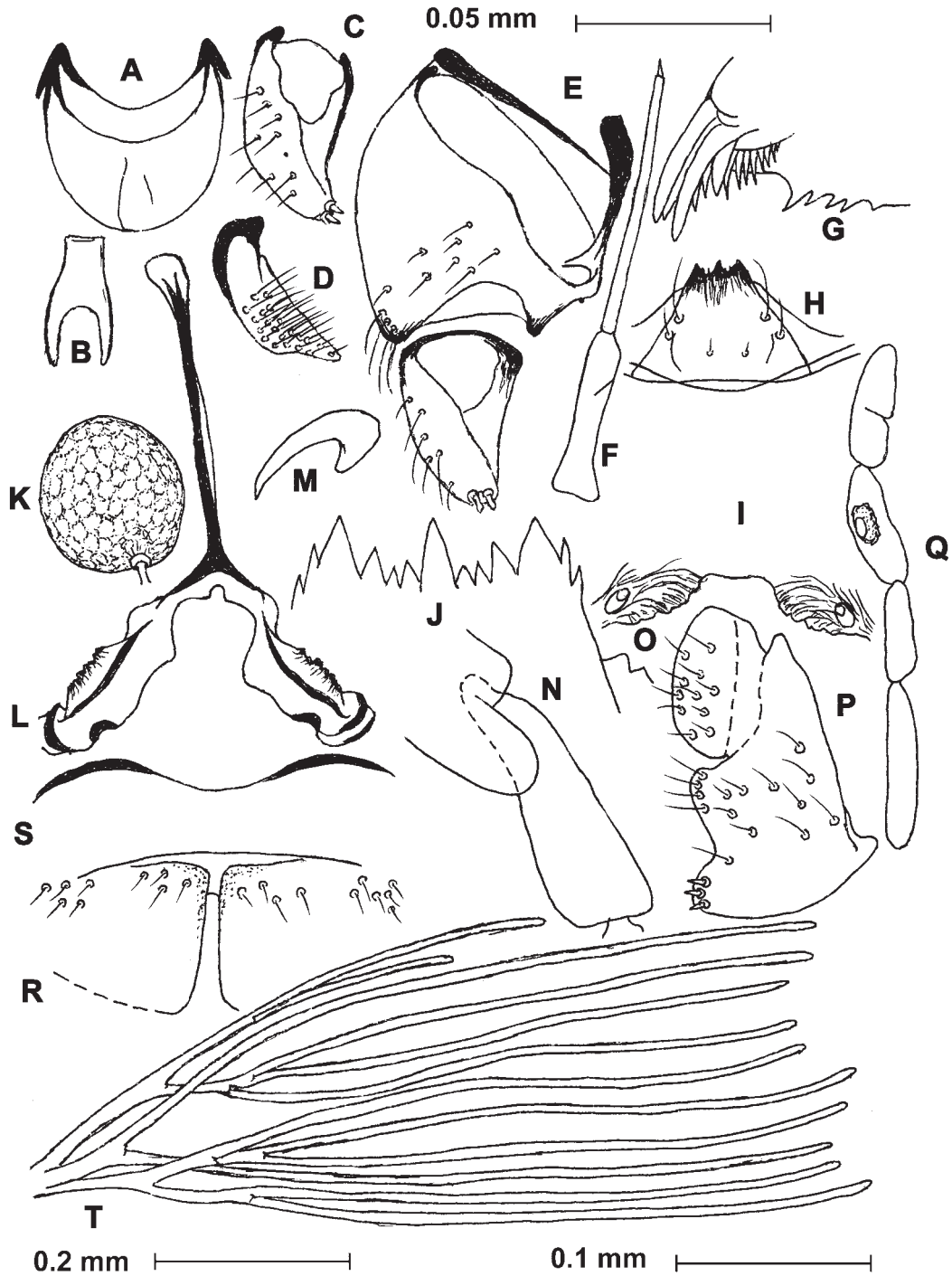


Fig. 4. *Stegopterna dentata* Rubzov et Carlsson, 1965, male, holotype (A-E): A – ventral plate; B – median sclerite; C – gonostylus; D – paramere; E – gonocoxite. Larva, paratype (F-J): F – antenna; G – mandibular teeth; H – hypostoma; I – postgenal cleft; J – hypostomal teeth. Female, paratype (K-S): K – spermatheca; L – genital fork; M – claws; N – calcipala; O – cerci; P – anal lobes; Q – maxillary palp; R – hypogynal valves; S – abdominal sternite VIII. Pupa, holotype: T – gills. Scale bar: 0.2 mm = H, I, Q, T; 0.1 mm = A, B, C, D, E, F, K, L, N, O, P, R, S; 0.05 mm = G, J, M.

Paratypes: 2 females (ZIN, both in slide 14555), Perm Province, Lysvensk District, Kamenka village, 14 June 1961, coll. K.N. Beltyukova; 3 females (ZIN, slides 15433–15435), same data, 16 July 1961, coll. K.N. Beltyukova; 1 male (reared from pupa) and 1 larva with gill histoblast (ZIN, both in slide 17256), same data, 25 May 1961, coll. K.N. Beltyukova.

Distribution. Russia: Komi, North and Middle Urals (Yankovsky 2002).

5. *Stegopterna duodecimata* (Rubzov, 1940) (Figs. 5, 6)

Simulium duodecimata Rubzov 1940: 310, figs. 16 L, B1; 55F; 61K; 69I; 71F; 73L, M; 74O, P;

Stegopterna duodecimata Rubzov 1956: 273, fig. 87; 1961: 206, fig. 92.

Description. *Male.* Body length 2.8 mm. Scutum velvet black, with sparse golden hairs; legs brown to black. Hind basitarsi short, distinctly widened, 3 times as long as wide; calcipala medium-sized, half as wide as distal part of basitarsus. Gonocoxites widened, 1.5 times as wide as long, 1.5 times as long as gonostyli. Gonostyli tapered, moderately curved inwards, in ventral view twice as long as wide at base. Ventral plate about as wide as long (ventral view), posterior margin rounded, medial keel clearly distinct. Median sclerite 4–5 times its minimum width; branches very short, widely divergent.

Female. Body length 3 mm. Scutum velvet black, with dense golden hairs; abdomen dorsally black, ventrally brown; legs completely black. Calcipala moderate, half as wide as distal part of basitarsus, slightly shorter than half-length of very shortened hind tarsomere I; claws with small pointed basal tooth. Frons narrow, its height 2.5 times the minimum width. Mouthparts not haematophagous. Maxillar palpi fairly stout; palpomeres III+IV combined 1.2–1.3 times as long as palpomere V; sensory vesicle one-fourth of length of palpomere III. Stem of genital fork slightly widened distally, about equal to branches in length; anterolateral apodeme of branches relatively small, elongate, weakly sclerotized; posteromedial apodeme lost; posterior cleft of genital fork wide, triangular, 1.6–1.7 as wide as long. Abdominal sternite VIII weakly sclerotized, not protruding anteriorly. Hypogynal valves simple, subequal to middle part of sternite VIII in length; sclerotized angles of valves not developed. Anal lobes 1.7 times as high and twice as long as cerci; anal lobes 1.5 times cerci twice as

high as long; lower blade of anal lobes with 6–8 spiniform setae. Spermatheca rounded, length subequal to width, surface smooth. Female terminalia very weakly sclerotized (peculiar character of *S. duodecimata*).

Larva. Body length 6–7 mm. Head capsule yellow, head pattern dark brown. Antennae 1.4–1.5 times longer stalks of premandibles, segments I+II combined 1.5 times as long as segment III. Primary fan of premandibles with 48–50 rays, secondary fan with 26–28, median fan with 8–10 rays. Median hypostomal tooth half as long as lateral teeth; either side of hypostoma with 2 sublateral setae. Postgenal cleft relatively large, rectangular, lateral sides strongly sclerotized. Mandible with outer teeth moderate size, half as long as very large apical tooth, preapical teeth I and II very small, preapical tooth III 3 times as long as others; inner mandibular teeth 6–7 in number; mandibular serration of 2–3 large and 16–18 small notches. Posterior circling of 64–66 rows with 7–8 hooklets per row; lower branches of anal sclerite extended as far as to row XII; lower side of branches of anal sclerite with a row of 20–25 minute, heavily sclerotized, 2–3 times furcated hooklets.

Pupa. Body length 3 mm. Gills distinctly shorter than pupal body, of 12 filaments on 3 short stems, scheme of divergence (2+2)+3+(3+2), filaments of upper stem 0.67–0.77 times as long as others, distal parts of filaments not threadlike, angle between basal parts of upper and lower filaments about 70°. Cocoon shapeless, completely covering pupal abdomen.

Type material. Female lectotype (ZIN, slide 3725), Irkutsk Province, Kharik River, 3 June 1934, coll. I.A. Rubzov.

Paralectotypes: 1 female (ZIN, prep. 3729), same data, 3 June 1934, coll. I.A. Rubzov; 2 males (ZIN, slides 3355, 3736), same data, 7 June 1934, coll. I.A. Rubzov; 1 male (ZIN, slide 3726), same data, 1934, coll. I.A. Rubzov; 1 larva with gill histoblast and pupa (ZIN, slide 3728), same data, 25 May 1934 coll. I.A. Rubzov; 1 pupa (ZIN, slide 3727), same data, 1934, coll. I.A. Rubzov.

Additional material. 2 larvae with gill histoblast (ZIN, slide 7247, 7248), Irkutsk Province, Burdakovka River near head, 10 June 1953, coll. I.A. Rubzov; 1 larva with gill histoblast (ZIN, slide 7003), Irkutsk Province, near Burduguz, 21 May 1953, coll. I.A. Rubzov; 1 larva with gill histoblast (ZIN, slide 10633), Krasnoyarsk Territory, spring between Kazulskiy and Yemelyanovskiy mines, 9 June 1957, coll. K.N. Beltyukova; 1 larva with gill histoblast (ZIN,

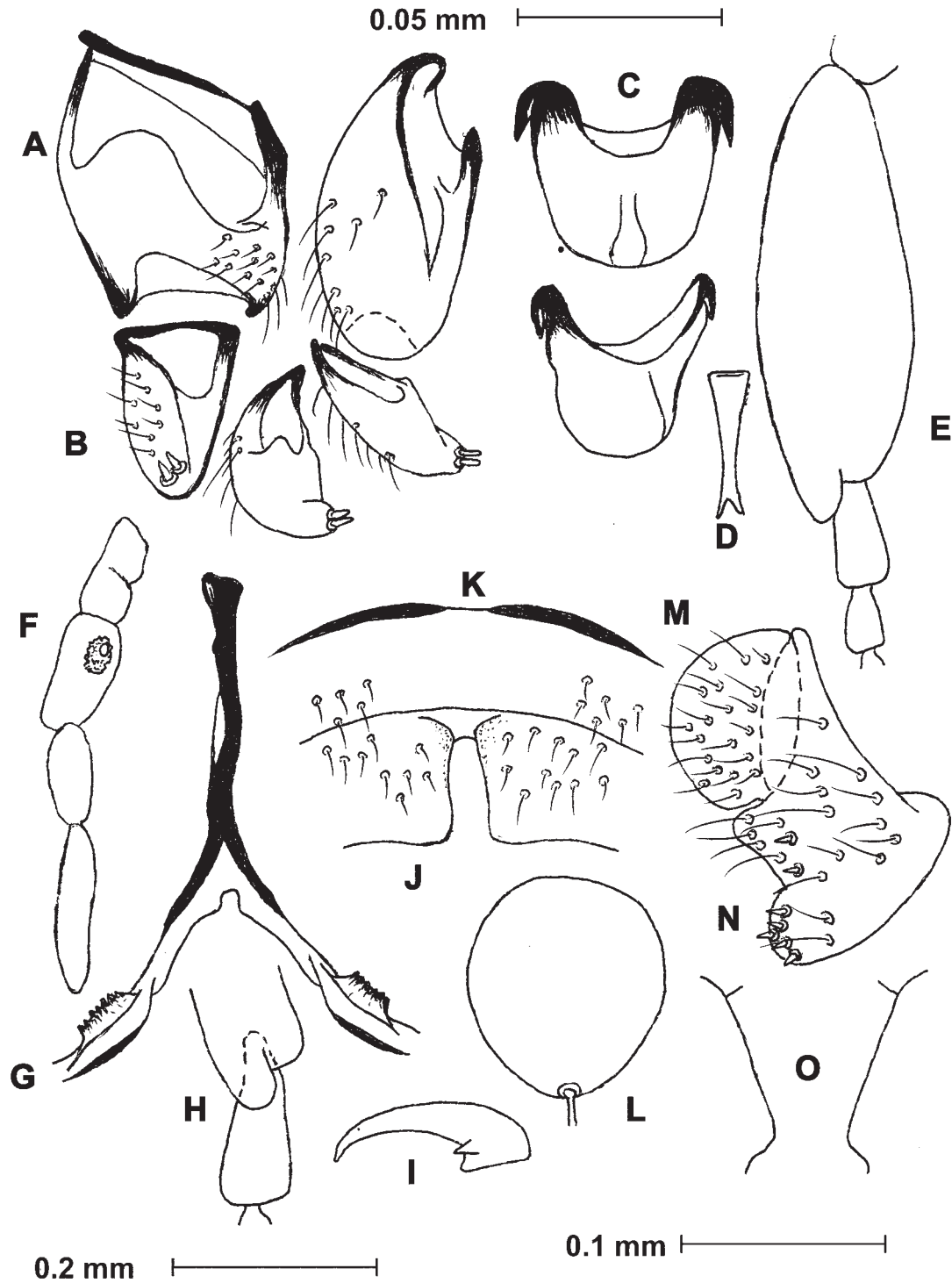


Fig. 5. *Stegopterna duodecimata* (Rubzov, 1940), male, paralectotype (A–D): A – gonocoxite; B – gonostylus; C – ventral plate; D – median sclerite. Female, lectotype (E–O): E – hind basitarsus; F – maxillary palp; G – genital fork; H – calcipala; I – claws; J – hypogynal valves; K – abdominal sternite VIII; L – spermatheca; M – cerci; N – anal lobes; O – frons. Scale bar: 0.2 mm = E, F, O; 0.1 mm = A, B, C, D, G, H, J, K, L, M, N; 0.05 mm = I.

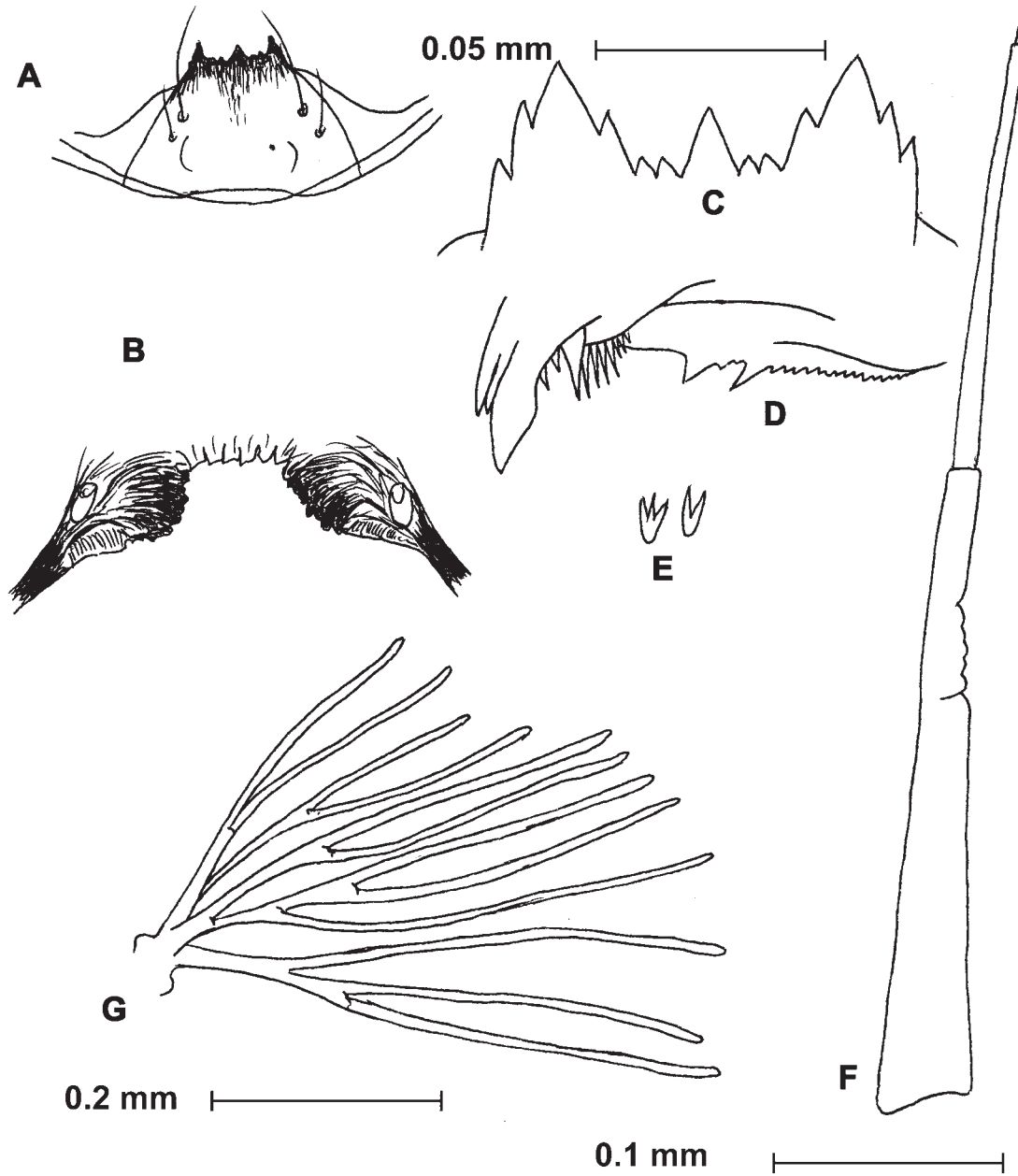


Fig. 6. *Stegopterna duodecimata* (Rubzov, 1940), larva, paralectotype (A–F): A – hypostoma; B – postgenal cleft; C – hypostomal teeth; D – mandibular teeth; E – spines near branches of anal sclerite; F – antenna. Pupa, paralectotype: G – gills. Scale bar: 0.2 mm = A, B, G; 0.1 mm = F; 0.05 mm = C, D, E.

slide 17230), Irkutsk Province, Bratsk District, Podsalanka village, Shivezskiy Spring, 31 July 1962, coll. Muravyova; 2 females (pinned, reared from pupae), Irkutskaya Province, Kharik River, 5 June 1934, coll. I.A. Rubzov; 4 females (pinned, 2 reared from

pupae), Irkutsk Province, Kuytun, 3 June 1929, coll. unknown; 1 female (pinned), South Ural, 12 June 1940, coll. Kirikov.

Distribution. Russia: South of West Siberia, South Ural (Crosskey and Howard 1997).

6. *Stegopterna haematophaga* Rubzov et Carlsson, 1965

(Fig. 7)

Stegopterna richteri haematophaga Rubzov and Carlsson 1965: 17, fig. 7.

Stegopterna haematophaga Yankovskiy 2000: 174, figs. 44, 45, 46, 47.

Description. *Male, larva* and *pupa* unknown.

Female. Body length 2.5 mm. Scutum velvet black, with dense silvery hairs; legs completely black. Calcipala very large, 0.75 time as wide as distal part of basitarsus, slightly shorter than half-length of not shortened hind tarsomere I; claws with a small basal tooth. Frons relatively narrow, height twice than minimum width. Mouthparts haematophagous; mandible with 25×15 , maxillar lacinia with 10×15 teeth. Maxillar palpi sorted, palpomere III elongated, distinctly longer than palpomere IV, palpomere V subequal in length to palpomere III; sensory vesicle one-third as long as palpomere III or slightly longer. Stem of genital fork not widened distally, about equal to branches in length; anterolateral apodeme of branches large, projecting laterally, weakly sclerotized; posteromedial apodeme well-developed, distinctly sclerotized medially; posterior cleft of genital fork very deep, nearly oval, 1.4 times as long as wide. Abdominal sternite VIII moderately sclerotized, not protruding anteriorly. Hypogynal valves subequal to median part of sternite VIII in length, peculiar in shape: widely-spaced basally, rounded and nearly contiguous distally, with oval median lumen. Anal lobes twice as high and about as long as cerci; anal lobes 2.5 times, cerci 3 times as high as long; lower blade of anal lobes with 3 spiniform setae. Spermatheca distinctly elongate, 1.5–1.6 times as long as wide, surface with clear polygonal pattern.

Type material. Female holotype (ZIN, slide 17257), Perm Province, Lysva District, 17 June 1960, coll. K.N. Beltuykova.

Paratypes: female (ZIN, slide 17257), same data, July 1960, coll. K.N. Beltuykova; 1 female (ZIN, slide 17417), Perm Province, Yayva village, 1960, coll. K.N. Beltuykova.

Distribution. Russia: Ural (Yankovsky 2002).

7. *Stegopterna hamuligera* Yankovsky, 1977

(Fig. 8)

Stegopterna hamuligera Yankovsky 1977: 96, fig. 1.

Stegopterna sibirica decafilis Usova and Bodrova 1979: 46, fig. 1.

Description. *Male.* Body length 2.3–2.5 mm. Scutum and legs completely black. Hind basitarsi not widened, 5–6 times as long as wide; calcipala medium-sized, half as wide as distal part of basitarsus. Gonocoxites 1.6–1.7 times as long as gonostyli, 1.4 times as long as wide. Gonostyli tapered, not curved inwards, in ventral view 2–2.5 times as long as wide at base. Ventral plate relatively narrow, 1.5–1.6 times as long as wide (ventral view), posterior margin rounded, medial keel moderately developed.

Female. Body length 3 mm. Body completely black, legs mostly light brown, with the following elements black: distal parts of femora, basal and distal parts of tibiae, distal part of hind basitarsi, basal and distal parts of middle basitarsi, entire fore basitarsi; and all other tarsal segments. Calcipala moderate, half as wide as distal part of hind basitarsus, $\frac{1}{3}$ – $\frac{1}{2}$ as long as very shortened hind tarsomere II; claws with small but clearly distinguishable basal tooth. Frons wide, its height subequal to minimum width. Mouthparts not haematophagous. Maxillar palpi thin, polished, palpomeres III, IV and V subequal in length, palpomere III narrow, sensory vesicle small, less than 0.5 times as long as palpomere III. Stem of genital fork not widened distally, subequal in length to branches; anterolateral apodeme of branches elongate, weakly sclerotized, half as long as branch, comb-like, with 7–8 notches; branches with a large elongated blade between anterolateral apodeme and basal part of stem; posteromedial apodeme small, tapered; posterior cleft of genital fork deep, semicircular, its length subequal to width. Abdominal sternite VIII moderately sclerotized, strongly protruding anteriorly. Hypogynal valves half as long as median part of sternite VIII; sclerotized anteromedial angles of valves not developed. Anal lobes twice as high and 1.8 times as long as cerci, anal lobes twice, cerci 1.5 times as high as long; lower blade of anal lobes with 3 spiniform setae. Spermatheca rounded, length subequal to width, surface with distinct polygonal pattern.

Larva. Body length 5 mm. Body coloration dirty white. Head capsule yellow, head pattern dark brown. Antennae slightly shorter than stalks of premandibles, length of segments I+II combined 1.7 times the length of segments III. Primary fan of premandibles with 50–55 rays, secondary fan with 28, median fan with 8–9 rays (medial fan rays with lateral branches). Hypostoma moderately sclerotized, median hypostomal tooth very large, markedly longer than lateral teeth; either side of hypostoma with 3 sublateral setae. Post-

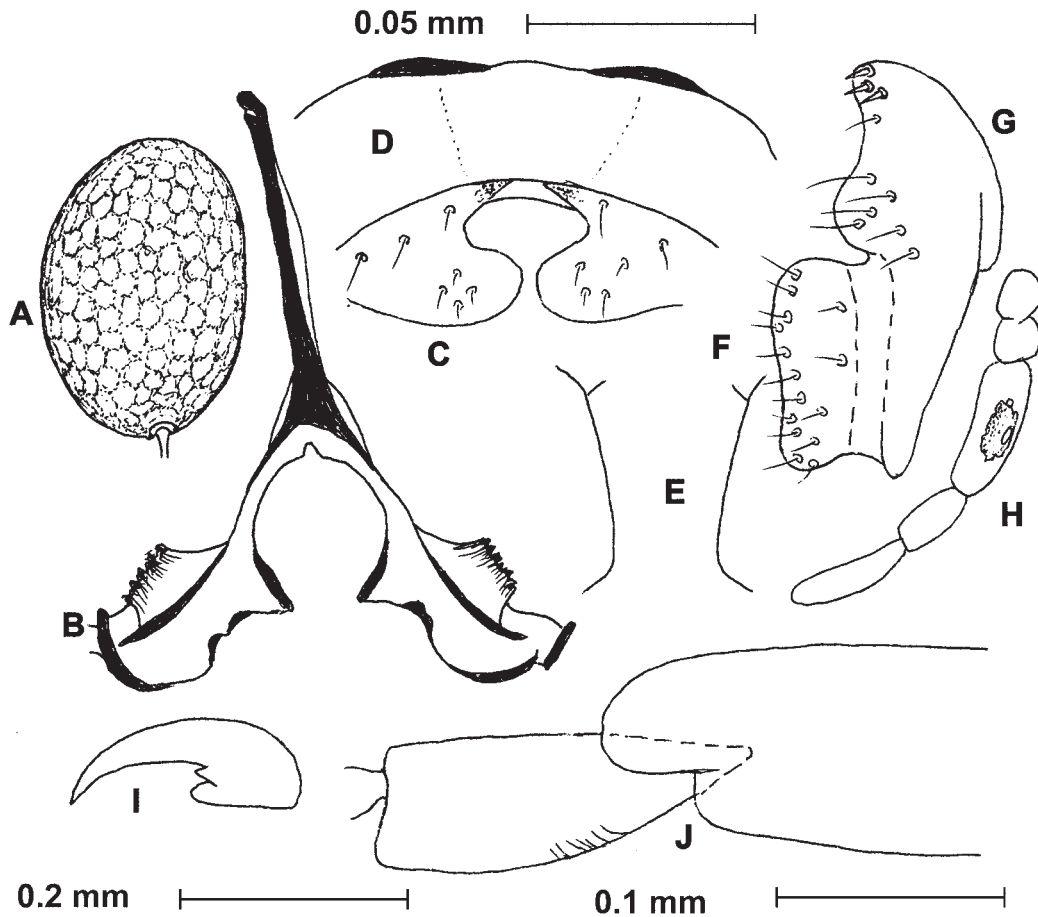


Fig. 7. *Stegopterna haematophaga* Rubzov et Carlsson, 1965, females, holotype: A – spermatheca; B – genital fork; C – hypogynal valves; D – abdominal sternite VIII; E – frons; F – cerci; G – anal lobes; H – maxillary palp; I – claws; J – calcipala. Scale bar: 0.2 mm = E, H; 0.1 mm = A, B, C, D, F, G, J; 0.05 mm = I.

genal cleft relatively deep, rectangular or semioval, its lateral sides strongly sclerotized. Mandibles with outer teeth small, $\frac{1}{3}$ – $\frac{1}{2}$ the length of apical tooth; preapical tooth III large, about half as long as apical tooth and about 2–2.5 times as long as preapical teeth I and II; inner mandibular teeth 6–7 in number; mandibular serration of 12–15 notches gradually decreasing in size basally. Posterior circlet of 56–60 rows with 8–10 hooklets per row; lower branches of anal sclerite extended as far as to rows XI–XII; of anal sclerite between upper and lower branches with a row of 20–25 minute, heavily sclerotized simple hooklets.

Pupa. Body length 3 mm. Gills 0.75 times as long as of pupal body, of 10 filaments on 3 long and thin stems (stems 8–10 times as long as wide), scheme of divergence (2+2)+2+(2+2), angle between basal

parts of upper and lower filaments 60–90°, all filaments subequal in length, distal parts of filaments not threadlike. Cocoon shapeless, covering abdomen of pupa.

Type material. Female holotype (reared from pupa) (ZIN, slide 21208), Khabarovsk Territory, small spring, tributary of Khungari River, 20 km S of Dappy village, 14 July 1976, coll. A.V. Yankovsky.

Paratypes: 2 females (reared from pupae) (ZIN, slides 21209, 21210), same data; 1 larva with gill histoblast (ZIN, slide 21207), same data, 20 June 1976, coll. A.V. Yankovsky.

Distribution. Russia: South Far East (Yankovsky 2002).

Remarks. Yankovsky (1977) described this species from the larva, pupa and female. The male of *S.*



Fig. 8. *Stegopterna hamuligera* Yankovsky, 1977, female holotype (A–J, P): A – spermatheca; B – genital fork; C – hypogynal valves; D – abdominal sternite VIII; E – claws; F – anal lobes; G – cerci; H – calcipala; I – hypostoma; J – maxillary palp; P – frons. Larva, paratype (K–M, O): K – hypostomal teeth; L – mandibular teeth; M – postgenal cleft; O – antenna. Pupa, holotype: N – gills. Scale bar: 0.2 mm = I, J, M, N, P; 0.1 mm = A, B, C, D, F, G, H, O; 0.05 mm = E, K, L.

hamuligera was described by Usova and Bodrova (1979) as *S. sibirica decafilis*. All data on the male are based on this paper because of males of *S. hamuligera* are absent in the ZIN collection.

8. *Stegopterna longicoxa* Rubzov, 1971 (Fig. 9)

Stegopterna richteri longicoxa Rubzov 1971: 172, fig. 4.
Stegopterna longicoxa Yankovskiy 2000: 174, figs. 44, 45, 46, 47.

Description. *Male.* Body length 3–3.5 mm. Body and legs completely black. Hind basitarsi not widened, 6 times as long as wide; calcipala small. Gonocoxites 1.2 times as long as wide at base, 1.6–1.7 times as long as gonostyli. Gonostyli tapered, slightly curved inwards, in ventral view 1.7 times as long as wide at base. Ventral plate of peculiar shape, widened, subtriangular with rounded posterior margin, twice as wide as long (ventral view), with developed medial keel. Gonopleurites narrow, triangular, sclerotized basally, parameres with 9–10 small but clearly distinguishable spines and numerous fine spinelets. Length of median sclerite 3 times its minimum width; sclerite bifurcated at two-thirds of length.

Female. Body length 3.5 mm. Body and legs completely black. Calcipala moderately developed, one-third as wide as distal part of hind basitarsus; claws toothless. Frons relatively narrow, its height 1.5 times the minimum width. Mouthparts not haematophagous. Maxillar palpi slender, palpomeres III+IV combined 1.5 times as long as palpomere V; sensory vesicles 0.25 times the length of palpomere III. Stem of genital fork long and thin distinctly widened distally, 1.3–1.4 times as long as branches; anterolateral apodeme of branches wide, strongly sclerotized, slightly larger than $\frac{1}{3}$ of branch length, comb-like, with 7–8 notches; posteromedial apodeme large, tapered; posterior cleft of genital fork deep, widely semioval, 1.4–1.6 times as wide as long. Abdominal sternite VIII strongly sclerotized, moderately protruding anteriorly. Hypogynal valves simple, half as long as median part of sternite VIII; sclerotized anteromedial angles of valves distinctly developed. Anal lobes 2.2 times as high and 1.6 times as long as cerci, anal lobes 2.8 times, cerci twice as high as long; lower blade of anal lobes with one spiniform seta. Spermatheca elongated, oval. 1.5 times as long as wide, surface with distinct polygonal pattern.

Larva and pupa unknown.

Type material. Male holotype (ZIN, slide 19379), Krasnoyarskiy Territory, Norilsk Mounts., 13–28 July 1967, coll. Grunin.

Paratypes: 2 males (ZIN, slides 19380, 19381), same data, 3 females (ZIN, slides 19383, 19388, 19389), same data.

Additional material. 7 males (ZIN, slides 19440, 19442–19446, 19448), same data.

Distribution. Russia: North Siberia (Yankovskiy 2002).

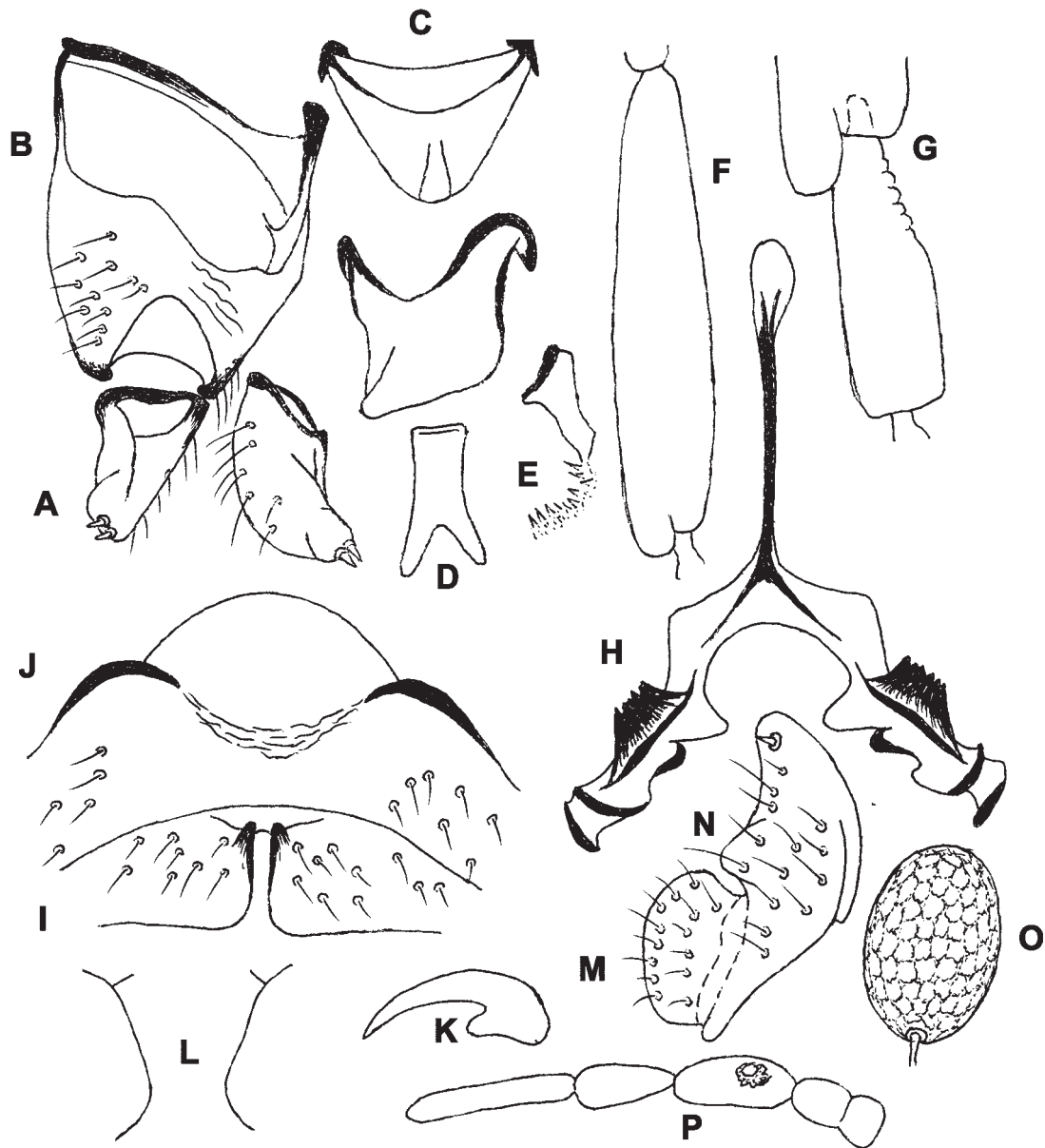
9. *Stegopterna majalis* Rubzov et Carlsson, 1965 (Fig. 10, 11)

Stegopterna richteri majalis Rubzov and Carlsson 1965: 12, fig. 5.

Stegopterna majalis Yankovskiy 2000: 174, figs. 44, 45, 46, 47.

Male. Body length 2–2.5 mm. Body and legs completely black. Hind basitarsi not widened, 6 times as long as wide; calcipala medium-sized, half as wide as distal part of basitarsus. Gonocoxites twice as long as gonostyli and about as long as wide. Gonostyli indistinctly tapered, not curved inwards, distally rounded, in ventral view 2.3–2.4 times as long as wide at base. Ventral plate subtriangular with rounded posterior margin, 1.2–1.4 times as wide as long (ventral view), with hardly visible medial keel. Gonopleurites narrow, triangular, sclerotized laterally; parameres with numerous very small spinelets. Median sclerite narrow, its length 7–8 times the minimum width, bifurcated before the middle.

Female. Body length 2–2.5 mm. Body dark grey, legs brown. Calcipala very large, 0.75 times the width of distal part of basitarsus; claws toothless. Frons narrow, its height twice the minimum width. Mouthparts haematophagous; mandibles with 15×17 , maxillar lacinia with 5×12 teeth. Maxillar palpi relatively short, palpomeres III+IV combined 1.7 times as long as palpomere V; sensory vesicle moderate-sized, one-third as long as slightly widened palpomere III. Stem of genital fork very long and thin, distinctly widened distally, 1.7–1.8 times as long as branches, anterolateral apodemes of branches very weakly sclerotized, half of branch length, comb-like, with 4–5 notches; posteromedial apodeme moderately developed, tapered, sclerotized on posterior margin; posterior cleft of genital fork deep, widely semicircular, 1.3–1.4 times as wide as long. Abdominal sternite VIII distinctly sclerotized, strongly protruding anteriorly. Hypogynal valves simple, half as long as median part



0.2 mm |—————|
 0.1 mm |—————|
 0.05 mm |—————|

Fig. 9. *Stegopterna longicoxa* Rubzov, 1971, male, holotype (A–E): A – gonostylus; B – gonocoxite; C – ventral plate; D – median sclerite; E – paramere. Female, paratype (F–P): F – hind basitarsus; G – calcipala; H – genital fork; I – hypogynal valves; J – abdominal sternite VIII; K – claws; L – frons; M – cerci; N – anal lobes; O – spermatheca; P – maxillary palp. Scale bar: 0.2 mm = F, L, P; 0.1 mm = A, B, C, D, E, G, H, I, J, M, N, O; 0.05 mm = K.

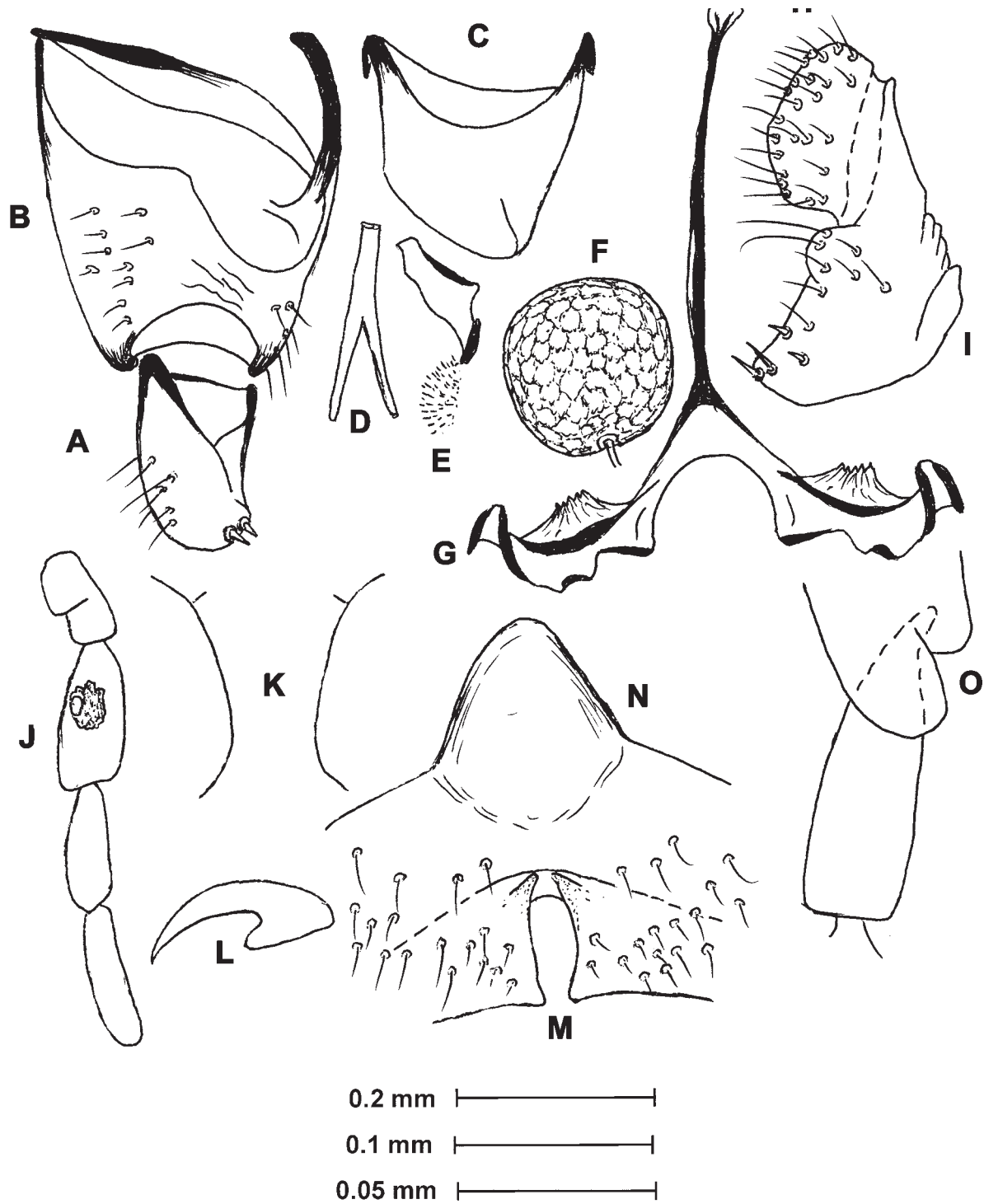


Fig. 10. *Stegopterna majalis* Rubzov et Carlsson, 1965, male, holotype (A–E): A – gonostylus; B – gonocoxite; C – ventral plate; D – median sclerite; E – paramere. Female, paratype (F–O): F – spermatheca; G – genital fork; H – cerci; I – anal lobes; J – maxillary palp; K – frons; L – claws; M – hypogynal valves; N – abdominal sternite VIII; O – calcipala. Scale bar: 0.2 mm = J, K; 0.1 mm = A, B, C, D, E, F, G, H, I, M, N, O; 0.05 mm = L.

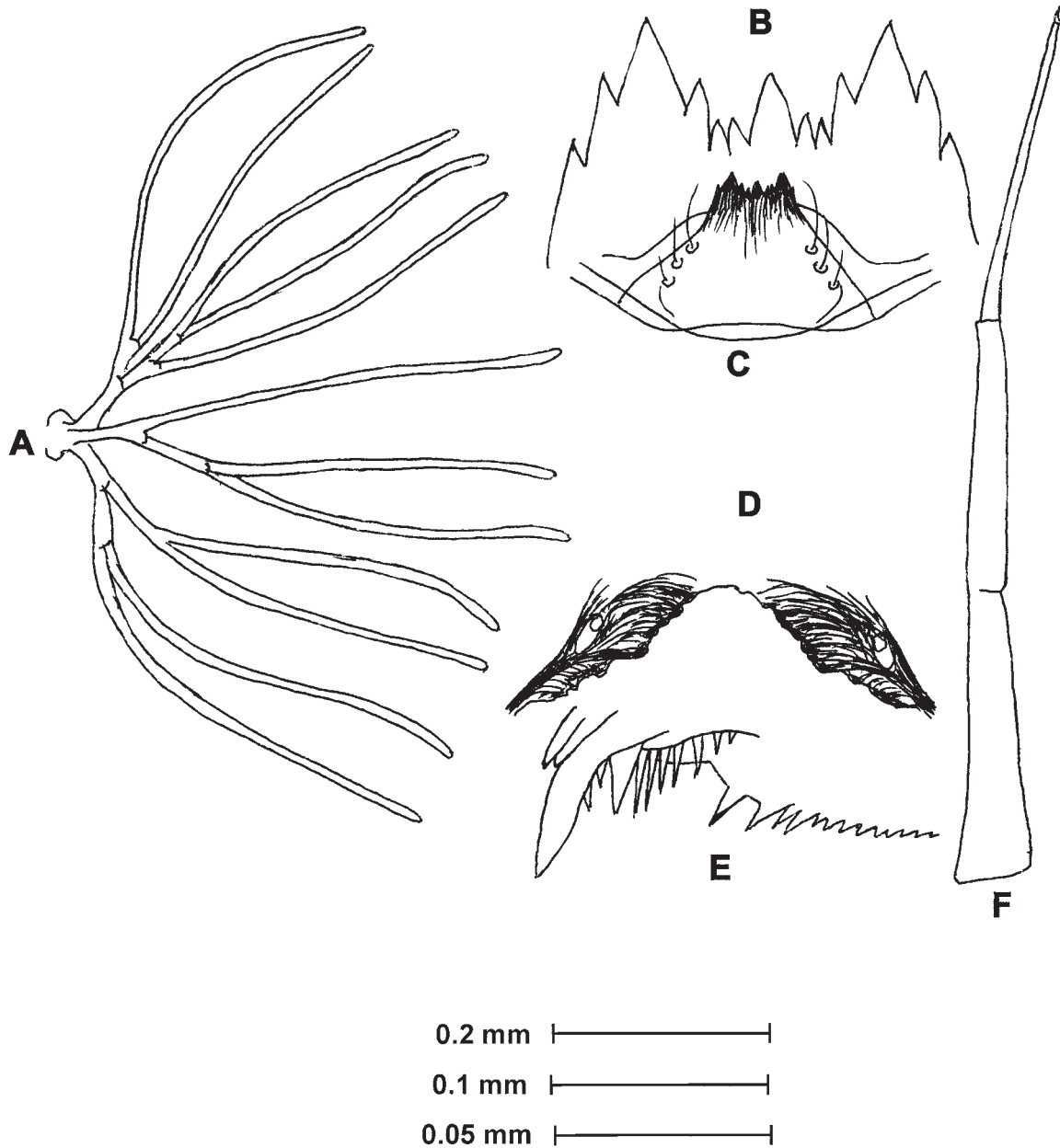


Fig. 11. *Stegopterna majalis* Rubzov et Carlsson, 1965. Pupa, paratype: A – gills. Larva, paratypes (B–F): B – hypostomal teeth; C – hypostoma; D – postgenal cleft; E – mandibular teeth; F – antenna. Scale bar: 0.2 mm = A, C, D; 0.1 mm = F; 0.05 mm = B, E.

of sternite VIII; posteromedial angles of valves tapered, anteromedial angles distinctly developed, but almost unsclerotized. Anal lobes twice as high and twice as long as cerci, anal lobes and cerci twice as high as long; lower blade of anal lobes with 4 spini-form setae. Spermatheca rounded, length subequal to width, surface with distinct polygonal pattern.

Larva. Body length 5–7 mm. Body coloration white to yellowish. Head capsule yellow, head pattern brown, hardly distinguishable. Antennae subequal in length to stalks of premandibles, segments I+II combined 1.8–1.9 times as long as segment III. Primary fan of premandibles 42–45 rays, secondary fan with 21–23, median fan with 10–11 rays. Hypostoma

strongly sclerotized, median hypostomal tooth twice as long as lateral teeth; either side of hypostoma with 2 sublateral setae. Postgenal cleft relatively small, wide, rounded, its lateral sides heavily sclerotized. Mandibles with outer teeth small, one-third as long as apical tooth; preapical tooth III large, about one-third as long as apical tooth and 3–3.5 times as long as very small preapical teeth I and II; inner mandibular teeth 5–7 in number; mandibular serration of 2 large and 9–10 small notches gradually decreasing in size basally. Posterior circlet of 56–62 rows with 8–12 hooklets per row; lower branches of anal sclerite extended as far as to row VIII–IX; hooklets near anal sclerite not developed.

Pupa. Body length 2.5–3.5 mm. Gills short, $\frac{1}{2}$ – $\frac{2}{3}$ of body length, of 12 filaments on 3 short stems, scheme of divergence (2+2)+3+(3+2), very widely divergent, angle between basal parts of upper and lower filaments 160–180°, all filaments subequal in length, distal parts of filaments not thread-like. Cocoon shapeless, covering abdomen of pupa.

Type material. Male holotype (ZIN, pinned, terminalia on prep. 14036 on the same pin), Leningrad Province, Luga District, Sitenka River, 10 May 1961, coll. I.A. Rubzov.

Paratypes: 1 female (ZIN, slide 14203), Leningrad Province, Luga District, tributary of Yashchera River, 10 May 1961, coll. I.A. Rubzov; 1 pupa (female) (ZIN, slide 1404), 2 larvae with gill histoblast (ZIN, slides 14012, 14013) and 1 female (reared from pupa) (pinned), same data; 1 female (pinned), same data, 29 May 1961, coll. I.A. Rubzov; 1 male (pinned, terminalia in slide 14204 on the same pin), Leningrad Province, Luga District, Sitenka River, 17 May 1961, coll. I.A. Rubzov; 1 female (ZIN, pinned, terminalia in prep. 8569 on the same pin), same data, 10 June 1955, coll. I.A. Rubzov; 2 larvae with gill histoblast (ZIN, slides 12054, 12055), Karelia, Kamenny Spring, 24 May 1952, coll. Z.V.Ussova; 1 larva (ZIN, slide 17415), Perm Province, Lysva District, unnamed spring, 25 May 1961, coll. K.N.Beltyukova.

Additional material. 1 female (ZIN, slide 17421), 2 larvae with gill histoblast (ZIN, slides 17422, 17423), 5 pupal exuviae (males) (ZIN, slides 17424–17428), 1 larval head (ZIN, slide 17429), SWEDEN: Hallands, Väderö, 29 May 1960, coll. Carlsson; 1 female (ZIN, slide 17134), SWEDEN: Üreskutan, 12 July 1963, coll. Carlsson; 2 females (ZIN, slides 17637, 17638), NORWAY: Svartisen, 11 July 1964, coll. Carlsson.

Distribution. Russia: North West of European Russia, Permskiy Territory (Yankovsky 2002).

10. *Stegopterna trigonium* (Lundström, 1911) (Figs. 12, 13)

Melusina trigonium Lundström 1911: 18, fig.16.

Stegopterna freyi Enderlein 1929: 73.

Stegopterna richteri Enderlein 1930: 90.

Description. *Male.* Body length 2.5–3.5 mm. Body brownish black; scutum with dense golden hairs; legs completely brown. Hind basitarsi shortened and widened, 3.8–4.5 times as long as wide; calcipala moderate-sized. Gonocoxites 1.6–1.7 times as long as gonostyli, 1.4 times as long as wide. Gonostyli very indistinctly tapered, not curved inwards, in ventral view about twice as long as wide at base. Ventral plate subtriangular, about as long as wide (in ventral view), with rounded posterior margin and hardly visible medial keel almost undistinguishable. Gonopleurites narrow, elongated, poorly sclerotized; parameres of 15–16 distinct spines. Median sclerite narrow, bifurcated in apical half, its length 5–7 times the minimum width.

Female. Body length 3–4 mm. Body brown; scutum with dense shiny golden hairs; legs brown. Calcipala moderate, half as wide as distal part of basitarsus; claws toothless. Frons relatively narrow, its height 1.4–1.5 times the minimum. Mouthparts haematophagous; mandibles with 12×27 – 30 , maxillar lacinia with 9×17 – 18 teeth. Maxillar palpomere V shortened, palpomeres III+IV combined 1.5 times as long as palpomere V; sensory vesicle large, almost half as long as distinctly widened palpomere III. Stem of genital fork slightly widened distally, 1.2–1.3 times as long as branches, anterolateral apodeme of branches strongly sclerotized, one-third of branch length, comb-like, with 2–3 notches; posteromedial apodeme moderately developed; posterior cleft of genital fork widely semicircular, 1.4 times as wide as long. Abdominal sternite VIII moderately sclerotized, protruding anteriorly. Hypogynal valves simple, 0.59 times as long as median part of sternite VIII; anteromedial angles undeveloped. Anal lobes 1.5 times as high and twice as long as cerci; anal lobes 2.3 times, cerci 1.8 times as high as long; lower blade of anal lobes with 5 spiniform setae. Spermatheca slightly elongated, no more than 1.2 times as long as wide, surface polygonal pattern undistinguishable.

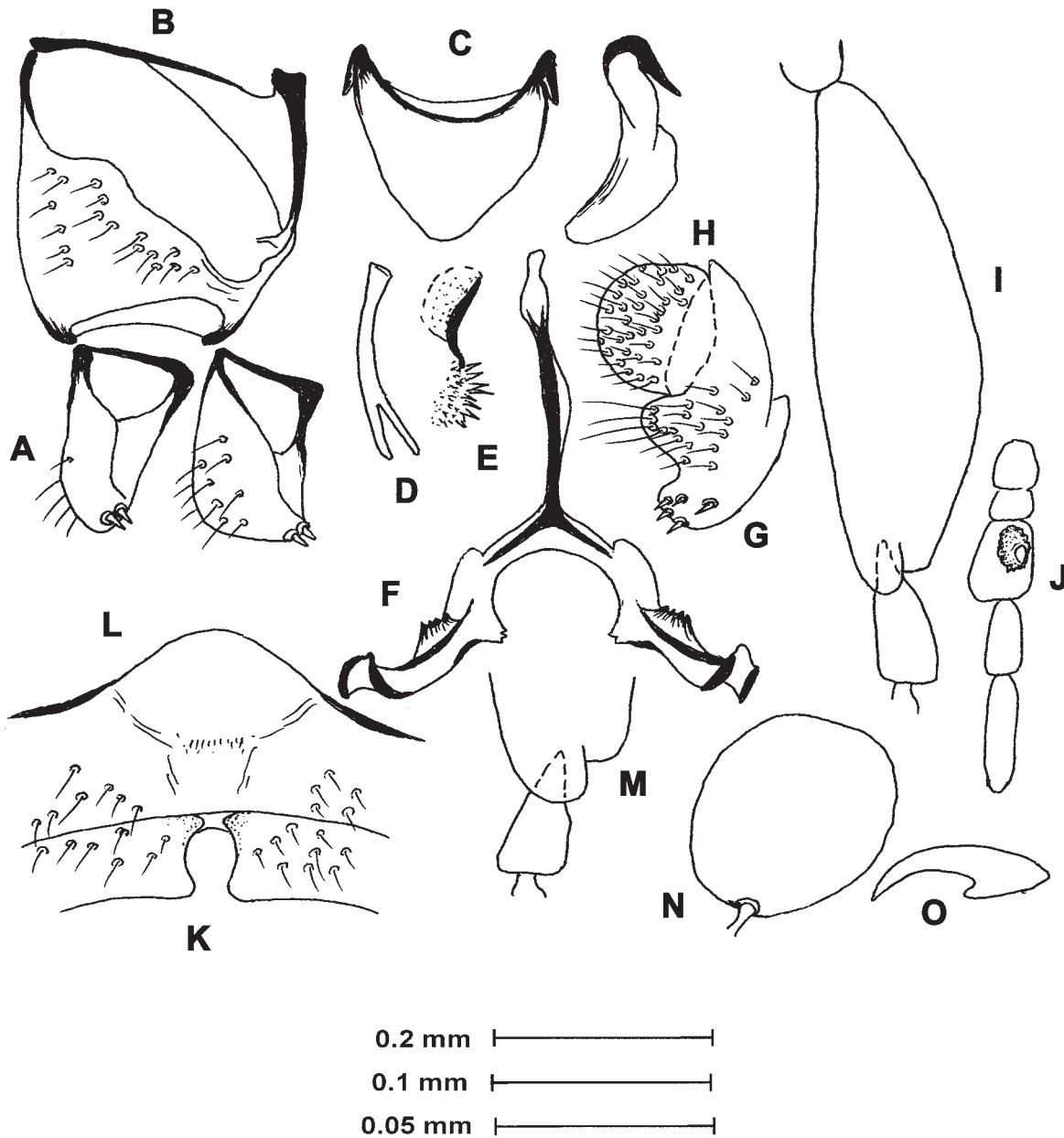


Fig. 12. *Stegopterna trigonum* (Lundström, 1911), male: (A–E): A – gonostylus; B – gonocoxite; C – ventral plate; D – median sclerite; E – paramere. Female (F–O): F – genital fork; G – anal lobes; H – cerci; I – hind basitarsus; J – maxillary palp; K – hypogynal valves; L – abdominal sternite VIII; M – calcipala; N – spermatheca; O – claws. Scale bar: 0.2 mm = I, J; 0.1 mm = A, B, C, D, E, F, G, H, K, L, M, N; 0.05 mm = O.

Larva. Body length 5.5–7.5 mm, in specimens from Japan 6.9–7.5 mm (Takaoka 2005). Body yellow to yellowish-brown; head capsule yellow, head pattern hardly distinguishable. Antennae distinctly longer than stalks of premandibles, segments I+II combined 1.5–1.6 as long as segment III. Primary

fan of premandibles with 48–49 rays (in specimens from Japan 60–65 [Takaoka 2005]), secondary fan with 27–28, median fan with 14–15 rays. Hypostoma heavily sclerotized, median hypostomal tooth subequal to lateral teeth in length; either side of hypostoma with 3 sublateral setae. Postgenal cleft



Fig. 13. *Stegopterna trigonium* (Lundström, 1911), pupa: A – gills. Larva (B – F): B – hypostoma; C – postgenal cleft; D – mandibular teeth; E – hypostomal teeth; F – antenna. Scale bar: 0.2 mm = A, B, C; 0.1 mm = F; 0.05 mm = D, E.

relatively small, rounded or subtriangular, its lateral sides heavily sclerotized. Mandibles with outer teeth very large, subequal to apical tooth in length; apical tooth 3 times as long as preapical teeth I and II, twice as long as preapical tooth III; inner mandibular teeth 8–10; mandibular serration of 8–10 notches, first one distinctly larger than others, notches gradually decreasing in size to base. Posterior circling of 76–78 rows with 8–12 hooklets in each row (in specimens from Japan of 62–66 rows with 12–15 hooklets in each row [Takaoka 2005]); lower branches of anal sclerite extended as far as to rows XIV–XV; anal sclerite with numerous short sclerotized hooklets laterally to upper end.

Pupa. Body length 3–4 mm. Gills $\frac{3}{4}$ of pupal body length, of 12 filaments on 3 short stems, scheme of divergence (2+2)+3+(3+2); filaments VI and VII distinctly shorter than others, distal parts of long filaments not thread-like; angle between basal parts of upper and lower filaments about 70°. Cocoon shapeless, covering abdomen of pupa.

Material. 2 males (ZIN, slides 3422, 3423), Tyumen Province, Muzhi village on Ob' River, 17 September 1925, coll. Fridolin; 2 males (ZIN, pinned, terminalia in slides 16098, 17330 on the same pins), Arkhangelsk Province, Silova-Yakha River, 80 km North Kholmeryu, 19 July 1961, coll. Gorodkov; 1 female (ZIN, slide 14577), Ryazan Province, Okskiy State Reserve, Pra River, 11 May 1961, coll. unnamed; 6 larvae with gill histoblast (ZIN, slides 5623, 5624, 5984–5986, 5988), 1 pupa (ZIN, slide 5981), Leningrad Province, Gatchina District, Slukhva River, 10 May 1952, coll. Ilyina; 2 larvae (ZIN, slides 6834, 6835), Karelia, Saynavolok, 28 May 1952, coll. Z.V. Ussova; 1 male (ZIN, pinned, terminalia in prep. without number, on the same pin), Karelia, spring near Selga, 7 June 1955, coll. I.A. Ussova; 2 males (ZIN, pinned, terminalia in prep. 6397, 6398 on the same pins), Yamalo-Nenetskiy Region, Voykar River Basin, Salekhard, 14 August 1925, coll. Fridolin; 1 male (ZIN, pinned, terminalia in prep. 6399 on the same pin), same data, 23 August 1925, coll. Fridolin; 1 female (ZIN, pinned), Kolskiy Peninsula, Khibin Mountains, Vudyavr Lake, 30 August 1931, coll. Fridolin; 1 pupa (ZIN, pinned), Karelia, Saynavolok, 28 May 1952, coll. Z.V. Ussova; 2 females (reared from pupae, pinned), Karelia, spring near Selga, 7 June 1955, coll. Z.V. Ussova; 2 females and 3 males (reared from pupae, pinned), Karelia, Kamenny Spring, 2 June 1956, coll. Z.V. Ussova.

Distribution. Denmark, Fennoscandia, Russia (North West and Central European Russia, Urals, West Siberia) (Crosskey and Howard 1997); Canada: Northwest Terr., Nunavut; USA: Alaska (Adler et al. 2004).

11. *Stegopterna tschukotensis* Rubzov, 1971 (Fig. 14)

Stegopterna tschukotensis Rubzov 1971: 174, fig. 5; Adler et al. 2004: 286, figs. 4.37, 10.37, 10.130, 10.285, 10.575, 10.725.

Description. *Male.* Body length 2.5 mm. Scutum velvet black, with shiny silvery hairs; abdomen dorsally black, ventrally brown. Hind basitarsi short, distinctly widened, 3 times as long as wide; calcipala very small. Gonocoxites 3 times as long as gonostyli, 1.3–1.4 times as long as wide. Gonostyli distinctly shortened, distinctly curved inwards, triangular in ventral view, length subequal to width at base. Ventral plate bag-shaped, about as long as wide (ventral view), with rounded posterior margin and without medial keel. Gonopleurites poorly sclerotized; parameres with 8–12 short but distinct spines. Median sclerite narrow, its length of 7 times the minimum, sclerite bifurcated near mid-length.

Female. Body length 2.5 mm. Body black; scutum with shiny silvery hairs; legs brown. Calcipala small, one-third as wide as distal part of basitarsus; claws with distinct small basal tooth (according to Rubzov, 1971: legs broken in both pinned specimen and absent on slides). Stem of genital fork very strongly widened and transversely cut distally, slightly longer than branches, branches flattened distally; anterolateral apodeme of branches strongly sclerotized, half of branch length, comb-like, with 4–5 notches; posteromedial apodeme well-developed, distinctly sclerotized on posterior margin; posterior cleft of genital fork 1.4–1.6 times as wide as long. Abdominal sternite VIII heavily sclerotized, strongly protruding anteriorly. Hypogynal valves simple, shortened, half as long as median part of sternite VIII; anteromedial angles developed but almost unsclerotized. Anal lobes 1.5 times as high and twice as long as cerci; anal lobes twice, cerci 2.5 times as high as long; lower blade of anal lobes with 4 spiniform setae. Spermatheca transverse, 1.5 times as wide as long, surface smooth.

Larva and pupa unknown.

Type material. Male holotype (ZIN, pinned, terminalia in prep. 19112 on the same pin), Chukotka,

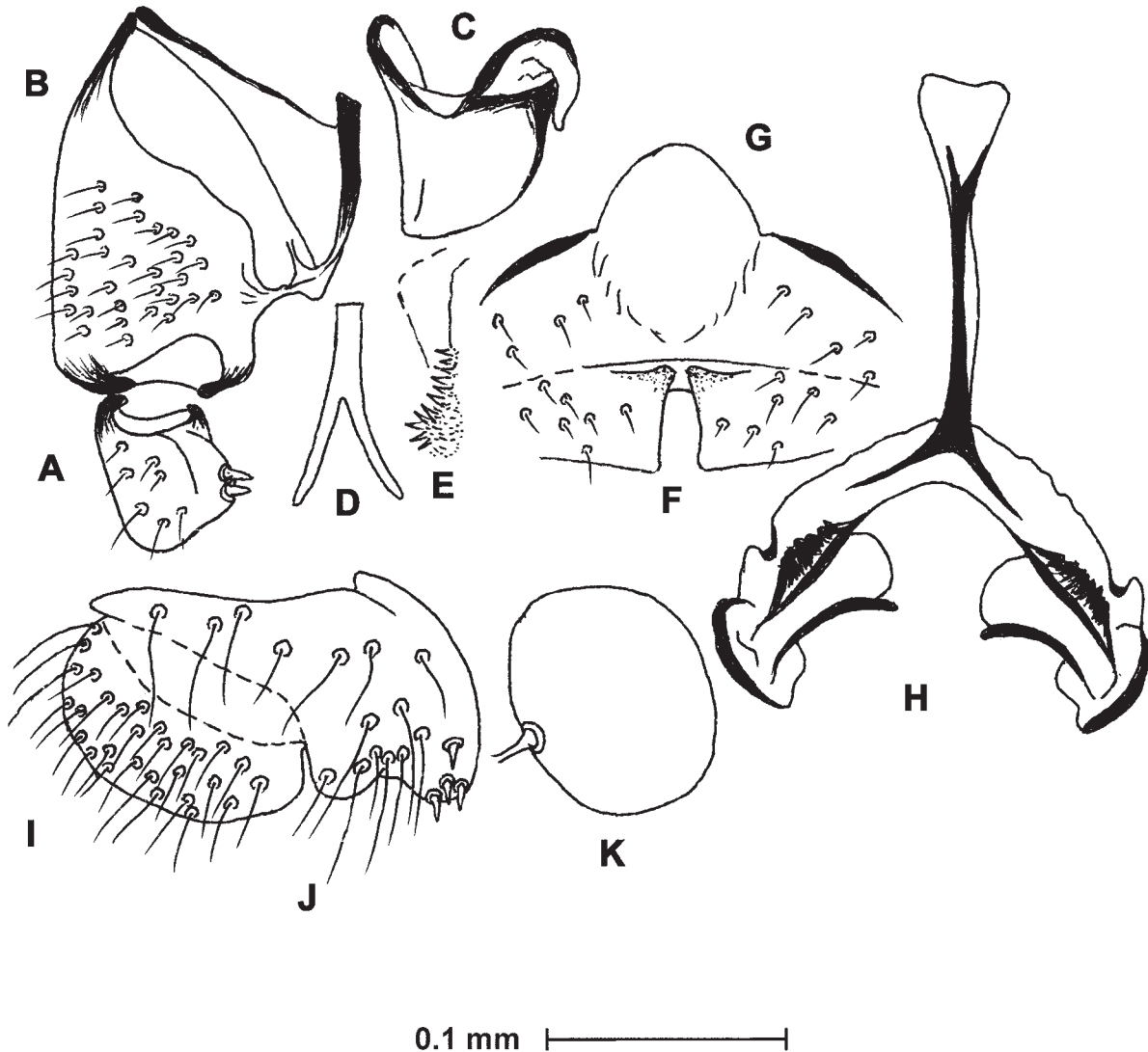


Fig. 14. *Stegopterna tschukotensis* Rubzov, 1971, male, holotype (A–E): A – gonostylus; B – gonocoxite; C – ventral plate; D – median sclerite; E – paramere. Female, paratype (F–K): F – hypogynal valves; G – abdominal sternite VIII; H – genital fork; I – cerci; J – anal lobes; K – spermatheca.

Chaunskiy District, Krasnoarmeyskiy village, 8 July 1963, coll. Gorodkov.

Paratype: 1 female (ZIN, pinned, terminalia in prep 19113), same data.

Distribution. Russia: Chukotka (Yankovsky 2002).

Remarks. Adler et al. (2004) synonymized *Stegopterna tschukotensis* Rubzov, 1971 and *Simulium emergens* (Stone, 1952). We, nevertheless, consider these two species as separate. Their differential characters are provided in the key below.

12. *Stegopterna tundrensis* Yankovsky et Aibulatov sp. nov.

(Fig. 15)

Description. *Male.* Scutum black; abdomen dorsally black, ventrally grey; halteres grey; legs completely dark brown. Hind basitarsi short, distinctly widened, 3 times as long as wide; calcipala small. Gonocoxites 1.5 times as long as gonostyli, about as long as wide. Gonostyli tapered, not curved in-

wards, in ventral view 1.7 times as long as wide at base. Length of ventral plate subequal to its width, posterior margin subtriangular; in lateral margins of ventral plate with a peculiar concavity between arms and body of plate; median keel almost undistinguishable. Gonopleurites very narrow, band-like, distinctly sclerotized basally; parameres with 10–12 relatively large spines and few fine spinelets. Length of median sclerite 4 times its minimum width; sclerite bifurcated in distal one-four, branches collateral, cleft between them oval.

Female. Unknown.

Larva. Body length 6–7 mm. Head capsule yellow, head pattern brown, distinct. Antennae subequal in length to stalks of premandibles, segments I+II combined 1.4 times as long as segment III. Primary fan of premandibles with 38–45 rays, secondary fan with 13–15, median fan with 10 rays. Hypostoma strongly sclerotized, median hypostomal tooth subequal to lateral teeth in length; either side of hypostoma with 2 sublateral setae. Postgenal cleft rectangular, its lateral sides heavily sclerotized. Mandibles with outer teeth moderate in size, half as long as apical tooth; apical tooth long and thin, 4 times as long as preapical teeth III; preapical teeth I and II very small; inner mandibular teeth 6–7 in number; mandibular serration of 4 large and more than 10 small notches gradually decreasing in size to base. Posterior circler of 60–62 rows with 8–10 hooklets in each row; lower branches of anal sclerite extended as far as to rows VIII–IX; hooklets near anal sclerite not developed.

Pupa. Gills markedly longer than pupal body, of 10 filaments on 3 long and slender stems, scheme of divergence 3+(2+1)+(1+3), angle between basal parts of upper and lower filaments 30–45°; all filaments subequal in length, distal parts of filaments not thread-like. Cocoon shapeless, covering abdomen of pupa.

Type material. Male holotype (ZIN, slide 20421), Chukotka, Chaunskiy District, Krasnoarmeyskiy village, 9 July 1963, coll. Gorodkov.

Paratypes: 1 male (ZIN, pinned, legs and terminalia in prep. 20433 on the same pin), Yakutia, lower Lena River, 12 km NE Kyusyur village, 21 July 1957, coll. Gorodkov; 1 larva with gill histoblast (ZIN, slide 21074), Chukotka, spring 3 km of Ioni Lake, 5 August 1973, coll. U.D. Bodrova; 1 larva (ZIN, slide 20065), Yakutia, Ust'-Yana District, Kular village, Nettik Spring, 16 July 1967, coll. E.I. Worobez; 1 larva (ZIN,

slide 21155), Yakutia, Kobyya District, unnamed spring, 27 June 1973, coll. E.I. Worobez.

The whole type material is deposited in ZIN.

Distribution. Russia: North Yakutia, Chukotka.

Differential diagnosis. The new species differs from most species of the genus *Stegopterna* by the pupal gills, consisting of 10 filaments (excluding *S. decafilis* and *S. hamuligera* also having 10 filaments in gills).

It differs from *S. decafilis* by the following characters.

Male: calcipala half as wide as distal part of basitarsus (vs. *S. decafilis* two-third as wide), length of gonocoxites subequal to width (vs. *S. decafilis* gonocoxites twice as long as wide), length of gonostyli 1.7 times their width at base (vs. *S. decafilis* gonostylus 2.5 times as long as wide); , posterior margin of ventral plate subtriangular, lateral margins with distinct peculiar clefts between arms and body of plate (vs. *S. decafilis* ventral plate differently-shaped, 1.6 times as wide as long).

Larva: secondary fan with 13–15 rays (vs. *S. decafilis* 23–25); inner mandibular teeth 6–7 (vs. *S. decafilis* 8–10); mandibula with 4 large notches (vs. *S. decafilis* 1–2); median hypostomal tooth subequal to lateral teeth (vs. *S. decafilis*, shorter than lateral teeth); rows of hooklets in posterior circler 60–62 (vs. *S. decafilis* 78).

Pupa: angle between basal parts of upper and lower gill filaments 30–45° (vs. *S. decafilis* 60–90°).

The new species differs from *S. hamuligera* by the following characters.

Male: length of gonocoxites subequal to width (vs. *S. hamuligera* gonocoxites 1.4–1.6 times as long as wide); gonostyli 1.7 times as long as wide (vs. *S. hamuligera* 2–2.5 times); shape and other characters of ventral plate (see above), so that its length is subequal to width (vs. *S. hamuligera* ventral plate 1.5–1.6 times as long as wide).

Larva: smaller number of primary and secondary rays 38–45 and 13–15, respectively (vs. *S. hamuligera*, 50–55 and 28); mandibula with 4 large and more than 10 very small notches (vs. *S. hamuligera* 12–15 notches decreasing in size to base); median hypostomal tooth subequal to lateral teeth (vs. *S. hamuligera* distinctly longer than lateral teeth).

Pupa: gills longer than pupal body (vs. *S. hamuligera* markedly shorter than pupal body); angle between basal parts of upper and lower filaments 30–45° (vs. *S. hamuligera* 60–90°).

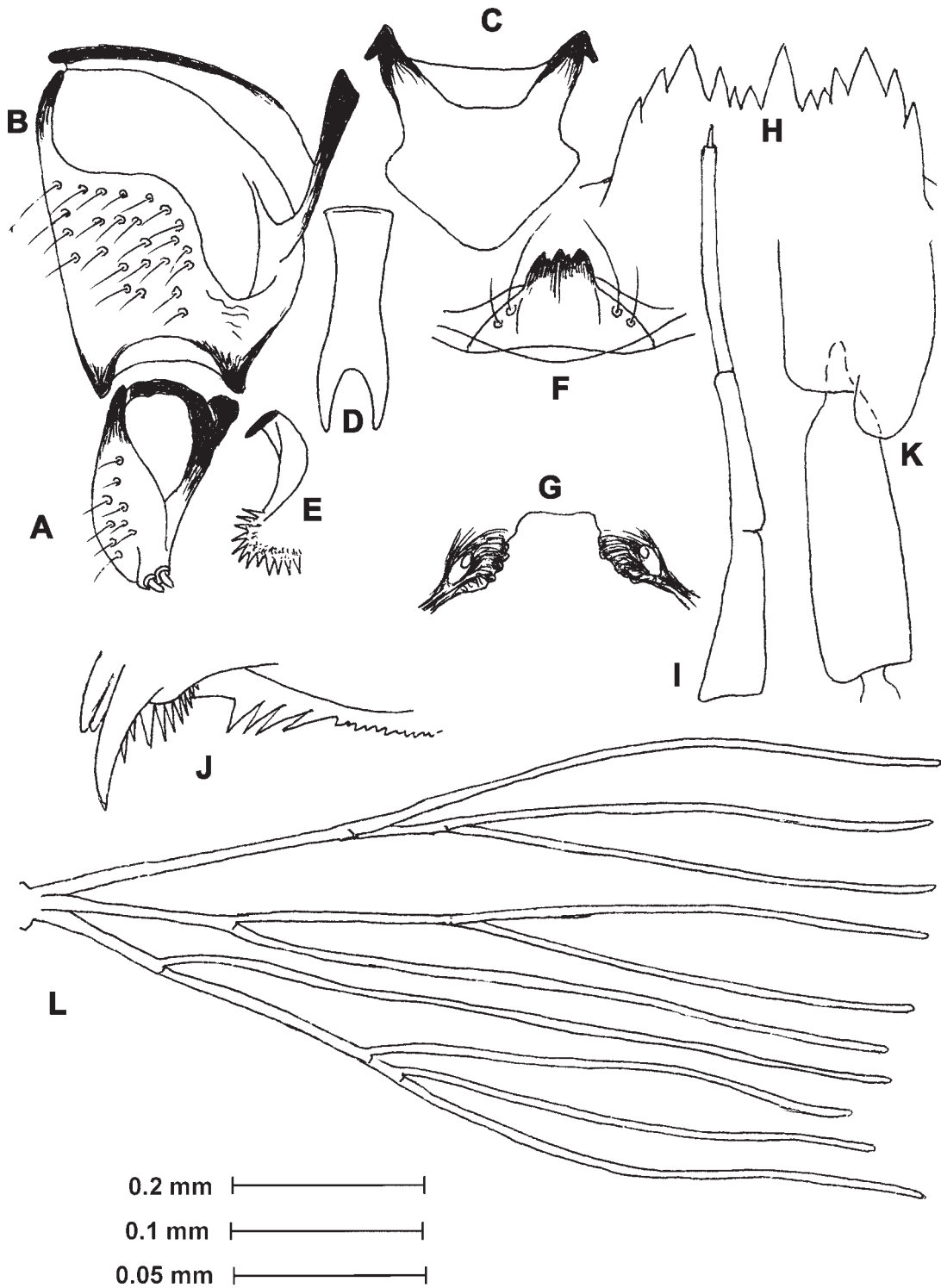


Fig. 15. *Stegopterna tundrensis* Yankovsky, sp. nov., male, holotype (A–E): A – gonostylus; B – gonocoxite; C – ventral plate; D – median sclerite; E – paramere. Larva (F–I): F – hypostoma; G – postgenal cleft; H – hypostomal teeth; I – antenna, J – mandibular teeth. Female: K – calcipala. Pupa: L – gills. Scale bar: 0.2 mm = F, G, L; 0.1 mm = A, B, C, D, E, K; 0.05 mm = H, J.

Key to species of the genus *Stegopterna* Enderlein, 1930**Male (males of *S. asema* and *S. haematophaga* are unknown)**

1. Gonocoxites 3 times as long as gonostyli
..... *S. tschukotensis* Rubzov, 1971 (Fig. 14)
- Gonocoxites 1.2–2 times as long as gonostyli 2
2. Ventral plate 1.4–1.7 times as long as wide 3
- Length of ventral plate less or subequal to width 5
3. Hind basitarsi swollen, 3.5–4 times as long as wide
..... *S. nukabirana* Ono, 1977
- Hind basitarsi not swollen, about 6 times as long as
wide 4
4. Gonocoxites 2 times as long as gonostyli, gonostyli
curved inwards, 1.2–1.3 as long as wide at base
..... *S. byrrangii* Yankovsky, 2000 (Fig. 2)
- Gonocoxites 1.6–1.7 times as long as gonostyli; gonos-
tyli not curved inwards, 2–2.5 times as long as wide at
base *S. hamuligera* Yankovsky, 1977 (Fig. 8)
5. Gonostyli 3 times as long as wide at base 6
- Gonostyli 1.6–2.5 times as long as wide at base 7
6. Calcipala very large, $\frac{3}{4}$ of width of distal part of hind
basitarsus *S. xantha* Currie et al., 2004
- Calcipala $\frac{1}{2}$ of width of distal part of hind basitarsus ...
..... *S. acra* Currie et al, 2004
7. Gonostyli in ventral view 1.6–1.7 times as long as wide
at base 8
- Gonostyli in ventral view 2–2.5 times as long as wide at
base 9
8. Gonocoxites 1.6–1.7 times as long as gonostyli
..... *S. longicoxa* Rubzov, 1971 (Fig. 9)
- Length of gonocoxites slightly more or subequal to
gonostyli 9
9. Ventral plate 1.6–1.7 times as wide as long
..... *S. dentata* Rubzov et Carlsson, 1965 (Fig. 4)
- Length of ventral plate subequal to width
..... *S. tundrensis* Yankovsky et Aibulatov sp. nov. (Fig. 15)
10. Gonostyli in ventral view 2.3–2.5 times as long as wide
at base 11
- Gonostyli in ventral view 2 times as long as wide at base
..... 13
11. Length of gonocoxites subequal to width
..... *S. majalis* Rubzov et Carlsson, 1965 (Fig. 10)
- Gonocoxites 1.8–2 times as long as wide 12
12. Ventral plate 1.6 times as wide as long
..... *S. decafilis* Rubzov et Carlsson, 1965 (Fig. 4)
- Ventral plate 1.2 times as wide as long
..... *S. takeshii* Takaoka, 2005
13. Length of ventral plate subequal to width 4
- Ventral plate 1.5–2 times as wide as long 15
14. Hind basitarsus very swollen, 2.5–3 as long as wide;
ventral plate with wide rounded posterior edge; median
sclerite 4–5 times as long as least wide
..... *S. duodecimata* Rubzov, 1940 (Fig. 5)

- Hind basitarsus moderately swollen, 3.6–4 as long as
wide; ventral plate tapered, subtriangular; median sclerite
7 times as long as least wide
..... *S. trigonium* (Lundström, 1911) (Fig. 12)
- 15. Ventral plate 1.5 times as wide as long
..... *S. emergens* (Stone, 1952)
- Ventral plate 2 times as wide as long
..... *S. diplomutata* Currie
et Hanter, 2003, *S. permutata* (Dyar et Shannon, 1927)

Female (females of *S. diplomutata*, *S. permutata*, *S. takeshii* and *S. tundrensis* unknown)

1. Mouthparts not haematophagous 2
- Mouthparts haematophagous 7
2. Claws toothless *S. longicoxa* Rubzov, 1971 (Fig. 9)
- Claws with basal tooth 3
3. Stem of genital fork 3 times as long as branches
..... *S. byrrangii* Yankovsky, 2000 (Fig. 2)
- Stem of genital fork not more than 1.5 times as long as
branches 4
4. Posteromedial apodeme on branches of genital fork not
developed; hypogynal valves subequal or slightly longer
than middle part of sternite VIII; surface of spermatheca
smooth *S. duodecimata* Rubzov, 1940 (Fig. 5)
- Posteromedial apodeme on branches of genital fork
distinctly developed; hypogynal valves 1.3–2 times as
short as middle part of sternite VIII; surface of spermatheca
with distinct polygonal pattern 5
5. In genital fork between anterolateral apodeme and basal
part of stem large elongated blade; hypogynal valves 2
times as short as middle part of sternite VIII
..... *S. hamuligera* Yankovsky, 1977 (Fig. 8)
- Large elongated blade between anterolateral apodeme
and basal part of stem of genital fork not developed;
hypogynal valves 1.3 times as short as middle part of
sternite VII I 6
6. Calcipala very large, $\frac{3}{4}$ of width of distal part of hind
basitarsus; stem of genital fork subequal or slightly longer
than branches; spermatheca rounded (length equal to
width) ... *S. decafilis* Rubzov et Carlsson, 1965 (Fig. 4)
- Calcipala small, $\frac{1}{2}$ of width of distal part of hind basi-
tarsus; stem of genital fork 1.5 times as long as branches;
spermatheca oval, 1.3–1.4 times as long as wide
..... *S. emergens* (Stone, 1952)
7. Claws with basal tooth 8
- Claws toothless 10
8. Spermatheca peculiarly short (1.3–1.5 times as wide as
long), surface smooth
..... *S. tschukotensis* Rubzov 1971 (Fig. 14)
- Spermatheca elongated, oval (1.5–1.6 times as long as
wide), surface with distinct polygonal pattern 9
9. Hypogynal valves distinctly curved
..... *S. haematophaga* Rubzov et Carlsson, 1965 (Fig. 7)
- Hypogynal valves simple *S. nukabirana* Ono, 1977

10. Surface of spermatheca smooth 11
 – Surface of spermatheca with distinct polygonal pattern 12
11. Calcipala very large, $\frac{3}{4}$ of width of distal part of hind basitarsus; stem of genital fork subequal to branches, posterior cleft of genital fork wide, semi-oval
 *S. asema* Rubzov, 1956
 – Calcipala $\frac{1}{2}$ of width of distal part of hind basitarsus; stem of genital fork 1.2–1.3 times as long as branches, posterior cleft of genital fork distinctly more narrow, semi-circular
 *S. trigonium* (Lundström, 1911) (Fig. 12)
12. Spermatheca oval, elongated, 1.3 times as long as wide 13
 – Spermatheca rounded (length equal to width) 14
13. Calcipala very large, $\frac{3}{4}$ of width of distal part of hind basitarsus *S. xantha* Currie et al., 2004
 – Calcipala $\frac{1}{2}$ of width of distal part of hind basitarsus
 *S. acra* Currie et al., 2004
14. Anal lobes 3 times as long as cerci
 *S. dentata* Rubzov et Carlsson, 1965 (Fig. 4)
 – Anal lobes 2 times as long as cerci 15
15. Calcipala very large, $\frac{3}{4}$ of width of distal part of hind basitarsus. . . *S. majalis* Rubzov et Carlsson, 1965 (Fig. 10)
 – Calcipala $\frac{1}{2}$ of width of distal part of hind basitarsus . .
 *S. mutata* (Malloch, 1914)

Larva (larvae of *S. byrrangii*, *S. diplomutata*, *S. haematophaga*, *S. longicoxa* and *S. tschukotensis* unknown)

1. Median hypostomal tooth subequal or longer than lateral teeth 2
 – Median hypostomal tooth 2 times as short as lateral teeth 9
2. Median hypostomal tooth very large, markedly longer than lateral teeth
 *S. hamuligera* Yankovsky, 1977 (Fig. 8)
 – Median and lateral hypostomal teeth subequal in length 3
3. Outward mandibular teeth very large, subequal in size to apical tooth 4
 – Outward mandibular teeth small or moderate size, always less than $\frac{1}{2}$ of apical tooth 5
4. Antennae slightly longer than stalks of premandibles; postgenal cleft triangular
 *S. trigonium* (Lundström, 1911) (Fig. 13)
 – Antennae distinctly shorter than stalks of premandibles; postgenal cleft rectangular
 *S. dentata* Rubzov et Carlsson 1965 (Fig. 4)
5. Postgenal cleft rectangular; antennae subequal in length to stalks of premandibles
 . . *S. tundrensis* Yankovsky et Aibulatov sp. nov. (Fig. 15)
 – Postgenal cleft triangular; antennae distinctly longer, or (rarely) shorter than stalks of premandibles 6

6. Antennae distinctly shorter than stalks of premandibles *S. asema* Rubzov, 1956
 – Antennae distinctly longer than stalks of premandibles 7
7. Per side of hypostoma 2 sublateral setae
 *S. emergens* (Stone, 1952)
 – Per side of hypostoma 3 sublateral setae 8
8. Postgenal cleft very small or absent; in primary fan 40–47 rays *S. xantha* Currie et, 2004
 – Postgenal cleft relatively large; in primary fan 49–53 rays *S. acra* Currie et al., 2004, *S. permutata* (Dyar et Shannon, 1927)
9. Antennae subequal in length to stalks of premandibles; length of articles I+II 1.8–2 times length of article III . .
 10
 – Antennae distinctly longer than stalks of premandibles; length of articles I+II 1–1.5 times length of article III . .
 11
10. In primary fan 42–45 rays; per side of hypostoma 2 sublateral setae . . *S. majalis* Rubzov et Carlsson, 1965 (Fig. 11)
 – In primary fan 54 rays; per side of hypostoma 3 sublateral setae *S. mutata* (Malloch, 1914)
11. In primary fan 42–45 rays; posterior circler of 72–78 rows . . . *S. decafilis* Rubzov et Carlsson, 1965 (Fig. 4)
 – In primary fan 48–56 rays; posterior circler of 64–68 rows 12
12. In primary fan 56 rays; in posterior circler 13 hooklets per row *S. takeshii* Takaoka, 2005
 – In primary fan 48–50 rays; in posterior circler 6–9 hooklets per row 3
13. Length of antennal articles I+II 1.5 times length of article III; inner mandibular teeth 6–7
 *S. duodecimata* Rubzov, 1940 (Fig. 6)
 – Length of antennal articles I+II 1.2 times length of article III; inner mandibular teeth 10–11
 *S. nukabirana* Ono, 1977

Pupa (pupae of *S. tschukotensis*, *S. longicoxa* and *S. haematophaga* unknown)

1. Gills of 10 filaments 2
 – Gills of 12 filaments 4
2. Gills of $\frac{3}{4}$ of pupal body length
 *S. hamuligera* Yankovsky, 1977 (Fig. 8)
 – Gills distinctly longer than pupal body 3
3. Angle between basal parts of upper and lower gill filaments 60–90°
 *S. decafilis* Rubzov et Carlsson, 1965 (Fig. 4)
 – Angle between basal parts of upper and lower gill filaments 30–45°
 . *S. tundrensis* Yankovsky et Aibulatov sp. nov. (Fig. 15)
4. Filaments on 3 stems 5
 – Filaments on 2 stems 12
5. Angle between basal parts of upper and lower gill filaments 70–90° 6

- Angle between basal parts of upper and lower gill filaments 30–45° or 120–180°8
- 6. Gills distinctly longer than pupal body
.....*S. emergens* (Stone, 1952)
- Gills of ¾ of pupal body length7
- 7. Gill filaments VI and VII 2–3 times as short as others .
.....*S. trigonium* (Lundström, 1911) (Fig. 13)
- Gill filaments I–IV 1.5 times as short as lower filaments
.....*S. duodecimata* Rubzov, 1940 (Fig. 6)
- 8. Gills of ½–⅔ of pupal body length, angle between basal
parts of upper and lower filaments 120–180° 9
- Gills subequal or distinctly longer than pupal body,
angle between basal parts of upper and lower filaments
30–45° 10
- 9. Angle between basal parts of upper and lower gill fila-
ments 120° *S. nukabirana* Ono, 1977
- Angle between basal parts of upper and lower gill filaments
160–180° ... *S. majalis* Rubzov et Carlsson, 1965 (Fig. 11)
- 10. Gills subequal in length to pupal body, all filaments of
about equal length*S. mutata* (Malloch, 1914)
- Gills 1.5–3 times as long as pupal body, 2–6 of 12 fila-
ments 2 times as short as others11
- 11. Gills 1.5 times as long as pupal body, filaments I and II
2 times as short as others
..... *S. dentata* Rubzov et Carlsson 1965 (Fig. 4)
- Gills 2.5–3 times as long as pupal body, filaments I–III
and X–XII 2 times as short as others
.....*S. byrrangii* Yankovsky, 2000 (Fig. 2)
- 12. Gills 1.5 times as long as pupal body
.....*S. asema* Rubzov, 1956
- Gills shorter or subequal to body of pupa 3
- 13. Angle between basal parts of upper and lower gill fila-
ments about 45° *S. takeshii* Takaoka, 2005
- Angle between basal parts of upper and lower gill fila-
ments about 70° 14
- 14. Scheme of gill divergence (3+2+2)+(2+3)
.....*S. diplomutata* Currie
et Hanter, 2003, *S. permutata* (Dyar et Shannon, 1927)
- Scheme of gill divergence (3+2+2)+(3+2)
.....*S. acra* Currie et al., 2004, *S. xantha* Currie et al., 2004

ACKNOWLEDGEMENTS

This work was supported by a grant No. 05-04-48719 of the Russian Foundation for Basic Research and by a grant the President of the Russian Federation to the Leading Scientific School No. 5563.2006.4 (School of Academician E.N. Pavlovsky).

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