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Description of larva of *Aegialites kunashirensis* Zerche, 2004 (Coleoptera: Salpingidae)

Описание личинки *Aegialites kunashirensis* Zerche, 2004 (Coleoptera: Salpingidae)

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КЛЮЧЕВЫЕ СЛОВА: жесткокрылые, личинка, Salpingidae, Aegialitinae

ABSTRACT. The last-instar larva of *Aegialites kunashirensis* Zerche, 2004 is described. The generic key to larvae of Salpingidae, occurring in Russia, is provided.

РЕЗЮМЕ. Описана личинка последнего возраста *Aegialites kunashirensis* Zerche, 2004. Приводится определительный ключ личинок родов Salpingidae, известных с территории России.

Introduction

Salpingidae Leach, 1815 is a rather small Coleoptera family, consisting of about 50 genera and 300 species worldwide, attributed to seven subfamilies [Lawrence *et al*., 2010, 2021]; 15 genera with 42 species belonging to five subfamilies are known from the territory of Russian Federation [Pollock *et al*., 2020; Makarov *et al*., 2023]. Subfamily Aegialitinae LeConte, 1862 is a peculiar group of flightless beetles with only two genera described so far: *Aegialites* Mannerheim, 1853 consisting of about 30 species [Zerche, 2004] distributed along the Northern Pacific coasts [Haugen *et al*., 2024] and monotypic, a New Zealand endemic *Antarcticodomus* Brookes, 1951. Adults and larvae of both genera inhabit intertidal zone, where they live on rocks [Lawrence *et al*., 2010]. Seventeen *Aegialites* species are recorded from Russian Far East: by one specimen known from Commander Archipelago of Kamchatskii Krai and Sachalin; fifteen are distributed on Kuril islands, with single species, *A. kunashirensis* Zerche 2004, known from Kunashir island [Pollock *et al*., 2020]. Within the genus, only larva of *A. californicus* Motschulsky 1845 have been adequately described so far [Wickham, 1904; Böving, Craighead, 1931].

Material and methods

During the study of beetles' fauna of Kurilsky Nature Reserve, larvae and adults of *Aegialites* were collected from a single rock (Figs 1–5). Upon determination, all adults appeared to be of *A. kunashirensis*, thus larvae were assigned to this species.

The specimens were preserved in 70% ethanol or on slides with Faure's Berlese media and are deposited in Moscow Pedagogical State University, Moscow, Russia (MPGU). Habitus photographs were taken with a Canon EOS 40D camera with a MP-E 65 mm macro lens. Photos of slide mounts were taken with a Canon EOS6D camera attached to a Carl Zeiss AXIO Scope. A1microscope. All photos were processed using Helicon Focus 7.0 software. Line drawings were made in CorelDRAW 12. The measurements were taken with an ocular-micrometer mounted on a MBS1 (Lomo) stereo microscope.

The following abbreviations were used:

1) body sclerites: Ascl — additional sternal sclerite, AT — abdominal tergite, BS — basisternite, EM — epimeron, EP — epipleurite, ES — episternum, FR — frontal sclerite, HY — hypopleurite, IP — interpleurite, LbS — latero-basal sternite, LIP — lateral interpleurite, LPr — lateral presternum, MPr — medial presternum, MS — mesonotum, MT — metanotum, PA — parietal sclerite, PR — pronotum, SpS — spiracular sclerite, SS — spinasternite;

2) head appendages and their parts: At1–3 — anterior mandibular teeth, Cdo —cardo, Cl — clypeus, Lb — labrum, Lg — ligula, Ma — mala, Mnt — mentum, Mt — molar teeth, Mxa — maxillary articulating area, Pf — palpifer, Pmnt — prementum, Smnt — submentum, Stp — stipes, Tr — tormae;

3) endoskeletal structures: Aem2–3 — epimeral apodeme (numeric corresponds to segment, on which apodeme is developed), Aes2–3 — episternal apodeme, Apl1 — pleural apodeme of prothorax, Hypbr — hypopharyngeal bracon, Hypsc — hypopharyngeal sclerome;

4) other abbreviations: Asp — group of microasperities, Sp — spiracle, Sa — sensorial appendage, T — tooth of abdominal sternite IX, UR — urogomphi.

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Sclerites nomenclature mostly follows Lawrence [1991]. Designation of ventral and certain lateral thoracic sclerites of Tenebrionoidea larvae is quite complex and confusing [see Crampton, 1918a; Lawrence 1991], since segments boundaries are not obvious. So, in the present paper, Crampton [1918a] terminology was mostly used for naming these regions. In some cases, original nomenclature was proposed (latero-basal sternite, additional sternal sclerite). Besides, the attribution of certain sclerites to the corresponding segments became possible by the definition of ventral longitudinal muscles points of insertion (Figs 6–8). Thus, spinasternite considered to be the anteriormost sclerite of the segment behind it. Snodgrass [1935] proposed the term "intersternite" for the same area, but the usage of "spinasternite" is preferable, cause it indicates the topology of the sclerite: its corresponding apodeme — spina, when present, located in the anterior part of the segment.

Results and discussion

Aegialites kunashirensis Zerche, 2004, last-instar larva
Figs 1–3, 9–33.

MATERIAL. *Aegialites kunashirensis*, 59 last-instar larvae, 81 adults: Russia, Far East region, Sakhalin oblast, Kurilsky Nature Reserve, Kunashir isl., 1 km SW from Alekhino cordon, 43°54′58″N 145°31′00″E, on littoral rock, with *Littorina* sp., 3–4.VIII.2011, leg. A. Zaitsev, K. Makarov; adult determined by K. Makarov.

ADDITIONAL MATERIAL. *Istrisia rufobrunnea* Lewis, 1895, 20 last-instar larvae, 2 adults: Russia, Far East region, Sakhalin oblast, Kurilsky Nature Reserve, Kunashir isl., "Stolbovskaya" ecological route, 44°00'26"N, 145°40'59"E, in rotten wood of *Abies*, 16.VIII.2009, leg. & det. A. Zaitsev; *Elacatis kraatzi* Reitter, 1879, 34 last-instar larvae together with adults: Russia, Far East region, Sakhalin oblast, Kurilsky Nature Reserve, Kunashir isl., near Alekhino cordon, 43°55'06"N, 145°31'34"E, under bark of *Salix*, 10.VIII.2009, leg. & det. A. Zaitsev; *Prostominia lewisi* Reitter, 1889, 25 last-instar larvae: Russia, Far East region, Sakhalin oblast, Kurilsky Nature Reserve, Kunashir isl., valley of Ozernaya river, 43°52'44"N, 145°28'16"E, under bark of *Pinus pumila*, 21.VII.2011, leg. & det. A. Zaitsev; *Rabocerus* sp., 6 last-instar larvae: Russia, Moscow region, Volokolamsk district, near Pagubino village, 55°58'7"N, 35°54'55"E, under bark of *Alnus glutinosa*, 30.VII.2008, leg. & det. A. Zaitsev; *Aglenus brunneus* Gyllenhal, 1813, 1 last-instar larva: Ungarn, Köszeg, leg. & det. B. Klausnitzer; *Salpingus planirostris* Fabricius, 1787, 4 last-instar larvae, Russia, Moscow region, Volokolamsk district, near Pagubino village, 55°58'7"N, 35°54'55"E, under bark of *Alnus glutinosa*, 30.VII.2008, leg. & det. A. Zaitsev; *Lissodema plagiatum* Lewis, 1895, 15 last-instar larvae, 2 adults: Russia, Far East region, Sakhalin oblast, Kurilsky Nature Reserve, Kunashir isl., near Goryachee lake, 43°51'47"N, 145°30'42"E, under bark of *Populus tremula*, 28.VIII.2009, leg. & det. A. Zaitsev. Larvae of *Vincenzellus fascipennis* Reitter, 1897 and *Colposis mutilatus* Beck, 1817 were not available in the present study and their characteristics are given according to literature data [Franz, 1955; Klausnitzer, 1997].

DESCRIPTION. Maximum body length (from anterior margin of frontal sclerite to the apex of abdominal segment IX) 7.1 mm; head length (from the base of epicranial suture to the apex of labrum) 0.6 mm; head width 0.7 mm; maximum width of thorax 0.9 mm; maximum width of abdomen 1.2 mm. Head 0.9 as wide as prothorax; body elongate, moderately convex; widest across abdominal segments III–IV, then tapering posterad; urogomphi present (Figs 1–3).

Head light-brown; frontal sinuses area, lateral edges of parietal sclerites and anterior frontal margin darker. Thoracic tergites brown-yellow, with darker sigillae forming complex pattern of small spots; post-tergal area yellow-gray. Abdominal tergites I–IV brown-grey, strongly pigmented anteriorly; sigillae darker, forming pattern of rather large spots in lateral areas. Spiracles with heavy pigmented area. Abdominal tergites V–VII pigmented stronger, with similar pattern of spots. Abdominal tergite VIII darker, practically of the same color as head. Abdominal tergite IX light brown, with heavy pigmented sclerotized ridge in anterior part and dark brown tubercles; urogomphi yellow-brown.

Head capsule, maxillae and labium ventrally light-brown, cardo and prementum distinctly darker. Prothoracic sternites and pleurites brown-grey, becoming lighter caudally. Meso- and metathoracic sternites and pleurites pale, grayish. Legs mostly light, dorsal surface of femur and tibiatarsus darker; claws yellow-brown. Abdominal sternites and pleurites pale, brownish, with poorly marked broad sigillae.

Head capsule as well as body sclerites and legs are covered with simple setae of various length and numerous small campaniform sensilla.

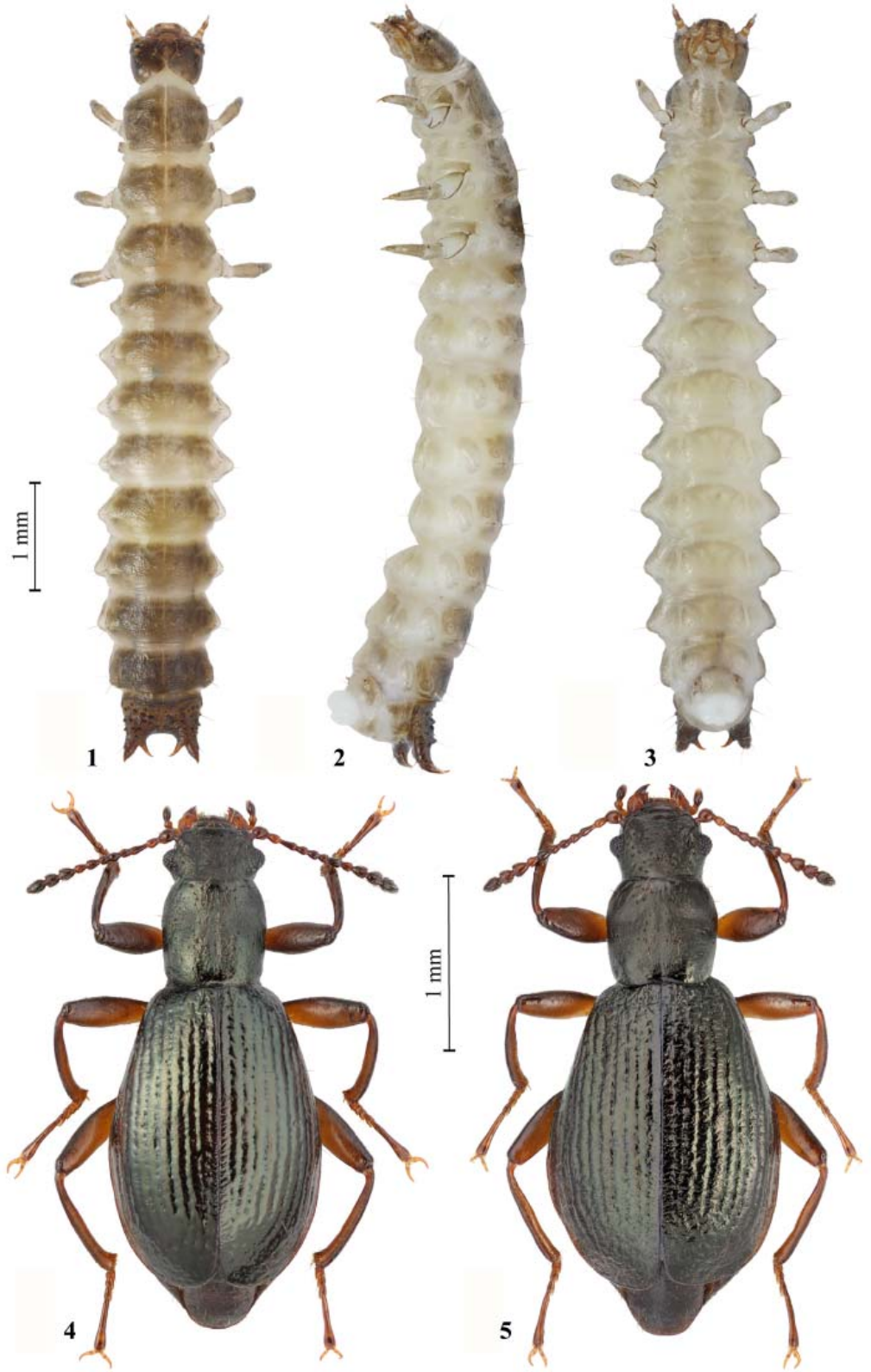
Head (Figs 9–15) prognathous, subquadrate, 0.85 as long as wide. Epicranial suture rather short, about 0.1 as long as head capsule; frontal sutures U-shaped, long, reaching antennal sockets (Fig. 9). Frontoclypeal suture indistinct. Stemmata five on each side, pigmented; anterior three arranged in transverse row just behind the antennal sockets and a pair located posteriorly (Fig. 2).

Clypeus trapezoidal, about 0.3 as long as wide; its proximal part sclerotized, bearing three setae on each side: lateral meso- and macroseta as well as medial microseta; single pore located between lateral setae (Fig. 9). Distal part of clypeus membranous, without setae. Clypeolabral suture distinct. Labrum (Fig. 11) about 0.3 as long as wide; its lateral margins rounded; dorsally with five setae on each side: three macrosetae on anterior margin, one macroseta on lateral edge as well as single microseta. Moreover, unpaired medial pore present. Ventrally labrum with five marginal setae on each side: four meso- and single microseta. Epipharynx (Fig. 11) on each side with several short microtrichia, absent in central area, where three conical and three small campaniform sensilla located. Tormae present, well developed (Fig. 11); leiotorma and dexiotorma symmetrical, connected to each other approximately at the midlevel.

Surface of frontal sclerite smooth; each side with four setae and single pore: two macro- and single microseta located in the anterior part, single mesoseta posteriorly with pore situated close to it (Fig. 9). Each parietal sclerite dorsally (Fig. 9) with three macrosetae, eight mesosetae and eight microsetae as well as five pores. Ventrally each parietal sclerite with three macrosetae, single mesoseta, two microsetae as well as three pores (Fig. 10).

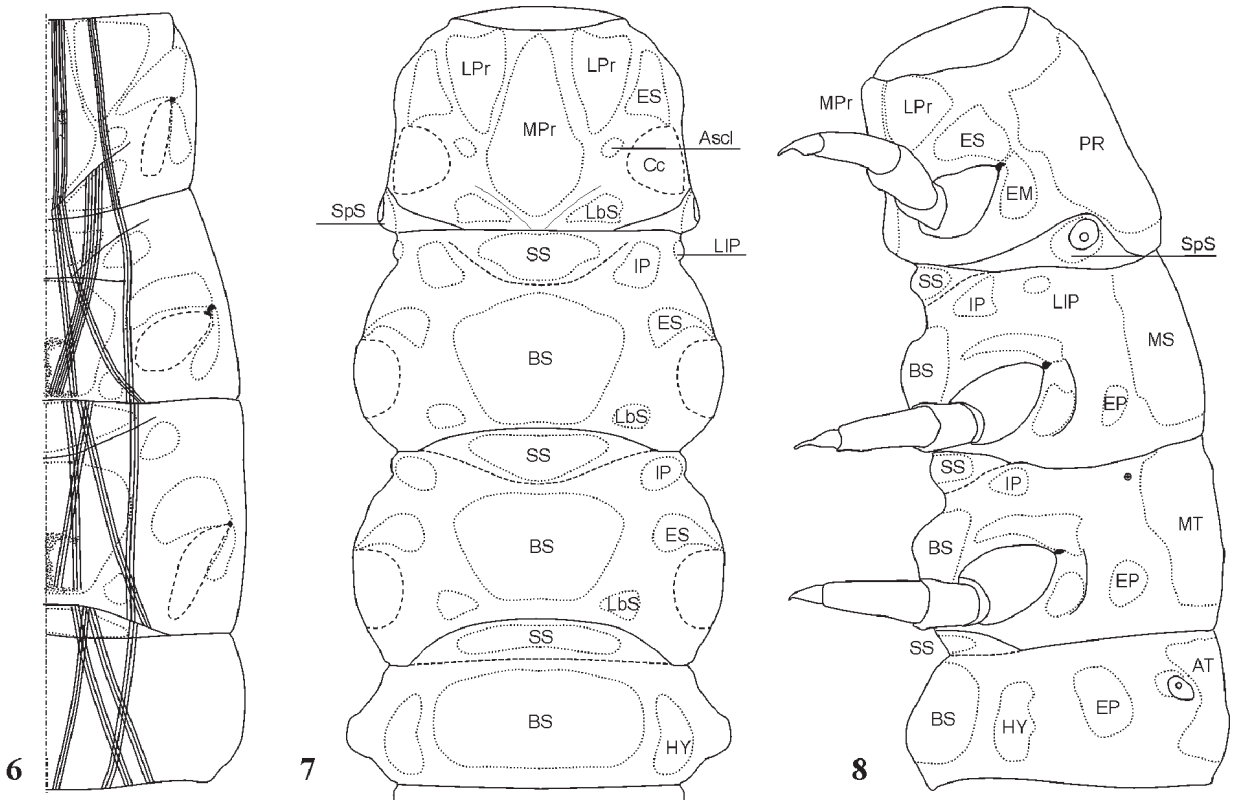
Antenna (Fig. 12) with three antennomeres, 0.4 as long as head capsule length. Antennomere I rectangular, heavily sclerotized except apical part, 1.2 as long as wide, ventrally with single microseta and two pores; dorsally with two microsetae and three pores, also single lateral mesoseta present. Antennomere II 1.2 as long as antennomere I and 2.0 as long as wide, ventrally with two meso- and two microsetae; two sensorial appendages present: one elongated conical, 0.7 as long as antennomere III, other very small, located nearby. Dorsally antennomere II with single mesoseta and pore, also two lateral mesosetae present. Antennomere III 0.4 as long as antennomere II and 3.2 as long as wide; with single ventral pore and two dorsal subapical mesosetae; its apical part with elongated sensillum and single mesoseta.

Mandibles (Figs 13–14) symmetrical, 1.2 as long as basal width; apex tridentate, molar area with serrated hyaline lobe. Dorsal surface of each mandible with single macroseta and adjacent pore on outer edge, also single medial pore present.



Figs 1–5. *Aegialites kunashirensis*, habitus: 1–3 — last-instar larva: 1 — dorsal view; 2 — lateral view; 3 — ventral view; 4 — male, dorsal view; 5 — female, dorsal view.

Рис. 1–5. *Aegialites kunashirensis*, габитус: 1–3 — личинка последнего возраста: 1— сверху; 2 — сбоку; 3 — снизу; 4 — самец, сверху; 5 — самка, сверху.



Figs 6–8. *Aegialites kunashirensis*, last-instar larva: 6 — schematic diagram of ventral longitudinal muscles of thorax and abdominal segment I; 7–8 — position and nomenclature of thoracic and abdominal segment I sclerites. 7 — ventral view; 8 — lateral view. Not to scale.
Рис. 6–8. *Aegialites kunashirensis*, личинка последнего возраста: 6 — схема расположения продольной вентральной мускулатуры груди и первого брюшного сегмента; 7–8 — расположение и номенклатура склеритов груди и первого брюшного сегмента. 7 — снизу; 8 — сбоку. Не в масштабе.

Maxilla (Fig. 15) with transverse triangular cardo, which is not "divided" by the internal sclerotization; dorsally with single microseta on the distal part; maxillary articulating area membranous, with two small campaniform sensilla. Stipes ventrally smooth, with two meso- and single macrosetae, as well as two pores. Dorsal side of stipes mostly membranous. Mala slightly narrowed apically; ventral surface (Fig. 15) with 12 setae and single pore: seven microsetae (four located on anterior margin, one on inner and outer margin, as well as single medial) and five stout macrosetae (four on anterior margin and single subapical on inner margin). Dorsally (Fig. 15) mala with 16 setae: four stout macrosetae on anterior margin, six stout macrosetae, five mesosetae and single microseta on inner margin).

Maxillary palps three-jointed, palpifer membranous, without setae (Fig. 15). Palpomere I 0.6 as long as wide; ventrally with single apical pore. Palpomere II 1.1 as long as palpomere I and 0.7 as long as wide; with one ventral and two dorsal mesosetae. Palpomere III almost twice as long as palpomere II and 2.1 as long as wide; with microseta on inner edge and single subapical pore on outer edge; dorsally with medial digitiform sensillum. Apex of palpomere III with a group of six short conical sensilla.

Labium (Fig. 15). Ligula broad, blunt; anterior margin with numerous small microtrichia, ventrally with two pores on each side. Prementum ventrally on each side with one micro- and one macroseta as well as single pore. Labial palps two-jointed. Palpomere I 1.15 as long as wide, ventrally with 1 basal microseta on the outer edge and single pore near the inner edge. Palpomere II 0.8 as long as palpomere I and 1.6 as long as wide, with single ventral pore; its apex with a group of seven short conical sensilla.

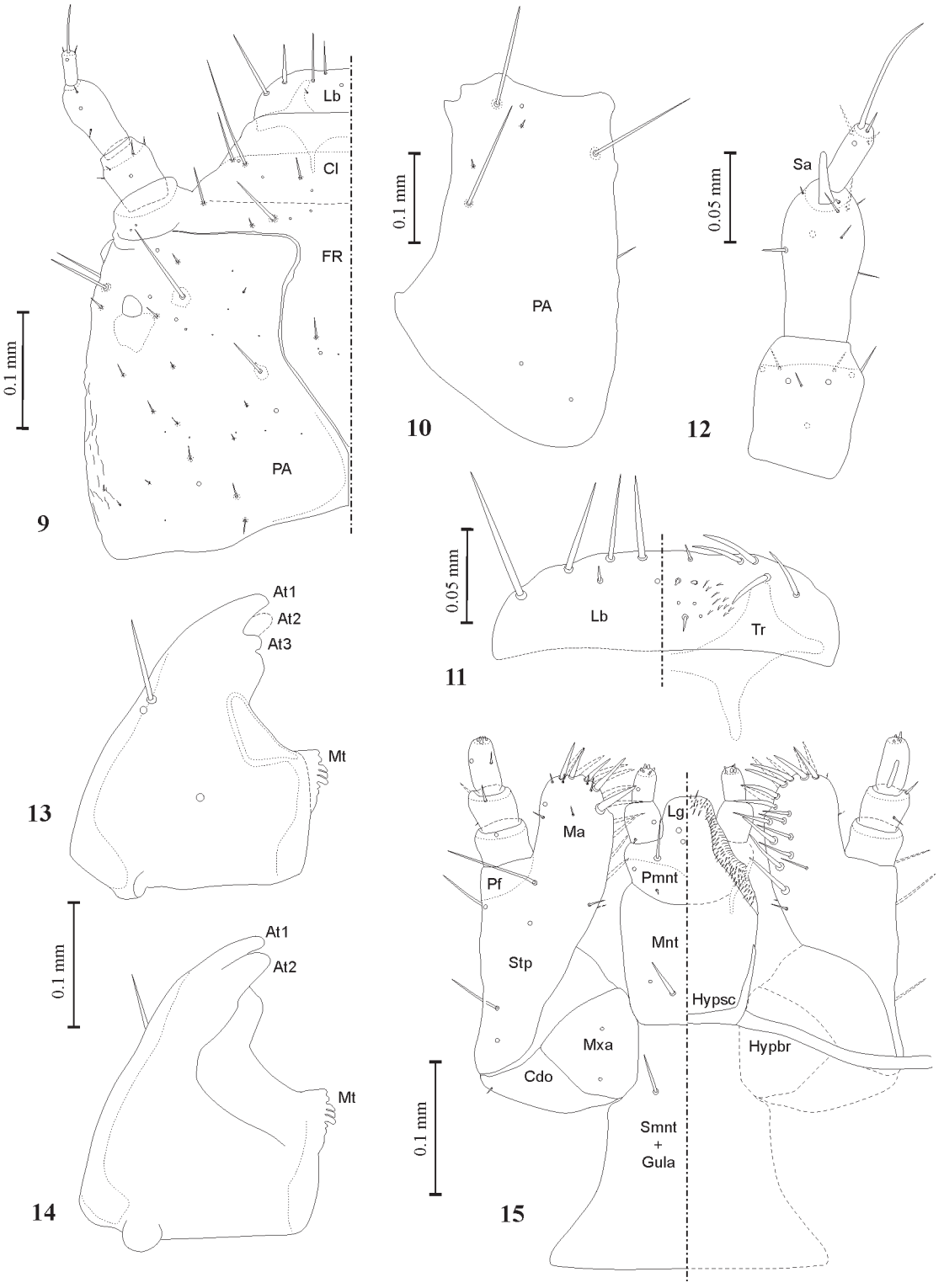
Mentum distinct, trapezoidal, membranous, ventrally each side with single macroseta and pore. Submentum fused with gula; on each side with single anterior macroseta. Hypopharynx (Fig. 15) with numerous microtrichia; hypopharyngeal sclerotisation consists of well-defined sclerome and bracon.

Thorax (Figs 1–3, 16–18, 26). About 0.3 as long as total body length, widest across metathorax. Prothorax almost as long as wide, 1.2 as long as meso- and metathorax.

Prothorax with a pair of large pronotal sclerites with rugulosed surface (Fig. 26); ecdysial line distinct. Each pronotal plate (Fig. 16) with two macrosetae, nine mesosetae, numerous microsetae as well as six pores and several small campaniform sensilla. Membranous area surrounding pronotal plates with numerous small microgranules, and several small campaniform sensilla.

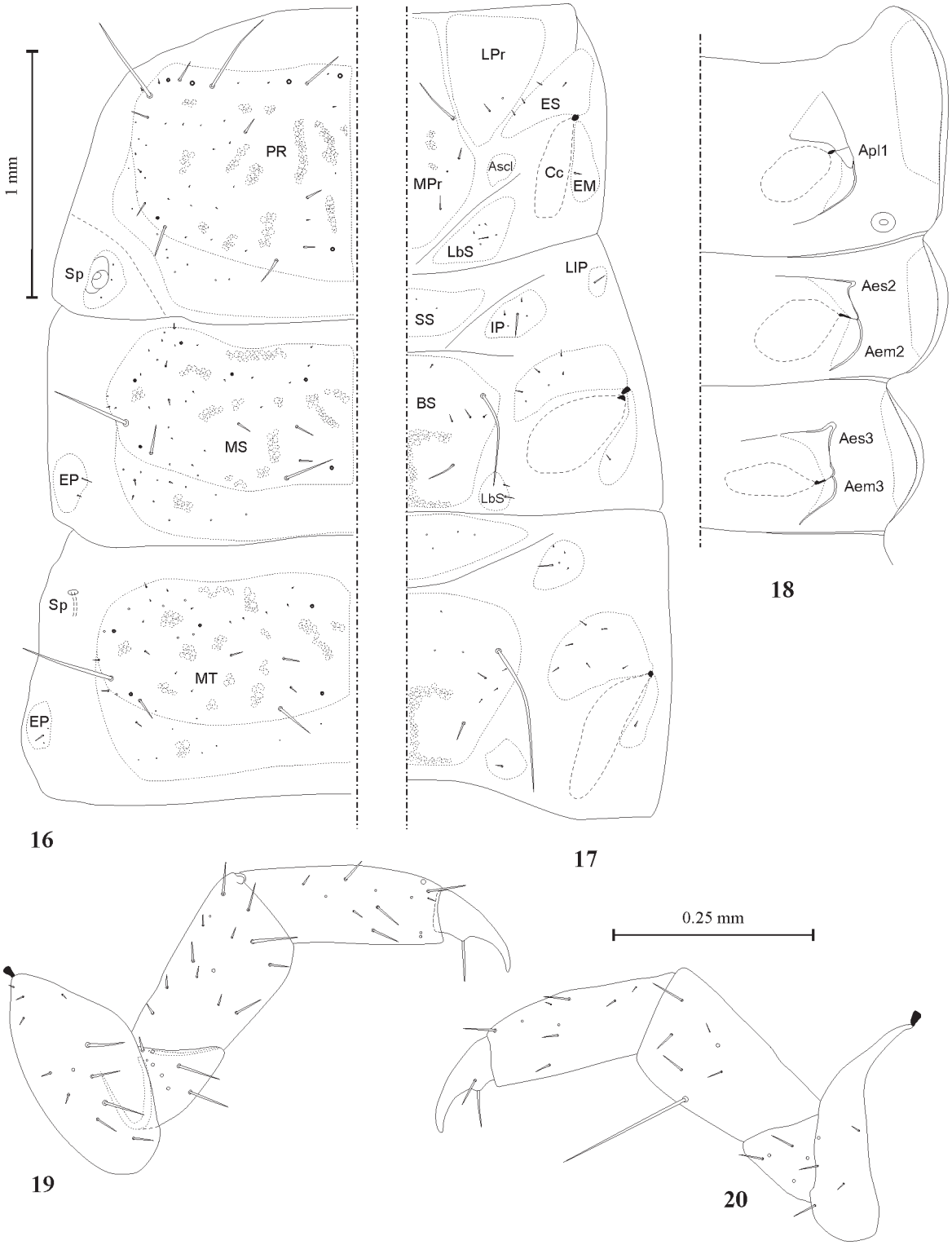
Meso- and metanotum with rugulosed surface; ecdysial line distinct; each meso- and metanotal plate with one macroseta, five mesosetae, numerous microsetae as well as five pores and several small campaniform sensilla (Fig. 16). Membranous area with the same microgranules as on prothorax as well as several microsetae and small campaniform sensilla.

Mesothoracic spiracle shifted on the posterior region of prothorax, but separated from it by impressed line (Fig. 27); small, annular, surrounded by oval sclerome [*sensu* Böving & Craighead, 1931], distinctly protruding; spiracular sclerite with several small campaniform sensilla. Metathoracic spiracle rudimentary, barely visible (Fig. 16).



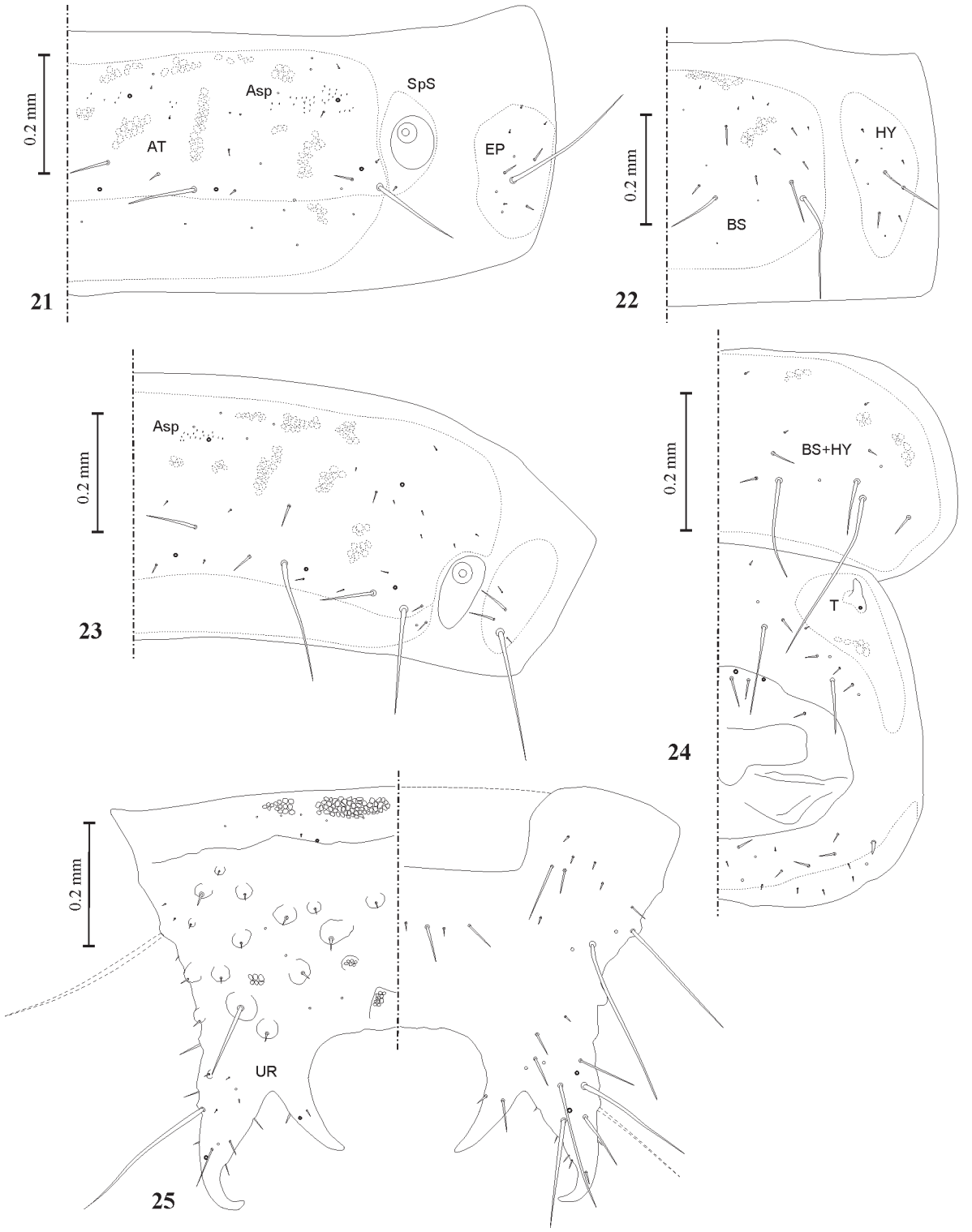
Figs 9–15. *Aegialites kunashirensis*, last-instar larva: 9 — head; 10 — parietal sclerite; 11 — labrum and epipharynx; 12 — antenna; 13–14 — left mandible; 15 — labio-maxillar complex and hypopharynx. 9, 13 — dorsal view; 10, 12, 14 — ventral view; 11 — left — dorsal view, right — ventral view; 15 — left — ventral view, right — dorsal view.

Рис. 9–15. *Aegialites kunashirensis*, личинка последнего возраста: 9 — голова; 10 — париетальный склерит; 11 — верхняя губа и эпифаринкс; 12 — антенна; 13–14 — левая мандибула; 15 — лабио-максиллярный комплекс и гипофаринкс. 9, 13 — сверху; 10, 12, 14 — снизу; 11 — слева — сверху, справа — снизу; 15 — слева — снизу, справа — сверху.



Figs 16–20. *Aegialites kunashirensis*, last-instar larva: 16–17 — thorax; 18 — thoracic endoskeleton, schematically; 19–20 — middle leg. 16 — dorsal view; 17 — ventral view; 19 — anterior view; 20 — posterior view.

Рис. 16–20. *Aegialites kunashirensis*, личинка последнего возраста: 16–17 — грудные сегменты; 18 — эндоскелет груди, схематично; 19–20 — нога второй пары. 16 — сверху; 17 — снизу; 19 — спереди; 20 — сзади.



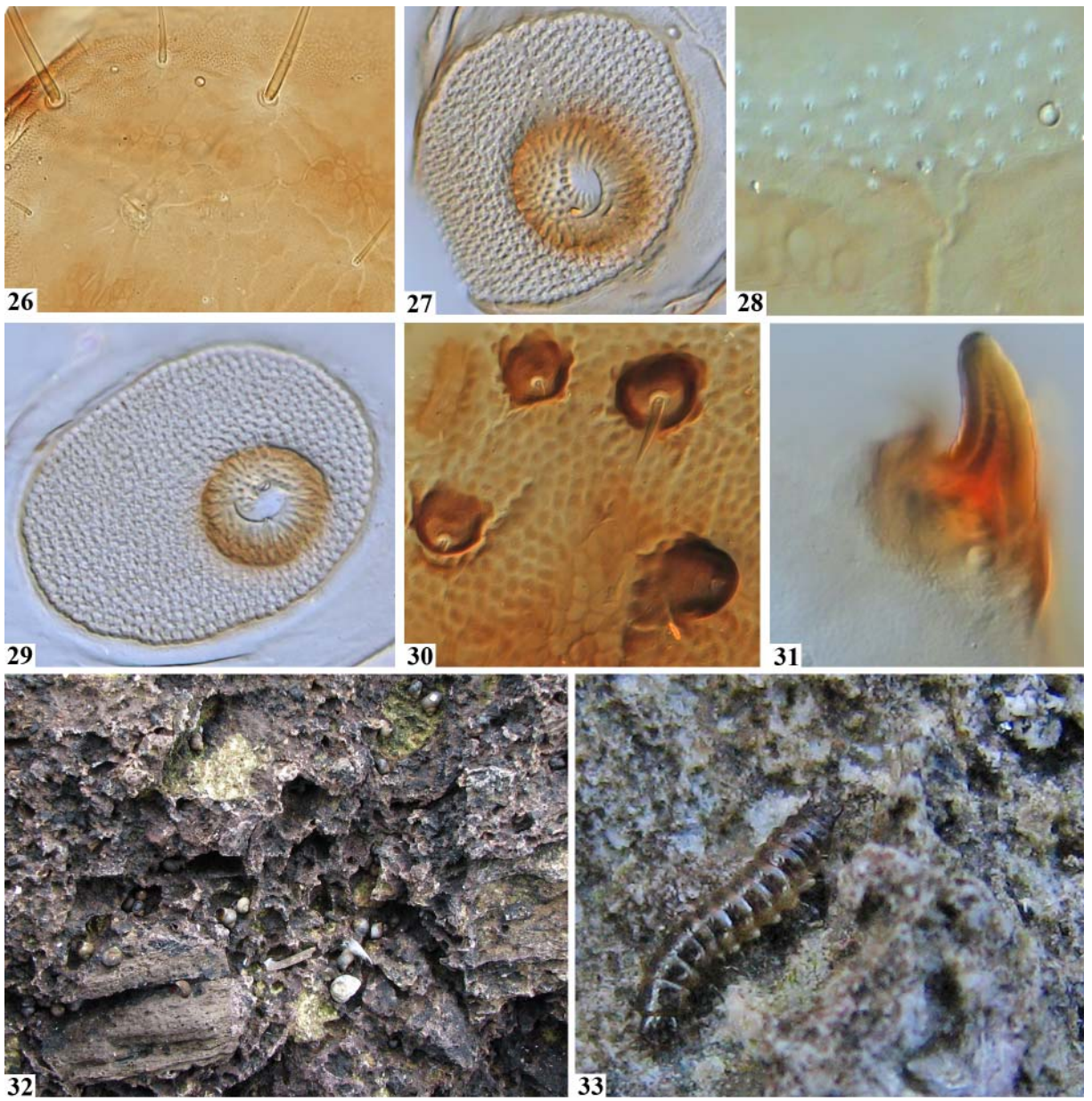
Figs 21–25. *Aegialites kunashirensis*, last-instar larva: 21–22 — abdominal segment II; 23 — abdominal segment VII; 24 — abdominal segments VIII–X; 25 — abdominal segment IX. 21, 23, 25 — dorsal view; 22, 24 — ventral view.

Рис. 21–25. *Aegialites kunashirensis*, личинка последнего возраста: 21–22 — II брюшной сегмент; 23 — VII брюшной сегмент; 24 — VIII–X брюшные сегменты; 25 — IX брюшной сегмент. 23, 25 — сверху; 22, 24 — снизу.

Prothoracic episternum heavy sclerotized, with four microsetae; epimeron lightly sclerotized, with single microseta (Fig. 17). Presternum consists of three sclerites; medial one is the largest, bearing one macroseta and two mesosetae on each side. Each lateral sclerite with single mesoseta. Between coxal cavities and medial presternal sclerite small additional paired sclerites located, lacking setae. Each latero-basal sternite with one mesoseta and two microsetae.

Meso- and metathoracic episternum with four and six microsetae respectively; epimeron similar to that on prothorax (Fig. 17). Each mesothoracic epipleurite with single meso- and microseta; each metathoracic epipleurite with single mesoseta. Each mesothoracic interpleurite subdivided into two sclerites: lateral interpleurite with single mesoseta and latero-apical interpleurite with single mesoseta and two microsetae. Lateral interpleurites absent on metathorax; thus each interpleurite with single mesoseta and three microsetae.

Mesothoracic spinasternite without setae, bearing several small campaniform sensilla; basisternite on each side with one macroseta, one mesoseta and four microsetae. Each latero-



Figs 26–33. *Aegialites kunashirensis*, last-instar larva: 26 — microsculpture of pronotum; 27 — thoracic spiracle; 28 — microasperities of abdominal tergite II; 29 — abdominal spiracle VIII; 30 — tubercles of abdominal tergite IX; 31 — tooth of abdominal sternite IX; 32–33 — habitat. Not to scale.

Рис. 26–33. *Aegialites kunashirensis*, личинка последнего возраста: 26 — микроскульптура пронотума; 27 — грудное дыхальце; 28 — шипики тергита II брюшного сегмента; 29 — дыхальце VIII брюшного сегмента; 30 — бугорки тергита IX брюшного сегмента; 31 — зубец стернита IX брюшного сегмента; 32–33 — местообитание. Не в масштабе.

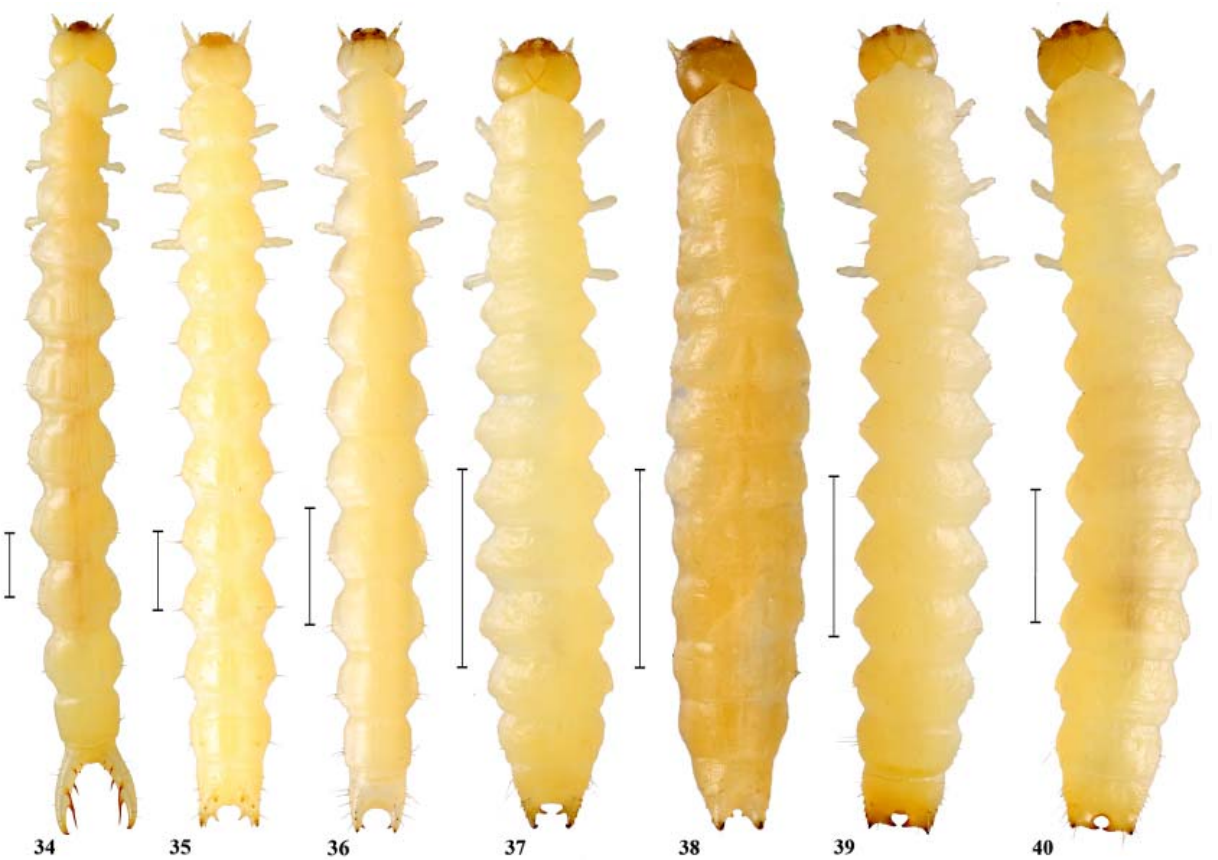
basal sternite with single meso- and microseta. Metathoracic spinasternite also lack setae; basisternite on each side with one macroseta, one mesoseta and five microsetae; each latero-basal sternite with single microseta (Fig. 17).

Thoracic endoskeleton (Fig. 18) is poorly developed in comparison to other studied representatives of the family [Zaitsev, 2009; unpublished data]. Prothorax with rather small, triangular pleural apodemes, furcae absent. Meso- and metathorax with well developed elongated episternal apodemes, standard-sized epimeral apodemes, pleural apodemes reduced; furcae and spinae absent. Such minimized endoskeleton structure can possibly be connected with the reduction of wings in adults, but further investigation is needed.

Legs (Figs 19–20) five-jointed, rather long and slender, slightly increasing in size posteriorly; all three pairs similar in structure and chaetotaxy, covered in simple setae of various length; length ratio of its joints to coxa is 0.4 : 0.9 : 1 : 0.4. Coxa with 15 setae: seven meso- and eight microsetae; two pores present: one anterior and one posterior. Trochanter with five setae: one dorsal microseta, two ventral mesosetae, one anterior and one posterior mesoseta; eight pores present: five anterior and three posterior. Femur with total of 18 setae: dorsally with one meso- and three microsetae; ventrally with one macroseta; five meso- and three microsetae anteriorly; three meso- and two microsetae posteriorly; three pores present: one dorsal, one anterior and one posterior. Tibiotarsus with total of 14 setae: four dorsal mesosetae, two ventral mesosetae; one meso- and three microsetae anteriorly; one meso- and three microsetae posteriorly; eight pores present: one dorsal, two ventral, three anterior, two posterior. Pretarsus with single elongated claw bearing two mesosetae.

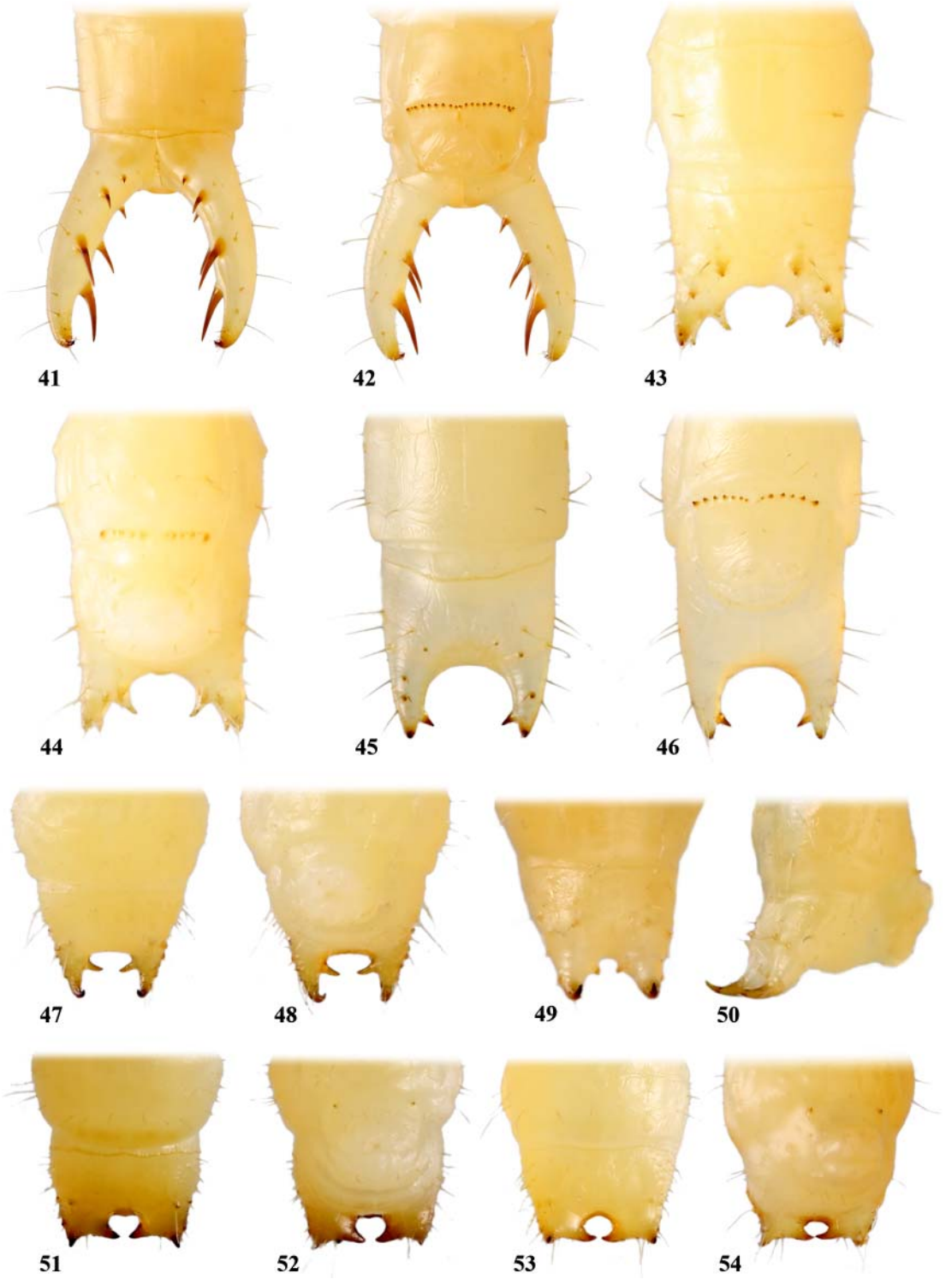
Abdomen (Figs 1–3, 21–25, 28–31). About 0.6 as long as total body length, widest across abdominal segments III–V, then slightly narrowing posteriorly. Each abdominal segment (AS) I–VIII with heavy-sclerotized, rugulosed tergite and less-sclerotized convex epipleurites (=laterotergites) (Fig. 1). Anterior part of tergites I–VIII with a group of microasperities (Fig. 28); each side with two macrosetae, three mesosetae, 7–15 microsetae as well as five pores and several small campaniform sensilla (Figs 21, 23). Each epipleurite of AS I–VIII with one macroseta, two mesosetae and 2–5 microsetae. Membranous area surrounding sclerites with numerous microgranules and several small campaniform sensilla.

Each hypopleurite of AS I–VII with two mesosetae and 2–5 microsetae; hypopleurite of AS VIII fused with corresponding basisternite (Fig. 24). AS I with well-developed anterior sclerite without setae, possibly homologous to thoracic spinasternite. Abdominal basisternites I–VII faintly sclerotised, with smooth surface; on each side with one macroseta, four mesosetae and 6–10 microsetae (Fig. 22). Abdominal basisternite VIII with additional mesoseta on each side as a result of fusing with hypopleurite VIII (Fig. 24). Abdominal spiracles similar in structure to those



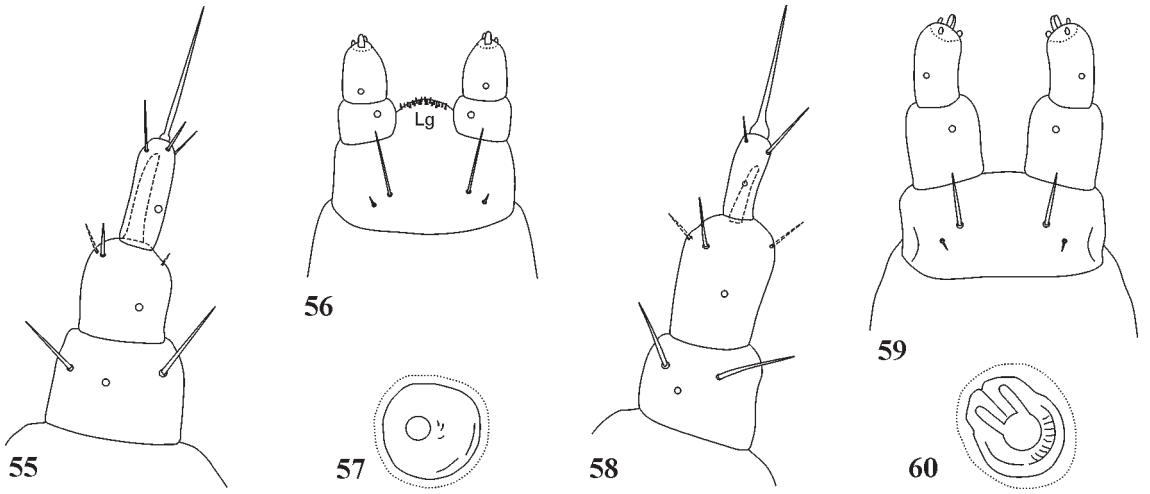
Figs 34–40. Salpingidae, last-instar larvae, dorsal habitus: 34 — *Istrisia rufobrunnea*; 35 — *Elacatis kraatzi*; 36 — *Prostominia lewisi*; 37 — *Rabocerus* sp.; 38 — *Aglenus brunneus*; 39 — *Lissodema plagiatum*; 40 — *Salpingus planirostris*. Scale bar = 1 mm.

Рис. 34–40. Salpingidae, личинки последнего возраста, габитус, сверху: 34 — *Istrisia rufobrunnea*; 35 — *Elacatis kraatzi*; 36 — *Prostominia lewisi*; 37 — *Rabocerus* sp.; 38 — *Aglenus brunneus*; 39 — *Lissodema plagiatum*; 40 — *Salpingus planirostris*. Масштабная линейка = 1 мм.



Figs 41–54. Salpingidae, last-instar larvae, abdominal segments VIII–IX: 41–42 — *Istrisia rufobrunnea*; 43–44 — *Elacatis kraatzi*; 45–46 — *Prostominia lewisi*; 47–48 — *Rabocerus* sp.; 49–50 — *Aglenus brunneus*; 51–52 — *Lissodema plagiatum*; 53–54 — *Salpingus planirostris*. 41, 43, 45, 47, 49, 51, 53 — dorsal view; 42, 44, 46, 48, 52, 54 — ventral view; 50 — lateral view. Not to scale.

Рис. 41–54. Salpingidae, личинки последнего возраста, VIII–IX брюшные сегменты: 41–42 — *Istrisia rufobrunnea*; 43–44 — *Elacatis kraatzi*; 45–46 — *Prostominia lewisi*; 47–48 — *Rabocerus* sp.; 49–50 — *Aglenus brunneus*; 51–52 — *Lissodema plagiatum*; 53–54 — *Salpingus planirostris*. 41, 43, 45, 47, 49, 51, 53 — сверху; 42, 44, 46, 48, 52, 54 — снизу; 50 — сбоку. Не в масштабе.



Figs 55–60. Salpingidae, last-instar larvae: *Lissodema plagiatum* (55–57), *Salpingus planirostris* (58–60): 55, 58 — antenna, dorsal; 56, 59 — prementum, ventral; 57, 60 — abdominal spiracle. Not to scale.
Рис. 55–60. Salpingidae, личинки последнего возраста: *Lissodema plagiatum* (55–57), *Salpingus planirostris* (58–60): 55, 58 — антенна, сверху; 56, 59 — пременту, снизу; 57, 60 — брюшное дыхальце. Не в масштабе.

on mesothorax; their sclerome gradually increasing in size posteriorly (Figs 2, 29).

Abdominal tergite IX dorsally with distinct sclerotized ridge in anterior part; each side covered with 15–17 heavier sclerotised tubercles of various size, most of which bear one microseta, except the largest posterior one with mesoseta (Figs 25, 30). Also, a single pore present on each side, close to the anterior ridge. Ventrally abdominal tergite IX on each side with two macrosetae, five mesosetae and seven microsetae (Fig. 24). Urogomphi well developed, widely separated, distinctly upturned; their surface mostly smooth; each with elongated internal processus curved inward (Fig. 25). Each urogomphi dorsally with one macroseta, five mesosetae, six microsetae as well as single pore; ventrally with three macrosetae, five mesosetae, seven microsetae as well as two pores; each internal processus dorsally with two microsetae and single pore, ventrally with one meso- and microseta. Sternite IX (Fig. 24) consists of heavy sclerotized paired antero-lateral sclerites and unpaired posterior one; basisternite only lightly pigmented. Each antero-lateral sclerite with distinct curved tooth, bearing single basal pore (Figs 24, 31); posterior sclerite with several microsetae and small campaniform sensilla on each side. Anterior part of basisternite with two mesosetae and six microsetae on each side, posterior part with five mesosetae and four microsetae on each side. Pygopod (abdominal segment X) about 0.4 as long as abdominal segment IX, membranous; on each side with two mesosetae, one microseta and two pores (Fig. 24).

BIOLOGY. Larvae and adults were found on a single rock in intertidial zone, together with numerous *Littorina* specimens (Figs 32–33), often hiding inside their empty shells or in crevices.

Comparative remarks. Larvae of *Aegialites* can be easily distinguished from those of other Salpingidae, known from the territory of Russia, by the heavy-sclerotized tergites, spiracles surrounded by oval sclerome and sclerotized tubercles on abdominal tergite IX.

Larval description of the only other specimen, *A. californicus*, have been performed by Wickham [1904] and Spilman [1967]; Böving and Craighead [1931] provided illustrations of dorsal habitus, head capsule and abdominal spiracle. The only evident difference between larvae of these species is the number of sclerotized tubercles on each side of abdominal tergite IX: 15–17 for *A. kunashirensis* and about 8 for *A. californicus*. Certainly, the knowledge of larvae of other representatives of the genus is needed to confirm or deny the significance of this character.

With larva of *A. kunashirensis* described it is possible to provide the generic key to the known late-instar larvae of Salpingidae occurring in Russia, which complements previously published keys for European part and Caucasus [Nikitsky, 1980], as well as Central Europe in general [Klausnitzer, 1997].

KEY TO THE GENERA OF KNOWN LATE-INSTAR LARVAE OF SALPINGIDAE OCCURRING IN RUSSIA

1. Tergites of thoracic and abdominal segments heavy-sclerotized, brown. All spiracles surrounded by oval sclerome, largest on AS VIII. Abdominal tergite IX with 15–17 rather large, heavy-sclerotized setiferous tubercles on each side (Figs 1–3). Length about 7mm. On intertidial rocks (S. Kurils: Kunashir isl.) ..... *Aegialithes* (*A. kunashirensis*)
– Tergites of thoracic and abdominal segments at most light brown, in many cases pale-yellow. Spiracles without oval sclerome. Abdominal tergite IX without heavy-sclerotized tubercles. Under bark or in rotten wood 2
2. Abdominal sternite IX with anterior row of 12–20 heavy-sclerotized teeth 3
– Abdominal sternite IX with at most two antero-lateral heavy-sclerotized teeth or completely without them 5
3. Tergites pale-yellow. Urogomphi very long, occupy almost all area of AS IX, no less than 3 as long as basal wide; each urogomphus with 3 dorso-lateral and 3 ventro-lateral heavy-sclerotized internal spines, increasing in size apically (Figs 34, 41–42). Length about 12 mm. In rotten coniferous wood (Primorskyi krai, Sachalin, S. Kurils: Kunashir isl.) .... *Istrisia* (*I. rufobrunnea*)

– Urogomphi distinctly shorter, at most half as long as AS IX, broad at base, dorsally with rather small heavy-sclerotized teeth; each urogomphus with 1–2 internal processes 4
4. Tergites light-brown. Five ocelli on each side. Each urogomphus dorsally with two heavy-sclerotized teeth; two lesser-sclerotized internal processes present, basal one is the largest (Figs 35, 43–44). Length about 10 mm. Under bark, mostly of hardwood (Primorskyi krai, S. Kurils: Kunashir isl.)..... ..... *Elacatis* (*E. kraatzi*)
– Tergites pale-yellow. Single ocellus on each side. Each urogomphus dorsally with three small heavy-sclerotized teeth, increasing in size apically; single subapical internal processus present (Figs 36, 45–46). Length about 7 mm. Under bark of *Pinus pumila* (S. Kurils: Kunashir isl.) .....*Prostominia* (*P. lewisi*)
5. Abdominal sternite IX with two antero-lateral sclerotized teeth (can be small and hardly distinguishable in early-instar larvae) 6
– Abdominal sternite IX without teeth. Urogomphi gradually narrowed apically, distinctly upturned; about 1.4 as long as basal wide; each with single dorsal and 2-3 lateral external setiferous tubercles; single basal internal processus present, about 0.6 as long as urogomphus basal width (Figs 37, 47–48). Length about 4 mm. Under bark of hardwood. (European part, Primorskyi krai) ....*Rabocerus* (based on *Rabocerus* sp. from European part)
6. Urogomphal pit present. Urogomphi very broad at base, with massive internal processus on each side 7
– Urogomphal pit absent. Urogomphi elongated, gradually narrowed apically, distinctly upturned, each with short basal internal processus, about 0.2 as long as urogomphus basal width (Figs 38, 49–50). Length about 6 mm. In cellars, caves, mills. (South European part, Caucasus) .....*Aglenus* (*A. brunneus*)
7. Spiracles annular (Fig. 57). Antennomere III distinctly longer than II; ligula present; urogomphal notch trapezoidal (Figs 39, 51–52, 55–56). Length 5 mm. Under bark of *Populus tremula* (European part, Caucasus, Primorskyi krai, S. Kurils: Kunashir isl.) .....*Lissodema* (based on *L. plagiatum*)
– Spiracles annular-biforous (Fig. 60), rarely annular-uniforous. Antennomere III shorter than II; ligula absent (Figs 58–59) 8
8. Basal joints of labial palps are distinctly separated from each other (Fig. 59). External processus of urogomphi short, urogomphal notch oval, transverse (Figs 40, 53–54). Length about 6 mm .Under periderm of hardwood. See Nikitsky & Belov [1983] for species key (European part, Caucasus, Primorskyi krai, S. Kurils: Kunashir isl.) ....*Salpingus* (based on *S. planirostris*)
– Basal joints of labial palps are closely located to each other 9
9. External processus of urogomphi elongated, up to 0.4 as long as urogomphal length. Urogomphal notch oval, longitudinal. Spiracles annular-biforous [see Nikitsky, 1980; Klausnitzer, 1997]. Length about 6 mm. (South European part, Caucasus) .....*Vincenzellus* (*V. fascipennis*)
– External processus of urogomphi short, sometimes barely visible. Urogomphal notch transverse, weakly angulated. Spiracles annular-uniforous [see Franz, 1955; Klausnitzer, 1997]. Length about 4 mm. In *Cucurbitaria pithyophila* (European part, Far East) ..... *Colposis* (*C. mutilatus*)

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