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KOREAN SPECIES OF THE COASTAL GENUS *ADOTA* AND A KEY TO THE KNOWN SPECIES (COLEOPTERA: STAPHYLINIDAE: ALEOCHARINAE)

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ABSTRACT

A taxonomic study of the genus *Adota* Casey in Korea is presented. Four species are recognized, 2 of which are newly described (*A. koreana* **sp. nov.** and *A. minuta* **sp. nov.**). *Adota ushio* (Sawada) is newly added to the Korean fauna. A key to the known species, descriptions, habitus photographs, and line drawings of diagnostic characters are provided.

Key Words: Staphylinidae, Aleocharinae, *Adota*, Korea, new species, key

RESUMEN

Se presenta un estudio taxonómico del género *Adota* Casey en Corea. Cuatro especies son reconocidas, dos de las cuales están aqui descritas, es decir, *A. koreana* **sp. nov**. y *A. minuta* **sp. nov.** Tambien, se informa *Adota ushio* (Sawada) para la fauna de Corea. Se provee una clave para las especies conocidas, descripciones, fotografías del habitus, y dibujos de las características diagnósticas.

Palabras Clave: Staphylinidae, Aleocharinae, *Adota*, nuevas especies, clave

The coastal athetine genus *Adota* Casey (1910) contains 6 species worldwide (Gusarov 2003; Frank & Ahn 2011). Three species are distributed in the Nearctic and 3 in Palaearctic region. Up to the present, *Adota magnipennis* is the only species recorded in the Korean Peninsula by Park et al. (2007).

Fenyes (1918, 1920) raised *Adota* to generic rank from a subgenus of *Atheta* Thomson based on the absence of infraorbital carina. Recently, Gusarov (2003) revised the Nearctic *Adota* species including one new species. Most *Adota* species are found under seaweeds and stones along seashores.

In this paper we recognize 4 *Adota* species from Korea including 2 new species (*A. koreana* **sp. nov.** and *A. minuta* **sp. nov.**). *Adota ushio* is recorded for the first time in Korea. A key to the known species of *Adota*, descriptions, habitus photographs, and line drawings of diagnostic characters are provided. All specimens are deposited in the Chungnam National University Insect Collection (CNUIC), Daejeon, Korea. Terminology for chaetotaxy and microstructures follows Sawada (1972) and Ashe (1984).

RESULTS

Genus *Adota* Casey, 1910

See Gusarov (2003) for synonyms.

Diagnosis

Members of the *Adota* can be distinguished from other athetine genera by combination of the following characters: body parallel-sided, flattened dorsoventrally (Figs. 1-4); surface densely pubescent and finely punctured with isodiametric microsculpture; infraorbital carina absent; antennomere 2 longer than 3 (Figs. 17, 26, 35 and 44); pronotal pubescence directed anteriorly in midline; hypomera fully visible in lateral aspect; tarsal formula 4-5-5; all tarsi with long setae ventrally, metatarsomere 1 about as long as 2; one empodial seta present, about as long as claw; abdominal tergites III-VI transversely impressed in basal region; medial lamellae of internal sac reduced; spermathecal duct coiled once distally (Figs. 25, 34, 43 and 53) (Gusarov 2003). Nothing is known of their larvae and development.

KEY TO THE SPECIES OF *ADOTA*

1. Antennomeres 4-5 slightly elongate (Fig. 17; see Gusarov 2003: Figs. 17-18) 2

—. Antennomeres 4-5 about as long as wide or slightly transverse (Figs. 26, 35, 44) 3

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2. Posterior margin of male abdominal tergite VIII with about 8 small irregular dentations (Fig. 18); posterior margin of female abdominal tergite VIII slightly emarginate medially (Fig. 20); Pacific coast of eastern Asia . . . . . .*A. koreana* **sp. nov.**

—. Posterior margin of male abdominal tergite VIII without dentations or with about 4 large blunt dentations; posterior margin of female abdominal tergite VIII round; Pacific coast of North America (see Gusarov 2003: 8 for the key to Nearctic species of *A. colpophila***,** *A. gnypetoides* and *A. maritima*)

3. Labrum with 7 macrosetae on each side of midline (Fig. 11); posterior margin of mesocoxal cavities weakly margined . . . . . *A. minuta* **sp. nov.**

—. Labrum with 8 macrosetae on each side of midline (Fig. 45); posterior margin of mesocoxal cavities distinctly margined 4

4. Frons with macrosetae (see Sawada 1971: Fig. 6A); male sternites VI-VII with many pores in antero-medial region; posterior margin of male sternite VIII emarginate (Fig. 47), with entire marginal setae . . . . . *A. ushio*

—. Frons without macrosetae; male sternites VI-VII with very few pores in antero-medial region; posterior margin of male sternite VIII broadly round (Fig. 28), with bifid marginal setae (see Yosii and Sawada 1976: Fig. 36M; Sawada, 1977: Fig. 8G) 5

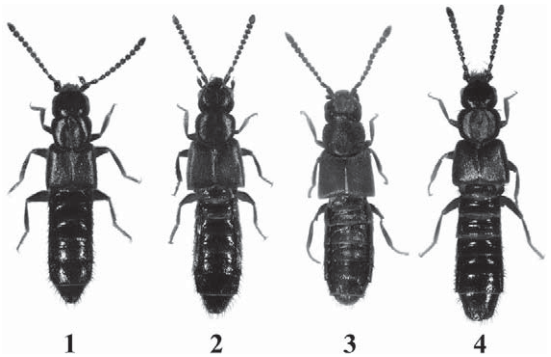
5. Posterior margin of male abdominal tergite VIII slightly emarginate; marginal setae of male sternite VIII deeply bifid . . . . . *A. madida*

—. Posterior margin of male abdominal tergite VIII slightly emarginate and very slightly crenate (Fig. 27); marginal setae of male sternite VIII slightly bifid . . . . . .*A. magnipennis*

Adota koreana Lee and Ahn **sp. nov.** (Figs. 1, 5-10, 17-25)

Type Series

HOLOTYPE, ♂, labeled as follows: KOREA: Jeonnam prov.: Muan-gun, Mangun-myeon, Topmeori beach, N 34° 58' 6.7" E 126° 23' 4.2", 10 m, 2IV2009, under stones on seashore, TK Kim, YH Kim, SG Lee; HOLOTYPE, Adota koreana Lee and Ahn, Desig. S.-G. Lee and K.-J. Ahn 2012. Deposited in CNUIC, Daejeon. Paratypes, 40 (total); 10♂♀ (2 on slide), same data as holotype; 5♂♀ (in 80% ETOH) same data as holotype except N 34° 58' 7.5" E 126° 22' 58.9", 57 m, 12V2011, YH Kim, IS Yoo, under stones on sandy beach; 14♂♀ (in 80% ETOH), Goheung-gun, Pungyang-myeon, N 34° 31' 28.5" E 127° 14' 01.8" 13 m, 25V2011, IS Yoo, YH Kim, under stones on beach; 11♂♀ (in 80% ETOH), same data as the former except 'under stones on beach at night'.



Figs. 1-4. Habitus of *Adota*. 1: *A. koreana* **sp. nov.**, 2.4 mm; 2: *A. magnipennis*, 2.3 mm; 3: *A. minuta* **sp. nov.**, 1.8 mm; 4: *A. ushio*, 2.8 mm.

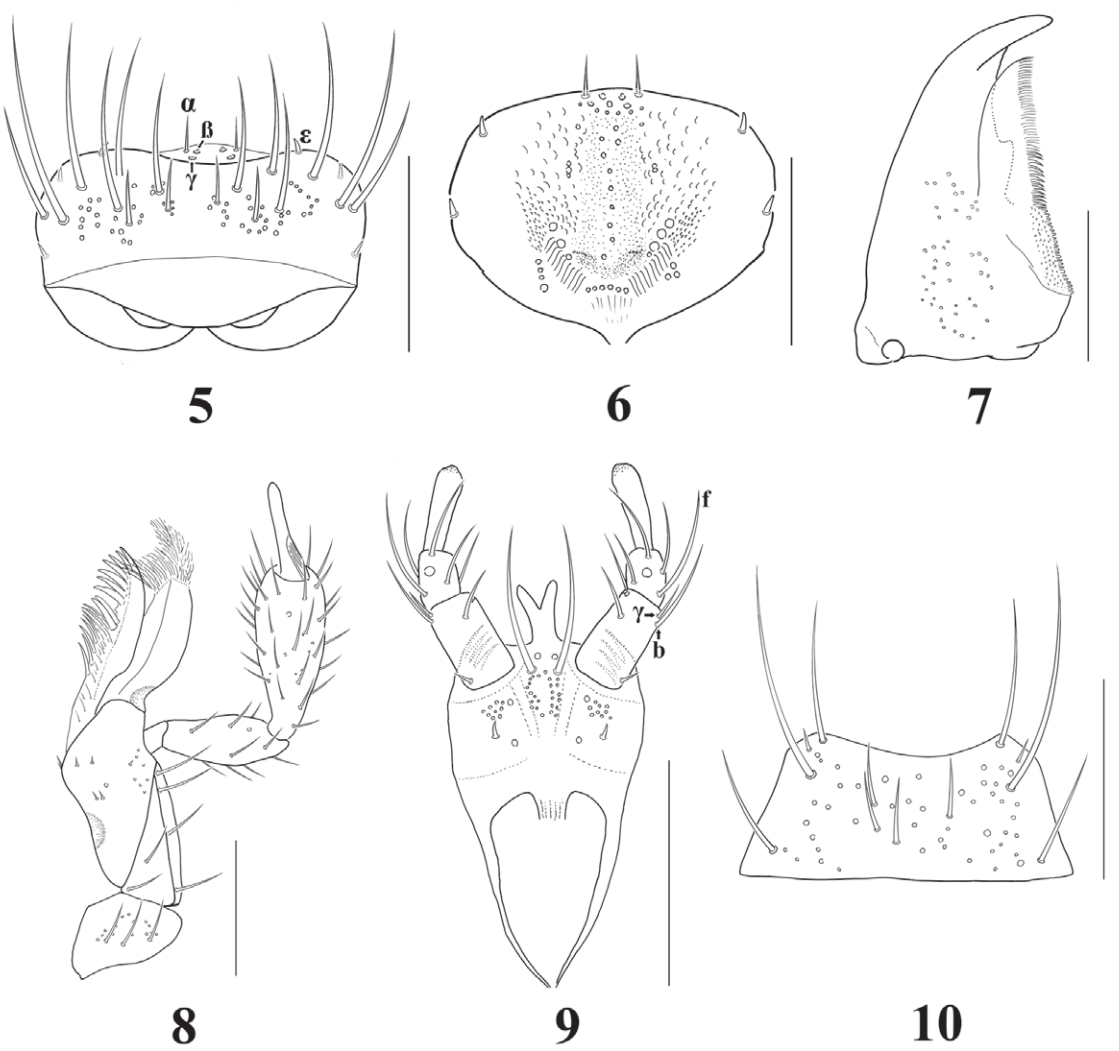
Other Material Examined

2♂ (one on slide), same data as holotype except N 34° 58' 10.6" E 126° 22' 55.3" 13 m, 15V2008, TK Kim, YH Kim'; Jeonnam prov., 7♂♀ (one on slide, 5 in 80% ETOH), Wando-gun, Gogeum-myeon, Bugok-ri, N 34° 22' 58.4" E 126° 49' 09.3" 3 m, 26V2011, IS Yoo, YH Kim, under stones on seashore (mixed with sand & mud) at night; Gyeongnam prov.: 2♂ (one on slide), Geoje-si, Geoje-myeon, Osu-ri, N 34° 50' 9.5" E 128° 35' 13.0" 7 m, 20I2009, TK Kim, JH Song, under stone covered seaweeds.

Description

Length 2.3-3.4 mm. Body (Fig. 1) of most specimens dark brown; head and abdomen almost black, darker than other body parts; surface fairly glossy, densely pubescent. Head quadrate, approximately 1.0-1.1 times longer than wide, widest at across eyes, about as wide as pronotum; eyes moderate in size, slightly prominent, about as long as tempora; gular sutures moderately separated, dilated basally; cervical carina forked. Antennae (Fig. 17) long and slender; antennomeres 1-3 elongate, 1 longest, 4-10 slightly elongate, 11 shorter than the preceding two combined. Labrum (Fig. 5) transverse,

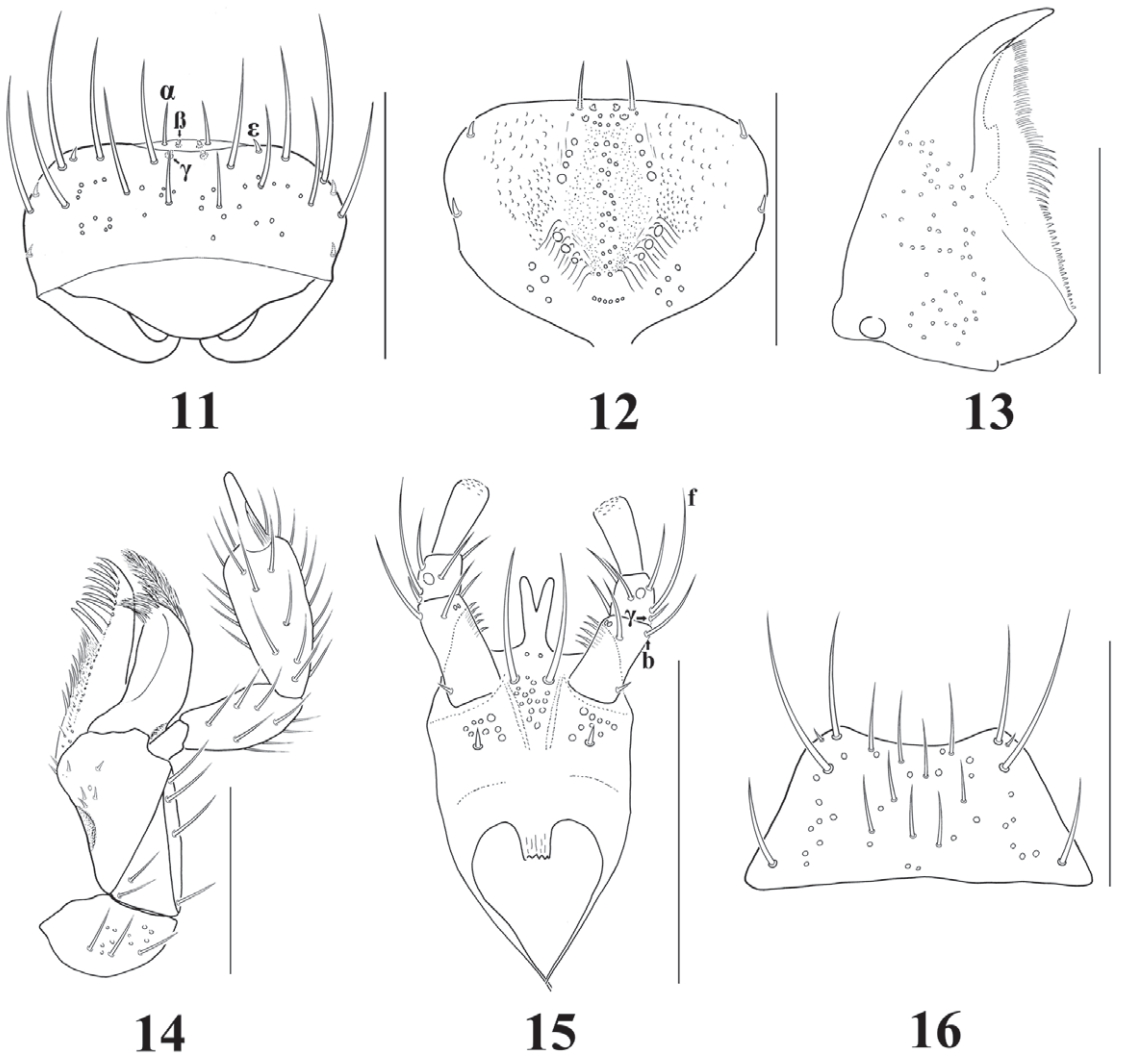
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Figs. 5-10. Mouthparts of *Adota koreana* **sp. nov.**. 5: labrum, dorsal aspect; 6: epipharynx, ventral aspect; 7: right mandible, ventral aspect. 8: right maxilla, ventral aspect; 9: labium, ventral aspect; 10: mentum, ventral aspect. Scale: 0.1 mm.

slightly emarginate in anterior margin, 2 lateral sensilla and about 8-9 macrosetae present on each side of midline, α-sensillum long and setaceous, about twice as long as ε-sensillum, β- and γ-sensilla very short, convergent at apex. Epipharynx as in Figure 6. Mandibles asymmetrical, pointed apically, approximately twice as long as basal width; right one (Fig. 7) with internal tooth, anterior internal margin serrulate. Maxillary palpus elongate with pubescence and long setae; palpomere 1 smallest and about 1.8-1.9 times as long as wide, 2 about 2.7 times longer than wide, 3 slightly longer than 2, about 2.7 times as long as wide, 4 digitiform, filamentous sensilla reaching to basal half (Fig. 8). Labium (Fig. 9) with ligula divided into 2 lobes in basal half; medial setae moderately separated; 2 basal pores present; median pseudopores, lateral pseudopores, l setal pore and 2 real pores present on prementum; labial palpus elongate, with many setulae; palpomere 1 largest, about twice longer than wide, with γ-setula short and adjacent to β-setula, 2 shortest, about 1.3-1.4 times longer than wide, 3 about 3.5-3.6 times longer than wide. Pronotum subquadrate, approximately 1.1-1.2 times as wide as long, widest in apical third. Mesocoxae narrowly separated, mesoventral process distinctly pointed at apex, longer than metaventral process; length ratio of mesoventral process, isthmus and metaventral process 18:13:6. Elytra more or less quadrate and parallel-sided,

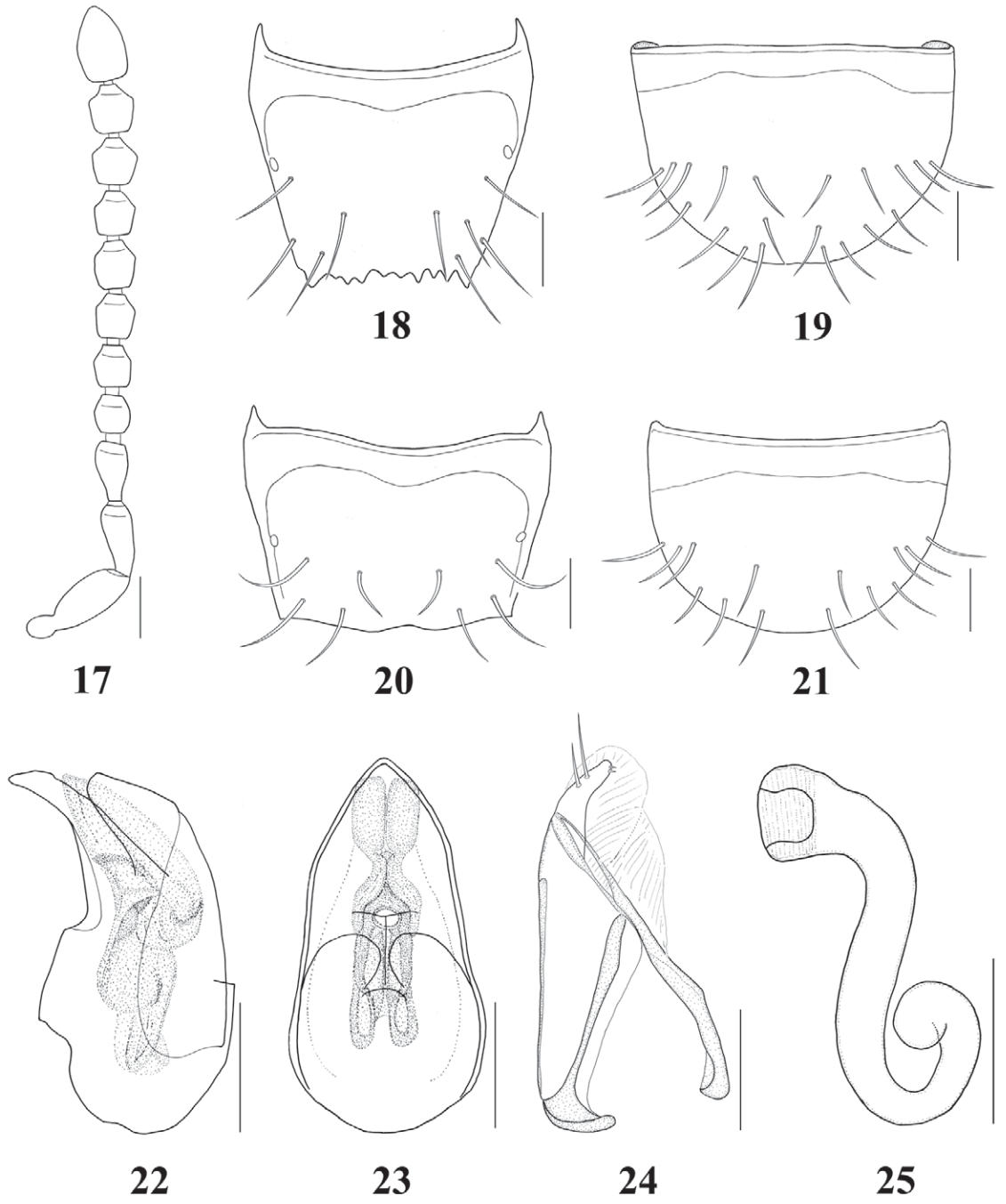
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Figs. 11-16. Mouthparts of *Adota minuta* **sp. nov.**. 11: labrum, dorsal aspect; 12: epipharynx, ventral aspect; 13: right mandible, ventral aspect. 14: right maxilla, ventral aspect; 15: labium, ventral aspect; 16: mentum, ventral aspect. Scale: 0.1 mm.

slightly wider than pronotum; elytron approximately 1.8 times as long as wide, pubescence directed postero-laterally; postero-lateral margin straight; hind wings fully developed; flabellum with about 12 setae. Legs slender and long, with dense pubescence and ctenidium; tibiae with 2 spurs at apex; length ratio of tarsomeres 25:27:29:67 (protarsus); 32:32:33:31:67 (mesotarsus); 41:40:40:38:80 (metatarsus). Abdomen parallel-sided, convergent at apex; surface strongly glossy; tergites II-III with macrochaetal arrangement 02-13 (see Yosii and Sawada 1976); male tergite VIII (Fig. 18) with 4-5 macrosetae on each side of midline, posterior margin irregularly dentate; male sternite VIII (Fig. 19) with 10 macrosetae on each side of midline, posterior margin round, weakly sclerotized and translucent, marginal setae present in median region; posterior margin of female tergite VIII (Fig. 20) slightly sinuate; posterior margin of female sternite VIII (Fig. 21) round, weakly sclerotized and translucent with moderately long marginal setae. Median lobe of aedeagus (Figs. 22 and 23) entirely oval, apical process broad, convergent at apex in ventral aspect; internal sac slightly complicated. Apical lobe of paramere (Fig. 24) with 4 setae; a-seta longer than b, closed together, c-and d-setae very short, positioned apically. Spermatheca (Fig. 25) with large umbilicus.

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Figs. 17-25. *Adota koreana* **sp. nov.**. 17: antenna; 18: male tergite VIII, dorsal aspect; 19: male sternite VIII, ventral aspect; 20: female tergite VIII, dorsal aspect; 21: female sternite VIII, ventral aspect; 22: median lobe, lateral aspect; 23: median lobe, ventral aspect; 24: paramere, lateral aspect; 25: spermatheca. Scale: 0.1 mm.

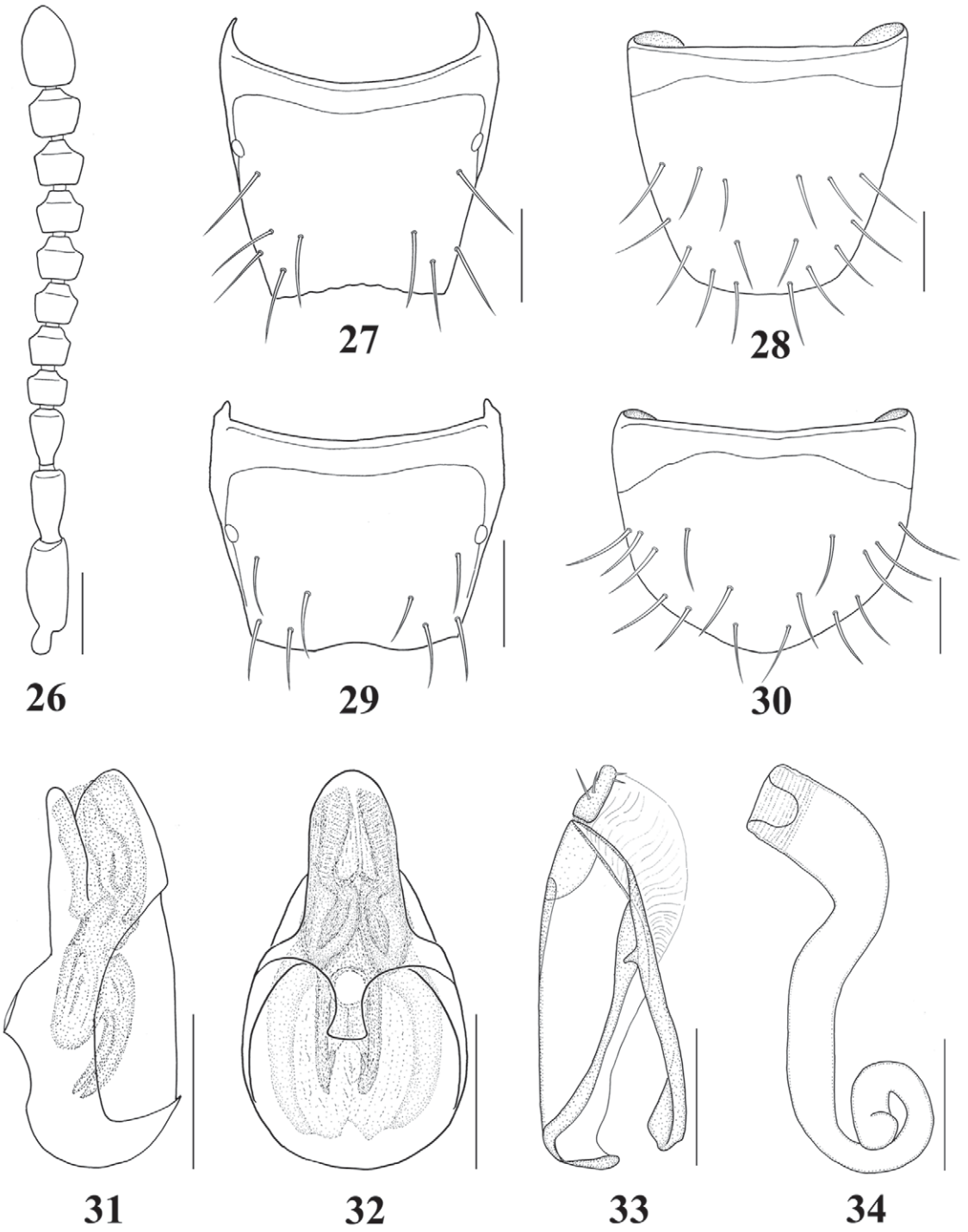
Distribution

Korea (South).

Remarks

Adota koreana can be distinguished from the other species of *Adota* by posterior margin of male tergite VIII with about 8 small dentations (Fig. 18), and different shape and structure of the aedeagus and spermatheca (Figs. 22-25). Several specimens

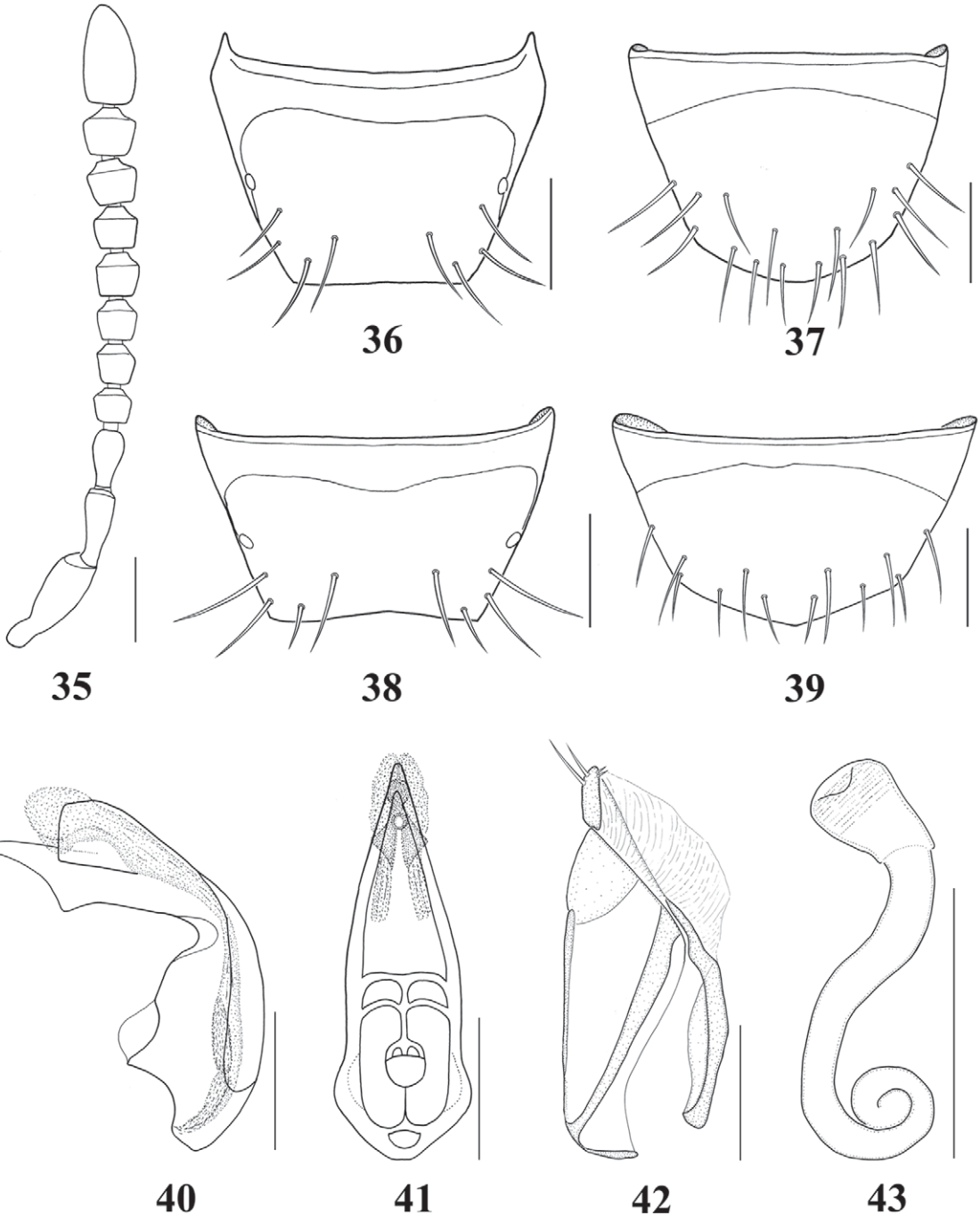
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Figs. 26-34. *Adota magnipennis*. 26: antenna; 27: male tergite VIII, dorsal aspect; 28: male sternite VIII, ventral aspect; 29: female tergite VIII, dorsal aspect; 30: female sternite VIII, ventral aspect; 31: median lobe, lateral aspect; 32: median lobe, ventral aspect; 33: paramere, lateral aspect; 34: spermatheca, lateral aspect. Scale: 0.1 mm.

were collected under stones on seashore at night, associated with members of *Myrmecopora* Saulcy and *Bryothinusa* Casey. They did not move rapidly compared to others in the habitat.

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Figs. 35-43. *Adota minuta* **sp. nov.**. 35: antenna; 36: male tergite VIII, dorsal aspect; 37: male sternite VIII, ventral aspect; 38: female tergite VIII, dorsal aspect; 39: female sternite VIII, ventral aspect; 40: median lobe, lateral aspect; 41: median lobe, ventral aspect; 42: paramere, lateral aspect; 43: spermatheca. Scale: 0.1 mm.

While preparing 6 specimens on slides for the study of detailed characters, we discovered an interesting feature on abdominal tergite VIII (Figs. 18, 20) of *A. koreana*. A row of several very distinct macrosetae is present on the surface of abdominal tergite VIII. This has been well known as a

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good diagnostic character in some members of the tribe Athetini (Yosii & Sawada 1976). However, the number of macrosetae is variable, ranging 4-5 on each side of the midline in this species. Therefore, we tentatively conclude that these features represent intraspecific variation, even though we have examined only a small sample of specimens.

Adota magnipennis (Bernhauer, 1943) (Figs. 2, 26-34)

Atheta (*Anopleta*) *magnipennis* Bernhauer, 1943: 184; Benick, 1970: 94.

Atheta (*Halostiba*) *magnipennis*: Yosii & Sawada, 1976: 88; Sawada, 1977: 173.

Adota magnipennis: Gusarov, 2003: 20; Smetana 2004: 366; Park et al. 2007: 208; Frank & Ahn 2011: 20.

Material Examined

KOREA: Chungnam prov.: 5♂♀, Boryeong-si, Woongcheon-eup, Doksan-ri, Holmoi-beach, 6XI2003, KJ Ahn, JS Park, under seaweeds; Jeju prov.: 57♂♀, Bukjeju-gun, Hanrim-eup, Hyeobje-beach, 19V2004, YB Cho, under seaweeds; Jeonbuk prov.: 6♂♀, Buan-gun, Byeonsan-myeon, Byeonsan-beach, N 35° 40' 53.9" E 126° 31' 52.1" 9 m, 14V2011, YH Kim, IS Yoo, JH Song, decaying fish; Jeonnam prov.: 1♂, Sinan-gun, Jeungdo-myeon, Ujeon-beach, N 34° 58' 21.8" E 126° 08' 13.9" 22 m, 14V2011, IS Yoo, decaying fish.

Diagnosis

Length 1.7-2.4 mm. Body (Fig. 2) of most specimens brownish black; head, pronotum and abdominal tergites dark brown to black; antennae, elytra and legs brown to dark brown; surface slightly glossy, densely pubescent. Antennomere 1 longest, 4-10 transverse, 11 slightly shorter than preceding two combined (Fig. 26). Pronotum transverse, approximately 1.2 times as wide as long, widest in apical third. Elytron about 1.7 times longer than wide. Tergite VIII (Figs. 27 and 29) with 4-6 macrosetae on each side of midline, posterior margin (Fig. 27) emarginate and very slightly crenate in male; sternite VIII (Figs. 28 and 30) with 8 macrosetae on each side of midline, bifid marginal setae present in male. Aedeagus and spermatheca as in Figures 31-34.

Distribution

Korea and Japan.

Remarks

Adota magnipennis is similar to *A. madida*, but can be distinguished by the characters provided in the key and the shape and structure of the aedeagus and spermatheca (Figs. 31-34).

The number of macrosetae on tergite VIII is variable of ranging 4-6 on each side of midline in this species as in *A. koreana*. We examined 7 slide-mounted specimens.

Adota minuta Lee and Ahn, **sp. nov.** (Figs. 3, 11-16, 35-43)

Type series

HOLOTYPE, labeled as follows: KOREA: Gangwon prov.: Gangneung-si, Anhyeon-dong, Gyeongpo-beach, 26IV2001, KJ Ahn, under seaweeds; HOLOTYPE, *Adota minuta* Lee and Ahn, Desig. S.-G. Lee and K.-J. Ahn 2012. Deposited in CNUIC, Daejeon. Paratypes, 56 (total); 56♂♀ (5 on slide, 35 in 80% ETOH), same data as holotype.

Other material examined

7♂♀ (2 on slide), same data as holotype except 5VI1991; Gangwon prov., 2♂♀, Gosung-gun, Toseong-myeon, Cheonjin-ri, Cheonjin-beach, 29IV2000, KJ Ahn, under seaweeds.

Description

Length 1.5-2.0 mm. Body (Fig. 3) of most specimens dark brown; head, pronotum and abdominal tergites dark brown to black; antennae and legs paler than other body parts; elytra brown to dark brown; surface slightly glossy, densely pubescent. Head quadrate, approximately 1.0-1.1 times longer than wide, slightly narrower than pronotum; eyes slightly prominent, about 1.1-1.2 times as long as tempora; gular sutures moderately separated, dilated basally; cervical carina forked. Antennae (Fig. 35) long and slender; antennomeres 1-3 elongate, 1 longest, 4-10 gradually transverse, 11 about as long as preceding 2 combined. Labrum (Fig. 11) transverse, slightly emarginate in anterior margin, 2 lateral sensilla and about 7 macrosetae present on each side of midline, α-sensillum setaceous, more than twice as long as ε-sensillum, β- and γ -sensilla very short, convergent at apex. Epipharynx as in Fig. 12. Mandibles asymmetrical, pointed apically, approximately 1.4 times as long as basal width; right one (Fig. 13) with a small internal tooth, anterior internal margin serrulate. Maxillary palpus elongate, with pubescence and long setae; palpomere 1 smallest and about twice as long as wide, 2 about 2.2 times longer than wide, 3 slightly longer than 2, about 2.1 times as long as wide, 4 digitiform, filamentous sensilla extending over basal half (Fig. 14). Labium (Fig. 15) with ligula divided into 2 lobes in basal half; 2 medial setae moderately separated; 2 basal pores close together; median pseudopores, lateral pseudopores, 1 setal pore and 2 real pores

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present on prementum; labial palpus elongate with many setulae; palpomere 1 largest, about 1.7 times longer than wide, 2 shortest, about 1.3 times longer than wide, with γ-setula short and close to f-setula, 3 dilated distally, about 2.1 times longer than wide. Pronotum slightly transverse, approximately 1.2 times as wide as long, widest in apical fourth. Posterior margin of mesocoxal cavities weakly margined; mesoventral process distinctly pointed at apex, longer than metaventral process. Elytra subquadrate and subparallel-sided, slightly wider than pronotum; elytron approximately 1.7-1.8 times longer than wide, pubescence directed postero-laterally; postero-lateral margin straight; hind wings fully developed; flabellum with about 8-10 setae. Legs slender and long with dense pubescence and ctenidium; tibiae with 2 spurs at apex; length ratio of tarsomeres 18:20:19:36 (protarsus); 21:23:22:23:32 (mesotarsus); 29:30:26:24:38 (metatarsus). Abdomen parallel-sided, convergent at apex; surface glossy and densely pubescent; macrochaetal arrangement of tergites II-III 02-13 (see Yosii and Sawada 1976); male tergite VIII (Fig. 36) with 4 macrosetae on each side of midline, posterior margin truncate; male sternite VIII (Fig. 37) with 8 macrosetae on each side of midline, posterior margin round, weakly sclerotized and translucent, marginal setae present; posterior margin of female tergite VIII (Fig. 38) similar to male tergite VIII; posterior margin of female sternite VIII (Fig. 39) broadly round, minute setae present in median region. Median lobe of aedeagus (Figs. 40 and 41) entirely elongate, convergent at apex in ventral aspect; apical process strongly curved in lateral aspect; internal sac slightly complicated. Apical lobe of paramere (Fig. 42) parallel-sided, with 4 setae; a-seta longest, b-seta longer than c-and d-setae which are subequal in length. Spermatheca (Fig. 43) with relatively small umbilicus.

Distribution

Korea.

Remarks

Adota minuta can be distinguished from the other species of *Adota* by smaller body, posterior margin of male tergite VIII truncate (Fig. 36), different shape and structure of the aedeagus and spermatheca (Figs. 40-43).

Etymology

Named from the Latin *minuta* meaning "minute, small".

Adota ushio (Sawada, 1971) (Figs. 4, 44-53)

Ischnopoda (*Philhygra*) *ushio* Sawada, 1971: 304.

Atheta (*Halostiba*) *ushio*: Yosii and Sawada, 1976: 86.

Adota ushio: Gusarov, 2003: 19; Smetana, 2004: 366; Frank and Ahn, 2011: 21.

Material Examined

KOREA: Gangwon prov.: 2♂, Gangneung-si, Anhyeon-dong, Gyeongpo-beach, 26IV2001, KJ Ahn, under seaweeds; Gyeongnam prov.: 4♂♀, Geoje-si, Ilun-myeon, Gujora-beach, N 34° 48' 34.9" E 128° 41' 18.0" 8 m, 6V2011, TK Kim, YH Kim, under seaweeds; 1♂, Geoje-si, Ilun-myeon, Donam-beach, N 34° 49' 25.3" E 128° 26' 23.5" 1 m, 7V2011, TK Kim, YH Kim, under seaweed; Jeonnam prov.: 2♂♀, Goheung-gun, Duwon-myeon, Daejeon-beach, N 34° 42' 45.4"E 127° 16' 14.6" 17 m, 25V2011, IS Yoo, YH Kim, burned wood on beach; 12♂♀, Goheung-gun, Duwon-myeon, Pungryu-beach, N 34° 39' 46.6" E 127° 13' 44.0" 2 m, 25V2011, IS Yoo, YH Kim, under decaying seaweeds; 1♂, Muan-gun, Mangun-myeon, Topmeori beach, N 34° 58' 10.6" E 126° 22' 55.3" 13 m, 15V2008, TK Kim, YH Kim, stones on beach.

Diagnosis

Length 2.2-3.2 mm. Body (Fig. 4) generally brownish black; head darker than other regions, legs yellowish brown to brown. Frons with about 4 macrosetae on each side of midline. Antennomere 1 longest, 4-10 slightly transverse, 11 slightly shorter than preceding two combined (Fig. 44). Pronotum transverse, approximately 1.2-1.3 times as wide as long. Elytron about 1.7 times longer than wide. Tergite VIII (Figs. 46 and 48) with 5 macrosetae on each side of midline, posterior margin (Fig. 46) slightly emarginate and slightly crenate in male; male sternites V-VII with many pores in antero-medial region; male sternite VIII (Fig. 47) with 12 macrosetae on each side of midline, posterior margin emarginate at middle. Aedeagus and spermatheca as in Figures 50-53.

Distribution

Korea and Japan.

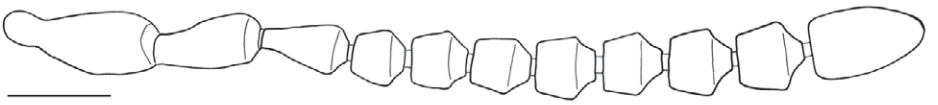
Remarks

Adota ushio is similar to *A. magnipennis*, but can be distinguished by the characters provided in the key, and the shape and structure of the aedeagus and spermatheca (Figs. 50-53).

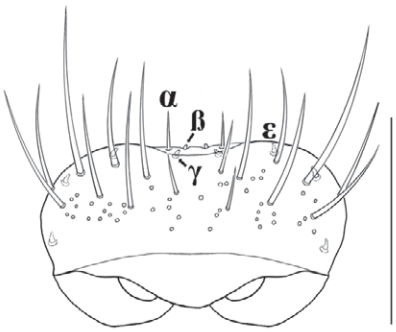
ACKNOWLEDGMENTS

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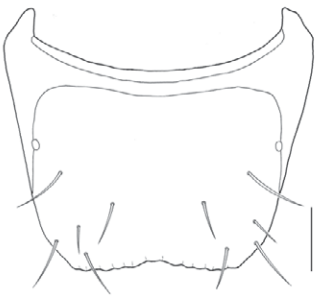
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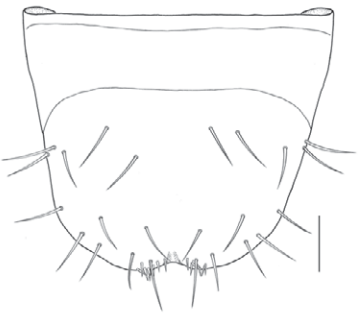
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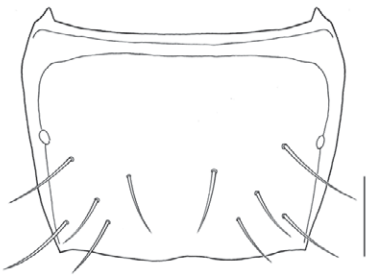
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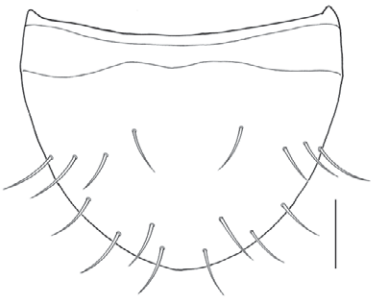
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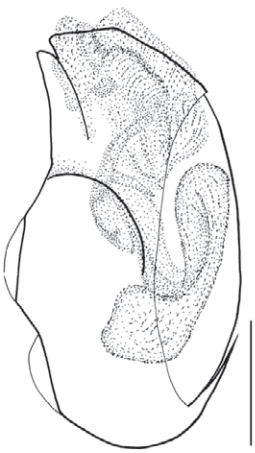
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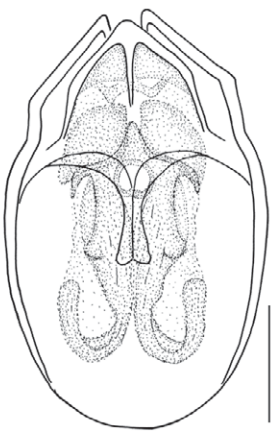
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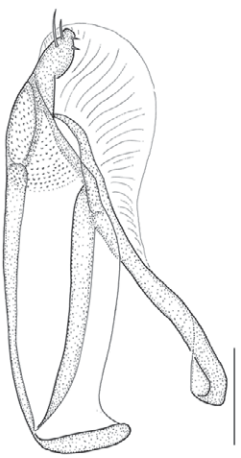
49



50



51



52



53

Figs. 44-53. *Adota ushio*. 44: antenna; 45: labrum, dorsal aspect; 46: male tergite VIII, dorsal aspect; 47: male sternite VIII, ventral aspect; 48: female tergite VIII, dorsal aspect; 49: female sternite VIII, ventral aspect; 50: median lobe, lateral aspect; 51: median lobe, ventral aspect; 52: paramere, lateral aspect; 53: spermatheca. Scale: 0.1 mm.

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