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attacking Coniferous Plants in Japan

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Studies on the Yponomeutoidea (XII)

Argyresthia-species (Lepidoptera: Argyresthiidae)
attacking Coniferous Plants in Japan¹⁾

By

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Argyresthia HÜBNER is a large genus, the larvae of which are known to mine buds, twigs, leaves, cones, and fruits of a number of deciduous and coniferous hosts in Europe, Japan, and North America.

In Japan four *Argyresthia* moths have been recorded as pests of coniferous plants. These are: *Argyresthia laevigatella* H.-S., on larch; *Arg. chamaecypariae* MRT., on cypresses; *Arg. anthocephala* MEYR., on cryptomeria; and *Arg. juniperana* MRT., on juniper. At present we are able to add one species to the list, viz. *Arg. praecocella* ZELL., occurring in Europe and infesting juniper. In this paper, the adult, mature larva, and pupa of each of these five species, except the pupa of *praecocella* and *chamaecypariae*, are described in detail, and some ecological notes on each species are added.

Argyresthia HÜBNER, 1826

Argyresthia HÜBNER, 1826, Verz. bek. Schmett.: 422. (Type-species: *Phalaena Tinea godeartella* LINNÉ, 1758).

Blastotere RATZBURG, 1840, Forst. Ins. 2: 240. (Type-species: (*Argyresthia illuminatella* ZELLER, 1839 =) *Tinea (Blastotere) bergiella* RATZBURG, 1840).

The following generic characters are common to all the species described in this paper.

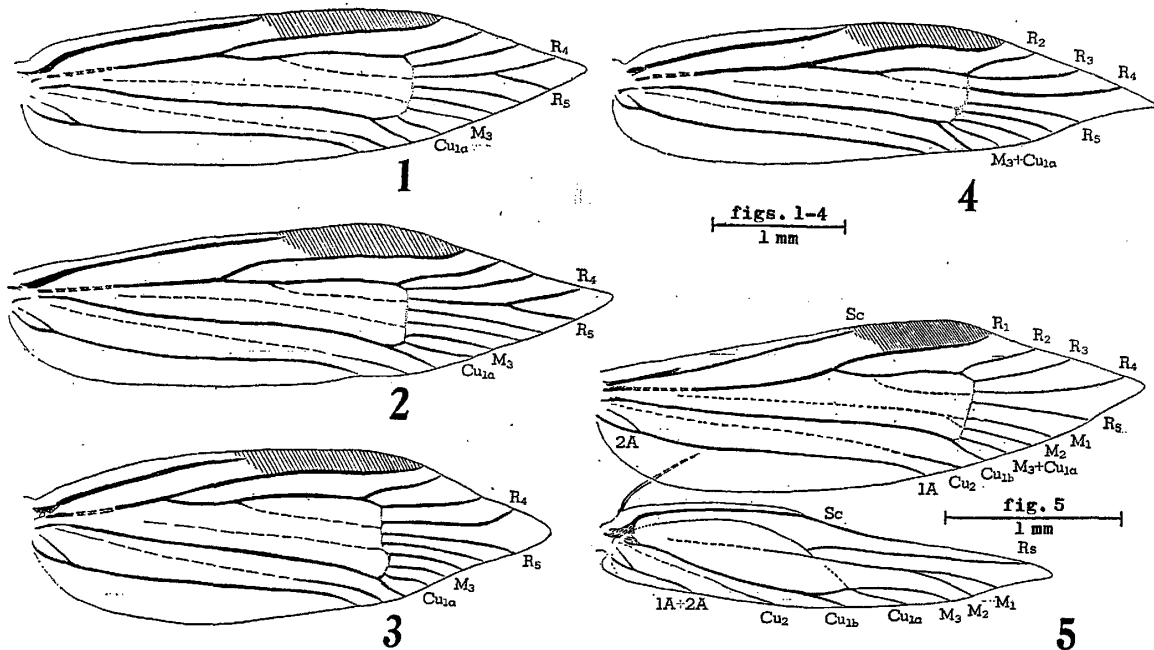
Adult

Forewing lanceolate, R_2 and R_3 connate from upper angle (in *sabinae* sp. n.), or separate, R_3 rising from angle (in the other four spp.), R_4 and R_5 stalked (in *laevigatella* and *praecocella*) or separate (in *chamaecypariae* sp. n., *anthocephala*, and *sabinae*), M_3 and Cu_{1a} coincident from angle (in *anthocephala* and *sabinae*), or separate, Cu_{1a} from angle (in the rest), 1A with basal fork. Hindwing under 1, lanceolate, M_1 and M_2 long-stalked, M_3 and Cu_{1a} from a point, or from a very short common stem.

Male genitalia: Gnathos paired, covered with specialized scales; top with one or two short hairs. No spine behind anellus. Valva rounded distally, the internal surface being clothed with hairs ventrally and distally, and the dorsal margin with a few hairs. Vinculum subrectangular, without lateral, anterior projections. Aedeagus much longer than valva; cornuti present. A sclerite (plate) of 8th abdominal segment V- or Y-shaped. Coremata long.

Female genitalia: Antapophysis branched. Antrum membranous, funnel-shaped, and set with small spinulae, the anterior end with a sclerotized ring; ductus bursae membranous throughout. Inception of ductus seminalis from ductus bursae. Corpus bursae oval or

1) 一色周知教授に委嘱された農林省農林水産応用研究費による「針葉樹を加害する小蛾類の分類学的研究」の成果の一部



Figs. 1-4. Forewing. (1) *Arg. laevigatella* H.-S. (2) *Arg. praecocella* ZELL.
 (3) *Arg. chamaecypariae* sp. n. (4) *Arg. sabiniae* sp. n.
 Fig. 5. Wing, *Arg. anthocephala* MEYR.

nearly so. Signum simply corniform (in *laevigatella*), or crescent-shaped, denticulated (in the rest).

Mature larva²⁾

Head broader than long; adfrontals extending to, or nearly to, vertical triangle; front much longer than wide; clypeus defined. Ocelli six on each side. Epipharyngeal surface with numerous spinulae on median portion. Mandible with five teeth, sometimes only four clearly defined. Pinacula invisible. Spinules of body dense, conspicuous. Prothoracic leg with claw shorter than dorsal setae of tarsus. Crochets of ventral proleg vary in arrangement. Spiracle round or nearly so. Chaetotaxy: in prothoracic shield, SD-setae present on the sclerite (in *sabiniae*), or removed from it (in the rest). In *sabiniae*, the setal pattern is not the ordinary type of this genus, i. e. L group bisetose on T1-T3 and A1-A8, and SV group bisetose on A3-A6. (*Arg. sabiniae* is similar in the larval chaetotaxy to *Arg. aureoargentella* BROWER (1953)³⁾ and *Arg. freyella* WALSINGHAM (1890)³⁾ described by SILVER (1957). According to him, the latter two species have L group bisetose on T1-T3 and SV group bisetose on A3-A6. But, judging from illustrations to his paper, I have some doubts about the correctness of the setal arrangement.) In the other four species, L- and SV-setae are typical of the *Argyresthia*.

Pupa

The length/width ratio is about 3.5 (in *anthocephala* and *sabiniae*), or about 5 (in *laevigatella*). Epicranial suture distinct. Fronto-clypeal suture indiscernible. Clypeo-labral suture discernible. Pilifer visible. Labial palpus about 3/7 length of maxilla. Maxilla extremely shorter than prothoracic leg. Maxillary palpus small, not reaching proximo-lateral angle of maxilla. Prothorax very short. Mesothoracic leg never reaching cephalad to maxillary palpus. Hindwing reaching about middle of A2. Thoracic spiracles not produced, slit; abdominal spiracles produced and short-tubular, except that those of

2) The nomenclature used for the setae is that of HINTON (1946).

3) Arbovitae leaf-mining species, occurring in North America.

A8 are flat. Proleg scars invisible. A10 without a distinct cremaster.

This genus can be divided into two subgenera as follows:

Blastotere RATZBURG, 1840. In female genitalia, signum corniform (fig. 43).

Argyresthia s. str. In female genitalia, signum crescent-shaped, clothed with denticles (figs. 44-47).

Argyresthia (Blastotere) laevigatella HERRICH-SCHÄFFER (1855) (Figs. 1, 13-16, 31, 32, 39, 43, 48, 53, 58, 63, 68, 70, 72, 74, 78, 83, 84, 93, 98, 103, 108, 112-114)

laevigatella HERRICH-SCHÄFFER, 1855, p. 271; STAUDINGER & REBER, 1901, p. 136, no. 2437; SPULER, 1910, p. 449; MEYRICK, 1914, p. 5; ESCHERICH, 1931, p. 169, text-f. 118, t. 1, f. 12; WERNER, 1958, p. 63, f. 82; ITO, 1960, p. 4, no. 3, f. A; EIDT, 1961, p. 28, f. 8, 15, 20, 21, 29-32; ISSIKI & MUTUURA, 1961, p. 29, no. 13, f. 13; ISSIKI & MUTUURA, 1962, p. 7, no. 62; ISSIKI et al., 1962, p. 15, f. 4.

atmoriella BANKES, 1896, p. 25; STAUDINGER & REBER, 1901, p. 136, no. 2430; MEYRICK, 1914, p. 4; MEYRICK, 1927, p. 729; PIERCE & METCALFE, 1935, p. 51, t. 29.

The adult has been illustrated with a coloured figure by ESCHERICH (1931) and ISSIKI and MUTUURA (1961). The diagnostic characters have recently been figured by EIDT (1961) and ISSIKI et al. (1962), but I have refigured them for completeness' sake. The Japanese specimen has a wing expanse of 9-12 mm.

Male genitalia: Gnathos with about 30 specialized scales (fig. 15) on one lobe; top with two hairs, the one being much longer than the other. Valva rather narrow. Vinculum with anterior corner not angulated. Aedeagus fairly longer than valva, with about 15 denticles on posterior 1/5 as shown in fig. 31; cornuti as illustrated (fig. 32). Plate of A8 varies in shape (see the figures given by PIERCE and METCALFE (1935, pl. 29), EIDT (1961, fig. 32), and ISSIKI et al. (1962, fig. 4F); an example is shown in fig. 16.

Female genitalia: Antrum large; ductus bursae rather short, gradually widening into the elongate corpus bursae. Signum as in fig. 43.

Distribution: Japan (Honsyû—Nagano Prefecture), Central Europe, and England.

Food-plant: *Larix leptolepis* MURRAY (Pinaceae) in Japan.

This species is very closely allied to *Arg. laricella* KEARFOTT (1908), occurring in North America. The most detailed account of the morphological difference in all stages between the two species is given by EIDT (1961).

Mature larva

Length 6-7 mm. Head blackish-brown, nerve attachments of individual ocelli black. Body dirty yellow; prothoracic shield with blackish-brown marking (fig. 63); thoracic legs, peritreme of spiracles, and anal shield blackish-brown; claws somewhat paler than legs. Head (figs. 48, 53) much broader than long; adfrontals extending to vertical triangle; ocelli IV closer to V than III. Mandible as shown in fig. 98. Labrum illustrated in figs. 83, 84. Labial palpus and spinneret (in fig. 58 a pair of minute setae at base omitted), as shown in fig. 58. Spinules of A8-tergite as shown in fig. 103. Thoracic legs short, with small claws; prothoracic claw as shown in fig. 78. Ventral prolegs reduced to small papillae; a single transverse band of uniordinal rudimentary crochets, 2 to 6 in number, usually 3 (according to EIDT (1961), 2 to 8, usually 5). Anal prolegs slightly more developed, without crochets. Spiracles round, the relative sizes—that of T1:that of A7:that of A8 \doteq 10:7:12. Chaetotaxy: cranium as shown in figs. 48, 53. Body as in figs. 63, 68, 70, 72, 74, 93; meta-thorax with chaetotaxy as in mesothorax; A2 with SV group bisetose.

Pupa

Length about 5 mm. Light brown, later changing to dark brown. Cephalic margin convex, with a small emargination at meson. Antenna, wingtip, and metathoracic leg extending

over A5; antenna slightly extending beyond wingtip; metathoracic leg longer or shorter than antenna. A10 curved ventrad, terminating in four short tooth-like processes (fig. 112). Small tooth-like spines on A7 to A10 are as follows:- A7 with a pair on dorsum; A8 with two pairs on dorsum, which are larger than those of A7; A9 with three spines on each side, which are equal in size and are the largest of all spines, and with a pair on venter, being small; A10 with a pair on dorsum, which is very small (sometimes extinct), and with a single small spine on each side. A10 without hooked setae.

Ecological notes

It is well-known that the larva is a larch twig borer. The biology of the Japanese populations seems to be quite similar to that of the European ones. Brief descriptions of the life history and habits in Japan have been given by ITO (1960) and ISSIKI et al. (1962). Univoltine; the larvae feed within the twigs, and overwinter. Pupation occurs within the mine in May, and adults emerge from the beginning of June.

I must express my hearty thanks to Dr. G. FRIESE (Deutsches Ent. Inst., Berlin) for his kind help in the identification of this species.

***Argyresthia (Argyresthia) praecocella* ZELLER (1839)** (Figs. 2, 17-20, 33, 41, 44, 49, 54, 59, 64, 79, 85, 86, 94, 99, 104)

praecocella ZELLER, 1839, p. 205; STAUDINGER & REBER, 1901, p. 136; no. 2427; SPULER, 1910, p. 448; MEYRICK, 1914, p. 4; MEYRICK, 1927, p. 730; PIERCE & METCALFE, 1935, p. 51, t. 29; WERNER, 1954, p. 60, f. 72.

The Japanese specimen has a wing expanse of 9.5-12 mm. Head ochreous-white. Forewing unicolorous shining light ochreous.

Male genitalia: Gnathos with about 25 specialized scales (fig. 19) on one lobe; top usually with a single hair. Valva broad-ovate. Vinculum with anterior corner dull-pointed, and with anterior margin gently concave. Aedeagus very long, about twice as long as valva; cornutus a long spine. Plate (fig. 20) Y-shaped, the arms being rather long.

Female genitalia: Antrum narrow; ductus bursae long and slender. Corpus bursae oval. Signum as shown in fig. 44.

Specimens examined: 30 exs., Izumi-Hutyû, Osaka Prefecture, Honsyû, 7 IV 1959 (T. KODAMA), reared from *Juniperus rigida* SIEB. et ZUCC.

Distribution: Japan (Honsyû) and Europe.

Food-plant: *Juniperus rigida* SIEBOLD et ZUCCARINI (Cupressaceae) in Japan.

This is the first record of this European species in Japan.

Mature larva

Length about 8 mm. Head light brown, nerve attachments of individual ocelli black. Body greenish or pale dirty green; prothoracic shield darkish brown; thoracic leg brown, with a little paler claws; peritreme of spiracles dark brown; anal shield brown. Head (fig. 49) much wider than long; adfrontals extending to vertical triangle; ocelli IV almost equidistant from III and V (fig. 54). Mandible as shown in fig. 99. Labrum as in figs. 85, 86. Labial palpus and spinneret as in fig. 59. Spinules (fig. 104) somewhat slenderer than those of the preceding species. Prothoracic claw as shown in fig. 79. Ventral prolegs normal; a complete circle of uniordinal crochets, about 13 in number (according to WERNER (1958), 10). Anal prolegs with about 10 crochets, arranged in a semi-circle. Spiracles round or nearly so, the proportional sizes—that of T1:that of A7:that of A8 \doteq 10:6:10. Chaetotaxy: head as shown in figs. 49, 54. Prothorax as in fig. 64; shield with 4 setae, viz. XD1, XD2, D1, and D2; SD1 and SD2 situated on a common pinaculum. (WERNER (1958), when describing the larva of this species, states that the prothoracic shield has 6 setae, including SD-setae.) SV group unisetose on A9, bisetose on A1, A2, A7, and A8, and trisetose on A3-A6. A9 bearing 2 L-setae. Anal shield as shown in fig. 94.

Pupa

Not available for study.

Ecological notes

Univoltine. Adults appear from late in March to early in April. The larva bores into cone, causing it to die and fall. Overwintering in prepupal stage. Pupation occurs in a white cocoon in the ground.

***Argyresthia (Argyresthia) chamaecypariae* sp. n.** (Figs. 3, 6, 21-24, 34, 35, 40, 45, 50, 55, 60, 65, 76, 80, 87, 88, 95, 100, 105, 110, 111)

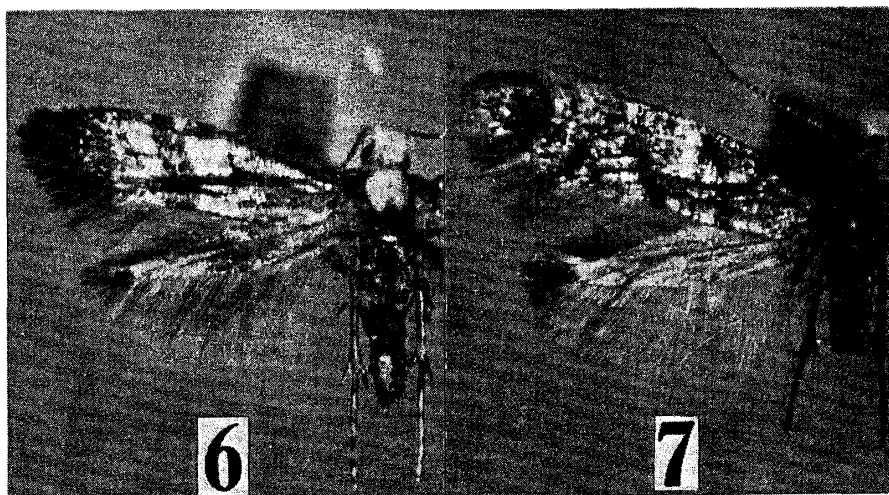


Fig. 6. *Arg. chamaecypariae* sp. n.

Fig. 7. *Arg. sabinae* sp. n.

Argyresthia chamaecypariae MORIUTI (MS.), ISSIKI & MUTUURA, 1962, p. 7 (non-descr.).

♂ ♀. 6-9 mm. Head and thorax snow-white, face pale yellow, orbit and tegula golden-yellow. Palpus pale ochreous. Antenna pale yellow, annulated with purplish-black; scape golden-yellow. Legs pale yellow; fore femur and tibia purplish exteriorly; mid tibia with purplish-fuscous dots at base, basal 1/4, middle, and apex exteriorly; hind tibia greyish on posterior half exteriorly, the spurs being purplish-black, with pale yellow apices; all tarsi with purplish-black apical ring on each segment. Abdomen shining grey. Forewing broad (figs. 3, 6); dark fuscous, heavily irrorate with whitish scales; costal margin narrowly shaded throughout with black-fuscous, and marked with about eight irregularly placed white dots on posterior 3/4; basal 1/3 deep golden-yellow, with a narrow white streak along inner margin from base to 1/7 of wing-length; two broad inwardly oblique golden-fuscous fasciae, one beyond middle, and the other at 4/5 and a little narrower; cilia purplish-fuscous, on termen with a dark ochreous-grey median shade, on dorsum ochreous-grey. Hindwing grey, darker posteriorly; cilia grey.

Male genitalia: Gnathos with about 15 specialized scales (fig. 23) on one lobe; top usually with one hair. Valva short, the distal half being triangulated. Vinculum dull-pointed at anterior corner, the anterior margin being concave. Aedeagus about 2.5 times as long as valva; about 7 denticles present on posterior extremity, as is recognized in the case of *laevigatella*; cornuti consist of numerous spinulae, as shown in fig. 35. Plate with very slender divergent arms (fig. 24).

Female genitalia: Antrum short and broad; ductus bursae broad. Signum as shown in fig. 45.

Holotype ♂, Takanoko, Yamaguti Prefecture, Honsyû, 5 V 1957 (T. KODAMA), reared from *Chamaecyparis obtusa* ENDL. Paratypes: 6 exs., same locality with holotype, 28 IV-13 V 1957 (T. KODAMA), reared from *C. obtusa*; 2 exs., Sibunoyu, Nagano Pref., Honsyû, 30

V-1 VII 958 (S. MORIUTI), reared from *C. pisifera* ENDL.; 2 exs., Ôtakimura, Nagano Pref., Honsyû, 24 VII 1957 (S. MORIUTI). Holo- and 8 paratypes are in the collection of Professor ISSIKI, and 2 paratypes in coll. Ent. Lab., Univ. Osaka Prefecture.

Other specimens have been examined from the following localities:

Honsyû: Yumoto, Totigi Pref.; Mt. Hieisan, Kyôto Pref.; Hanase, Kyôto Pref.; Mt. Iwawakisan, Osaka Pref.; Mt. Makinosan, Osaka Pref.; Mt. Kongôsan, Osaka Pref.; and Ikuno, Hyôgo Pref.

Sikoku: Uwa, Ehime Pref.

Distribution: Japan (Honsyû and Sikoku).

Food-plants: *Chamaecyparis obtusa* ENDLICHER and *C. pisifera* ENDLICHER (Cupressaceae).

A conspicuous species, easily recognized by the deep golden-yellow basal patch and two golden-yellow fasciae, contrasting somewhat strongly with the ground colour.

Mature larva

Length about 5 mm. Head black. Body dirty green or pale brownish-green; prothoracic shield black-pigmented (fig. 65); thoracic legs nearly black, with brownish claws; peritreme of spiracles and anal shield black. Head (fig. 50) slightly broader than long; adfrontals nearly extending to vertical triangle; ocelli IV a little closer to III than V (fig. 55). Mandible as in fig. 100. Labrum as in figs. 87, 88. Labial palpus and spinneret, as shown in fig. 60. Spinules of A8-tergite as in fig. 105. Prothoracic claw as in fig. 80. Ventral prolegs normal; a mesal penellipse of uniordinal crochets (fig. 110), 12-20 in number, usually 15 or so. Anal prolegs with 5-11 crochets, usually 10 (fig. 111). Spiracles almost round, the proportional sizes—that of T1:that of A7:that of A8 \doteq 12 : 10 : 13. Chaetotaxy: cranial setae as in figs. 50, 55. Prothoracic setae as in fig. 65. SV group of A1 bisetose, of A2-A6 trisetose, of A7 bisetose, of A8 unisetose, and of A9 uni- or bisetose. A9 as in fig. 76. Anal shield as in fig. 95.

Pupa

The specimens have not been available.

Ecological notes

This species is a leaf miner of *Chamaecyparis obtusa* ENDL. and *C. pisifera* ENDL. Univoltine. In West Honsyû, the adults emerge from late in April to the middle of May; in mountain region of Central district, the adults from late in May to the middle of June. The larvae occupy a few mines during their development. The winter is passed as the mature larva. In West Honsyû, the larva leaves the mine during February, and spins a white cocoon, within which it pupates from late in March.

Argyresthia (*Argyresthia*) *anthocephala* MEYRICK (1936) (Figs. 5, 8-12, 29, 30, 38, 46, 51, 56, 61, 66, 77, 81, 89, 90, 96, 101, 106, 109, 115, 116)

anthocephala MEYRICK, 1936, p. 622; KAWABATA, 1956, p. 4, figs.; ISSIKI, 1957, p. 22, t. 3, f. 76; ISSIKI & MUTUURA, 1961, p. 31, no. 18, f. 18; ISSIKI & MUTUURA, 1962, p. 7, no. 61.

An illustrated description of the adult has been given by ISSIKI (1957) and ISSIKI and MUTUURA (1962). The wing expanse varies from 7 mm to 10 mm; according to KAWABATA (1956), 6.5-13 mm. The specimen reared from the cone is larger than that reared from the bud: in the average expanse 10 mm against 8 mm. MEYRICK (1936) gives the coloration of the forewing as "light glossy grey: cilia light grey". In the fresh specimens before me the forewing is unicolorous glossy purplish-grey, with grey cilia.

Male genitalia: Gnathos with about 15 specialized scales (figs. 8, 11) on one lobe; top with a single minute hair. Valva elongate-ovate. Vinculum with anterior corner dull-pointed, anterior margin deeply concave. Aedeagus about twice as long as valva; a strong cornutus emitting three rows of many spinulae, as shown in fig. 30. Plate Y-shaped, with basal prong very slender.

Female genitalia: Antrum small; ductus bursae long, slender. Signum as shown in fig. 46.

Specimens have been examined from the following prefectures.

Honsyû: Akita, Niigata, Nagano, Mie, Siga, Kyôto, Osaka, Nara, Wakayama, Hyôgo, Tottori, Simane, and Yamaguti.

Sikoku: Ehime and Kôti.

Kyûsyû: Hukuoka, Ôita, Kumamoto, Miyazaki, and Kagosima.

The miners are found generally throughout the range of the host tree.

Distribution: Japan (Honsyû, Sikoku, and Kyûsyû).

Food-plant: *Cryptomeria japonica* D. DON (Taxodiaceae).

Mature larva

Length 4-5 mm. Head dark brown, with eye-spot black. Body pale green; prothoracic shield dark brown-pigmented (fig. 66); thoracic legs and anal shield brown; peritreme of spiracles blackish-brown. Head (fig. 51) much wider than long; adfrontals almost extending to vertical triangle; ocelli IV slightly closer to V than III (fig. 56). Mandible with two small teeth on about middle of outer margin (fig. 101). Labrum as in figs. 89, 90. Labial palpus and spinneret, as in fig. 61. Spinules, as shown in fig. 106, quite similar to those of the preceding species. Prothoracic claw as in fig. 81. Ventral prolegs normal; uniordinal crochets, 9-13 in number, arranged in a circle (fig. 109). Anal prolegs with about 10 uniordinal crochets in a semi-circle. Spiracles almost round, the relative sizes—that of T1:that of A7:that of A8 \doteq 13:10:13. Chaetotaxy: head as shown in figs. 51, 56. T1 as in fig. 66. A9 as in fig. 77. SV group of A1 bisetose, of A2-A6 trisetose, of A7 bisetose, and of A8 unisetose. Anal shield as shown in fig. 96.

Pupa

Length about 4 mm. Greenish-yellow, later changing to dark brown. Cephalic margin roundly convex (fig. 115). Antenna, wingtip, and metathoracic leg extending over A6; antenna slightly extending beyond wingtip; metathoracic leg a little longer than antenna. Terminal segments as shown in fig. 116; A10 bearing 4 pairs of hooked setae on ventral surface. Abdomen without tooth-like spines.

Ecological notes

The larva mines the bud or cone of *Cryptomeria japonica* D. DON. The entire larval life is spent in one mine. A detailed description of the biology in Kagosima Prefecture, Kyûsyû, has been given by KAWABATA (1956). According to his report, the life history is as follows. There are three or four generations a year. Hibernating in the mature larva within the injured bud. The adults of the first generation emerge between the middle of March and the middle of April; those of the second one during June; those of the third and fourth ones during August and September. Pupation takes place in a white cocoon usually spun among the leaves, but the larva of the overwintering generation pupates in the mine. In Kinki district trivoltine; adults in April, June-July, and September-October.

***Argyresthia (Argyresthia) sabinae* sp. n.** (Figs. 4, 7, 25-28, 36, 37, 42, 47, 52, 57, 62, 67, 69, 71, 73, 75, 82, 91, 92, 97, 102, 107, 117, 118)

Argyresthia juniperana MORIUTI (MS.), ISSIKI & MUTUURA, 1962, p. 7 (non-descr.).

♂ ♀. 8-9 mm. Head and thorax pale ochreous, tegula ochreous. Palpus fuscous, with apex ochreous, the inner side being largely suffused pale ochre. Antenna pale yellow, annulated with purplish-black; scape pale ochreous. Foreleg purplish-yellow except tarsus; middle and hind legs pale yellow; all tarsi pale yellow, with purplish apical ring on each segment. Abdomen shining grey. Forewing rather narrow (figs. 4, 7); ochreous; costal edge blackish towards base; markings fuscous; three narrow outwardly oblique streaks from costa reaching about 1/5 across wing, first at 1/5, second and third placed together in middle; a

narrow inwardly oblique streak from costa at 4/5 reaching about 1/3 across wing; a rather broad inwardly oblique streak from dorsum at 1/3 tending to connect with first costal; a fascia, which is as broad as dorsal streak, from 2/3 of dorsum to 2/3 of costa (sometimes interrupted); distal 1/3 more or less suffused with pale fuscous; cilia ochreous, on termen with a pale ochreous antemedian shade, on dorsum pale greyish-ochreous. Hindwing pale grey-ochreous; cilia pale greyish-ochreous.

Male genitalia: Gnathos with about 18 specialized scales (fig. 27) on one lobe; top with a very minute hair. Valva elongate-ovate. Vinulcum pointed at anterior corner, with anterior margin weakly concave. Aedeagus about twice as long as valva; cornuti composed of a strong spine and numerous spinulae, as shown in fig. 37. Plate with divergent arms slightly produced.

Female genitalia: Antrum short, triangulated; ductus bursae long, the posterior half being narrow, and the anterior half widening gently into the almost round corpus bursae. Signum as shown in fig. 47.

Holotype ♂ and 20 paratypes: Kumamoto, Kumamoto Prefecture, Kyûsyû, 10 IV 1962 (Z. Kuranaga), reared from *Juniperus chinensis* L. var. *procumbens* ENDL.; in coll. Ent. Lab., Univ. Osaka Pref.

Distribution: Japan (Kyûsyû).

Food-plant: *Juniperus chinensis* LINNÉ var. *procumbens* ENDLICHER. (Cupressaceae).

Distinct and should not be confused with any other Holarctic species. As previously mentioned, this and the preceding species differ from the typical form in having veins M_3 and Cu_{1a} of the forewing coincident.

This is the species recorded under the name of *Arg. juniperana* MORIUTI by ISSIKI. I propose to change the name of this species to *sabinae*, for the name derived from *Juniperus* was already applied to a species of the *Argyresthia* from Armenia by KUZNETSOV in 1958.

Mature larva

Length 4-5 mm. Head black. Body green; prothoracic shield with black marking (fig. 67); legs black, claws brownish; peritreme of spiracles black; anal shield nearly black. Head (fig. 52) much wider than long; adfrontals extending to vertical triangle; ocelli IV and V approximated (fig. 57). Mandible as in fig. 102. Labrum as in figs. 91, 92. Both labial palpus and spinneret, as shown in fig. 62, extremely short. Spinules exceedingly small (fig. 107). Prothoracic claw strongly bending, as illustrated (fig. 82). Ventral prolegs normal, a complete circle of uniordinal crochets, about 15 in number. Anal prolegs with about 8 crochets in a semi-circle. Spiracles round, the relative sizes—that of T1: that of A7: that of A8 = 10:8:9. Chaetotaxy: head as shown in figs. 52, 57. As above-mentioned, the chaetotaxy of the body is entirely distinctive. Body, as shown in figs. 67, 69, 71, 73, 75, and 97, L2 absent on T2, T3, and A1-A8, L3 absent on T1, and SV3 absent on A3-A6. T3 as in T2 (fig. 69); A2 as in A1 (fig. 71); A7 as in A8 (fig. 75).

Pupa

Length about 3.5 mm. Greenish, later changing to dark brown. Cephalic margin (fig. 117) a little concave or almost straight. Antenna, wingtip, and metathoracic leg extending over A6; antenna extending to, or sometimes not extending to, wingtip; metathoracic leg slightly longer than antenna, but sometimes shorter. Terminal segments as in fig. 118; A10 bearing 4 pairs of hooked setae on caudal end of dorsum.

Ecological notes

As already mentioned, the food-plant is *Juniperus chinensis* L. var. *procumbens* ENDL. Univoltine. The adults appear in April. The larva seems to make two or more mines on foliage during its development. Hibernating in a fully grown larva. In early spring, the mature larva leaves the mine, and pupates in a white or yellowish cocoon spun on the foliage surface. Pupation takes place from late in February to March.

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Explanation of figures 8-118

Figs. 8-37. Male genitalia.

- Figs. 8-12. *Arg. anthocephala* MEYR. (8) Ventral aspect. (9) Lateral aspect. (10) Vinculum, ventral aspect. (11) Specialized scale. (12) Plate.
- Figs. 13-16. *Arg. laevigatella* H.-S. (13) Valva and vinculum, ventral aspect. (14) Vinculum, ventral aspect. (15) Specialized scale. (16) Plate.
- Figs. 17-20. *Arg. praecocella* ZELL. (17) Valva and vinculum, ventral aspect. (18) Vinculum, ventral aspect. (19) Specialized scale. (20) Plate.
- Figs. 21-24. *Arg. chamaecypariae* sp. n. (21) Valva and vinculum, ventral aspect. (22) Vinculum, ventral aspect. (23) Specialized scale. (24) Plate.
- Figs. 25-28. *Arg. sabiniae* sp. n. (25) Valva and vinculum, ventral aspect. (26) Vinculum, ventral aspect. (27) Specialized scale. (28) Plate.
- Figs. 29-30. *anthocephala*. (29) Aedeagus. (30) Cornutus.
- Figs. 31-32. *laevigatella*. (31) Aedeagus. (32) Cornutus.
- Fig. 33. *praecocella*, aedeagus.
- Figs. 34-35. *chamaecypariae*. (34) Aedeagus. (35) Cornutus.
- Figs. 36-37. *sabiniae*. (36) Aedeagus. (37) Cornutus.

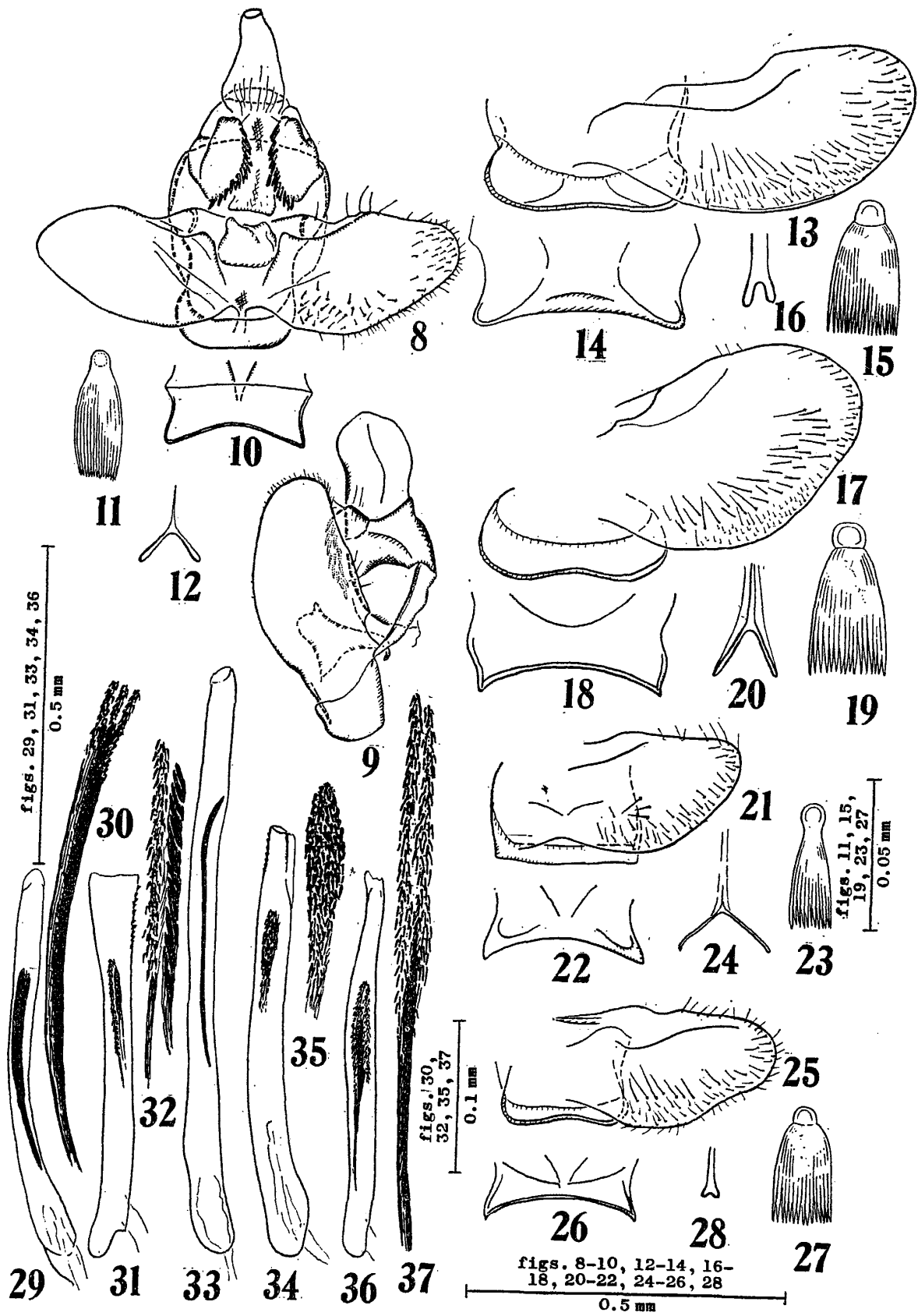
Figs. 38-47. Female genitalia.

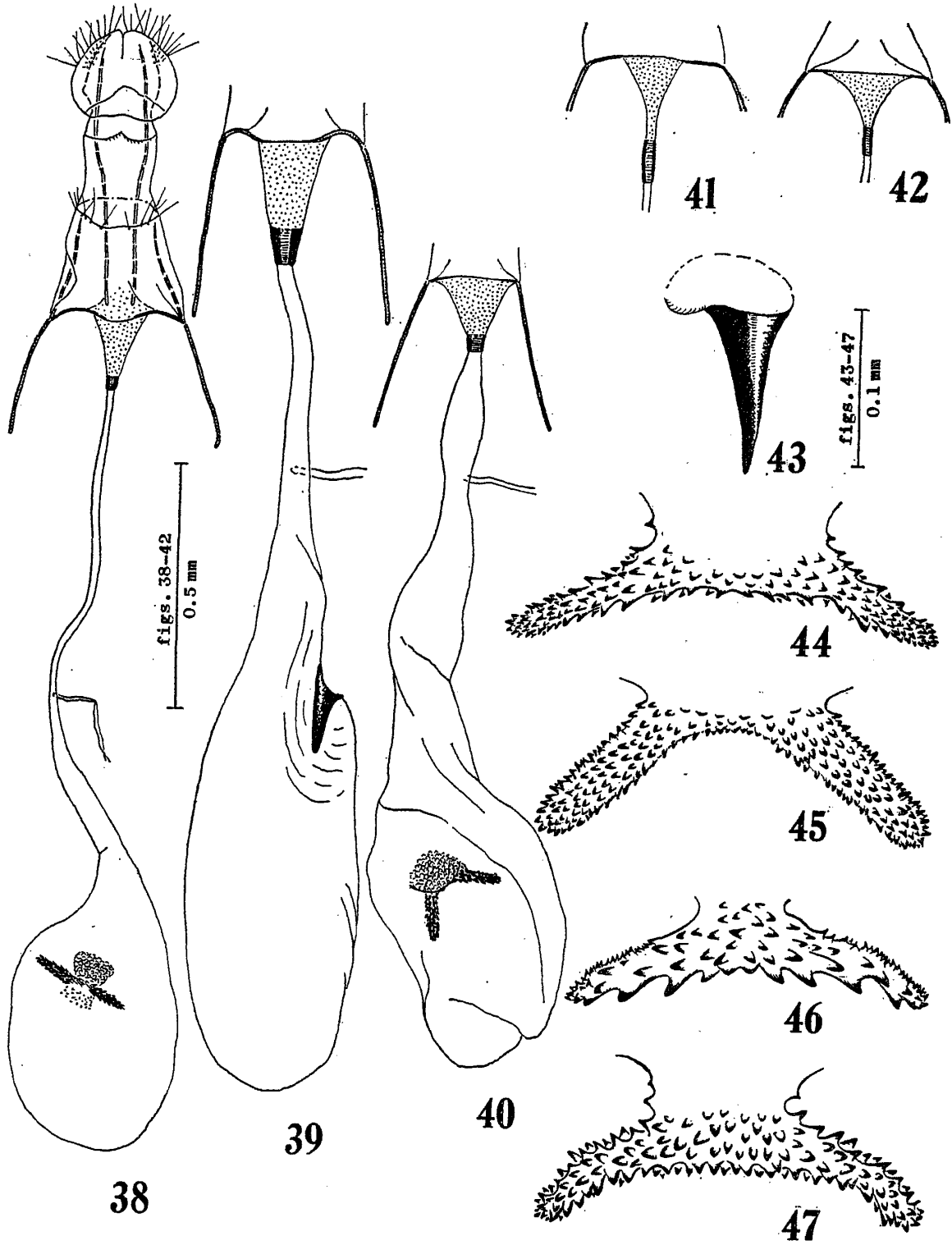
- Fig. 38. *anthocephala*, ventral aspect.
 Fig. 39. *laevigatella*, bursa copulatrix, ventral aspect.
 Fig. 40. *chamaecypariae*, bursa copulatrix, ventral aspect.
 Fig. 41. *praecocella*, antrum, ventral aspect.
 Fig. 42. *sabinae*, antrum, ventral aspect.
 Fig. 43. *laevigatella*, signum.
 Fig. 44. *praecocella*, signum.
 Fig. 45. *chamaecypariae*, signum.
 Fig. 46. *anthocephala*, signum.
 Fig. 47. *sabinae*, signum.

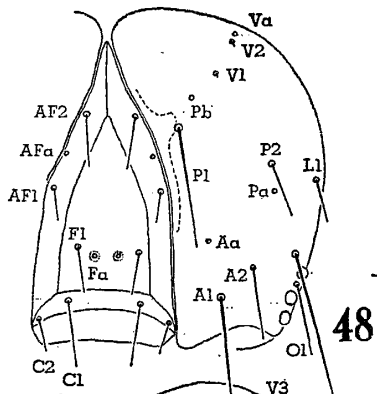
Figs. 48-111. Mature larva.

- Fig. 48. *laevigatella*, head, dorsal aspect.
 Fig. 49. *praecocella*, head, dorsal aspect.
 Fig. 50. *chamaecypariae*, head, dorsal aspect.
 Fig. 51. *anthocephala*, head, dorsal aspect.
 Fig. 52. *sabinae*, head, dorsal aspect.
 Fig. 53. *laevigatella*, head, lateral aspect.
 Fig. 54. *praecocella*, head, lateral aspect.
 Fig. 55. *chamaecypariae*, head, lateral aspect.
 Fig. 56. *anthocephala*, head, lateral aspect.
 Fig. 57. *sabinae*, head, lateral aspect.
 Fig. 58. *laevigatella*, labial palpus and spinneret, ventral aspect.
 Fig. 59. *praecocella*, labial palpus and spinneret, ventral aspect.
 Fig. 60. *chamaecypariae*, labial palpus and spinneret, ventral aspect.
 Fig. 61. *anthocephala*, labial palpus and spinneret, ventral aspect.
 Fig. 62. *sabinae*, labial palpus and spinneret, ventral aspect.
 Fig. 63. *laevigatella*, prothorax, dorsal and lateral setae.
 Fig. 64. *praecocella*, prothorax, dorsal and lateral setae.
 Fig. 65. *chamaecypariae*, prothorax, dorsal and lateral setae.
 Fig. 66. *anthocephala*, prothorax, dorsal and lateral setae.
 Fig. 67. *sabinae*, prothorax.
 Fig. 68. *laevigatella*, mesothorax.
 Fig. 69. *sabinae*, mesothorax.
 Fig. 70. *laevigatella*, first abdominal segment.
 Fig. 71. *sabinae*, first abdominal segment.
 Fig. 72. *laevigatella*, third abdominal segment.
 Fig. 73. *sabinae*, third abdominal segment.
 Fig. 74. *laevigatella*, seventh to ninth abdominal segments.
 Fig. 75. *sabinae*, eighth to ninth abdominal segments.
 Fig. 76. *chamaecypariae*, ninth abdominal segment.
 Fig. 77. *anthocephala*, ninth abdominal segment.
 Fig. 78. *laevigatella*, prothoracic claw.
 Fig. 79. *praecocella*, prothoracic claw.
 Fig. 80. *chamaecypariae*, prothoracic claw.
 Fig. 81. *anthocephala*, prothoracic claw.
 Fig. 82. *sabinae*, prothoracic claw.
 Figs. 83-84. *laevigatella*, labrum. (83) Dorsal surface. (84) Epipharyngeal surface.
 Figs. 85-86. *praecocella*, labrum. (85) Dorsal surface. (86) Epipharyngeal surface.
 Figs. 87-88. *chamaecypariae*, labrum. (87) Dorsal surface. (88) Epipharyngeal surface.
 Figs. 89-90. *anthocephala*, labrum. (89) Dorsal surface. (90) Epipharyngeal surface.
 Figs. 91-92. *sabinae*, labrum. (91) Dorsal surface. (92) Epipharyngeal surface.
 Fig. 93. *laevigatella*, anal shield.
 Fig. 94. *praecocella*, anal shield.
 Fig. 95. *chamaecypariae*, anal shield.

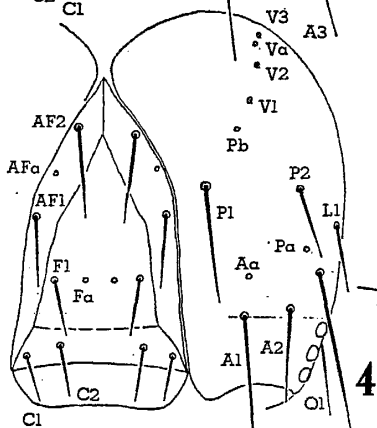
- Fig. 96. *anthocephala*, anal shield.
Fig. 97. *sabinae*, anal shield.
Fig. 98. *laevigatella*, left mandible.
Fig. 99. *praecocella*, left mandible.
Fig. 100. *chamaecypariae*, left mandible.
Fig. 101. *anthocephala*, left mandible.
Fig. 102. *sabinae*, left mandible.
Fig. 103. *laevigatella*, spinules of eighth abdominal tergite.
Fig. 104. *praecocella*, spinules of eighth abdominal tergite.
Fig. 105. *chamaecypariae*, spinules of eighth abdominal tergite.
Fig. 106. *anthocephala*, spinules of eighth abdominal tergite.
Fig. 107. *sabinae*, spinules of eighth abdominal tergite.
Fig. 108. *laevigatella*, crochets on third abdominal, left, ventral proleg.
Fig. 109. *anthocephala*, crochets on third abdominal, left, ventral proleg.
Figs. 110-111. *chamaecypariae*. (110) Crochets on third abdominal, left, ventral proleg.
(111) Crochets on left anal proleg.
- Figs. 112-118. Pupa.**
Figs. 112-114. *laevigatella*. (112) Lateroventral aspect. (113) Cephalic portion, dorsal aspect. (114) Caudal portion, lateral aspect.
Figs. 115-116. *anthocephala*, ventral aspect. (115) Cephalic portion. (116) Caudal portion.
Figs. 117-118. *sabinae*, ventral aspect. (117) Cephalic portion. (118) Caudal portion.



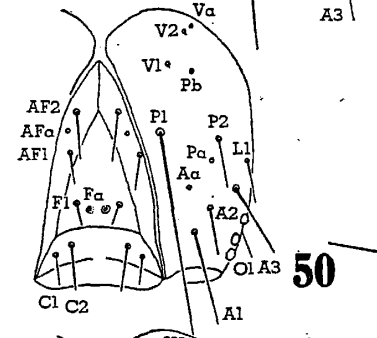




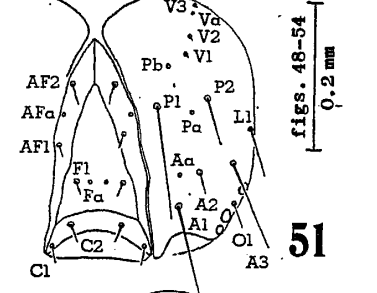
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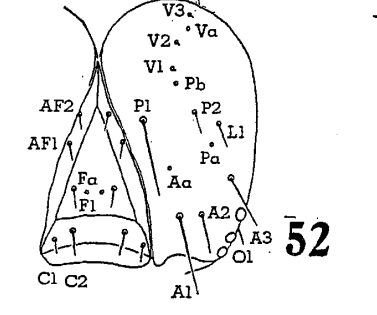
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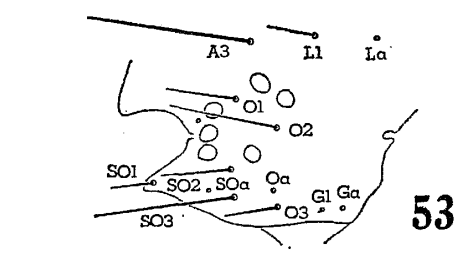
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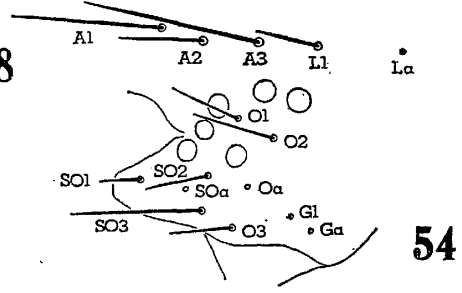
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figs. 48-54
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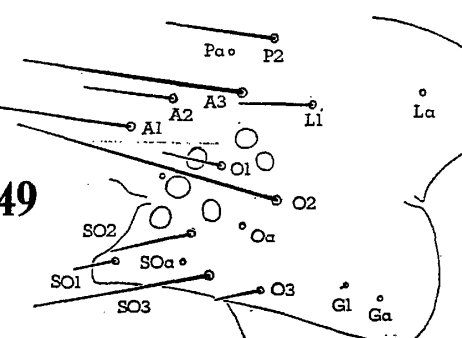
figs. 55-57
0.2 mm



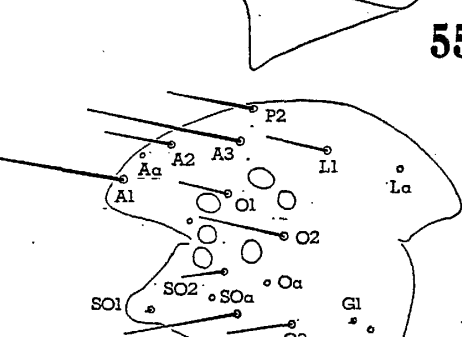
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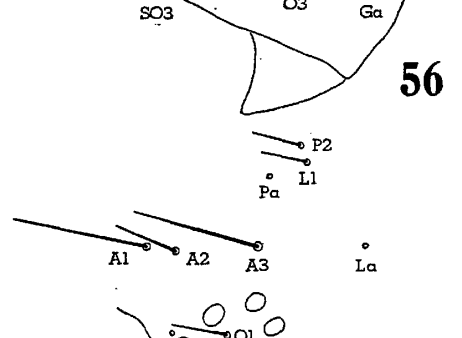
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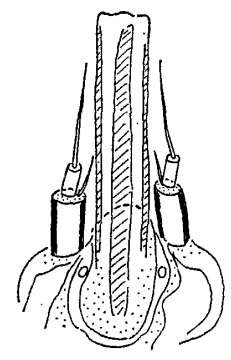
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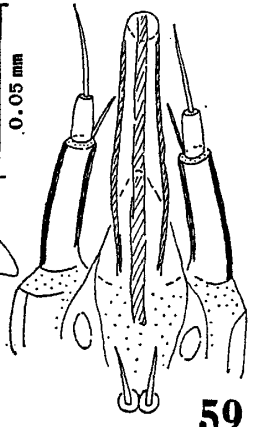
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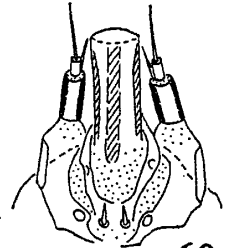
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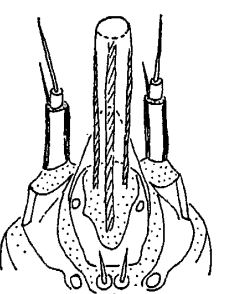
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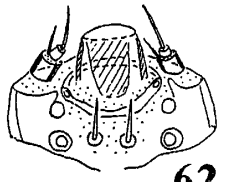
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60



61



62

figs. 58-62
0.05 mm

