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A TAXONOMIC REVISION OF THE GRACILLARIA GROUP
OCCURRING IN JAPAN
(LEPIDOPTERA: GRACILLARIIDAE)

By TOSIO KUMATA

Abstract

KUMATA, T. 1982. A taxonomic revision of the *Gracillaria* group occurring in Japan (Lepidoptera: Gracillariidae). *Ins. matsum. n. s.* 26: 1-186, 3 tabs., 88 figs. (47 text-figs., 41 pls.).

Fifty-seven species and 1 subspecies of the *Gracillaria* group occurring in Japan are classified in 4 genera, that is, 4 species in *Gracillaria*, 50 species and 1 subspecies in *Caloptilia*, 2 species in *Calybites* (= *Euspilapteryx*) and 1 species in *Eucalybites* (gen. nov.). *Gracillaria*, which has been treated as a synonym of *Caloptilia* or as a subgenus under the latter, is again raised to the generic rank. The genera *Timodora* and *Povolnya* are treated as subgenera under the genus *Caloptilia* together with *Sphyrrophora* and 4 new subgenera, *Phylloptilia*, *Rhadinoptilia*, *Minyoptilia* and *Cecidoptilia*. Following new species or subspecies are described: *Gracillaria japonica* (host: *Ligustrum*) for *Gracillaria syringella* sensu Issiki, 1957; *Caloptilia (Caloptilia) magnifica moriokensis* (host: *Epimedium*); *C. (C.) yasudai* (host: unknown); *C. (C.) kisoensis* (host: *Acer*); *C. (C.) aurifasciata* (host: *Rhus*); *C. (C.) matsumurai* (host: *Rhus*) for *Gracillaria elongella* sensu Matsumura, 1931; *C. (C.) rhois* (host: *Rhus*) for *Caloptilia recitata* sensu Issiki, 1957 (part); *C. (C.) leucothoes* (host: *Leucothoe* & *Rhododendron*); *C. (C.) mongolicae* (host: *Quercus* & *Castanea*); *C. (C.) ulmi* (host: *Ulmus* & *Zelkova*); *C. (C.) celtidis* (host: *Celtis*); *C. (C.) issikii* (host: *Alnus*) for *Caloptilia ellongella* sensu Issiki, 1957 (part); *C. (Phylloptilia) perseella* (host: *Persea*); *C. (P.) crinotibialis* (host: *Persea*); *C. (Timodora) elongata* (host: *Rhus*); *C. (Povolnya) querci* (host: *Castaena*, *Castanopsis* & *Quercus*); *C. (Rhadinoptilia) bipunctata* (host: *Neolitsea*); *C. (R.) camphorae* (host: *Actinodaphne*, *Cinnamomum* & *Parabenzoin*); *C. (Minyoptilia) callicarpae* (host: *Callicarpa*); *C. (Sphyrrophora) sapiivora* (host: *Sapium*); *Calybites trimaculata* (host: *Polygonum*); and *Eucalybites aureola* (host: *Hypericum*). Two species already described from Japan are newly synonymized as follows: *Caloptilia solaris* Kumata, 1966 with *C. (C.) isochrysa* (Meyrick, 1907), and *Gracillaria anthracosperma* Meyrick, 1931 with *C. (C.) azaleella* (Brants, 1913). The genitalia of both the sexes, except those of 20 species described by Kumata, 1966, are illustrated in addition to the photographs of the moths. Taxonomic relationship among genera or subgenera is discussed with special emphasis on the wing venation, male pregenital segments and larval body chaetotaxy. These organs are also illustrated for some species.

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INTRODUCTION

The species dealt with in this paper were formerly included in the genus *Gracillaria* (or *Gracilaria*) in a wide sense (e.g., Meyrick, 1912 and 1927). Later on, the genus was once synonymized with *Caloptilia* (Fletcher, 1929) and then divided into several genera (Vári, 1961), but most species of this group have been unrevised. In this paper, I attempt to reclassify the species of the group occurring in Japan with emphasis on the genital structure and larval chaetotaxy besides the adult external structure.

The *Gracillaria* group may contain the following taxa of the genus group:—*Calybites* Hübner, 1822 (= *Euspilapteryx* Stephens, 1835), *Caloptilia* Hübner, 1825, *Gracillaria* Haworth, 1828 (= *Gracilaria* Zeller, 1838), *Timodora* Meyrick, 1886, *Aspilapteryx* Spuler, 1910, *Ectropina* Vári, 1961, *Sphyrophora* Vári, 1961 and *Povolnya* Kuznetsov, 1979. Up to the present time, more than 300 species have been described from the world under those genera or subgenera, though most of them were originally described under the genus *Gracillaria* (or *Gracilaria*). These species do not seem to be concentrated to particular areas, but are scattered almost over the world in distribution.

So far as I am aware, *Gracilaria theivora* Walsingham is the first species from Japan among the members of the *Gracillaria* group. It was first recorded by Hotta in 1918 under the name *G. theavora* as a pest of tea plant. In 1930, *Gracilaria albicapitata* was described by Issiki from Hokkaidô. Subsequently, Meyrick (1931) described *Gracilaria anthracosperma* on the basis of material collected at Wakayama, Honsyû. In the same year, in his big book entitled "6000 illustrated insects of Japan-Empire", Matsumura described 2 species, *Gracillaria obliquatella* and *G. sapporella*, and recorded 3 others, *Gracillaria alchimiella*, *G. elongella* and *G. stigmatica* (= *G. stigmatella*). In 1950, Issiki added 2 species of the genus *Caloptilia* to the Japanese fauna: *C. soyella* and *C. isograptæ*. At the same time he transferred *G. albicapitata* and *G. theivora* to the genus *Caloptilia*. In 1954, Inoue enumerated these 10 species under the genus *Caloptilia* in his "Check list of the Lepidoptera of Japan, Vol. 1". In 1957, Issiki with his coworkers published 2 volumes of "Icones Heterocerorum Japonicorum in coloribus naturalibus", and in the 1st volume he presented 1 species of *Euspilapteryx*, 8 of *Caloptilia* and 1 of *Gracilaria*, among which 6 species were new to the fauna of Japan, namely, *Caloptilia azaleella*, *C. chrysolampra*, *C. recitata*, *C. zachrysa*, *C. rhodinella* and *Gracilaria syringella*. At the same time he transferred *Caloptilia isograptæ* to the genus *Euspilapteryx*. In 1966, I described 20 species of the genus *Caloptilia* as my first step to the studies of the Japanese species of the *Gracillaria* group. In 1979, Miyazaki recorded *Euspilapteryx phasianipennella* from Japan for the first time. Accordingly, 37 species, classified in 3 genera, have been recorded from Japan in total: 1 species in *Gracillaria*, 34 in *Caloptilia* and 2 in *Euspilapteryx*.

In this paper 57 species and 1 subspecies, including 22 new species, 1 new subspecies and 5 newly recorded species, should be rearranged into 4 genera, of which one is new to science. *Timodora* and *Povolnya* are treated as subgenera under the genus *Caloptilia* together with the subgenus *Sphyrophora* and 4 new subgenera. Although *Gracillaria* is now accepted by most European authors as a subgenus under the genus *Caloptilia*, it should be raised to the generic rank. Moreover, the following corrections are proposed:—*Caloptilia* (C.) *azaleella* (Brants, 1913) = *Gracilaria anthracosperma* Meyrick, 1931 (syn. nov.); *Caloptilia* (C.) *isochrysa*

(Meyrick, 1908)=*Caloptilia solaris* Kumata, 1966 (syn. nov.); *Gracillaria japonica* (sp. nov.)=*Gracillaria syringella* sensu Issiki, 1957; *Caloptilia* (C.) *rhois* (sp. nov.)=*Caloptilia recitata* sensu Issiki, 1957 (part); *Caloptilia* (C.) *matsumurai* (sp. nov.)=*Gracillaria elongella* sensu Matsumura, 1931; *Caloptilia* (C.) *issikii* (sp. nov.)=*Caloptilia elongella* sensu Issiki, 1957 (part); *Caloptilia* (C.) *stigmatella* (Fabricius, 1781)=*Gracillaria alchimiella* sensu Matsumura, 1931; *Caloptilia* (C.) *sapporella* (Matsumura, 1931)=*Caloptilia rhodinella* sensu Issiki, 1957; and *Calybites phasianipennella* (Hübner, 1810-13)=*Caloptilia isograpta* sensu Issiki, 1950.

The material used in this paper comprises about 2200 adult specimens collected from Japan throughout, though those from the Tyūgoku, Sikoku and Ryūkyū districts are very scanty. Most of them are collected by me and are reared from larvae mining in or rolling up the leaves of their food plants. In the enumeration of the specimens examined, numerals within parentheses placed just after the plant names are breeding numbers; these numbers are written on the host labels of parasites that emerged from the corresponding breeding series. The collectors are mentioned for the specimens other than collected by me. The depositories of the holotypes of the new species are indicated after Specimens examined, though it should be mentioned here that most specimens used are deposited in the collection of the Entomological Institute, Hokkaidō University, Sapporo, Japan.

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GRACILLARIA GROUP

As stated under Introduction, the genera treated in this paper may form the

Gracillaria group together with the genera *Aspilapteryx* and *Ectropina*. The group may be characterized as follows: -

Legs more or less smooth-scaled except for mid femur and tibia which are thickened beneath with rough scales, the scales sometimes forming thick tufts. Fore wing 13- or 12-veined, in the latter case vein M_1 being absent; all veins well separated at their bases, or veins M_2 and M_3 connate to or short-stalked with each other; vein R_1 usually arising from cell near base of wing; upper vein of cell weakened on basal part just beyond the point where the vein R_1 branches off. Hind wing 8- or 7-veined, in the latter case vein M_3 being absent; radial vein always 2-branched, but vein R_{2+3} very short and sometimes running in parallel to or fused with apical part of vein $Sc+R_1$ so closely that it is difficult to distinguish the former from the latter; veins M_1 and Cu_{1a} stalked with veins M_2 and Cu_{1b} , respectively; vein M_3 branched from vein Cu_{1a} or very rarely from M_2 so far as it is present; cell opened usually between M_2 and M_3 , very rarely between M_3 and Cu_{1a} or between M_{2+3} and Cu_{1a} . In male, 7th and 8th abdominal segments or 8th segment alone weakly membranous, the weakened segment(s) covered with more or less deformed scales or entirely bare and usually having a pair of coremata which are in a bundle of long and hairy scales in most species. In female, corpus bursae usually with 1 or 2 large, sickle-shaped signa; ostium bursae located on intersegmental membrane just behind 7th sternite. In body chaetotaxy of last instar larva, lateral groups of setae counted 3 on mesothorax and metathorax, while they are 2 on 1st to 8th abdominal segments, on which the seta L_2 is absent and L_3 is longer than L_1 ; seta D_1 on 1st to 8th abdominal segments always anterodorsal to seta D_2 ; microscopic setae MD_1 and MV_3 present on 1st to 9th abdominal segments; ventral prolegs always prominent in last instar larva, located on 3rd to 5th abdominal segments, with crochets uniordinal and arranged in a lateral penellipse plus a transverse row. In larval stage most species are leaf miners in early instars and leaf rollers in late instars, while some ones are leaf miners throughout the whole feeding stage.

The larva of *Caloptilia cecidophora* is very peculiar in structure as follows: the lateral groups of setae are represented by L_1 alone on the mesothorax, metathorax, and 1st to 8th abdominal segments, the seta XD_2 is lacking on the prothorax (see Fig. 79, A), and the crochets are arranged in a lateral penellipse alone on the ventral prolegs. It is also peculiar in the fact that it lives in a leaf gall in the late instars. In the adult structure, however, this species is very similar to the other members of the group especially in the venations of both pairs of wings and the pregenital segments of the male. The reduction of the larval chaetotaxy in *C. cecidophora* seems to be a specialized state associated with the gall-living habit.

The *Aristaea* group, which probably contains the genera *Aristaea* Meyrick, 1907, *Neurostrota* Ely, 1918, *Neurolipta* Ely, 1918, *Systroneura* Vári, 1961 and *Cupedia* Klimesch et Kumata, 1973, is most closely allied to the *Gracillaria* group, both belonging to the subfamily Gracillariinae, in having similar structures in the hind wing (the presence of the vein R_{2+3}), the pregenital segments of male (the weakly membranous 7th and 8th abdominal segments, each having a pair of coremata), the body chaetotaxy of the last instar larva (the number of the lateral groups of setae and the relative position of the seta D_1 and D_2), and the ventral prolegs of the larva (the arrangement of crochets). It is, however, slightly distinguished from the latter by the following characters:- 1) the mid femur and tibia are smooth-scaled or the tibia is slightly thickened apically, 2) in fore wing the

vein R_1 is absent or branched from the cell near the middle so far as it is present, 3) in male abdomen the anterior pair of coremata is always shorter than the posterior, 4) in female the ductus seminalis arises from the median area of the corpus bursae, and in last instar larva, 5) the seta L_1 is longer than the seta L_3 on all the abdominal segments, and 6) only 1 subventral group of setae (SV_1) is present on the abdominal segments except on the 3rd to 5th.

The character that the vein R_1 is dislocated towards the wing apex or disappears in the fore wing is assumed to be an advanced state in Lepidoptera. The reduction of the larval body setae in number is also regarded as specialized. If this interpretation is right, the *Aristaea* group may be more advanced and specialized than the *Gracillaria* group. This agrees with the result given by me (Kumata, 1978) in my study of the larval heteromorphosis.

The genus *Macarostola* Meyrick, 1907 is also related to the *Gracillaria* group on account of the membranous pregenital segments of the male abdomen, but it is somewhat more primitive than the latter in the hind wing venation and larval chaetotaxy as discussed by me (Kumata, 1977). The genus *Macarostola*, the *Gracillaria* group and the *Aristaea* group may not be arranged in a straight line of successive evolutionary changes; nevertheless, the *Gracillaria* group may be placed between the primitive *Macarostola* and the advanced *Aristaea* group in classification of the Gracillariinae.

The genus groups discussed above are essentially distinguished from the other groups such as the *Acrocercops* and *Parectopa* groups by the presence of the vein R_{2+3} on the hind wing and of the seta L_2 on the mesothorax and metathorax in the last instar larva.

GENUS GRACILLARIA HAWORTH

Gracillaria Haworth, 1828, Lep. Brit. 4: 528. [Type-species: (*Gracillaria anastomosis* Haworth, 1828)=*Tinea syringella* Fabricius, 1794.]

Gracillaria Zeller, 1838, Isis 32: 208. [Emendation.]

Xanthospilapteryx Spuler, 1910, Schmett. Europ. 2: 407. [Type-species: *Tinea syringella* Fabricius, 1794.]

Since Vári treated *Gracillaria* as a subgenus under the genus *Caloptilia* Hübner in 1961, most workers have followed his treatment. In the course of the present study, I have examined the Japanese and some European species including the types of both *Gracillaria* and *Caloptilia*, and I am inclined to conclude that *Gracillaria* should be a valid genus. The essential characteristics distinguishing the two are found in the pregenital segments of the male. In *Gracillaria* the 7th abdominal segment is normal in form like the preceding segments, without coremata and a sclerotized ventral band, and the 8th segment is rather membranous, covered with normal scales though sparsely, and with a pair of coremata. On the other hand, in *Caloptilia* the 7th and 8th abdominal segments are quite different from the preceding segments in structure, being very weakly membranous, deeply retracted into the 6th in ordinary condition, and bare or very sparsely covered with scent scales; further, both segments are provided with coremata (see Fig. 67). Other important characters of the wing venation and female genitalia in *Gracillaria* are stated by Vári (1961) as follows: "discal cell in forewing dilated towards apex with a slight indication of an areole, veins 9 and 10 rather short", and "♀-genitalia differ in having only one very large corniform signum". The larval

chaetotaxy of *G. syringella* is given by MacKay (1972) and that of Japanese species is shown in Fig. 75, A-B. The chaetotaxy is distinguished from that of the genus *Caloptilia* by the seta SV₃ on the 6th and 7th abdominal segments situated anterolaterally to the seta SV₁.

Almost all the species described by authors under the generic name *Gracilaria* or *Gracillaria* may be transferred to *Caloptilia* or its related genera, though most of them remain unrevised. Of the known Japanese members, 2 species, *albicapitata* Issiki and the so-called "*syringella* Fabricius", surely fall under the genus *Gracillaria* in the present sense. The Japanese specimens identified as "*syringella*" are different from the European, and should represent a new species as described herein after. Two other species are found from Japan, namely, *arsenievi* Ermolaev and *ussuriella* Ermolaev, both originally described under the genus *Caloptilia* from the Far East of USSR.

These 4 species are more or less easily distinguished from each other by the colour-pattern of the adults and also by the larval habit. On the other hand, they are closely similar to each other in the genital structures, and I have failed to separate them clearly by these organs. In this connection it is noteworthy that 3 species, *albicapitata*, *arsenievi* and *ussuriella*, are sympatric in Hokkaidô, and that *albicapitata*, *ussuriella* and the new species are also sympatric in Central Honsyû. This distributional pattern may suggest that these 4 species are not local variations, but are distinct species in spite of the fact that their genital structures are quite similar. In Japan the larvae of all these species have so far been exclusively found on plants belonging to the subfamily Oleoideae of the family Oleaceae.

Key to the Japanese species of the genus *Gracillaria*

- 1 Fore wing snow-white in ground colour, with 6 ochre-yellow, outwardly oblique fasciae; head uniformly snow-white. *albicapitata* Issiki
- Fore wing ochre-yellow or blackish in ground colour, with a few narrow, white fasciae or strigulae; head ochre-yellow or dark fuscous, if whitish, then distinctly darkened on vertex between antennae. 2
- 2 Thorax ochre-yellowish, smooth, without a crest; ground colour of fore wing bright ochre-yellow, partially suffused with dark scales on basal 1/4 and at apical 1/3 of discal area. *japonica*, sp. nov.
- Thorax blackish or sometimes whitish; ground colour of fore wing dark fuscous to blackish. 3
- 3 Fore wing partially suffused with bright golden-brown scales on discal area just before middle, at apex and near apical area of wing-fold. *ussuriella* Ermolaev
- Fore wing without any golden-brown suffusion. *arsenievi* Ermolaev

Gracillaria albicapitata Issiki

[Figs. 1, 5(B-D), 6(C-E), 8(C-D), 48(B-C), 59(B) & 75(A)]

Gracilaria albicapitata Issiki, 1930, Ann. Mag. nat. Hist. 10 (6): 429.

Caloptilia albicapitata: Issiki, 1950, Icons. Ins. Jap.: 452, f. 1219; Inoue, 1954, Check List Lep. Jap. 1: 26.

Lyoneta (!) *jezonella* Matsumura, 1931, 6000 Ill. Ins. Jap.: 1105, f. 2306.

♂ ♀. Expanse of wings: 9.8–12.5 mm (11.3 mm in average of 25 specimens).
Length of fore wing: 5.0–6.2 mm (5.6 mm in average of 25 specimens).

Face, head and thorax snow-white; thorax blackish anteriorly, the ventral

surface with a pair of blackish streaks. Palpi white; labial palpus ringed with black at subapex of apical segment and at apex of 2nd segment. Antenna ochre-whitish, with blackish-brown annulations; scape snow-white, blackish apically; pecten white. Fore and mid legs blackish; fore coxa whitish at base broadly and at middle narrowly; femora spotted with white at middle and apex rather broadly; tibiae ringed with white at middle and base narrowly; tarsi snow-white, ringed with black apically in each segment. Hind leg white; coxa with a blackish apical spot; femur with a blackish median spot; tarsus broadly ringed with black at base and apex in 1st segment and at apex alone in other segments. Fore wing snow-white, with 6 bright golden-brown, black-margined, broad fasciae; 1st fascia situated at basal 1/5 of wing, almost vertical, the 2nd at basal 2/5, oblique, broadened on wing-fold, the 3rd at middle, narrow, the 4th broadest, strongly oblique, the 5th at apical 1/6, oblique, fused with the 4th on its dorsal 1/3, and the 6th occupying preapical space of wing; space between 3rd and 4th golden fasciae interrupted by an ill-defined

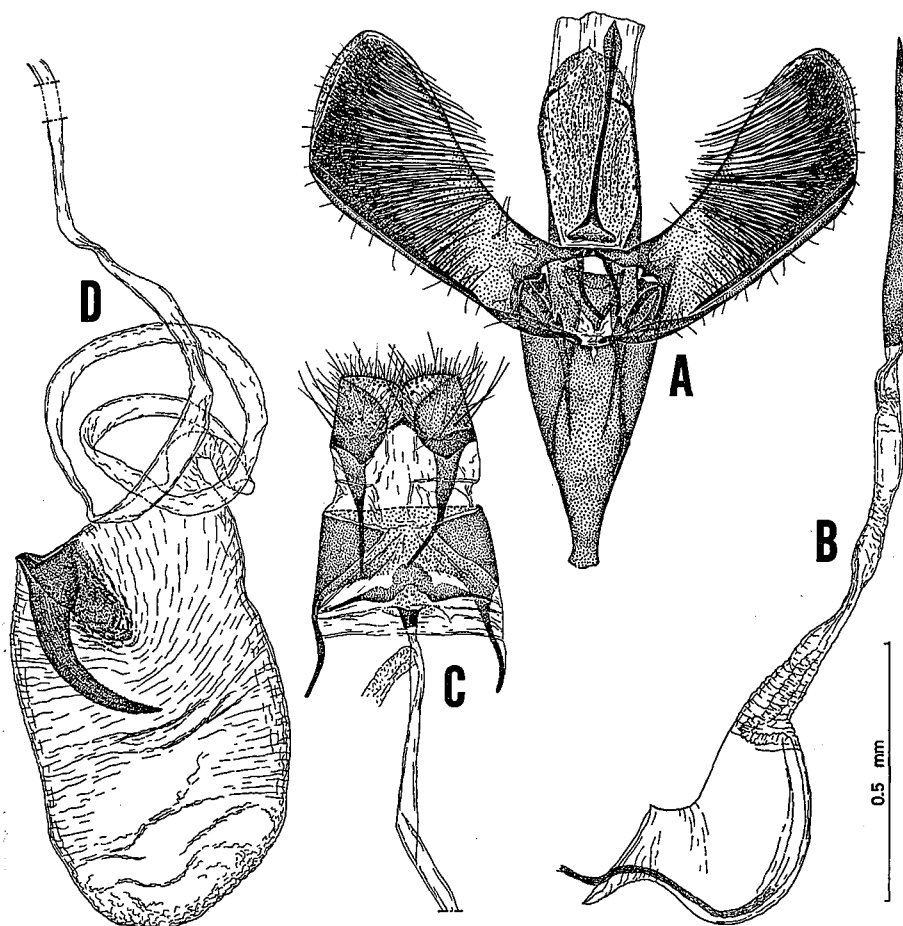


Fig. 1. *Gracillaria albicapitata* Issiki. A: Male genitalia [Grc-663, Sapporo, Hokkaido, 7/vi/1958]— B: Aedoeagus [ditto]— C: Female genitalia [Grc-1294, Sapporo, em. 30/vii/1964, ex *Syringa reticulata* (693)]— D: Bursa copulatrix [ditto].

blackish blotch on its middle, leaving a narrow stripe on costal part and a triangle on dorsal part in white ground colour; 2 dark fuscous costal strigulae situated near base of wing; cilia on apex of wing blackish with a broad, whitish median line, those along termen dark gray with 2 or 3 pale subapical lines, and those along dorsal margin wholly gray. Hind wing dark fuscous, with cilia gray.

Male genitalia: Tegumen simple, round apically; tuba analis protruded far beyond tegumen, with a subscaphium slender and widened into a fan-shape at basal extremity. Valva moderately long, widened apically; ventral margin nearly straight, with a narrow membraneous ridge projected along inner face just above ventral margin, this ridge making a short pointed angle at ventroapical corner of valva (see Fig. 5, B-D); long setae distributed thickly along terminal and ventral margins. Saccus slightly shorter than valva, triangular, narrowly prolonged apically, with its apex weakened in sclerotization and truncated. Juxta weakly sclerotized, triangular. Aedoeagus slightly shorter than valva, straight, bar-shaped, slender, very slightly thickened basally, with ductus ejaculatorius a little longer than twice length of aedoeagus itself. Eighth abdominal segment very short, normally scaled, with tergum Y-shapedly and sternum T-shapedly sclerotized; coremata rather thick, long, about 3 times as long as 8th segment. Seventh abdominal segment normal in structure like preceding segments.

Female genitalia: Papilla analis moderate in length, setose; apophysis posterioris long, strongly widened on its basal half. Eighth abdominal segment longer than papilla analis, not scaled; apophysis anterioris slender, short, about half as long as apophysis posterioris, without a distinct ventral prong; lamella postvaginalis wide-triangular, with its cephalic margin deeply notched medianly, and lateral margins sometimes more shallowly notched near caudal end; many microspines scattered around the caudal side of sinus vaginalis. Ductus bursae membraneous, very long, slender, coiled at least 3 times on cephalic half, with antrum weakly sclerotized and small: corpus bursae ellipsoidal, membraneous; a signum sickle-shaped, with a pair of elongate lobes on its base.

Specimens examined: 147♂♂ & 129♀♀. HOKKAIDŌ— 1♀ (holotype of *Lyonetia jazonella* Matsumura, G. sl. no. Grc-668), Sapporo, 29/viii/1918, S. Matsumura leg.; 3♀♀, Abasiri, 7/vi/1951; 2♀♀, Aizankei, Daisetu-zan, 2/viii/1966; 1♀, Ginsendai, Daisetu-zan, 12/viii/1970; 2♂♂ & 2♀♀, Ino, Asahigawa, em. 20/vi/1969, ex *Fraxinus mandshurica* var. *japonica*, S. Umezawa leg.; 9♂♂, & 11♀♀, Yûbari, Sorati, em. 8-9/v/1978, ex *Syringia reticulata* (1732); 1♀, Umaoiyama, Naganuma, 14/vi/1973; 1♂, Nopporo, 1/vi/1961; 1♂, ditto, 12/vi/1975; 2♂♂, ditto, 7/vi/1977; 9♂♂ & 7♀♀, Sapporo, em. 20-28/vii/1956, ex *F. m.* var. *japonica*, T. Harada leg.; 7♂♂ & 19♀♀, ditto, em. 24-25/vii/1956, ex *S. reticulata* (112); 2♂♂ & 1♀, ditto, em. 28/vii.-1/viii/1957, ex *F. m.* var. *japonica*; 4♂♂ & 1♀, ditto, em. 1/viii/1957, ex *S. reticulata*; 3♀♀, ditto, em. 17-18/ix/1957, ex *F. m.* var. *japonica*; 1♂, ditto, 7/vi/1958; 8♂♂ & 3♀♀, ditto, em. 26/vii/1958, ex *F. m.* var. *japonica*; 1♀, ditto, 24/viii/1959; 2♀♀, ditto, 25/v/1961; 1♂, ditto, em. 9/viii/1963, ex *S. vulgaris*; 1♀, ditto, 3/vii/1964; 10♂♂ & 5♀♀, ditto, em. 28/vii.-4/viii/1964, ex *S. reticulata* (693); 1♀, ditto, 21/viii/1966; 1♂, ditto, em. 10/v/1967, ex *F. m.* var. *japonica* (792); 1♂, ditto, 6/viii/1967; 1♂, ditto, 10/viii/1969; 1♀, ditto, 25/viii/1970; 1♂, ditto, 21/viii/1971; 1♀, ditto, 4/vi/1972; 3♂♂, ditto 14/vi/1974; 41♂♂ & 18♀♀, ditto, em. 22/v.-27/vi/1957, ex *F. m.* var. *japonica*, S. Umezawa leg.; 1♂ & 1♀, ditto, 30/viii.-6/ix/1967, S. Umezawa leg.; 6♂♂ & 3♀♀, ditto, em. 16-18/v/1968, ex *S. vulgaris*, S. Umezawa leg.; 1♂, Kitanosawa, Sapporo, 3/vi/1967, S. Umezawa leg.; 7♂♂ & 5♀♀, Huzinosawa, Sapporo, em. 3/vi/1967, ex *F. m.* var. *japonica*, S. Umezawa leg.; 1♀, Zyôzankei, 26/viii/1966; 1♂, Soranuma-dake, 9/viii/1962; 1♂, ditto, 5/viii/1967; 2♂♂, Teine, 13/vi/1959; 1♂, Tomakomai, em. 25/viii/1964, ex *F. m.*

var. *japonica*. HONSYŪ — 21♂♂ & 28♀♀, Kaida, Kiso, Nagano-ken, em. 24/vii.-2/viii/1975, ex *F. m.* var. *japonica* (1437). The holotype of *Lyonetia jezonella* is deposited in the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō: Honsyū).

Food plants: *Fraxinus mandshurica* Rupr. var. *japonica* Maxim., *Syringa reticulata* Hara and *S. vulgaris* Lam. (Oleaceae).

Remarks: Five to 20 eggs are laid in a row at side of a leaf-vein on the lower surface. The hatched larvae mine directly into the middle layer of the parenchymal tissue of the leaf or leaflet altogether; the mine made by the larvae of the first 3 instars is irregularly large blotchy or wide linear, and inter-parenchymal, with a few weak wrinkles on both the upper and lower surfaces. In the 4th instar the larvae leave the mine for another leaf or leaflet, and roll up it from the tip towards underside with the cooperation of almost all the members from the mine. The leaf roll made by the larvae of the last 2 instars (4th and 5th) is very large and cigarettelike in form. The cocoon is usually found at the margin of fallen leaves in field, buff whitish and boat-shaped. The present species hibernates in the pupal stage in rearing condition.

This species is very similar to *G. syringella* in the larval habit, though it is easily distinguished from the latter by the different colour-pattern of the adults.

Gracillaria japonica, sp. nov.

[Figs. 2(A-D), 5(E-G), 7(E-F), 8(E-F) & 48(D-E)]

Gracillaria syringella: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30, pl. 4 (120). [Misidentification.]

♂ ♀. Expanse of wings: 9.8–13.0 mm (12.0 mm in holotype, 11.1 mm in average of 26 specimens). Length of fore wing: 4.8–6.2 mm (6.0 mm in holotype, 5.5 mm in average of 26 specimens).

Face and head covered with pale ochre-yellowish scales, mixed with grayish scales on vertex in some specimens. Palpi smooth-scaled, pale ochre-yellowish, suffusedly irrorated with dark brown, the irrorations limited to a small median area of each segment in a few specimens; apical segment of labial palpus always whitish at apical extremity. Antenna ochre-whitish, annulated with brownish black; scape spotted with black above; pecten of a few grayish hairs. Thorax ochre-yellow dorsally, distinctly darkened anteriorly; pleural surfaces brownish-black. Fore and mid legs brownish-black, irregularly streaked or spotted with yellowish scales; tibia with a white spot at middle of upper side; tarsi white, the 1st segment with narrow blackish rings at subbase, middle and apex, the 2nd segment with similar rings at middle and apex, and the others with an apical ring alone. Hind leg ochreous-whitish; coxa blackish outside; femur with 3 blackish spots at basal 2/3 on outside; tibia becoming grayish towards both ends, with spurs gray except at apex; tarsus broadly grayish-black at apex and base in 1st segment, and at apex alone in the other segments. Fore wing brilliantly golden-brown in ground colour, with 6 dorsal and 5 costal strigulae white, these strigulae being sometimes reduced into marginal spots and broadly surrounded by blackish scales; basal 1/4 of wing suffusedly irrorated with blackish scales; a yellowish spot at base and a white spot at basal 1/8 near wing-fold; 1st dorsal strigula placed at basal 1/4, broadly triangular, extending slightly beyond wing-fold or very rarely to

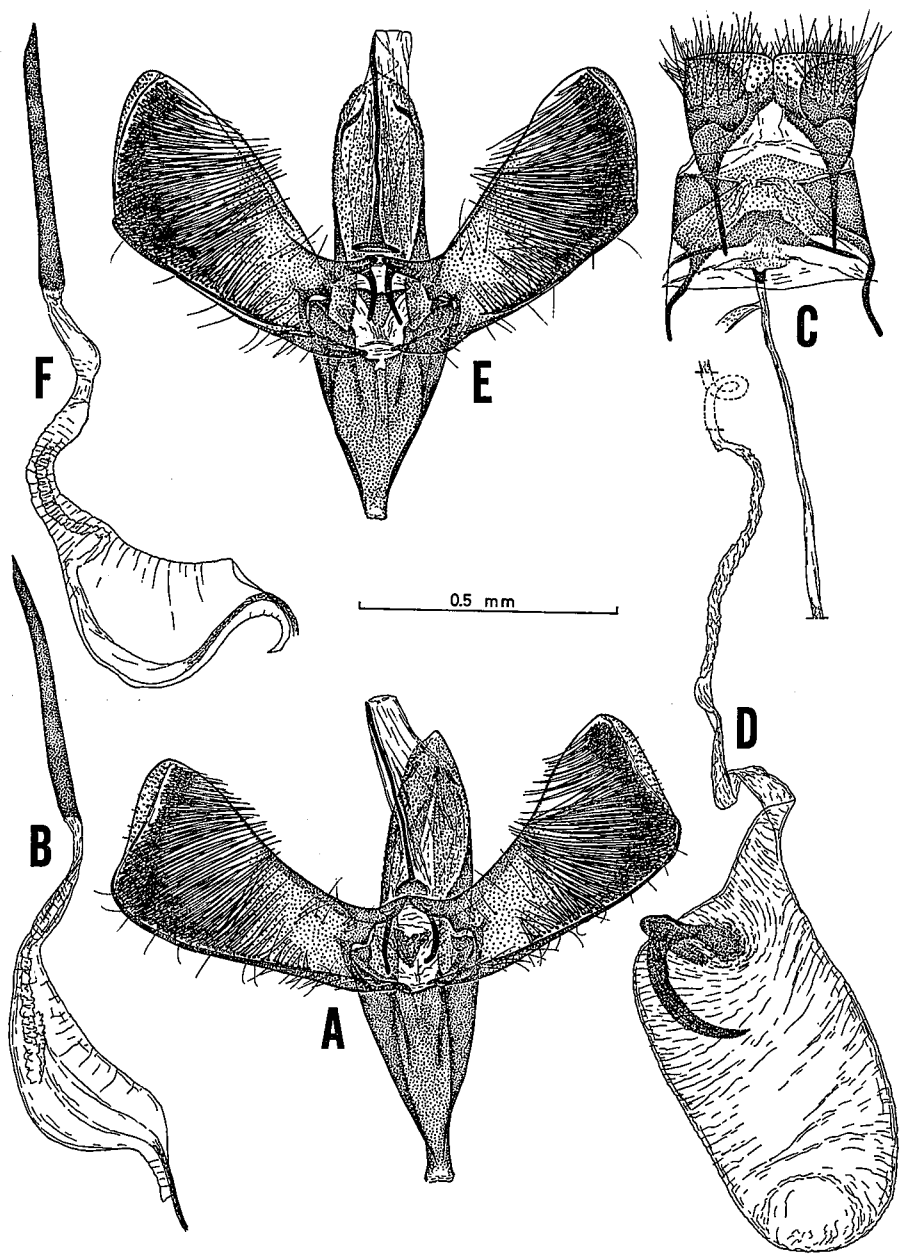


Fig. 2. A-D: *Gracillaria japonica*, sp. nov. A: Male genitalia [Grc-747, Kamikôti, Honsyû, em. 25/ix/1954, ex *Ligustrum tschonoskii*]— B: Aedeagus [ditto]— C: Female genitalia [Grc-1150, Kamikôti, em. 18/x/1954, ex *L. tschonoskii*]— D: Bursa copulatrix [ditto].
E-F: *Gracillaria syringella* (Fabricius). E: Male genitalia [Grc-931, Austria, em. 14/iv/1963, ex *Fraxinus excelsior*] — F: Aedeagus [ditto].

costal margin across wing; 2nd dorsal just before middle of wing, narrow, outwardly oblique, reaching wing-fold, usually fused with the 1st dorsal through a narrow white line along dorsal margin of wing; 3rd to 6th dorsals placed nearly equidistantly on apical half of wing, small, perpendicular; 1st costal at basal 1/3 of wing, rather broadly quadrangular, always shading into ground colour without blackish marginal scales; 2nd costal opposed with 2nd dorsal, narrow, oblique outwardly, usually short, sometimes extending to wing-fold and touching to 2nd dorsal to form an outwardly angulated fascia; 3rd costal very small, reduced into a spot in most specimens; 4th and 5th costals very narrow, sometimes fused with 5th and 6th dorsals to form a straight fascia, respectively; a few minute white spots irregularly alternated with blackish spots on costal margin; a spot at apex of wing white, crescent-shaped; discal area between middle and apical 1/8 of wing suffusedly irrorated with blackish scales irregularly; cilia gray, with 2 whitish apical lines alternated with blackish ones along apex and termen of wing. Hind wing dark gray; cilia grayish.

Genitalia: Very similar to those of *G. albicapitata* in both sexes, but distinguishable in the following characters:—Valva with ventral margin gently curved towards tip, slightly protruded and smoothly round at ventroapical corner. Ductus ejaculatorius shorter than that of *albicapitata*, at most 1.3 times as long as aedeagus itself. Lamella postvaginalis is in a curved band, rather smoothly round on caudal margin, without distinct notch or constriction. Ductus bursae somewhat shorter than that of *albicapitata*, coiled twice on its cephalic half.

Specimens examined: 11♂♂ & 15♀♀. HONSHÛ—3♂♂ (one the holotype, G. sl. no. Grc-2429) & 5♀♀, Kaida, Kiso, Nagano-ken, em. 17-31/x/1975, ex *Ligustrum obtusifolium* (1572); 2♂♂ & 3♀♀, Siobara, Totigi-ken, em. 28-31/vii/1975, ex *L. obtusifolium* (1466); 4♀♀, ditto, em. 31/x.-4/xi/1975, ex *L. obtusifolium* (1674); 2♂♂ & 1♀, Todai, Ina, Nagano-ken, 27/ix/1975; 2♂♂, Kisohukusima, Nagano-ken, 25/ix/1975; 2♂♂ & 2♀♀, Kamikôti, Nagano-ken, em. 18/x/1954, ex *L. tschonoskii*, T. Yasuda leg. The holotype is in the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû). Issiki (1957) recorded "*G. syringella*" (= *G. japonica*) from Kyûsyû, but there is in his collection no specimen identical with *G. japonica* and collected in Kyûsyû. His record may be referable to the next species, *G. ussuriella*.

Food plants: *Ligustrum obtusifolium* Sieb. et Zucc. and *L. tschonoskii* Decaisne (Oleaceae).

Remarks: *G. japonica* is distinguished from *G. syringella* and *G. albicapitata* by the larval habit as well as by the adult colour-pattern. In early instars, the larva of *japonica* makes a solitary tentiform mine on the lower surface of the food plant, the mine being quite similar to that in some *Phyllonorycter* species. In late instars it leaves the mine, then rolls up the leaf from the tip towards underside into a triangular cone as in many *Caloptilia* species. The cocoon is usually placed on the surface of the leaf, boat-shaped and whitish. Breeding data suggest that this species hibernates in the adult stage.

Gracillaria ussuriella (Ermolaev), comb. nov.

[Figs. 3, 5 (K-L), 7(C-D), 8(G-I), 48(F-G), 59(A), 62(B) & 73 (A)]

Caloptilia ussuriella Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 103 & 108.

The determination of the Japanese material is based on a comparison with Siberian specimens determined by V.P. Ermolaev. On this occasion a redescription will be given in the following lines.

♂♀. Expanse of wings: 9.8–12.0 mm (11.0 mm in average of 25 specimens); 11.2 mm in Siberian specimens. Length of fore wing: 4.8–6.0 mm (5.5 mm in average of 25 specimens); 5.5–5.6 mm in Siberian specimens.

Face covered with ochre-whitish scales, sparsely mixed with blackish scales; head and thorax blackish, the latter brownish posteriorly, with a blackish crest at posterior corner. In some specimens, the face, head and thorax are almost wholly

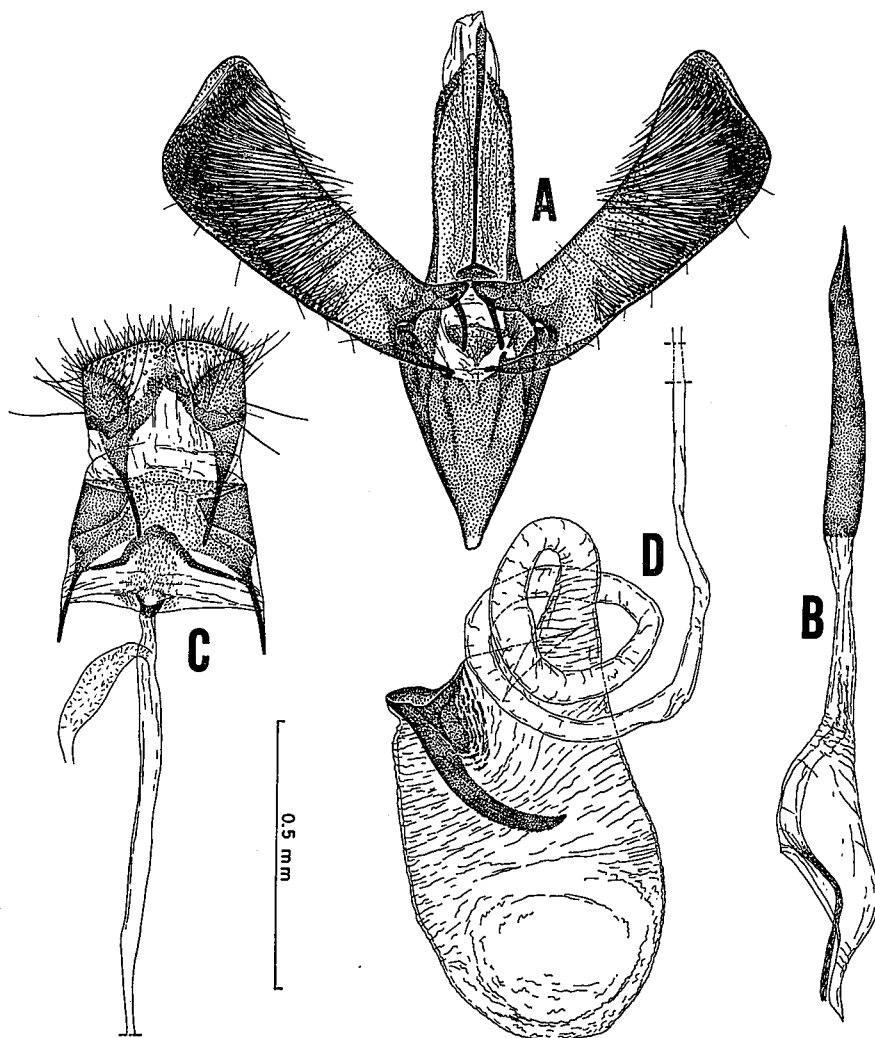


Fig. 3. *Gracillaria ussuriella* (Ermolaev). A: Male genitalia [Grc-749, Sapporo, Hokkaidô, em. 17/ix/1958, ex *Fraxinus mandshurica* var. *japonica*]— B: Aedeagus [ditto]— C: Female genitalia [Grc-1295, Hikosan, Kyûsyû, ex *Fraxinus* sp. (668)]— D: Bursa copulatrix [ditto].

covered with snow-white scales, but the head is always darkened at the vertex between the antennae, and the thorax blackish on the anterior extremity. Palpi blackish; apical segment of labial palpus ringed with white at apex, middle and base. Antenna ochre-whitish, with blackish-brown annulations; scape blackish with a white spot above; pecten whitish to grayish. Fore and mid legs blackish; fore coxa whitish at base broadly; tarsi white, broadly ringed with black at middle and apex in 1st segment and at apex alone in other segments. Hind leg white; coxa with a blackish apical spot; femur with a blackish median spot; tarsus broadly ringed with black at base and apex in 1st segment, and at apex alone in other segments. Fore wing blackish, with white markings arranged as follows: — 2 or 3 minute spots arranged in a row along wing-fold near base, an oblique fascia at basal 1/4 of wing, much widened dorsally, an outwardly arched fascia at middle of wing, often broadly interrupted on its middle into paired strigulae, 2 vertical strigulae on dorsal margin between middle and tornus, a hook-shaped streak at apical 1/5 of costa, about 10 small strigulae on costal margin throughout, and a dot at apex; a large, bright golden-brown blotch occupying almost whole space between 1st and 2nd white fasciae, and some small similar spots irregularly scattered on apex of wing and apical area of wing-fold; cilia around apex of wing blackish with 2 or 3 pale terminal lines, and those along dorsal margin dark gray. Hind wing dark fuscous, with cilia dark gray.

Genitalia: The structure is very similar to that of the preceding 2 species, *G. albicapitata* and *G. japonica*, except for the following points: — In male, valva slenderer, with ventroapical corner evenly round. In female, lamella postvaginalis with a larger notch on cephalic margin, thus sclerotization of lamella appearing very narrow.

Specimens examined: 122♂♂ & 98♀♀. HOKKAIDŌ— 14♂♂ & 11♀♀, Bantainosawa, Kamikawa, em. 12-17/viii/1957, ex *Fraxinus mandshurica* var. *japonica*; 9♂♂ & 10♀♀, Ino, Asahigawa, em. 20/vi/1967, ex *F. m.* var. *japonica*, S. Umezawa leg.; 2♂♂ & 1♀, Kōsyunai, Bibai, em. 21/ix/1968, ex *F. pensylvanica*, S. Umezawa leg.; 2♂♂ & 2♀♀, ditto, em. 20-21/ix/1968, ex *F. americana*, S. Umezawa leg.; 1♀, Nopporo, 25/vi/1972; 18♂♂ & 13♀♀, Sapporo, em. 7-17/ix/1957, ex *F. m.* var. *japonica*; 13♂♂ & 10♀♀, ditto, em. 17-19/ix/1958, ex *F. m.* var. *japonica*; 7♂♂ & 2♀♀, ditto, em. 21-24/ix/1966, ex *F. m.* var. *japonica*; 29♂♂ & 21♀♀, ditto, em. 28/viii.-10/ix/1968, ex *F. m.* var. *japonica*, S. Umezawa leg.; 2♂♂ & 3♀♀, ditto, em. 4-12/ix/1968, ex *F. m.* var. *japonica*, S. Umezawa leg.; 1♂, ditto, 26/xii/1964, R. Naruse leg.; 1♀, ditto, 4/iv/1965, R. Naruse leg.; 1♀, ditto, 28/ix/1967, S. Umezawa leg.; 22♂♂ & 15♀♀, Huzinosawa, Sapporo, em. 3/vi/1967, ex *F. m.* var. *japonica*, S. Umezawa leg.; 1♀, Soranuma-dake, em. 1/ix/1964, ex *F. m.* var. *japonica*. HONSYŪ— 2♂♂ & 4♀♀, Ina, Nagano-ken, em. 19/ix/1970, ex *Fraxinus* sp., M. Miyazaki leg. KYŪSYŪ— 1♀, Hikosan, Hukuoka-ken, em. 25/vi/1965, ex *Fraxinus* sp. USSR— 1♀, Sapovednik, Primorskij Kraj, 27/vii/1974, V.P. Ermolaev leg.; 1♂, ditto, 22/vii/1975, V.P. Ermolaev leg.; both the specimens were determined as *Caloptilia ussuriella* by Ermolaev.

Distribution: Japan (Hokkaidō; Honsyū; Kyūsyū) and USSR (Primorskij Kraj).

Food plants: *Fraxinus* spp., including *americana* Linné, *pensylvanica* Marsh. and *mandshurica* Rupr. var. *japonica* Maxim. (Oleaceae) in Japan.

Remarks: The present species is distinguished from the preceding two in the larval habit. The egg is laid singly at the side of a leaf vein on the lower surface. I have often found more than 5 eggs on a single leaflet. The mine made by the larva of the first 3 instars is large, lower-parenchymal, and tentiformed. The leaf

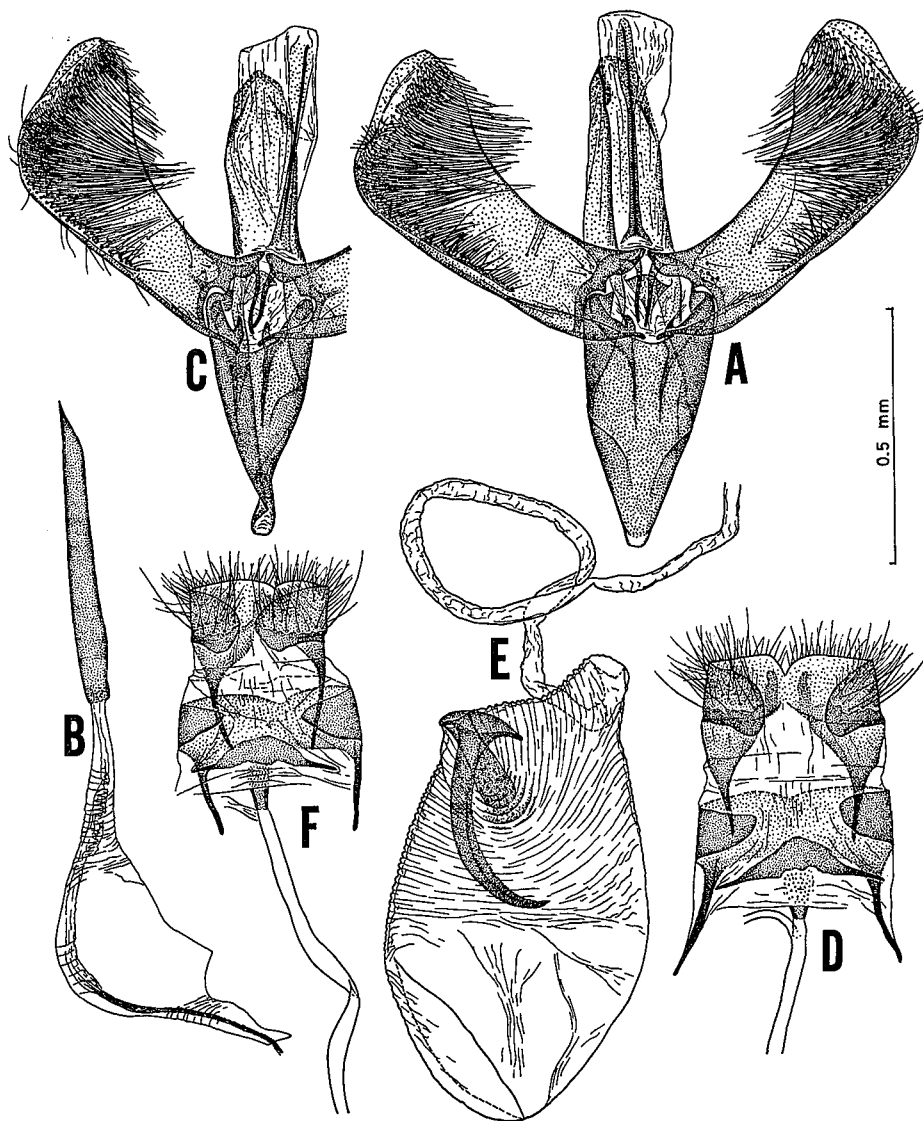


Fig. 4. *Gracillaria arsenievi* (Ermolaev). A: Male genitalia [Grc-1154, Tomakomai, Hokkaidô, em. 21/viii/1964, ex *Fraxinus mandshurica* var. *japonica*— B: Aedoeagus [ditto]— C: Male genitalia, right valva omitted [Grc-1660, Kôsyunai, Hokkaidô, em. 9/ix/1968, ex *F. pensylvanica*] — D: Female genitalia [Grc-1155, Tomakomai, em. 21/viii/1964, ex *F. m.* var. *japonica*] — E: Bursa copulatrix [ditto] — F: Female genitalia [Grc-1661, Kôsyunai, em. 10/ix/1968, ex *F. pensylvanica*].

roll made by the larva of the late instars is conical, or often cigarette-formed when many larvae inhabit a single leaflet. The cocoons are ordinarily formed inside the leaf roll, shining white and spindle-shaped. Rearing data suggest that the hibernation occurs in the adult stage, and this agrees with the fact that 1 male

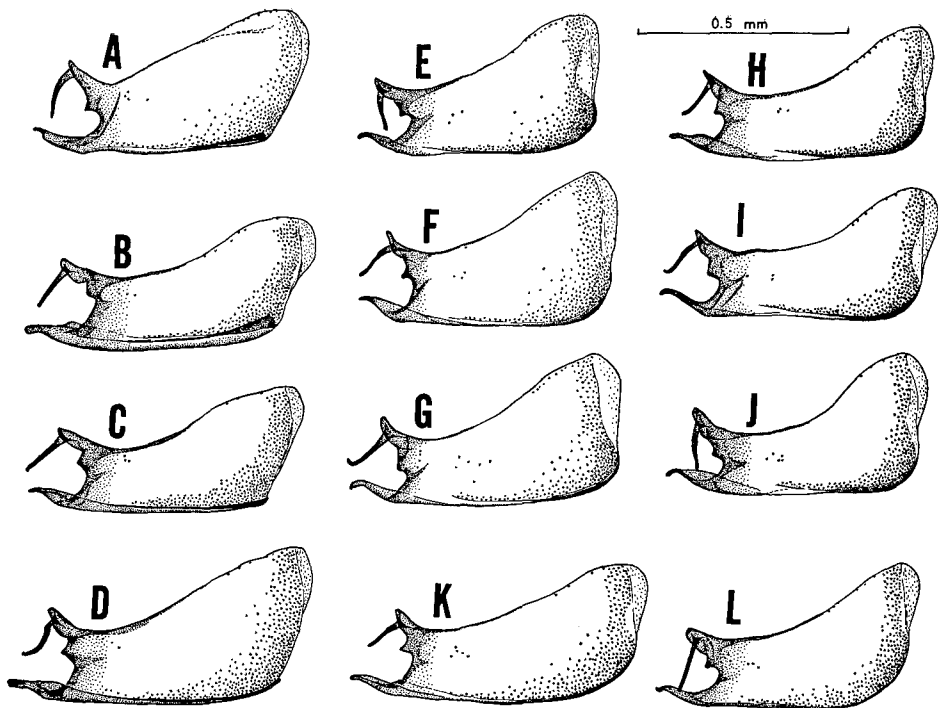


Fig. 5. Right valva of *Gracillaria* spp. A: *G. syringella* (Fabricius) [Grc-931] — B: *G. albicapitata* Issiki [Grc-2670, Kaida, Kiso, Nagano-ken, Honsyû, em. 26/vii/1975, ex *Fraxinus mandshurica* var. *japonica* (1437)] — C: Ditto [Grc-1293] — D: Ditto [Grc-2433, Nopporo, Hokkaidô, 12/vi/1975] — E: *G. japonica*, sp. nov. [Grc-2101, Kisohukushima, Nagano-ken, Honsyû, 25/ix/1975] — F: Ditto [Grc-2102, Todai, Ina, Nagano-ken, 27/ix/1975] — G: Ditto [Grc-2429, holotype] — H: *G. arsenievi* (Ermolaev) [Grc-2485, Uladivostok, USSR, em. 6/vii/1978, ex *F. mandshurica*] — I: Ditto [Grc-2667, Kôsyunai, Hokkaidô, 6/ix/1968] — J: Ditto [Grc-2430, Kôsyunai, em. 25/ix/1968, ex *F. americana*] — K: *G. ussuriella* (Ermolaev) [Grc-2488, Sapovednik, USSR, 22/vii/1975] — L: Ditto [Grc-2677, Sapporo, Hokkaidô, em. 24/ix/1966, ex *F. m.* var. *japonica* (794)].

was collected in midwinter and 1 female in early spring in the field.

Gracillaria arsenievi (Ermolaev), comb. nov.

[Figs. 4, 5(H-J), 7(A-B), 8(J-L), 48(H-J) & 75 (B)]

Caloptilia arsenievi Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 107 & 108.

♂♀. Expanse of wings: 10.0–13.2 mm (12.2 mm in average of 12 specimens); 13.0 mm in Siberian specimens. Length of fore wing: 4.8–6.5 mm (6.0 mm in average of 12 specimens); 6.2 mm in Siberian specimens.

Face and head grayish-black, very sparsely sprinkled with ochreous yellow, sometimes heavily on face anteriorly and head laterally. Palpi blackish, sparsely sprinkled with ochreous yellow; apical segment of labial palpus ringed with ochreous-yellow at apex, middle and base. Antenna black, annulated with ochreous white narrowly; scape black; pecten ochreous-gray. Thorax blackish, with a conspicuous

jet-black crest at posterior angle. Fore and mid legs blackish, mixed with ochreous-yellow scales especially heavily at base of fore coxa and at middle of femora and tibiae; tarsi ringed with white at base, middle and subapex in 1st segment and at base alone broadly in other segments. Hind leg ochreous-yellow; coxa suffused with black; femur with 1 or 2 large, blackish blotches; tibia darkened at base and near apex; tarsus rather blackish, with whitish rings at middle and subapex in 1st segment and at base alone in other segments. Fore wing very narrow, nearly parallel-sided; ground colour blackish-gray, slightly

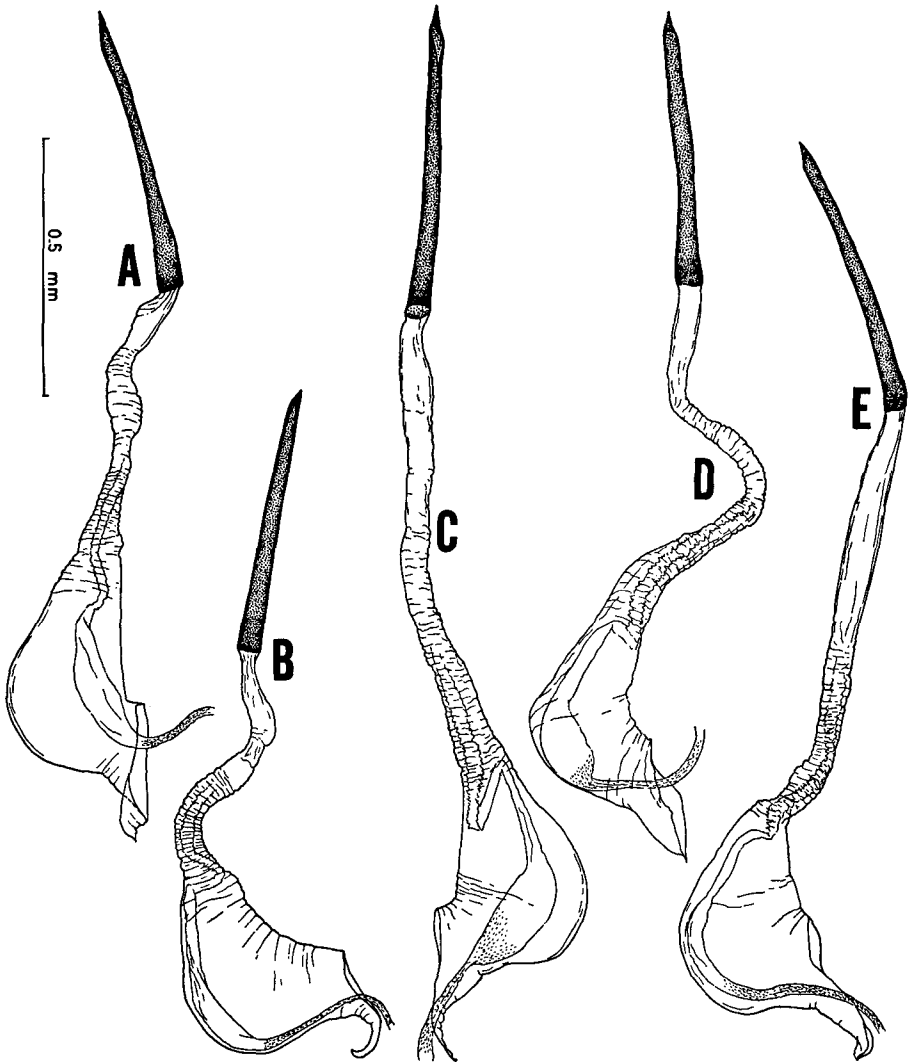


Fig. 6. Aedeagus of *Gracillaria* spp. A: *G. syringella* (Fabricius) [Grc-1158, Berlin, Europe, em. 24/vi/1924, ex *Syringa vulgaris*] — B: Ditto [Grc-931] — C: *G. albicapitata* Issiki [Grc-2423] — D: Ditto [Grc-2676, Sapporo, Hokkaido, em. 30/vii/1964, ex *Syringa reticulata*] — E: Ditto [Grc-2670].

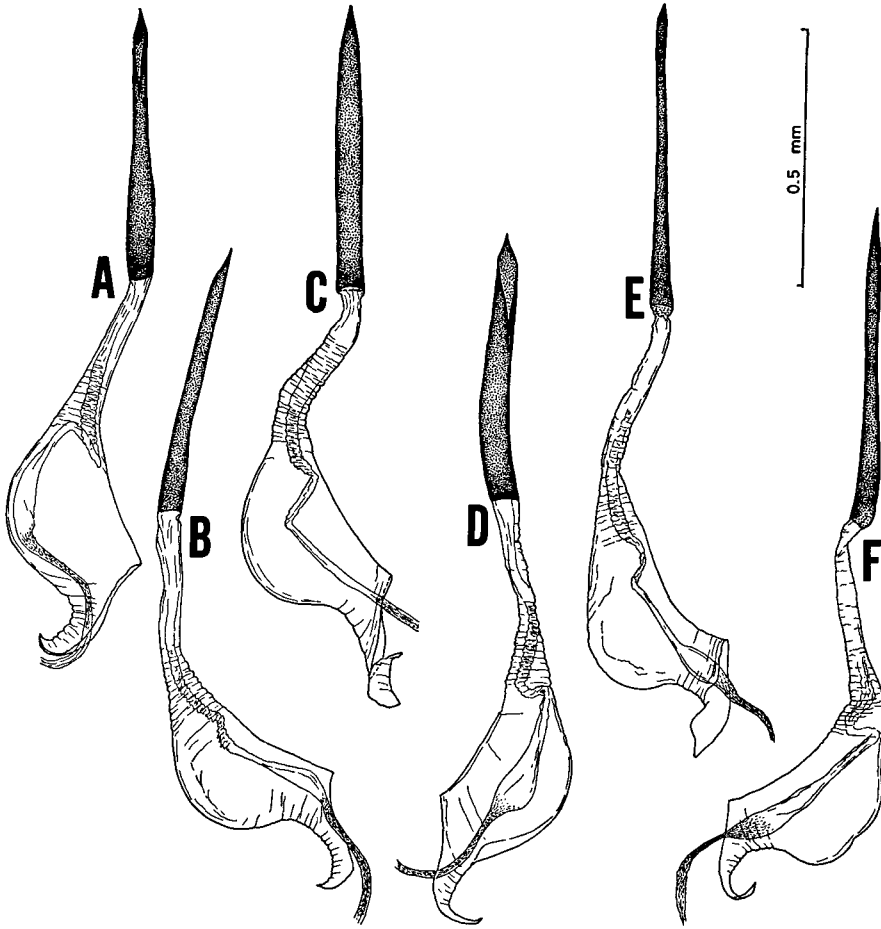


Fig. 7. Aedeagus of *Gracillaria* spp. A: *G. arsenievi* (Ermolaev) [Grc-2485] — B: Ditto [Grc-2667] — C: *G. ussuriella* (Ermolaev) [Grc-2488] — D: Ditto [Grc-2425, Ina, Naganoken, Honsyû, em. 19/ix/1970, ex *Fraxinus* sp.] — E: *G. japonica*, sp. nov. [Grc-2668, Kaida, Nagano-ken, Honsyû, em. 21/x/1975, ex *Ligustrum obtusifolium*]— F: Ditto [Grc-2429, holotype].

tinged with brown, irregularly strigulated or spotted with yellowish-white scales along costal and dorsal margins, the strigulae or spots on basal half of costal margin being alternated with jet-black spots; a few yellowish or whitish dots irregularly scattered on discal area and at apex of wing; a snow-white narrow strigula at basal $\frac{2}{5}$ of dorsal margin of wing, reaching nearly wing-fold, with a similar strigula placed just basad, inwardly oblique, and more ill-defined; an irregular jet-black blotch sometimes placed at apical $\frac{1}{4}$ of costa, narrowly margined with ochreous scales outside; cilia around apex of wing blackish-gray with 2 or 3 plae lines, and those along dorsal margin pale brownish-gray. Hind wing gray, with cilia pale brownish-gray.

Genitalia: Quite similar to those of the preceding 3 species in all respects in

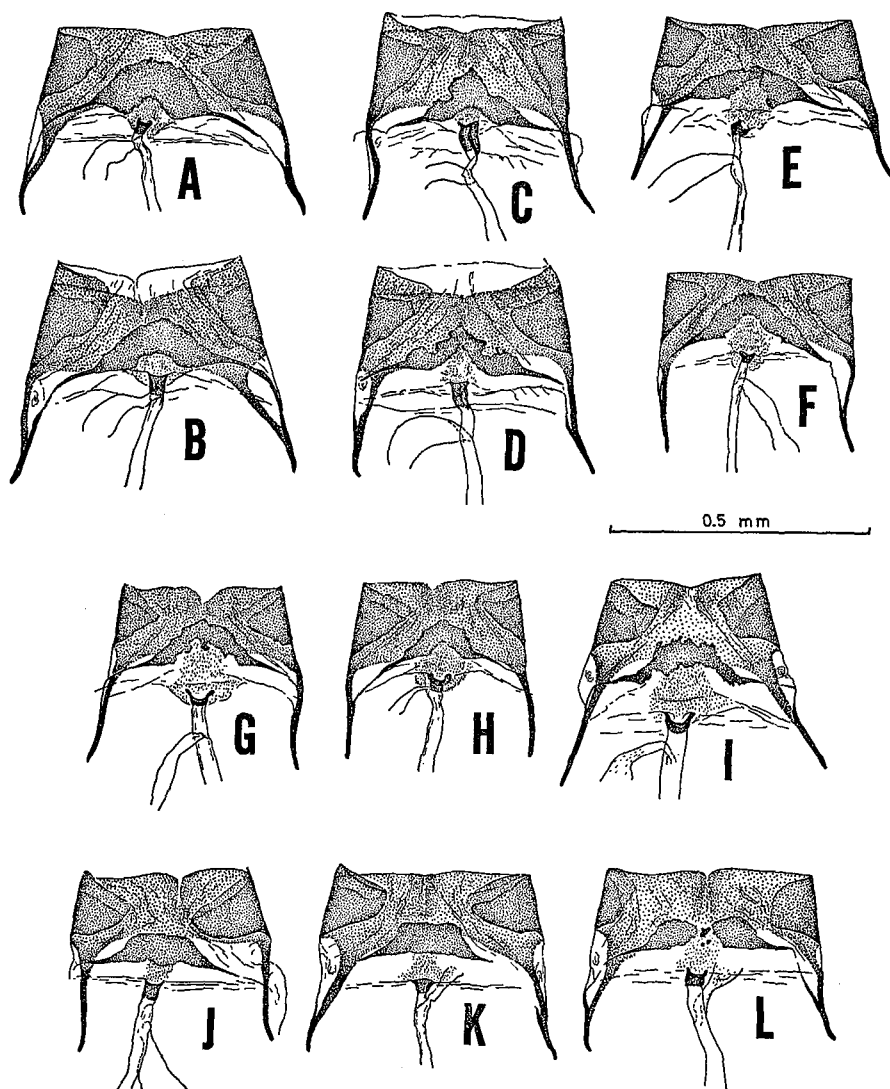


Fig. 8. Female 8th abdominal segment of *Gracillaria* spp. A: *G. syringella* (Fabricius) [Grc-1290] — B: Ditto [Grc-2666, Berlin, Europe, em. 4/vi/1924, ex *Syringa vulgaris*] — C: *G. albicapitata* Issiki [Grc-2675, Yūbari, Hokkaidō, em. 11/v/1978, ex *Syringa reticulata* (1732)] — D: Ditto [Grc-2672, Kaida, Kiso, Nagano-ken, Honsyū, em. 31/vii/1975, ex *Fraxinus mandshurica* var. *japonica* (1437)] — E: *G. japonica*, sp. nov. [Grc-2433, Kaida, em. 17/x/1979, ex *Ligustrum obtusifolium* (1572)] — F: Ditto [Grc-2669, Kaida, em. 27/x/1975, ex *L. obtusifolium* (1572)] — G: *G. ussuriella* (Ermolaev) [Grc-2487, Sapovednik, USSR, 27/vii/1974] — H: Ditto [Grc-2426, Ina, Naganoken, Honsyū, em. 19/ix/1970, ex *Fraxinus* sp.] — I: Ditto [Grc-2679, Sapporo, Hokkaidō, em. 8/viii/1968, ex *F. mandshurica* var. *japonica*] — J: *G. arsenievi* (Ermolaev) [Grc-2486, Vladivostok, USSR, em. 6/vii/1978, ex *F. mandshurica*] — K: Ditto [Grc-2432, Apoi Hidaka, Hokkaidō, em. 11/vii/1973, ex *Syringa reticulata* (1151)] — L: Ditto Kōsyunai, Hokkaidō, em. 20/ix/1968, ex *F. americana*].

both the sexes, and very slightly different from them in the following points:— In male, ventroapical corner of valva evenly round, slightly protruded beyond terminal margin, but less than in *G. japonica* and more than in *G. ussuriella*. In female, lamella postvaginalis more or less trapezoid in form, not notched on its cephalic margin, but in 1 specimen it is interrupted into 2 main pieces at its middle as shown in Fig. 8, L.

Specimens examined: 8♂♂ & 7♀♀. HOKKAIDÔ — 1♂ & 1♀, Tomakomai, em. 21/viii/1964, ex *Fraxinus mandshurica* var. *japonica*; 2♂♂ & 1♀, Apoi-dake, Hidaka, em. 10–16/vii/1973, ex *Syringa reticulata* (1151); 2♂♂ & 2♀♀, Kôsyunai, Bibai, ex *F. pensylvanica*, S. Umezawa leg.; 2♂♂ & 1♀, ditto, em. 20–25/ix/1968, ex *F. americana*, S. Umezawa leg.; 1♀, Huzinosawa, Sapporo, em. 6/vii/1968, ex *F. m.* var. *japonica*, S. Umezawa leg. USSR — 1♂ & 1♀, Vladivostok, Primorskij Kraj, em. 6/vii/1978, ex *F. mandshurica*, P.V. Ermolaev leg., determined as *Caloptilia arsenievi* by Ermolaev.

Distribution: Japan (Hokkaidô) and USSR (Primorskij Kraj).

Food plants: *Fraxinus americana* Linné, *F. pensylvanica* Marsh., *F. mandshurica* Rupr. var. *japonica* Maxim. and *Syringa reticulata* Hara (Oleaceae) in Japan. *Fraxinus mandshurica* Rupr. and *Syringa amurensis* Rupr. in USSR.

Remarks: In the behaviour of the immature stage this species is very characteristic, being distinguished from the preceding 3 species by the following points. — The egg is usually laid singly on the upper surface of the leaf or leaflet. The mine is at first upper epidermal and tortuous-linear, and finally becomes a blister-like blotch. The leaf roll made by the larva of the late instars is conical or trigonal, always rolled up from the tip of the leaf or leaflet on the lower side. The cocoon is situated on the edge of a living leaf around the leaf roll, whitish and boat-shaped. The hibernation seems to go through the adult stage, because the adults of the 2nd generation emerge late in autumn, at the end of September.

GENUS CALOPTILIA HUEBNER

Caloptilia Hübner, 1825, Verz. bek. Schmett.: 427. [Type-species: (*Tinea upupaepennella* Hübner, 1801)=*Tinea stigmatella* Fabricius, 1781.]

The genus *Caloptilia* is one of the largest groups in the family Gracillariidae, and known to be distributed over the world. It is distinctly separated from the genus *Gracillaria* in the male by the weakly membraneous 7th and 8th abdominal segments deeply inserted into the preceding segments in ordinary condition, each with a pair of coremata, and in the female by the corpus bursae having 2 sickle-shaped signa with a few exceptions. It is, however, rather heterogenous in the characters of the antennal pecten, venation of the fore wing, structure of the male tegumen, shape and number of the female signa, body chaetotaxy of the last instar larva, larval habit, etc. In this paper I would attempt to subdivide the Japanese members of this large group into 8 subgenera based on these features. Of the 8 subgenera, *Timodora* and *Povolnya* were originally established as genera, while *Sphyrophora* was described as a subgenus and the other four are newly described in this paper. In subdividing the genus, I have weighed, above all, the larval body chaetotaxy and paid special attention to the dorsal group on the 9th abdominal segment and the subventral groups on the 1st, 2nd, 6th and 7th abdominal segments. However, the larvae of 16 species among the 51 Japanese *Caloptilia* species have not been available for the present study.

The subgenera may be separated by the following keys.

Keys to the subgenera of the genus *Caloptilia*

I. Based on adult structure

- 1 Antennal scape with a pecten of hairs or scales. 2
- Antennal scape without a pecten. 6
- 2 Fore wing with all veins well separated at their bases, especially in veins M_2 and M_3 3
- Fore wing with veins M_2 and M_3 connate or short-stalked at their bases. 5
- 3 Male tegumen with several setae on lower face just lateral to tuba analis; one of 2 sickle-shaped signa of female corpus bursae serrated on both outer and inner curves. Subgenus *Sphyrrophora* Vári
- Male tegumen simple, without any setae on lower face; female corpus bursae with 1 or 2 signa, if the signum or signa are sickle-shaped, then serrated on inner curve alone. 4
- 4 Female corpus bursae with a single small thornlike signum. . . Subgenus *Minyoptilia* nov.
- Female corpus bursae with 2 long sickle-shaped signa. . . Subgenus *Cecidoptilia* nov.
- 5 Male tegumen with a pair of simple peniculi stretched from caudal margin just dorsal to costal base of valva. Subgenus *Rhadinoptilia* nov.
- Male tegumen simple, without any paired projection. Subgenus *Caloptilia* Hübner (part: for most species)
- 6 Second segment of labial palpus with a long, triangular tuft beneath, which is about as long as the apical segment; male tegumen with 1 pair of peniculi projected caudad; male anellus simple, without any setae; female corpus bursae with 2 short thornlike signa. Subgenus *Povolnya* Kuznetzov
- Second segment of labial palpus smooth, roughened with scales beneath, or with a tuft, but the tuft is always shorter than half length of apical segment of labial palpus; male tegumen without peniculi, if tegumen has a pair of sclerites (peniculi or gnathi) on lateral faces of tuba analis, then anellus with long setae on dorsal area; female corpus bursae with 2 long sickle-shaped signa. 7
- 7 Fore wing with vein R_2 arising from cell distinctly more distal than vein Cu_{1b} does. . . 8
- Fore wing with vein R_2 arising from cell more or less basal than vein Cu_{1b} does. . . . Subgenus *Caloptilia* Hübner (part: for *ryukyuensis* Kumata and *pulverea* Kumata)
- 8 Male tegumen with a pair of sclerites (peniculi or gnathi) on lateral faces of tuba analis, the sclerites having a row of long setae; anellus with long setae on dorsal area. Subgenus *Timodora* Meyrick
- Male tegumen simple, without any paired sclerites on lateral faces of tuba analis; anellus simple, without any setae. Subgenus *Phylloptilia* nov.

II. Based on larval structure

- 1 Lateral groups on 1st to 8th abdominal segments unisetose in last instar; ventral prolegs with uniordinal crochets arranged in a lateral penellipse alone in last instar. Gall making in late larval instars. Subgenus *Cecidoptilia* nov.
- Lateral groups on those segments bisetose in last instar; ventral prolegs with uniordinal crochets arranged in a lateral penellipse plus a transverse row in last instar. Late instar larvae are not gall makers. 2
- 2 Seta D_1 on 9th abdominal segment ventral to seta D_2 in last instar. 3
- Seta D_1 on that segment dorsocephalic to seta D_2 as in preceding segments in last instar. 6
- 3 Subventral group on 7th abdominal segment unisetose in last instar. The larva is a leaf miner throughout its whole feeding period. . . . Subgenus *Minyoptilia* nov.
- Subventral group on that segment bisetose in last instar. The larva is a leaf miner in early instars and a leaf roller in late instars. 4
- 4 Seta SV_3 lacking and seta SV_2 ventral to level of seta SV_1 on 6th and 7th abdominal segments in last instar. . . Subgenus *Caloptilia* Hübner & Subgenus *Timodora* Meyrick
- Seta SV_2 lacking and seta SV_3 dorsal to level of seta SV_1 on those segments in last

- instar. 5
- 5 Subventral group of setae arranged in a triangle on 2nd abdominal segment; seta SV₃ dorsocephalic to seta SV₁ on 6th and 7th abdominal segments in last instar. The larva is a leaf miner in early instars, then rolls up the leaf from the tip into a trigonal form in late instars. Subgenus *Povolmya* Kuznetsov
- Subventral group of setae arranged in a nearly straight line oblique to body axis on 2nd abdominal segment; seta SV₃ dorsocaudal to seta SV₁ on 6th and 7th abdominal segments in last instar. The larva is a leaf miner in early instars, then rolls up a narrow leaf-margin, cut off by the larva, into a cone in late instars. ... Subgenus *Sphyrophora* Vári
- 6 Subventral group of setae arranged in a straight line slightly oblique to body axis on 2nd abdominal segment; seta SV₃ absent and seta SV₂ ventrocephalic to seta SV₁ on 6th and 7th abdominal segments in last instar. The larva is a leaf miner throughout its feeding period. Subgenus *Rhadinoptilia* nov.
- Subventral group on that segment arranged in a triangle; seta SV₂ absent and seta SV₃ dorsocephalic to seta SV₁ on 6th and 7th abdominal segments in last instar. The larva is a leaf miner in early instars and a leaf roller in late instars. Subgenus *Phylloptilia* nov.

SUBGENUS CALOPTILIA HUEBNER

Caloptilia Hübner, 1825, Verz. bek. Schmett.: 427; Vári, 1961, Transv. Mus. Mem. 12: 3. [Type-species: (*Tinea upupaepennella* Hübner, 1801)=*Tinea stigmatella* Fabricius, 1781.]

Poeciloptilia Hübner, 1825, Verz. bek. Schmett.: 427. [Type-species: *Tinea falconipennella* Hübner, 1813.]

Ornix Treitschke, 1833, Schmett. Eur. 9: 194 (nec Zeller, 1839). [Type-species: *Tinea stigmatella* Fabricius, 1781.]

Coriscium Zeller, 1839, Isis 32: 209. [Type-species: (*Coriscium ligustrinellum* Zeller, 1839)=*Tinea cuculipennella* Hübner, 1796.]

? *Antiolopha* Meyrick, 1894, Trans. R. Ent. Soc. Lond. 1894: 25. [Type-species: *Antiolopha hemiconis* Meyrick, 1894.]

♂♀. Head and face smooth-scaled; ocellus absent; proboscis rather developed. Antenna as long as or a little longer than fore wing, smooth in both sexes; scape moderately thickened, with a pecten consisting of a few hairs or lacking in a few species. Labial palpus long, upturned, acutely pointed apically; 2nd segment smooth entirely, slightly rough-scaled beneath, or very rarely tufted with scales, but the tuft always shorter than half length of apical segment, which is smooth-scaled and as long as or a little shorter than the 2nd segment. Maxillary palpus shorter than apical segment of labial palpus, smooth-scaled or very rarely rough-scaled. Thorax smooth-scaled, without a crest. Legs smooth-scaled; fore tibia very slightly and mid femur and tibia rather strongly roughened and thickened with long scales apically; hind tarsus 1.5–1.7 times as long as hind tibia. Fore wing narrow, lanceolate, pointed apically; discoidal cell slightly dilated distad, with distal margin nearly vertical; 13- or very rarely 12-veined, in the latter case the veins M₃ and Cu_{1a} being coincident; all radial veins well separated at their bases, vein R₁ arising from cell near base of wing and ending in costal margin at about basal 3/5, R₂ from apical 1/3–1/5 of cell, R₃ from apical 1/13–1/20 of cell, and R₄ from upper angle of cell; veins M₂ and M₃ or M₂ and M₃+Cu_{1a} short-stalked or connate at their bases and arising from lower angle of cell; Cu_{1b} arising from cell more apical than vein R₂ with a few exceptions; vein Cu₂ distinct only on its apical part; vein An simple, curved, connected with dorsal margin of wing near middle; vein R₁

and upper vein of cell obsolescent towards base. Hind wing about $2/3$ as wide as and about $4/5$ as long as fore wing, narrowly lanceolate, acutely pointed, with cell opened between veins M_2 and M_3 ; 8-veined, vein R_{2+3} moderate to short in length, usually distinctly separated from veins $Sc+R_1$ and R_{4+5} ; veins M_1 and M_2 long-stalked; veins M_3 , Cu_{1a} and Cu_{1b} nearly equidistant, the veins M_3 arising from or near middle of vein Cu_{1a} .

Male genitalia: Tegumen weakly sclerotized, very simple, without any paired processes or sclerites; tuba analis membraneous, with a distinctly sclerotized, narrow subscaphium. Valva more or less dilated apically, upturned, moderate in length, with slender setae along terminal and ventral margins of cucullus rather densely. Vinculum usually elongate-triangular, with a short saccus very rarely. Aedoeagus simple, slender, tubular; vesica with or without cornuti. Seventh and 8th abdominal segments weakly membraneous, with a pair of coremata on each segment; anterior pair of coremata consisting of hairlike scales, always longer and thicker than the posterior pair, which usually consists of hairlike scales, or rarely of elongate scales. Seventh sternite much reduced into a small sclerite, with a slender interior process pointing caudad in most species; 8th tergite also reduced into a small, fan-shaped sclerite, with a narrow median ridge.

Female genitalia: Papilla analis moderate in length, setose as usual; apophysis posterioris long, somewhat dilated on its basal half; apophysis anterioris similar to apophysis posterioris in form, with a ventral prong extending to lamella postvaginalis. Ostium bursae always placed on intersegmental area between 7th and 8th abdominal segments. Ductus bursae variable in structure, membraneous in type-species and some others, while heavily sclerotized in many species; corpus bursae always membraneous, with 2 long, curved, sickle-shaped signa in most species, or very rarely with a single signum as in *Gracillaria*; the signum or signa usually smooth on outer curve and serrulate on inner curve.

Body chaetotaxy of last instar larva: Lateral groups on prothorax and 1st to 8th abdominal segments bisetose, and those on mesothorax and metathorax trisetose; seta L_2 absent in all abdominal segments. Subventral groups on 1st, 6th and 7th abdominal segments bisetose, those on 2nd to 5th segments trisetose; the 3 subventral setae on 2nd segment arranged in a triangle; seta SV_3 absent and seta SV_2 always ventrocephalic to seta SV_1 on 6th and 7th segments. Seta D_1 on 9th abdominal segment ventrocephalic to seta D_2 , and that on 1st to 8th segments dorsocephalic to and far apart from the latter.

Arrangement of crochets: Ventral prolegs with uniordinal crochets arranged in a lateral penellipse plus a transverse row as figured by Peterson (1951, Fig. L3, L). Anal proleg with uniordinal crochets arranged in a semicircular row, which is rather transverse to body axis.

Larval habit: The egg is laid singly on lower surface of the host leaf in most species, or rarely on the upper surface. The hatched larva mines in the epidermal layer or rarely parenchymal layer just above or under the epidermis. The mine made by the larva of the first 3 or 4 instars is rather small, blotchy or linear-blotchy, and finally the blotchy part is constricted with silken threads into a tentiform type in most cases. In the 4th or 5th instar the larva leaves the mine through a small, round hole (not a semicircular slit), moves to the tip or margin of the same leaf or another one, and then rolls up the leaf from the tip to form a trigonal cone on the underside; very rarely it folds the leaf margin towards the

underside, or folds the leaf towards upper side as in *C. (C.) pulverea*. It continues feeding inside the cone or fold; very often it makes further cone(s) or fold(s) according to the growth. When fully grown, the larva leaves the cone or fold through a round hole for a pupating site. The cocoon is formed usually on lower surface of leaf near the mid vein, boat-shaped, elliptical in outline, yellowish-white or very rarely brownish in colour, without any bubbles on upper surface. In *C. (C.) cuculipennella*, however, the cocoon is placed inside the leaf cone and spindle-shaped.

Remarks: Up to the present, I have had no chance to examine the type-species of *Antiolopha* Meyrick, 1894. According to the original description and also to the figures given by Vári (1961), it seems to me to be different from *Caloptilia* in the narrower sense here adopted by the well-separated veins of the fore wing, by the apical segment of the labial palpus having a triangular tuft of scales, and by the antenna lacking any pecten. On the other hand, the colour-pattern of the fore wing with a costal triangular mark suggests that it belongs to the subgenus *Caloptilia*. A reexamination of material, including the larva, of the type-species is needed for a definite decision of the true taxonomic position of *Antiolopha*. In this paper, it is temporarily treated as a synonym of *Caloptilia* after Meyrick (1908) and Vári (1961).

In the course of the present study, I have found from Japan 37 species which may be included in the subgenus *Caloptilia*. Some species, such as *cuculipennella*, *ryukyuensis*, *pulverea* and *soyella*, are slightly different from the subgeneric diagnosis given above, but they should provisionally be included in the subgenus because their larvae have not been available for the present study.

Insofar as known, the larval food plants are widely scattered in different families, thus the subgenus is not associated with any particular plant group. On the other hand, each of the species is oligophagous, feeding exclusively on plants belonging to one genus or one family. The known food plants of the Japanese species belong to Betulaceae, Fagaceae, Ulmaceae, Aceraceae, Ericaceae, Anacardiaceae, Salicaceae, Theaceae, Rosaceae, Proteaceae, Berberidaceae, Euphorbiaceae, Leguminosae and Oleaceae.

Key to the Japanese species of the subgenus *Caloptilia*

- 1 Fore wing with 2 triangular, yellowish blotches on costa, the blotches being distinctly contrasted with darker ground. 2
- Fore wing with other markings. 6
- 2 Fore wing with a yellowish blotch at basal area of dorsal margin. 3
- Fore wing without such a blotch at basal area of dorsal margin. 5
- 3 Antenna without a basal pecten of hairs; fore wing reddish-brown in ground colour, with 2 blotches on costa orange-yellow and set close to each other; 6–8 small tufts of a few blackish, raised scales along dorsal margin and termen of fore wing. Larva on *Glochidion*. *ryukyuensis* Kumata
- Antenna with a basal pecten; fore wing deeply purplish-brown in ground colour, with 2 blotches on costa brilliantly brassy-yellow and widely separated from each other; dorsal margin and termen of fore wing smooth, without such tufts. 4
- 4 Valva slender on its basal half, then widened apically, with a semielliptical lobe in centre of inner face; ductus bursae membranous, simple, without interior spines near corpus bursae; signa sickle-shaped, widened near middle. Larva on *Vaccinium*. *geminata* Kumata
- Valva suddenly widened from base towards apex, without such a lobe on inner face; ductus bursae with 9 minute spines scattered on inner side near corpus bursae;

- signa rather slender on its whole length. Larva on *Epimedium*.
. *magnifica moriokensis*, ssp. nov.
- 5 Fore coxa brassy-yellow; fore wing deeply purplish, with 2 golden-yellow blotches on costa widely detached from each other; moth smaller, at most 10.0 mm in wing expanse; valva truncated apically, with an acute process at ventral corner; aedoeagus with 2 large cornuti; ductus bursae rather broad, not covered with any spines. Larva on *Acer*. *gloriosa* Kumata
- Fore coxa dark-brown; fore wing reddish-brown, with 2 blotches on costa set close to each other; moth larger, more than 11.0 mm in wing expanse; valva round on apical margin, without such a process; aedoeagus with 10-15 minute thornlike cornuti in a row; ducts bursae slender, covered with microscopic spines on whole inner surface densely. Larva on *Acer*. *kisoensis*, sp. nov.
- 6 Fore wing with 1 subtriangular blotch on costa, the blotch being distinctly contrasted with darker ground. 7
- Fore wing with other markings. 29
- 7 A triangular blotch extending on costa from basal 1/4 to about 2/3 of fore wing. . . . 8
- A subtriangular blotch extending on costa from basal 1/4 to about apical 1/6 of fore wing. 24
- 8 A triangular blotch on costa of fore wing whitish. 9
- A triangular blotch on costa of fore wing brilliantly brassy-yellow. 12
- 9 Lower angle of triangular blotch shortly pointing outwardly along wing-fold; aedoeagus simple, without any cornuti; ductus bursae membranous on whole length. Larva on *Salix* and *Populus*. *stigmatella* (Fabricius) (part)
- Lower angle of triangular blotch truncated on wing-fold, not pointing outwardly; aedoeagus with cornuti; ductus bursae at least partly sclerotized heavily. 10
- 10 Fore wing irregularly mottled with ochre-brown and blackish-brown scales in ground. Larva on *Acer*. *hidakensis* Kumata (autumnal form)
- Fore wing uniformly reddish-brown or chestnut-brown in ground. 11
- 11 A very large moth, 16.0 mm in wing expanse; aedoeagus with a row of 19 corniform cornuti, one of which at apical 1/3 is the largest, about 1/4 as long as the aedoeagus, and hook-shaped; sterigma simple, without any process; ductus bursae heavily sclerotized on whole length, and once coiled on its median area. Larva on *Acer*. *kyokoi* Kumata
- A moderate moth, 10.0-12.0 mm in wing expanse; aedoeagus with a row of 5 or 6 corniform cornuti, which are very minute and nearly equal in size; sterigma with 2 long lateral processes; ductus bursae covered with hexagonal sclerites on its caudal 2/3-3/4, then membranous and twice coiled. Larva on *Celtis*.
. *cellidis*, sp. nov. (autumnal form)
- 12 Fore wing with a well-contrasted yellowish blotch at basal area of dorsal margin. . . . 13
- Fore wing without such a blotch at basal area of dorsal margin. 16
- 13 A triangular blotch on costa of fore wing with its lower angle shortly pointing outwardly along wing-fold. Larva on *Salix* and *Populus*. . . *stigmatella* (Fabricius) (part)
- A triangular blotch on costa of fore wing shortly truncated just above dorsal margin. . . 14
- 14 Seventh abdominal segment of male not covered with scent scales; aedoeagus without any cornuti; sclerotized antrum very minute, shorter than 1/20 length of membranous ductus bursae. Larva on *Salix* and *Populus*.
. *chrysolampra* (Meyrick)
- Seventh abdominal segment of male covered with scent scales; aedoeagus with 1 or more corniform cornuti; sclerotized antrum much larger, longer than 1/5 length of membranous ductus bursae. 15
- 15 Seventh sternite of male with an interior process; posterior pair of coremata consisting of hair-like scales, which are clustered in a bundle; aedoeagus straight, with 4-7 very minute, spiniform cornuti; lamella antevaginalis absent. Larva on *Acer*. *aceris* Kumata
- Seventh sternite of male without an interior process; posterior pair of coremata

- consisting of elongated scales, which are arranged in a transverse band; aedoeagus slightly sinuate on its apical half, with a corniform cornutus at apex of aedoeagus; lamella antevaginalis very large, circular, with a pair of short projections. Food plant unknown. *yasudai*, sp. nov.
- 16 A triangular blotch on costa of fore wing with its lower angle shortly pointing outwardly along wing-fold. Larva on *Salix* and *Populus*. *stigmatella* (Fabricius) (part)
 - A triangular blotch on costa of fore wing truncated on wing-fold or just above dorsal margin.....17
- 17 Fore wing dark brown, with deep purple reflections, in ground colour; aedoeagus without any cornuti; 7th sternite of male simple, without an interior process; ductus bursae long, membranous on whole length; corpus bursae with a single sickle-shaped signum. Larva on *Camellia* and *Thea*. *theivora* (Walsingham)
 - Fore wing ochreous-brown, reddish-brown, or chestnut-brown, with very slight purplish reflections, in ground colour; aedoeagus with 1 or more cornuti; 7th sternite with an interior process; ductus bursae short, heavily sclerotized at least in part; corpus bursae with 2 signa.18
- 18 Vinculum much longer than valva; lamella antevaginalis large, with long lateral lobes pointing cephalad. Larva on *Acer*. *wakayamensis* Kumata
 - Vinculum shorter than valva; lamella antevaginalis absent, if present, then small and simple, without such lobes.19
- 19 Aedoeagus bifurcated at apex, with 1 cornutus; ostium bursae very large, about as wide as caudal margin of 7th abdominal segment. Larva on *Acer*. *hidakensis* Kumata (aestival form)
 - Aedoeagus simple, pointed or truncated at apex, with 5 or more cornuti; ostium bursae small, narrower than 1/3 width of caudal margin of 7th abdominal segment.20
- 20 Aedoeagus with 7-9 needle-shaped cornuti, one of which is about as long as aedoeagus; ductus bursae with a long, narrow projection at its middle, the projection pointing towards corpus bursae. Larva on *Acer*. *heringi* Kumata
 - All cornuti short, shorter than 1/4 length of aedoeagus; ductus bursae without such a projection.....21
- 21 Aedoeagus with a narrow apical prong; about 20 spinelike cornuti arranged in a double row. Larva on *Alnus*. *issikii*, sp. nov.
 - Aedoeagus without apical prongs; cornuti arranged nearly in a single row.22
- 22 Aedoeagus with 5-6 cornuti all very minute and arranged on basal half of aedoeagus in a row; sterigma with a pair of long, acute lateral processes pointing caudad. Larva on *Celtis*. *celtidis*, sp. nov. (aestival form)
 - Aedoeagus with more than 10 cornuti arranged on phallobase in a row; sterigma without such a process.23
- 23 Aedoeagus with 11-15 cornuti moderate in length; ductus bursae folded at caudal 1/3 and 2/3; corpus bursae with 2 sclerotized blotches. Larva on *Acer*. *monticola* Kumata (part)
 - Aedoeagus with 30-40 cornuti short in length; ductus bursae twice coiled at its median part; corpus bursae membranous wholly, without such sclerotized blotches. Larva on *Quercus* and *Castanea*. *mongolicae*, sp. nov. (part)
- 24 Thorax brassy-yellow dorsally; fore wing with a brassy-yellow blotch at basal area of dorsal margin.25
 - Thorax brownish dorsally; fore wing without such a blotch at basal area of dorsal margin.26
- 25 Aedoeagus simple, without cornuti; ductus bursae slender, membranous except for elongated antrum; lamella antevaginalis absent. Larva on *Acer*. *acericola* Kumata
 - Aedoeagus ending in a short spine, with 9-13 minute, corniform cornuti; ductus bursae covered with microscopic, hexagonal sclerites on almost whole surface

- except for elongated antrum; lamella antevaginalis rather large, with 2 long lateral processes. Larva on *Quercus* and *Castanea*. *sapporella* (Matsumura)
26. Aedoeagus with 2 or 3 cornuti; antrum with a pair of small projections at its cephalic end. Larva on *Rhus*. 27
 - Aedoeagus with 5 or more cornuti; antrum without such projections. Larva on plants other than *Rhus*. 28
- 27 Aedoeagus with 3 cornuti, of which the longest one is shorter than 1/15 length of aedoeagus; sclerotization of ductus bursae gradually weakened towards corpus bursae. *recitata* (Meyrick) (part)
 - Aedoeagus with 2 cornuti, of which longer one is about 1/7 as long as aedoeagus; sclerotization of ductus bursae suddenly ended and clearly contrasted with membranous corpus bursae. *matsumurai*, sp. nov. (part)
- 28 Aedoeagus with 5-6 cornuti all very minute and arranged in a row; lamella antevaginalis with a pair of long, acute lateral processes pointing caudad; ductus bursae covered with microscopic hexagonal sclerites on caudal 2/3-2/4. Larva on *Celtis*. *celtidis*, sp. nov. (aestival form)
 - Aedoeagus with 12-20 cornuti all moderate in length and clustered in a bundle; lamella antevaginalis absent; ductus bursae weakly sclerotized on almost whole length. Larva on *Rhododendron*. *azaleella* (Brants)
- 29 Fore wing with 1 or more yellowish transverse fasciae. 30
 - Fore wing with other markings. 33
- 30 Fore wing with only 1 yellowish fascia. 31
 - Fore wing with 2 fasciae and 3 pairs of costal and dorsal spots golden-yellow, 1st fascia placed at basal 1/6 of wing, 2nd fascia at basal 2/5, 1st pair of spots at middle, 2nd pair at apical 1/4, and 3rd pair just before apex of wing. Larva on *Rhus*. *aurifasciata*, sp. nov.
- 31 Thorax pale yellow to straw-yellow; fore wing blackish-brown, with dorsal margin straw-yellow on whole length. Larva on *Quercus* and *Castanea*.
 *mongolicae*, sp. nov. (part)
 - Thorax and fore wing blackish in ground colour. 32
- 32 Face white; valva elongated, quadrate, nearly parallel-sided; aedoeagus with 2 cornuti, of which apical one is round apically and the other needle-shaped. Larva on *Acer*. *semifasciella* Kumata (part)
 - Face blackish; valva shell-shaped as usual, round on terminal margin; aedoeagus with 9-10 minute corniform cornuti clustered on median area and with 1 long, hook-shaped cornutus near apex of aedoeagus. Larva on *Betula*. *bicolor* Ermolaev
- 33 Fore wing whitish in ground, with numerous indistinct strigulae and 6 prominent fasciae of blackish or brownish scales; 2nd segment of labial palpus with a short apical tuft; valve with scalelike setae along ventral margin besides usual long setae. Larva on *Syringa* and *Fraxinus*. *cuculipennella* (Hübner)
 - Fore wing yellowish, brownish, grayish or blackish in ground, without such strigulae or fasciae; valva with usual long setae alone. 34
- 34 Fore wing with costal side widely golden-yellow and contrasted with reddish or purplish dorsal side. 35
 - Fore wing nearly unicoloured or dappled throughout surface. 37
- 35 Fore coxa shining white; fore wing with a reddish dorsal streak occupying about 1/5 width of wing. Larva on *Helicia*. *heliciae* Kumata
 - Fore coxa dark reddish-brown; fore wing with reddish dorsal area occupying more than 1/4 width of wing. 36
- 36 Fore wing with a series of coppery-brown dots along costal margin; purplish dorsal area of fore wing occupying nearly 1/2 width of wing; a moderate moth, 10.0-13.0 mm in wing expanse. Larva on *Malus*, *Photinia* and *Rubus*. . . *zachrysa* (Meyrick)
 - Fore wing without such dots along costal margin; purplish or reddish dorsal area occupying nearly 1/4 width of wing; a rather large moth, 14.0-15.0 mm in wing expanse. Larva on *Cleyera*. *isochrysa* (Meyrick)

- 37 Antenna with a basal pecten of hairs; valva with terminal margin round or straight; female genital plate represented at least by a sclerotized lamella postvaginalis.38
- Antenna with a pecten absent; valva strongly dilated apically, with terminal margin shallowly concaved; female genital plate absent. Larva on *Alnus*.
..... *pulverea* Kumata
- 38 Fore wing blackish or dark grayish in general appearance.39
- Fore wing more or less yellowish or brownish in ground colour.40
- 39 Face white; fore wing blackish, with a small golden-yellow spot in disc near central area; valva elongate-quadrata, nearly parallel-sided; aedoeagus with 2 large cornuti; corpus bursae with only 1 signum. Larva on *Acer*.
..... *semifasciella* Kumata (part)
- Face and fore wing dark grayish, with bluish reflections; fore wing sometimes having a very obscure whitish fascia at basal 1/3; valva shell-shaped as usual; aedoeagus with 40-50 cornuti clustered in a bundle; corpus bursae with 2 sickle-shaped signa. Larva on *Ulmus* and *Zelkova*. *ulmi*, sp. nov.
- 40 Face, palpi and hind coxa snow-white; aedoeagus with a long, spiniferous cornutus besides 3-8 corniform ones; corpus bursae with 2 very small, hook-shaped signa. Larva on *Leucothoe* and *Rhododendron*. *leucothoes*, sp. nov.
- Face, palpi and hind coxa yellowish to brownish; aedoeagus with or without corniform cornutus; corpus bursae with 2 sickle-shaped, long signa as usual.41
- 41 A small moth, less than 10 mm in wing expanse; aedoeagus simple, without any cornuti; valva with a ridge running from base of costa to ventroapical corner, the ridge having 2 rows of stout setae; ductus bursae slender and membranous on whole length; 7th sternite of female peculiarly well sclerotized. Larva on *Glycine*, *Azukia*, *Lespedeza* and *Kummerovia*. *soyella* (Deventer)
- Moderate to large moth, more than 11 mm in wing expanse; aedoeagus with 2 or more conspicuous cornuti; valva with slender marginal setae as usual and without such a setose ridge; ductus bursae more or less thickened and heavily sclerotized on whole length or on median part.42
- 42 Cilia of fore wing concolorous with yellowish- to reddish-brown wing, without any marginal dark lines; hind coxa and basal 2/3 of hind femur dark fuscous; aedoeagus with 10 or more cornuti; ductus bursae without a pair of projections at cephalic end of antrum. Larva on *Betula* or *Alnus*.43
- Cilia of fore wing dark brownish, darker than wing, with 3 blackish marginal lines; hind coxa and basal half of hind femur golden-yellowish; aedoeagus with 2 or 3 cornuti; ductus bursae with a pair of small projections at cephalic end of antrum. Larva on *Rhus*.44
- 43 Aedoeagus with 2 apical prongs both bifurcated apically; 6 or 7 long cornuti clustered on phallobase and 5-10 smaller ones irregularly scattered on whole area of aedoeagus; sclerotized ductus bursae nearly straight. Larva on *Betula*.
..... *betulicola* (Hering)
- Of 2 apical prongs of aedoeagus one is simple, and the other bifurcated apically and spinose on its basal 2/3; a double row of 20-30 cornuti placed on median area of aedoeagus; sclerotized ductus bursae irregularly curved and twice coiled on its cephalic part. Larva on *Alnus*. *alni* Kumata
- 44 Aedoeagus with 3 cornuti; sclerotization of ductus bursae gradually weakened towards corpus bursae; a small cone-shaped indentation or recess near cephalic end of ductus bursae. *recitata* (Meyrick) (part)
- Aedoeagus with 2 cornuti; sclerotization of ductus bursae suddenly ended and clearly contrasted with membranous corpus bursae; such an indentation or recess absent on ductus bursae.45
- 45 Cornuti of aedoeagus longer, the basal one being nearly 1/4 as long as aedoeagus; sclerotized ductus bursae much larger at its cephalic end. *rhois*, sp. nov.
- Cornuti of aedoeagus moderate in length, the basal one being about 1/7 as long as

aedoeagus; sclerotized ductus bursae smaller than that of *rhois* at its cephalic end.....*matsumurai*, sp. nov. (part)

Caloptilia (Caloptilia) cuculipennella (Hübner)

[Figs. 9, 49(A), 59(C), 62(C), 67(B) & 80(D)]

Tinea cuculipennella Hübner, 1828, Gesch. Eur. Schmett. 8 Tin. 6, Al, B. f. 2.

Caloptilia cuculipennellum: Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 108; *ibid.*, 1979, in Terrestrial Arthropoda of the Far East: 23.

This species, which is known to be distributed in the Holarctic Region, is new to the fauna of Japan. On this occasion a redescription is given based on Japanese material.

♂♀. Expanse of wings: 12.0–13.0 mm (12.6 mm in average of 5 specimens). Length of fore wing: 6.0–6.5 mm (6.3 mm in average of 5 specimens).

Almost whole surface whitish, rather heavily dusted with black- or brown-tipped scales, especially heavily so on thorax and vertex between antennae. Second segment of labial palpus shortly tufted beneath apically, the tuft at most 1/4 as long as the apical segment. Palpi basally, face anteriorly, vertex posterolaterally and thorax posteriorly whitish. Antenna a little longer than fore wing, blackish, with a narrow whitish ring at base of each segment; scape slightly thickened, whitish on upper side, with pecten of a few whitish hairs. Fore and mid legs blackish, whitish on inner sides; 1st tarsal segment with 2 white rings, one at middle and the other at subapex, the remaining segments with a white subapical ring alone. Hind leg ochreous or whitish, suffused with black at apex of coxa, middle of femur and apex of tibia; tarsus dark gray, with a broad white ring at subapex of each segment. Fore wing white, densely irrorated with black- or brown-tipped scales which form numerous indistinct strigulae, thus the ground colour appears to be grayish at first sight; 5 or 6 more or less prominent oblique fasciae; the 1st fascia placed near base of wing, finely interrupted by ground colour at fold; the 2nd at basal 2/5, the most prominent among the fasciae, slightly detached from dorsal margin; the 3rd just beyond middle, finely interrupted at its middle; the 4th at about apical 1/3, indistinct; the 5th set close to the 4th, sometimes fused with the latter into an irregular diffused blotch; 6th fascia near apex, almost vertical, sometimes indistinct; cilia along termen and apex of wing ochreous-gray, mixed with white hairs at base and middle of termen, with 3 subapical lines of black irroration, those along dorsal margin pale gray. Hind wing and its cilia pale gray.

Male genitalia: Subscaphium very weakly sclerotized, rather broad, widened at basal extremity into a fan-shape. Valva rather slender, upturned, slightly dilated apically, with elongate scales on basal area of ventral margin besides usual, long setae. Vinculum elongate-triangular, a little shorter than valva, with its apex protruded shortly. Aedoeagus about as long as valva, slender, bar-shaped, without cornuti. Seventh abdominal segment membraneous, bare; 8th segment rather thickly covered with round scent scales on almost whole surface; coremata consisting of hairy scales, the posterior pair about 3/4 as long as the anterior; interior process of 7th sternite fingerlike, about 1/3 as long as median ridge of 8th tergite.

Female genitalia: Apophysis anterioris with ventral prong absent. Lamella postvaginalis wide-semicircular or elliptical; lamella antevaginalis absent. Ductus

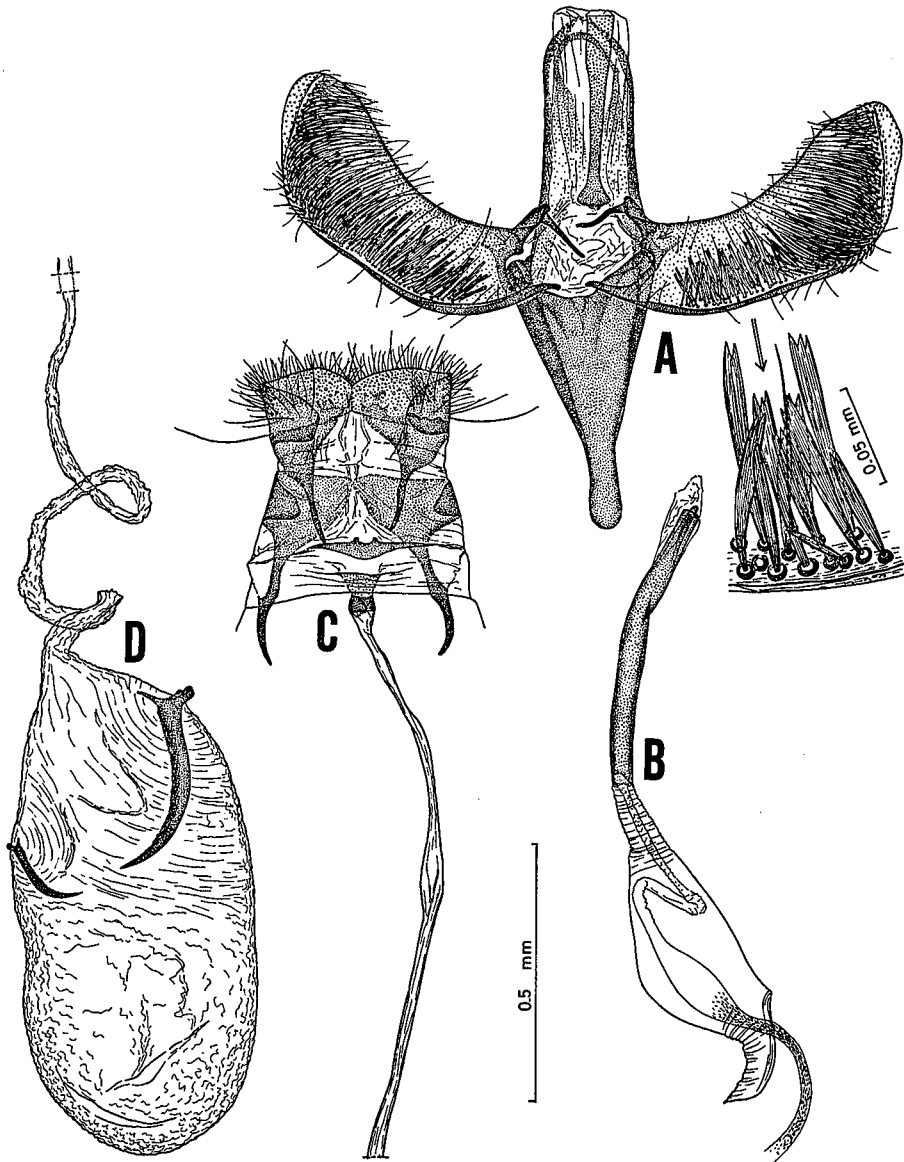


Fig. 9. *Caloptilia (Caloptilia) cuculipennella* (Hübner). A: Male genitalia [Grc-1687, Apoi, Hidaka, Hokkaidô, em. 17/vii/1973, ex *Syringa reticulata* (1153)] — B: Aedeagus [ditto] — C: Female genitalia [Grc-2139, Zyôzankei, Hokkaidô, em. 17/vii/1976, ex *Fraxinus mandshurica* var. *japonica* (1691)] — D: Bursa copulatrix [ditto].

bursae very long, slender, membraneous except for short antrum; corpus bursae membraneous, ellipsoidal, with 2 slender, sickle-shaped signa, one of which is a little shorter than half length of the other.

Specimens examined: 7♂♂ & 3♀♀. HOKKAIDÔ— 2♂♂, Memuro, Tokati, em. 26/vii/1976, ex *Syringa reticulata* (1695); 1♂, Apoi, Hidaka, em. 17/vii/1973, ex *S. reticulata* (1153);

1 ♂ & 1 ♀, Zyôzankei, em. 15-17/vii/1976, ex *Fraxinus mandshurica* var. *japonica* (1690 & 1691). EUROPE—1 ♂ & 1 ♀, Austria, em. 20/ix/1952, ex *Ligustrum vulgare*, J. Klimesch leg., determined as *C. cuculipennella* by Klimesch; 1 ♂, ditto, em. 11/ix/1955, ex *L. vulgare*, J. Klimesch leg., determined as *C. cuculipennella* by Klimesch; 1 ♂ & 1 ♀, Switzerland, em. 8/viii/1924, ex *Fraxinus excelsior*, M. Hering leg., determined as *C. cuculipennella* by Hering.

Distribution: Japan (Hokkaidô); East Asia to Europe; and North America.

Food plants: *Fraxinus mandshurica* Rupr. var. *japonica* Maxim. and *Syringa reticulata* Hara (Oleaceae) in Japan. *Fraxinus* spp., *Jasminum* spp., *Ligustrum* spp. and *Syringa* spp. (Oleaceae) in other countries.

Remarks: *C. (C.) cuculipennella* is a rather peculiar species among the members of the subgenus *Caloptilia* in having the following characters: — fore wing grayish in ground colour, with many blackish oblique fasciae; valva with scales besides usual long setae on inner face; apophysis anterioris without ventral prong; and cocoon always formed inside leaf cone made by larva, elongatedly spindle-shaped with a rectangular cross section. Especially the shape of the cocoon is quite unusual for the subgenus *Caloptilia*. The other features of the adult, such as the antenna, wing venation, pregenital segments of the male abdomen, etc., indicate that *cuculipennella* truly belongs to the subgenus *Caloptilia*. Nevertheless, some doubts on its taxonomic situation may remain until the larval characters have been examined.

Caloptilia (Caloptilia) stigmatella (Fabricius)

[Figs. 10, 49(B-C), 59(D), 62(D), 67(C), 73(B), 75(C) & 80(E-F)]

Tinea stigmatella Fabricius, 1781, Spec. Ins. 2: 297.

Gracillaria stigmatica (!): Matsumura, 1931, 6000 Ill. Ins. Jap.: 1101, f. 2285.

Caloptilia stigmatella: Inoue, 1954, Ceck List Lep. Jap. 1: 26; Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 108; *ibid.*, 1979, in Terrestrial Arthropoda of the Far East: 25.

Gracillaria alchimiella: Matsumura, 1931, 6000 Ill. Ins. Jap.: 1100, f. 2283. [Misidentification.]

This species, well-known in the Holarctic Region as a pest of poplars and willows, can immediately be separated from any others by the shape of the costal blotch of the fore wing as mentioned in the key. On this occasion the genitalia of both the sexes will be described in the following lines.

Male genitalia: Subscaphium slender, T-shaped or triangular at basal extremity. Valva curved, slightly dilated apically, straight on terminal margin, with usual marginal setae occurring especially thickly on ventroapical area. Vinculum triangular, about 1/2 as long as valva. Aedoeagus about 3/4 as long as valva, slender, pointed apically, without cornuti. Seventh abdominal segment bare, and the 8th sparsely covered with scales; coremata consisting of hairy scales, the posterior pair 1/2-2/3 as long as the anterior; interior process of 7th sternite absent.

Female genitalia: Lamella postvaginalis wide-pentagonal in shape, with its cephalic margin partially concave medianly; lamella antevaginalis absent. Antrum very short, weakly sclerotized; ductus bursae very narrow, membraneous, faintly scobinated on its basal 1/5; corpus bursae pyriform, with 2 much curved, sickle-shaped signa which are equal in size and symmetrical in position.

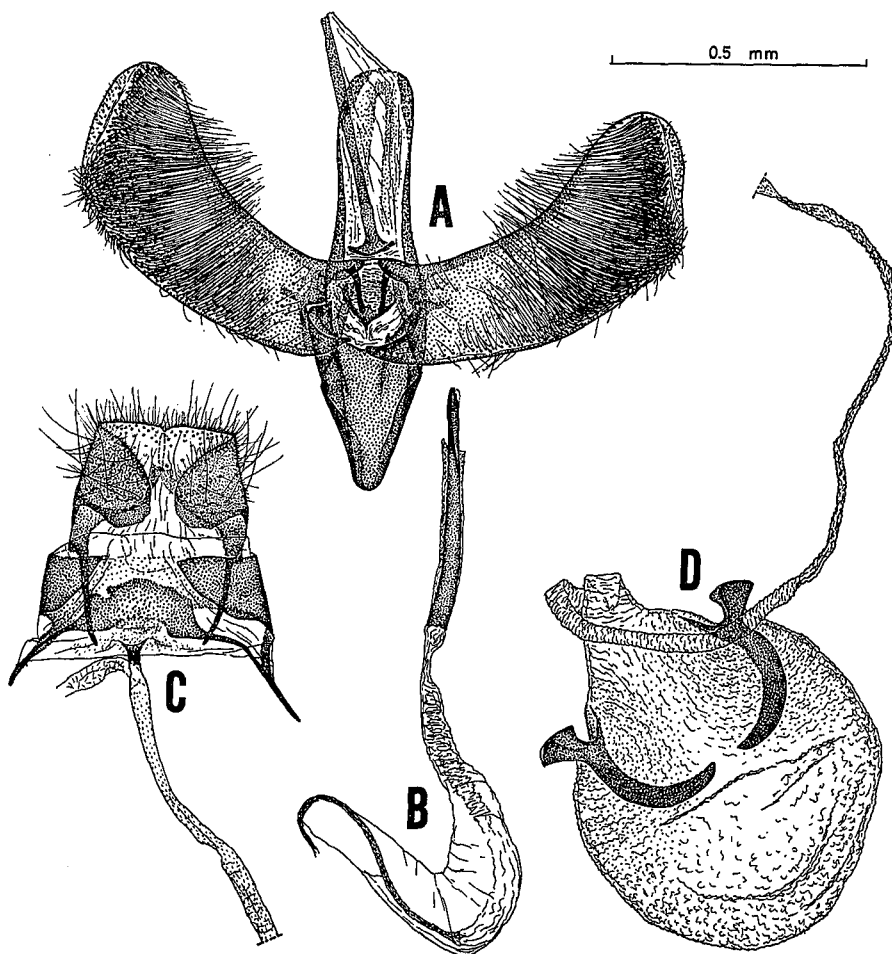


Fig. 10. *Caloptilia (Caloptilia) stigmatella* (Fabricius). A: Male genitalia [Grc-739, Yamabe, Hokkaidô, 19/vii/1961] — B: Aedeagus [ditto] — C: Female genitalia [Grc-683, Zyôzankei, Hokkaidô, em. 17/ix/1958, ex *Salix* sp.] — D: Bursa copulatrix [ditto].

Specimens examined: 45♂♂ & 42♀♀. HOKKAIDÔ— 1♂ (abdomen missing), Sapporo, 19/vii/1902, no collector's name, determined as *Gracillaria stigmatica* by Matsumura; 1♂, ditto, 20/ii/1914, S. Matsumura leg., determined as *G. stigmatella* by T. Isshiki (=S. Issiki); 2♀♀, Wassamu, Kamikawa, em. 3-17/x/1964, ex *Salix bakko*; 1♀, Peipan, Asahigawa, 30/vii/1966; 2♂♂, Yamabe, Sorati, 19-22/vii/1961, T. Nishiguchi leg.; 1♂, Tomurausi-Onsen, Tokati, em. 3/viii/1976, ex *Salix* sp. (1698); 1♀, Horokanai, Tokati, 29/vii/1958; 1♀, Yûbari, Sorati, em. 25/viii/1975, ex *Salix* sp.; 2♂♂, Bibai, Sorati, em. 14/vii/1961, ex *Betula platyphylla* (?), K. Kamiyo leg.; 1♀, Nopporo, em. 30/viii/1969, ex *Salix* sp. (911); 5♂♂ & 2♀♀, ditto, em. 7-13/ix/1971, ex *Salix* sp. (1099); 1♀, Ebetu, 20/v/1959; 1♂ & 2♀♀, Sapporo, 11/vii/1918, S. Matsumura leg.; 1♀, ditto, 9/ix/1918, S. Matsumura leg.; 1♂, ditto, 10/viii/1924, S. Matsumura leg.; 1♀, ditto, 14/x/1908, Arakawa leg.; 5♂♂ & 3♀♀, ditto, em. 4-14/ix/1957, ex *Populus nigra* (365); 1♀, ditto, em. 1/viii/1957, ex *Salix bakko* (356, a); 1♂, ditto, em. 1/viii/1957, ex *Salix* sp.; 5♂♂ & 2♀♀, ditto, em. 8-13/ix/1972, ex *P. nigra* (1113); 1♂ & 2♀♀, ditto, em. 29/vi.-23/vii/1973, ex *Salix* sp.; 1♂ & 2♀♀, Barato, Sapporo, em. 20-25/ix/1971, ex *Salix* sp.; 2♂♂ & 3♀♀, Misumai,

Sapporo, em. 6-15/ix/1967, ex *Salix* sp.; 1 ♂, ditto, em. 21/ix/1970, ex *Salix* sp.; 2 ♂♂ & 2 ♀♀, ditto, em. 22-27/ix/1971, ex *Salix* sp. (1123); 2 ♂♂ & 4 ♀♀, ditto, em. 21-27/vi/1974, ex *Salix* sp.; 1 ♂ & 1 ♀, Zyôzankei, em. 17/ix/1958, ex *P. nigra*; 1 ♂ & 2 ♀♀, ditto, em. 17-22/ix/1958, ex *Salix* sp.; 3 ♂♂, ditto, em. 5-10/x/1957, ex *Salix bakko* (366); 1 ♂, Gamusi, Hiyama, em. 4/x/1958, ex *Salix* sp. Honsyû—1 ♀, Morioka, xi/1945, M. Okano leg.; 2 ♂♂, Siobara, Totigi-ken, em. 6-7/x/1975, ex *Salix* sp. (1655); 1 ♀, Todai, Ina, Nagano-ken, 27/ix/1975; 1 ♀, Ôtaki, Kiso, Nagano-ken, em. 24/vii/1975, ex *Salix* sp. (1459). EUROPE—1 ♂ & 1 ♀, Berlin, Germany, em. 3/vii. & 6/ix/1920, ex *Populus tremula*, E. Hering leg., determined as *C. stigmatella* by Hering; 1 ♂ & 2 ♀♀, Austria, em. 27/ix/1953, ex *Salix* sp., J. Klimesch leg., determined as *C. stigmatella* by Klimesch; 1 ♂ & 1 ♀, ditto, em. 11/xi. & 16/x/1936, ex *Salix alba*, J. Klimesch leg., determined as *C. stigmatella* by Klimesch.

Distribution: Japan (Hokkaidô; Honsyû); East Siberia to North Asia; India (Kashmir); Asia Minor; Europe; and North America.

Food plants: *Populus nigra* Linné, *Salix bakko* Kimura and other *Salix* spp. (Salicaceae), and ? *Betula platyphylla* Sukatch. (Betulaceae) in Japan. *Myrica* spp. (Myricaceae), *Populus* spp. and *Salix* spp. in other countries.

Remarks: Matsumura (1931) recorded *Gracillaria alchimiella* from Japan, but I could not find any representatives of the species in his collection deposited in the Hokkaidô University. Judging from his description and figure given under the name *alchimiella*, his *alchimiella* might be a form of *C. (C.) stigmatella* which has a brassy-yellow dorsal triangle on the fore wing.

Caloptilia (Caloptilia) chrysolampra (Meyrick)

[Figs. 11 & 49(D)]

Gracillaria chrysolampra Meyrick, 1938, Exot. Microlep. 5: 38.

Caloptilia chrysolampra: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 29, pl. 4 (112).

♂♀. Expanse of wings: 8.2-9.2 mm. Length of fore wing: 4.0-4.5 mm.

Face yellowish-white, sometimes pure white on posterior half; palpi whitish, the labial palpus with a purplish-black ring near apex; head brownish-gray, densely irrorated with purplish-glossy brown. Antenna ochre-whitish, annulated with dark brown broadly; pecten brownish. Thorax brassy-yellow, shading into purplish-glossy brown anteriorly and laterally. Fore and mid legs blackish-brown, strongly purplish-glossy, the tarsi being pure white, with a blackish apical ring in each segment; hind coxa and femur brassy-yellow, the femur with a blackish blotch near apex; hind tibia and tarsus ochre-gray, darkened apically in all segments. Fore wing dark brown, strongly purplish-glossy; a brassy-yellow, triangular costal blotch extending from basal 1/4 to 2/3 of costa of wing, widely truncated just above dorsal margin, with blackish dots on costal margin in most specimens; a brassy-yellow dorsal blotch occupying basal area below fold; cilia around apex of wing ochre-gray with 3 lines of blackish irrorations, and those along dorsal margin gray. Hind wing and its cilia gray.

Genitalia: The genitalia of both the sexes slightly differ from those of *C. (C.) stigmatella* in the following features: — In male, basal extremity of subscaphium larger, semicircular in shape; valva a little slender; vinculum shorter, nearly 1/3 as long as valva. In female ductus bursae not scobinated on its basal 1/5; corpus bursae much more elongate; signa less strongly curved than those of *stigmatella*, asymmetrical in position.

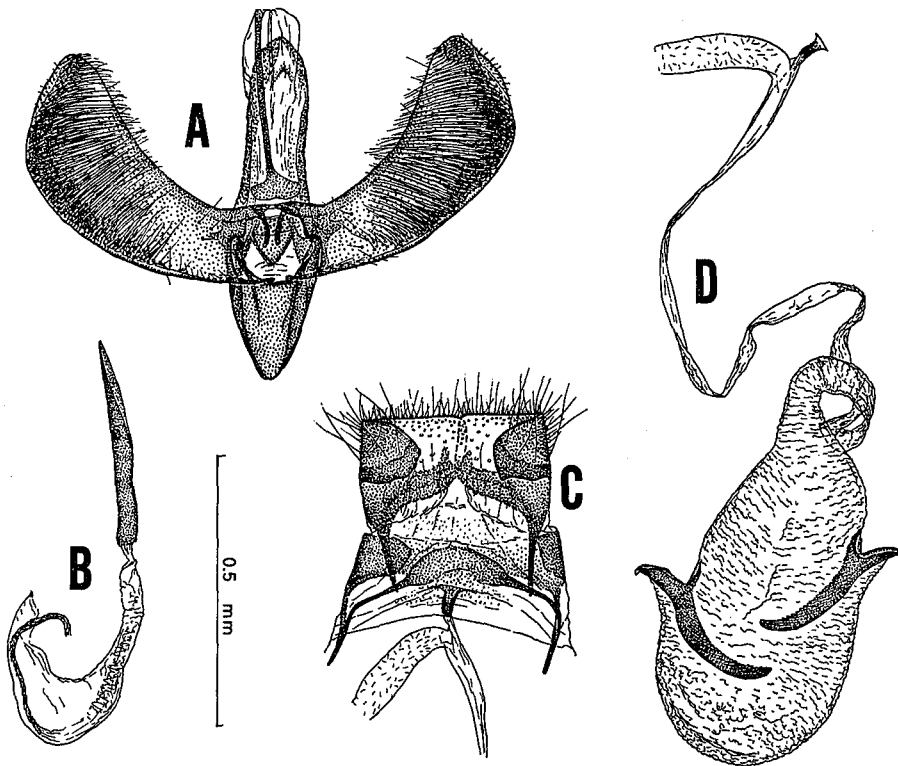


Fig. 11. *Caloptilia (Caloptilia) chrysolampra* (Meyrick). A: Male genitalia [Grc-246, Nisinomiya, Ôsaka, Honsyû, em. 8/ix/1949, ex *Salix* sp.]— B: Aedeagus [ditto]— C: Female genitalia [Grc-1070, Nisinomiya, em. 8/ix/1949, ex *Salix babylonica*]— D: Bursa copulatrix [ditto].

Specimens examined: 3♂♂ & 1♀. HONSYÛ— 2♂♂ & 1♀, Nisinomiya, Ôsaka, em. 8-9/ix/1949, ex *Salix babylonica*, S. Issiki leg. TAIWAN— 1♂, Taihoku, em. 19/viii/1946, ex *Salix* sp., S. Issiki leg. All the specimens were determined as *C. chrysolampra* by Issiki.

Distribution: Japan (Honsyû; Sikoku; Kyûsyû); and Taiwan.

Food plants: *Populus nigra* Linné (after Issiki, 1957) and *Salix babylonica* Linné (Salicaceae) in Japan. *Salix* spp. in Taiwan.

Remarks: *C. (C.) chrysolampra* is closely related to *C. (C.) stigmatella* in the genital structures, but is slightly different from the latter by the smaller size and by the shape of the costal blotch of the fore wing. Moreover, both the species attack the leaf of *Populus* and *Salix* in their larval stages in common. Although data on distribution of these 2 species are very fragmentary in Japan, they indicate that *chrysolampra* is distributed in the southern part of Japan, while *stigmatella* in the northern part.

Caloptilia (Caloptilia) theivora (Walsingham)

[Figs. 12, 49(E), 63(A), 75(D) & 81(A-B)]

Gracilaria theivora Walsingham, 1893, Ind. Mus. Notes 2: 49, f. 1.

Gracilaria theavora (!): Hotta, 1918, Kontyû-Sekai 22: 234.

Caloptilia theivora: Issiki, 1950, Iconogr. Ins. Jap.: 452, f. 1218; Inoue, 1954, Check List Lep. Jap. 1: 26; Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30, pl. 4 (117).

♂♀. Expanse of wings: 10.0–14.0 mm (11.9 mm in average of 25 specimens). Length of fore wing: 5.0–7.0 mm (6.0 mm in average of 25 specimens).

Face brassy-yellow; head brownish with purplish reflections. Palpi ochre-yellow; labial palpus brownish at apex. Antenna ochre-whitish, annulated with dark brown broadly; scape and pecten dark brownish. Thorax dark brown, strongly purplish-glossy. Fore and mid legs blackish-brown, slightly purplish-glossy, the tarsi being shining white, with a blackish apical ring in each segment, and sometimes with an ochre-yellow median band in 1st segment alone; hind coxa and femur brassy-yellow, the femur purplish-black on apical half; hind tibia and tarsus ochre-yellow, with a dark apical ring in each tarsal segment. Fore wing ochre-brown, strongly purplish-glossy, evenly covered with darker, ill-defined streaklets on almost whole surface; a brilliant brassy-yellow costal blotch isosceles-triangular, extending from basal 1/4 to middle of costa of wing, rather widely

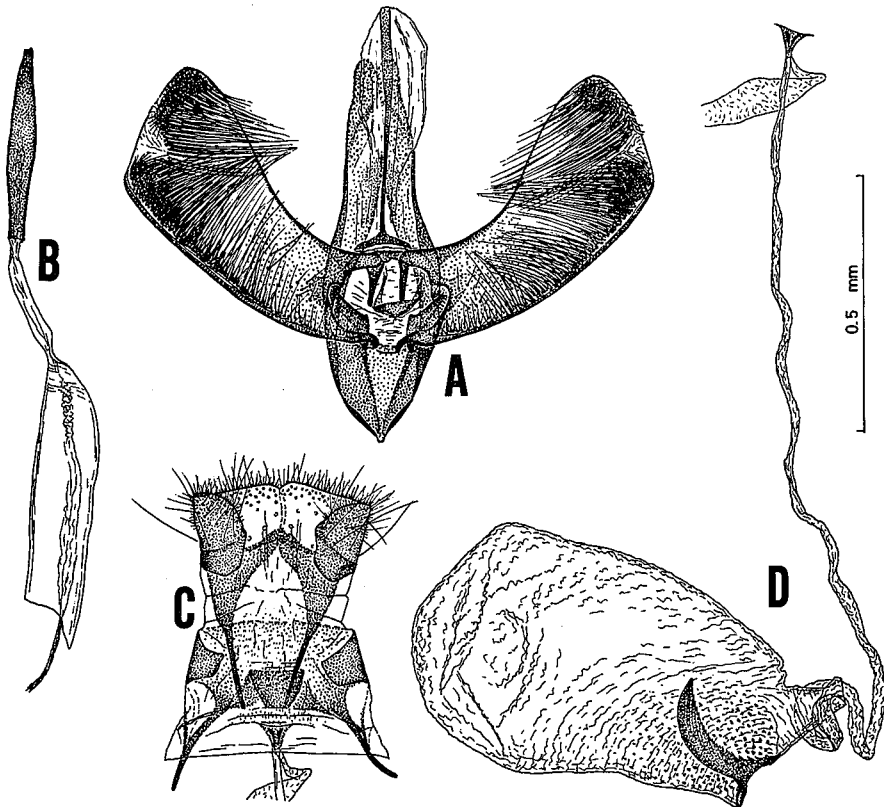


Fig. 12. *Caloptilia (Caloptilia) theivora* (Walsingham). A: Male genitalia [Grc-1091, Kozagawa, Wakayama-ken, Honsyû, em. 9/vi/1964, ex *Thea sinensis* (639)] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1068, Kozagawa, em. 3/vi/1964, ex *T. sinensis* (639)] — D: Bursa copulatrix [ditto].

truncated on fold, with a few blackish dots along its costal margin; cilia around apex of wing ochre-gray with 3 blackish lines, and those along dorsal margin dark gray. Hind wing and its cilia dark gray.

Male genitalia: Subscaphium slender, T-shaped at basal extremity. Valva curved, gradually dilated towards apex, with usual marginal setae occurring especially thickly at both ventro- and costo-apical corners. Vinculum very short, 1/3 as long as valva. Aedeagus about 2/3 as long as valva, slightly swollen medianly, without cornutus. Seventh and 8th abdominal segments bare; coremata consisting of hairy scales, the anterior pair being very thickened and about 3 times as long as the posterior; interior process of 7th sternite absent. Sixth sternite with an acute, long median invagination reaching caudal 2/3 of 5th sternite.

Female genitalia: Lamella postvaginalis rather small, trapezoid in shape; lamella antevaginalis absent. Ductus bursae very slender, long, wholly membraneous except for very short antrum; corpus bursae large, ovoid, with a single signum long, curved, sickle-shaped.

Specimens examined: 36♂♂ & 46♀♀. HONSYŪ—1♀, Higasiyodogawa, Ōsaka, 15/ix/1968, F. Komai leg.; 1♀, Minoo, Ōsaka, em. 25/vii/1975, ex *Camellia japonica* (1408); 9♂♂ & 9♀♀, Gozaisyo, Mie-ken, em. 12-14/xi/1966, ex *C. japonica* (833); 4♂♂ & 3♀♀, Kozagawa, Wakayama-ken, em. 6-10/vi/1964, ex *C. sasanqua* (676); 7♂♂ & 10♀♀, ditto, em. 24/v.-9/vi/1964, *Thea sinensis* (639); 5♂♂ & 5♀♀, ditto, em. 5-13/vi/1970, ex *T. sinensis* (1027); 1♀, ditto, em. 15/x/1974, ex *C. japonica* (1312); 1♀, ditto, 14/v/1964. SIKOKU—1♀, Ino, Kōti-ken, 22/vi/1957. KYŪSYŪ—1♂ & 3♀♀, Hikosan, Hukuoka-ken, em. 30/vi.-6/vii/1957, ex *C. japonica* (201); 1♂, ditto, 22/vi/1979, I. Kanazawa leg.; 2♀♀, Todorokiyō, Taradake, Nagasaki-ken, 20/ix/1979, I. Kanazawa leg.; 1♀, ditto, 17/xi/1979, I. Kanazawa leg.; 1♂, Kumamoto, em. 24/vi/1965, ex *T. sinensis*; 1♀, Takakuma, Kagosima-ken, em. 6/vii/1965, ex *T. sinensis*; 2♂♂ & 3♀♀, Kaziki, Kagosima-ken, em. 19-20/v/1958, T. Yasuda leg.; 1♂, Kagosima-si, 7/viii/1970, K. Kusigemati leg.; 4♂♂ & 4♀♀, ditto, em. 14-24/xi/1973, ex *C. japonica* (1250). NANSEI IS.—1♂, Yaku-sima, em. 4/x/1973, ex *T. sinensis* (1209).

Distribution: Japan (Honsyū; Sikoku; Kyūsyū); Taiwan; India; and Ceylon.

Food plants: *Camellia japonica* Linné, *C. sasanqua* Thunb. and *Thea sinensis* Linné (Theaceae) in Japan. *Thea* spp. in other countries.

Remarks: This species is very peculiar and well characterized by the presence of only 1 signum in the female genitalia like the genus *Gracillaria*, and by the presence of an acute invagination of the male 6th sternite, but the other features, such as venation, antennal scape, and the 7th and 8th abdominal segments of the male, indicate that it is really a member of the subgenus *Caloptilia*.

Caloptilia (Caloptilia) zachrysa (Meyrick)

[Figs. 13 & 49 (F-G)]

Gracillaria zachrysa Meyrick, 1907, Journ. Bomb. Nat. Hist. Soc. 17: 983.

Caloptilia zachrysa: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30, pl. 4 (116).

♂♀. Expanse of wings: 10.2-13.2 mm (11.8 mm in average of 11 specimens). Length of fore wing: 5.2-6.8 mm (6.0 mm in average of 12 specimens).

Face pale yellowish anteriorly and snow-white posteriorly; palpi ochre-whitish; 2nd segment of labial palpus with ochre-brown stripes below, the 3rd purplish-blackish on apical half. Antenna ochre-gray, annulated with dark brown;

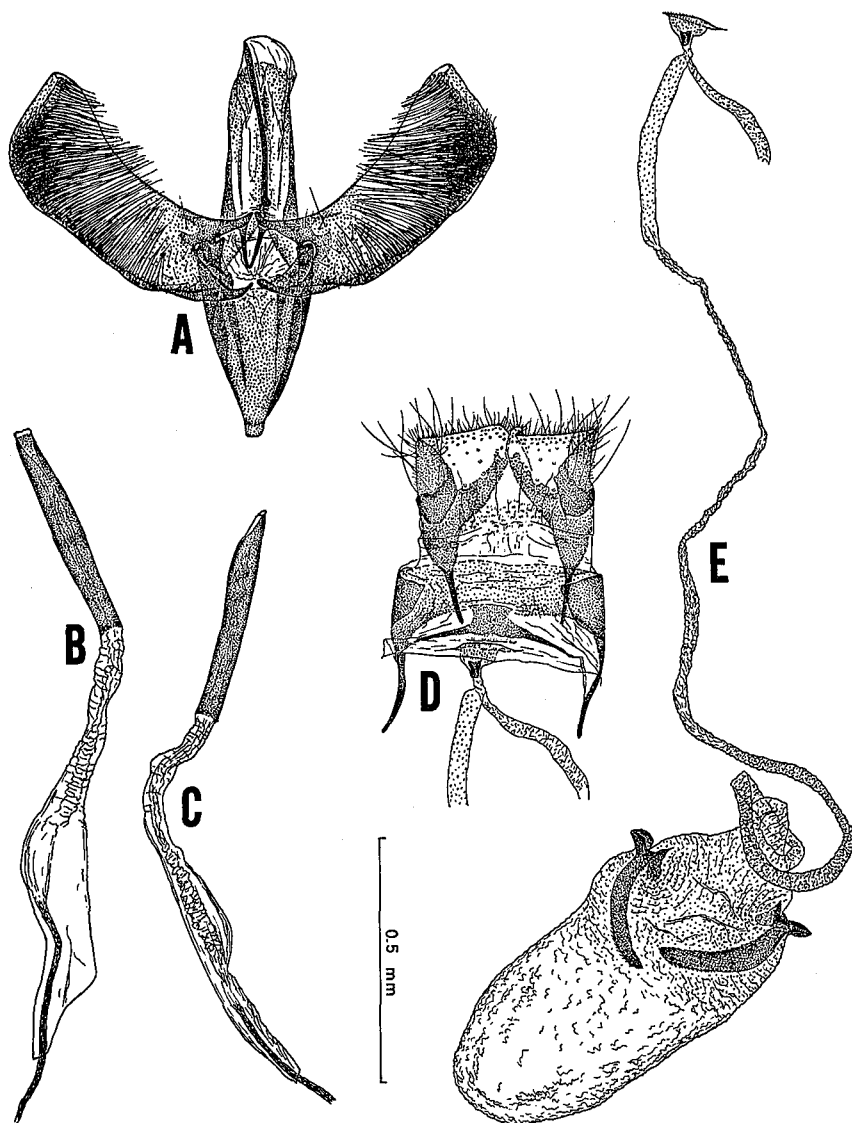


Fig. 13. *Caloptilia* (*Caloptilia*) *zachyrsa* (Meyrick). A: Male genitalia [Grc-1085, Yamamoto, Ōsaka, Honsyū, em. 5/xi/?, ex *Photinia glabra*] — B: Aedeagus [ditto] — C: Ditto [Grc-244, Iwawakisan, Ōsaka, em. 22/viii/1954, ex *Malus pumila*] — D: Female genitalia [Grc-1087, Yamamoto, Ōsaka, em. 2/xi/?, ex *P. glabra*] — E: Bursa copulatrix [ditto].

scape and pecten concolorous with head. Head and thorax ochre-brown to coppery-brown, strongly purplish-glossy. Fore and mid legs dark coppery-brown, purplish-glossy, the tarsi pure white, with a dark coppery-brown basal band and an orange-yellow apical band in 1st segment, and with an orange-yellow apical band alone in other segments; hind coxa and femur brassy-yellow, the femur being purplish-blackish on its apical half; hind tibia and tarsus ochre-grayish, slightly

darkened apically in all segments. Fore wing very narrow, almost parallel-sided; ground colour coppery-brown, strongly purplish-glossy, with slightly darker streaklets on dorsal margin; a brassy-yellow streak extending from basal 1/4 to apex along costa of wing, occupying a little more than half width of wing, with a series of coppery-brown dots along its costal margin; in some specimens emerged from *Photinia*, the costal streak with a minute indentation of ground colour at basal 1/3 on its hind margin; cilia around apex of wing coppery-ochreous with 3 dark lines, and those along dorsal margin dark gray. Hind wing and its cilia dark gray.

Male genitalia: Subscaphium very slender, knobbed at basal extremity. Valva curved, very slightly dilated apically, almost straight on terminal margin, partially convex at basal 1/3 of ventral margin, with usual marginal setae occurring especially thickly at ventroapical corner. Vinculum triangular, 2/3 as long as valva. Aedoeagus a little shorter than valva, tubular, without cornuti. Seventh abdominal segment bare; 8th segment sparsely squamose; posterior pair of coremata consisting of large, bag-shaped scales, while the anterior consisting of both a number of long, hairy scales and a few bag-shaped ones; interior process of 7th sternite very long.

Female genitalia: Lamella postvaginalis small, wide-trapezoid in shape; lamella antevaginalis absent. Antrum short, cup-shaped, weakly sclerotized on its narrowed cephalic end; ductus bursae very long, slender, membranous, sparsely scobinate on its caudal 1/7; corpus bursae ellipsoidal, with 2 sickle-shaped, curved signa which are slightly asymmetrical in position and size.

Specimens examined: 5♂♂ & 7♀♀. HONSYŪ — 1♀, Takayama, Gihu-ken, em. 12/viii/1954, ex *Malus pumila*, S. Issiki leg.; 2♀♀, Nara, em. 13/ix/1954, ex *M. pumila*, S. Moriuti leg.; 2♂♂ & 1♀, Iwawakisan, Ōsaka, em. 22/viii/1954, ex *M. pumila*, S. Issiki leg.; 2♂♂, & 2♀♀, Yamamoto, Ōsaka, em. 17/x.-5/xi/?, ex *Photinia glabra*, S. Issiki leg.; 1♀, Hirai, Ōsaka, em. 21/x/1954, ex *P. glabra*, S. Issiki leg. KYŪSYŪ — 1♂, Kagosima, em. 12/vi/1958, ex *Rubus* sp., A. Mutuura leg. All the specimens were determined as *C. zachrysa* by Issiki.

Distribution: Japan (Honsyū; Kyūsyū); Taiwan; India; and Ceylon.

Food plants: *Malus pumila* Mill., *Photinia glabra* Maxim. and *Rubus* sp. (Rosaceae) in Japan. *Photinia* sp. in Taiwan. *Malus pumila* Mill. in India.

Remarks: *C. (C.) zachrysa* as here understood seems to be rather variable in colour-pattern. As mentioned in the redescription, the specimens reared from *Malus* and *Rubus* are slightly different from those from *Photinia* (and also from the original description) in that the hind margin of the brassy-yellow costal mark on the fore wing is straight, without any indentation of the ground-colour. As far as the genitalia are concerned, however, these series of specimens are not distinguishable from each other.

Caloptilia (Caloptilia) isochrysa (Meyrick)

[Figs. 49(H-I), 59(E) & 81(C-D)]

Gracilaria isochrysa Meyrick, 1908, Journ. Bomb. Nat. Hist. Soc. 18: 829.

Caloptilia solaris Kumata, 1966, Ins. matsum. 29: 15, pls. 3 (18), 10 (39) and 18 (59).

Syn. nov.

Specimens examined: 3♂♂ & 3♀♀. HONSYŪ — 1♂ (holotype of *solaris*, G. sl. Grc-1065) & 2♀♀, Kozagawa, Wakayama-ken, em. 9-12/vi/1964, ex *Cleyera japonica* (653); 1♂,

ditto, em. 20/vi/1970, ex *C. japonica* (1024). NANSEI Is.— 1 ♀, Kosugidani, Yaku-sima, em. 5/vii/1956, ex *C. japonica*. NEPAL —1 ♂, Kuinibisona (ca 2000 m), No. 1 West, em. 1/viii/1968, ex an undetermined species of Theaceae. The holotype of *C. solaris* is deposited in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū; Nansei Is.); India (Assam); and Nepal (new record).

Food plant: *Cleyera japonica* Thunb. (Theaceae). The record from *Pasania edulis* Makino (Fagaceae) was based on my misidentification of the food plant, which is in reality *Cleyera japonica*.

Remarks: In the original description of *C. solaris* I pointed out that "*solaris* may be distinguished from *isochrysa* by the fore wing with a much broader, brassy-yellow costal area, which is a little more than 2/3 as broad as wing in *solaris*, while a little more than half in *isochrysa*". After my careful examination of further specimens collected from Japan and Nepal, I have found that the brassy-yellow costal area is rather variable in width, and that *C. solaris* is not distinguishable from "*Gracilaria*" *isochrysa* by this character. Moreover, the Nepalese specimen examined agrees well enough with the type of *solaris* in genital characters and also with the original description of *isochrysa* in colour-pattern. Taking all this into consideration, I am inclined to conclude that *C. solaris* is a junior synonym of *isochrysa*, though I have not yet examined the genitalia of the type of the latter. "*G.*" *isochrysa* is really referable to the subgenus *Caloptilia*.

The present species resembles the preceding *C. (C.) zachrysa*, but is distinguished at once from the latter by the much larger brassy-yellow costal area of the fore wing and by the fore and mid tarsi ringed with orange-yellow on median area or basal 2/3 of each segment.

Caloptilia (Caloptilia) heliciae Kumata

[Figs. 49(J), 63(B), 68(B) & 83(F)]

Caloptilia heliciae Kumata, 1966, Ins. matsum. 29: 16, pls. 3 (19), 10 (40) and 20 (63).

Specimens examined: 17 ♂♂ & 18 ♀♀. NANSEI Is.— 1 ♂ (holotype of *heliciae*, G. sl. Grc-1184) & 1 ♀, Anbō, Yaku-sima, em. 30/xi/1959, ex *Helicia cochinchinensis*, H. Kuroko leg.; 16 ♂♂ & 17 ♀♀, Onoaida, Yaku-sima, em. 3-17/xi/1973, ex *H. cochinchinensis* (1244). The holotype is deposited in the collection of Entomological Laboratory, Kyūsyū University.

Distribution: Japan (Nansei Is.).

Food plant: *Helicia cochinchinensis* Lour. (Proteaceae).

Remarks: This species is somewhat related to the preceding 2 species on account of the fore wing which is occupied with brilliantly brassy yellow almost on the whole costal area, but is distinguished at once from the latter two by the shining white fore coxa. Moreover, it is characteristic in lacking the vein M_3 of the fore wing. This character suggests that the species should run to the genus *Aspilapteryx* [type-species: *Gracilaria tringipennella* Zeller] according to the key to the genera of the family Gracillariidae given by Vári (1961). However, the 7th and 8th abdominal segments, each having 1 pair of coremata in the male, and the ostium bursae, placed at the intersegmental membrane caudal to the 7th sternite in the female, indicate that the present species surely falls under the subgenus *Caloptilia*. In the type-species of *Aspilapteryx*, on the other hand, the

8th abdominal segment lacks coremata in the male, and the ostium bursae is situated in the centre of the well-sclerotized 7th sternite in the female. These characters may be more important than the venation of the fore wing in recognizing the genus *Aspilapteryx*.

Caloptilia (Caloptilia) magnifica (Stainton)

Gracilaria magnifica Stainton, 1867, Tin. Syr.: 56.

This species is known to be distributed in South Europe and associated with *Epimedium* in the larval food. In the following lines will be described a new subspecies of *C. (C.) magnifica* from Japan. This subspecies also feeds on leaves of *Epimedium* in the larval stage.

Caloptilia (Caloptilia) magnifica moriokensis, subsp. nov.

[Figs. 14(C-F), 50(B-C), 68(A) & 82(A-B)]

♂ ♀. Expanse of wings: 10.5–11.0 mm. Length of fore wing: 5.2–5.4 mm.

Face and palpi brassy-yellow; apical segment of labial palpus purplish-black on its terminal half; head blackish-brown with purplish reflections. Antenna ochre-yellow, annulated with dark brown broadly; scape yellowish above, brownish below, with a brownish pecten. Thorax blackish-brown with purplish reflections, with a brassy-yellow median stripe widened posteriorly. Fore and mid legs brownish-black with purplish reflections, darker than thorax, the tarsi snow-white, narrowly ringed with black at apex in each segment; hind coxa and femur brassy-yellow, the femur with a triangular, blackish blotch on outside near apex; hind tibia and tarsus ochre-gray, suffused with dark brown apically in tibia and basally in 1st tarsal segment, narrowly ringed with blackish brown apically in all tarsal segments. Fore wing blackish-brown with deep purplish reflections in ground colour, with 2 triangular costal blotches and a dorsobasal one brassy-yellow; 1st costal blotch extending from basal 1/4 to middle of costa, reaching nearly dorsum across wing; 2nd costal blotch separated from the 1st by about its length, obtuse-triangular, about half as large as the 1st; dorsobasal blotch narrowed apically; cilia around apex of wing blackish-brown with 2 pale lines, and those along dorsal margin dark brownish-gray. Hind wing dark grayish-brown, with cilia a little paler.

Male genitalia: Subscaphium rather broad, much widened on basal extremity, sparsely covered with microscopic spines on median area. Valva rather short, strongly dilated apically, round on terminal margin, with slender setae scattered on basal area besides usual marginal setae. Vinculum about half as long as valva, gradually narrowed apically. Aedoeagus about 3/5 as long as valva, slender, tapering apically, without any cornutus. Seventh and 8th abdominal segments sparsely squamose; posterior pair of coremata consisting of slender scales; interior process of 7th sternite absent.

Female genitalia: Lamella postvaginalis united with lamella antevaginalis into a large, oval plate, in centre of which the ostium bursae is situated. Ductus bursae slender, rather short, wholly membranous, with a few minute spines scattered on inner surface of anterior area; antrum short, weakly sclerotized, parallel-sided; corpus bursae pyriform, with 2 curved sickle-shaped signa.

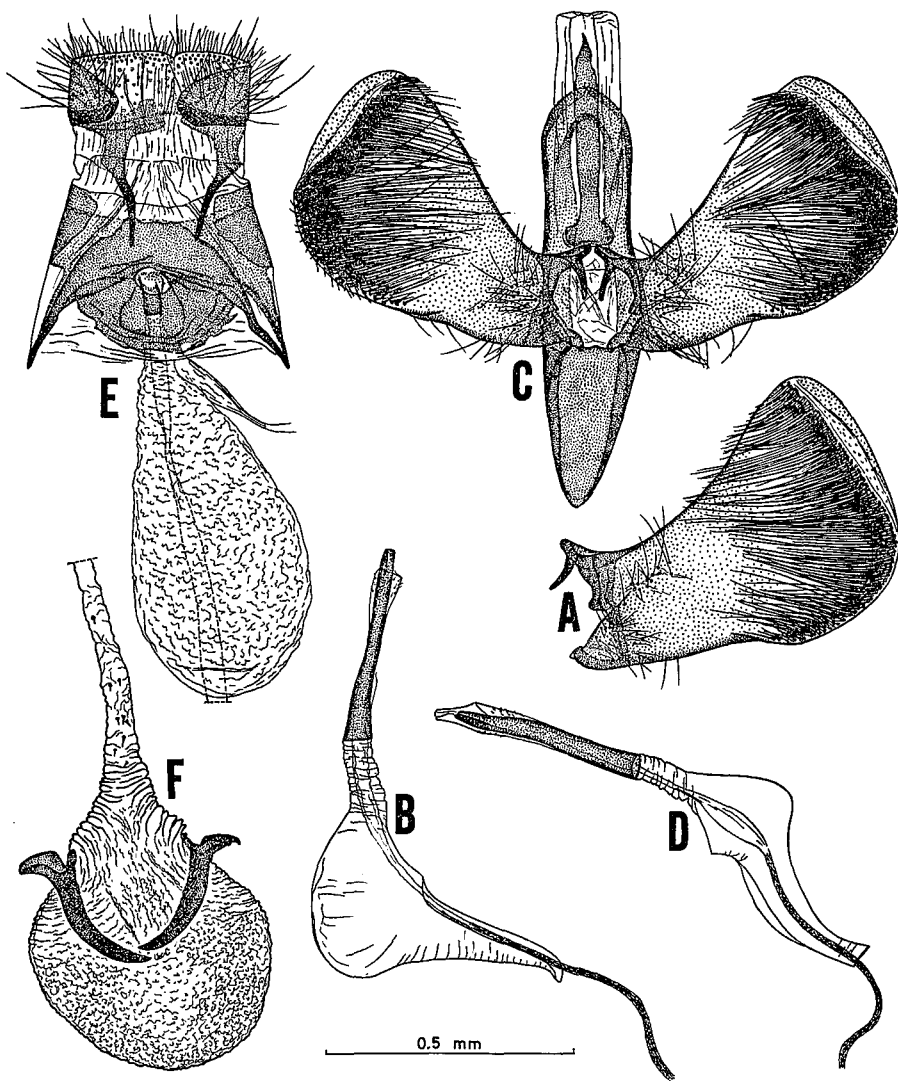


Fig. 14. A-B: *Caloptilia (Caloptilia) magnifica magnifica* (Stainton). A: Right valva [Grc-1178, Trento, Italia, em. viii/1945, ex *Epimedium alpinum*] — B: Aedoeagus [ditto].

C-F: *Caloptilia (Caloptilia) magnifica moriokensis*, ssp. nov. C: Male genitalia [Grc-1565, holotype] — D: Aedoeagus [ditto] — E: Female genitalia [Grc-1566, Tunagi, Morioka, Honsyû, em. 13/v/1970, ex *Epimedium grandiflorum* var. *thunbergianum* (973)] — F: Corpus bursae [ditto].

Specimens examined: 1♂ & 5♀♀. Honsyû — 1♂ (holotype, G. sl. Grc-1565) & 1♀, Tunagi, Morioka, em. 13/v/1970, ex *Epimedium grandiflorum* var. *thunbergianum* (973); 4♀♀, ditto, 21/vi/1979, K. Yasuda leg. The holotype is deposited in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû).

Food plant: *Epimedium grandiflorum* Morr. var. *thunbergianum* Nakai (Berberidaceae).

Remarks: The Japanese subspecies described above is slightly different in colour-pattern from the European, nominate one, of which 2 specimens have been examined: 1♂ & 1♀, Trento, Italia, viii/1945, J. Klimesch leg., ex *Epimedium alpinum*. In the European form, the fore coxa is distinctly brassy-yellow on almost the whole length; the thorax lacks a yellowish median stripe; the 1st costal blotch of the fore wing is nearly as large as or smaller than the 2nd, elongate-triangular or semicircular in form; and the dorsobasal blotch of the forewing is semicircular, never narrowed apically. Insofar as the genitalia are compared, however, I have failed to find any obvious characters by which both the forms are clearly separated from each other. Further, the food plant, larval habit, mine and leaf-folding manner of the Japanese form are very similar to those reported by Klimesch (1946) for the European form. Judging from these facts, the Japanese form should be a geographical race of the European *C. (C.) magnifica*, differing in colour-pattern.

Caloptilia (Caloptilia) geminata Kumata

[Figs. 50(D), 76(A) & 84(D)]

Caloptilia geminata Kumata, 1966, Ins. matsum. 29: 10, pls. 2 (11), 6 (31) and 16 (54).

Specimens examined: 6♂♂ & 2♀♀. HONSYŪ — 1♂, Tunagi, Morioka, em. 13/v/1970, ex *Vaccinium smallii* (974); 2♂♂ (one the holotype of *geminata*, G. sl. Grc-1052), Niyūgawa, Gihu-ken, em. 8/viii/1954, ex *Vaccinium* sp., S. Issiki leg.; 1♂, Higasiyama, Kyōto, 29/vi/1952, A. Mutuura leg.; 1♂, Kokubu, Ōsaka, 21/vi/1956, S. Moriuti leg.; 1♂ & 2♀♀, Sandankyō, Hirosima-ken, 4/vi/1953, S. Issiki & T. Kodama leg. The holotype is deposited in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū)

Food plants: *Vaccinium* spp. including *smallii* A. Gray (Ericaceae).

Remarks: This species is related to the preceding *C. (C.) magnifica moriokensis* on account of the presence of 2 triangular, brassy-yellow costal marks and a dorso-basal one on the purplish fore wing, but it is easily distinguished from the latter by the genital characters as follows: — In male, valva rather slender, a little longer than twice width at widest part, with a semielliptical lobe in disc. In female, signa blade-shaped, slightly narrowing towards base and apex; ductus bursae without any spine near its anterior area.

Caloptilia (Caloptilia) ryukyuensis Kumata

[Figs. 50(E) & 62(E)]

Caloptilia ryukyuensis Kumata, 1966, Ins. matsum. 29: 11, pls. 2 (12), 9 (36) and 16 (52).

Specimens examined: 7♂♂ & 11♀♀. NANSEI IS. — 2♀♀, Onoaida, Yaku-sima, em. 24-25/x/1973, ex *Glochidion hongkongensis* (1225); 3♀♀ (one the holotype of *ryukyuensis*, G. sl. Grc-1054), Tokuno-sima, 22/iv.-2/v/1960, T. Kodama leg. RYŪKYŪ IS. — 3♂♂, Mt. Omoto, Isigaki, 17-20/xi/1963, G.A. Samuelson leg.; 1♀, Sirahone, Iriomote, 4-5/xi/1963, G.A. Samuelson leg.; 1♀, Mt. Usiku, Iriomote, 3-7/xi/1963, G.A. Samuelson leg.; 1♀, Iriomote, 18/iv/1962, G. Kuno leg.; 4♂♂, & 2♀♀, Kampira Falls, Iriomote, 30-31/xii/1979, I. Kanazawa leg.; 1♀, Hunaura, Iriomote, 26-27/xii/1979, I. Kanazawa leg. The holotype is deposited in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Nansei Is.; Ryûkyû Is.).

Food plant: *Glochidion hongkongensis* Muell. (Euphorbiaceae).

Remarks: The present species is very peculiar among the members of the subgenus *Caloptilia* in lacking the basal pecten of the antenna. Nevertheless, the other features such as the wing venation and the male and female genitalia indicate that it truly belongs to the present subgenus. It is characterized also by the presence of 6–8 small tufts of a few blackish raised scales along the dorsal margin and termen of the fore wing as well as by the presence of 2 orange-yellow, triangular costal blotches on the fore wing.

Caloptilia (Caloptilia) aceris Kumata

[Figs. 50(F-G) & 83 (A-B)]

Caloptilia aceris Kumata, 1966, Ins. matsum. 29: 1, pls. 1 (1), 4(25) and 13 (45); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 109.

Specimens examined: 43♂♂ & 28♀♀. HOKKAIDÔ— 1♀, Risiri-tô, em. 23/vii/1958, ex *Acer mono*; 4♂♂ (one the holotype of *aceris*, G. sl. Grc-685) & 2♀♀, Abasiri, 7/vi/1961; 4♂♂ & 3♀♀, Nopporo, em. 10–11/v/1978, ex *A. mono* (1751); 2♂♂, ditto, 12/vi/1975; 1♂, ditto, 7/vi/1977; 1♂, ditto, 6/vi/1979; 2♂♂ & 1♀, Apoi, Hidaka, em. 21/iv/1975, ex *A. mono* (1369); 1♀, Sapporo, 8/vi/1958, K. Kamijo leg.; 2♂♂, ditto, 25/v/1961, N. Okabe leg.; 2♂♂, ditto, 25/v/1961, E.I. Schlinger leg.; 2♂♂, ditto, 31/v/1956; 1♂ & 1♀, ditto, em. 21–24/vii/1956, ex *A. mono* (147); 1♂, ditto, em. 28/vii/1957, ex *A. mono*; 1♀, ditto, em. 4/viii/1964, ex *A. mono* (701); 4♂♂ & 9♀♀, ditto, em. 27/iv.–1/v/1967, ex *A. mono*; 1♂, ditto, em. 29/vi/1967, ex *A. mono* (852); 1♂ & 2♀♀, ditto, em. 28/vii/1957, ex *A. palmatum*; 3♂♂ & 1♀, ditto, em. 22–23/vii/1963, *A. saccharum*; 3♂♂ & 1♀, ditto, em. 28–30/vii/1964, ex *A. saccharum* (700); 1♀, ditto, 2/vi/1967; 1♂, ditto, em. 1/v/1967, ex *A. miyabei*; 1♀, Teine, 13/vi/1959; 1♂, Zyôzankei, em. 5/iv/1958, ex *A. mono*; 1♂ ditto, 5/vi/1961; 1♂, Nakazima, Tôya-ko, 4/viii/1978. HONSYÛ— 2♂♂ & 2♀♀, Tunagi, Morioka, em. 6/v/1970, ex *A. mono* (969); 2♂♂, Siobara, Totigi-ken, em. 25–26/vii/1975, ex *A. mono* (1477); 1♂, Todai, Ina, Nagano-ken, 3/vii/1975; 1♀, Iwakakisan, Ôsaka, 27/v/1954, T. Yasuda leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû); and USSR (Far East).

Food plants: *Acer miyabei* Maxim., *A. mono* Maxim., *A. palmatum* Thunb. and *A. saccharum* Marsch. (Aceraceae) in Japan.

Caloptilia (Caloptilia) acericola Kumata

[Figs. 50(H-J) & 83 (C-D)]

Caloptilia acericola Kumata, 1966, Ins. matsum. 29: 2, pls. 1 (2), 4 (26) and 13(46); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 109.

Specimens examined: 32♂♂ & 32♀♀. HOKKAIDÔ— 3♂♂ & 1♀, Apoi, Hidaka, 21/iv/1975, ex *Acer palmatum* (1370); 1♀, Nopporo, 12/vi/1975; 1♀, ditto, 6/vi/1979; 2♂♂, Sapporo, em. 5/iv/1958, ex *A. japonicum*; 2♂♂ (one the holotype of *acericola*, G. sl. Grc-1171), ditto, em. 25–30/vii/1964, ex *A. japonicum*; 1♂, ditto, em. 5/iv/1958, ex *A. palmatum*; 1♂ & 3♀♀, ditto, em. 22/vii/1963, ex *A. palmatum* (626); 1♀, ditto, em. 3/viii/1963, ex *A. palmatum*; 1♂ & 2♀♀, ditto, em. 20/vi.–28/vii/1964, ex *A. palmatum*; 1♂, ditto, em. 28/iv/1967, ex *A. palmatum*; 1♂, ditto, em. 31/vii/1964, ex *A. mono*; 1♀, Maruyama, Sapporo, 22/viii/1966; 1♂, ditto, 4/vi/1972; 4♂♂ & 2♀♀, Tomakomai, em. 2–3/v/1970, ex *A. palmatum* (943); 2♀♀, Ônuma, Osima, em. 8/v/1978, ex *A. japonicum* (1782). HONSYÛ— 1♂, Amagi, Sizuoka-ken, em. 16/viii/1971, ex *A. palmatum* (1090); 1♂, Hatanagi, Akaisidake, 23/viii/1972, T. Hattori leg.; 1♀, Siobara, Totigi-ken, em. 28/vii/1975, ex *A.*

palmatum (1471); 1 ♀, Kisohukusima, Nagano-ken, em. 21/vii/1975, ex *A. palmatum* (1429); 1 ♂ & 3 ♀♀, Kyôto, em. 20/vi/1964, ex *A. palmatum*; 1 ♂ & 4 ♀♀, Minoo, Ôsaka, em. 8-22/vii/1975, ex *A. palmatum*; 1 ♀, ditto, 5/vi/1974, T. Saito leg.; 2 ♂♂, Kawatinagano, Ôsaka, em. 25/vi/1964, ex *A. palmatum*; 1 ♀, Kozagawa, Wakayama-ken, 14-20/v/1964. Kyûsyû — 2 ♂♂, Hikosan, Hukuoka-ken, 31/v.-2/vi/1957; 6 ♂♂ & 6 ♀♀, Kumamoto, em. 9-25/vi/1965, ex *A. palmatum*; 1 ♂ & 1 ♀, Mt. Sehuri, Saga-ken, 10/vi/1979, I. Kanazawa leg. The holotype of *acericola* is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû; Kyûsyû); and USSR (Far East).

Food plants: *Acer japonicum* Thunb., *A. mono* Maxim. and *A. palmatum* Thunb. (Aceraceae) in Japan. *Acer pseudosieboldianum* Kom. in USSR.

Table 1. Number and percentage of specimens, reared from different *Acer*-species, of *Caloptilia (Caloptilia) aceris* and *C. (C.) acericola*.

	<i>A. miyabei</i>	<i>A. mono</i>	<i>A. saccharum</i>	<i>A. palmatum</i>	<i>A. japonicum</i>	Total
<i>C. (C.) acericola</i>	—	1 (1.9)	—	48 (90.6)	4 (7.5)	53
<i>C. (C.) aceris</i>	1 (2.1)	36 (75.0)	8 (16.6)	3 (6.3)	—	48

Remarks: *C. (C.) acericola* can easily be distinguished from *C. (C.) aceris* in that the costal blotch of the fore wing is much prolonged on the costa from the basal 1/5 to near the apex of the wing, the aedoeagus is slenderer and lacks any cornuti, and the antrum is much longer, about twice as long as apophysis posterioris and about 2/3 as long as the membranous part of the ductus bursae. Moreover, the host preference seems to be different between the 2 species; the host records show that *acericola* mainly attacks the leaf of *Acer palmatum* while *aceris* infests most often the leaf of *Acer mono* (see Table 1).

Caloptilia (Caloptilia) kisoensis, sp. nov.

[Figs. 15 & 51 (A-B)]

♂♀. Expanse of wings: 11.0–13.8 mm (13.2 mm in holotype and 12.3 mm in average of 22 specimens). Length of fore wing: 5.5–6.8 mm (6.6 mm in holotype and 6.1 mm in average of 23 specimens).

Face yellowish; head dark reddish-brown; palpi whitish; labial palpus dusted sparsely with dark brown beneath, and shading into black apically. Antenna dark brown, annulated with pale brown; scape and its basal pecten a little darker than head. Thorax dark reddish-brown dorsally and ventrally, the dorsal surface mixed with ochreous scales medianly and posteriorly. Fore and mid legs dark reddish-brown, much darker than thorax, tarsi snow-white, with a narrow, black apical ring in each segment. Hind leg yellowish-white in coxa and basal half of femur, the apical half of femur brownish-black, tibia and tarsus ochre-yellow on lower half and gray on upper half. Fore wing reddish-brown, slightly tinged with purplish reflections, with 2 brassy-yellow costal blotches; 1st blotch triangular, extending on costa of wing from basal 1/4 to a little beyond middle, sometimes widely truncated on fold, margined with dark brown on both outer and inner sides, with 4–7 blackish dots along its costal margin; 2nd blotch set close to the 1st, a little shorter than and about half as wide as the 1st, semicircular, with a few blackish

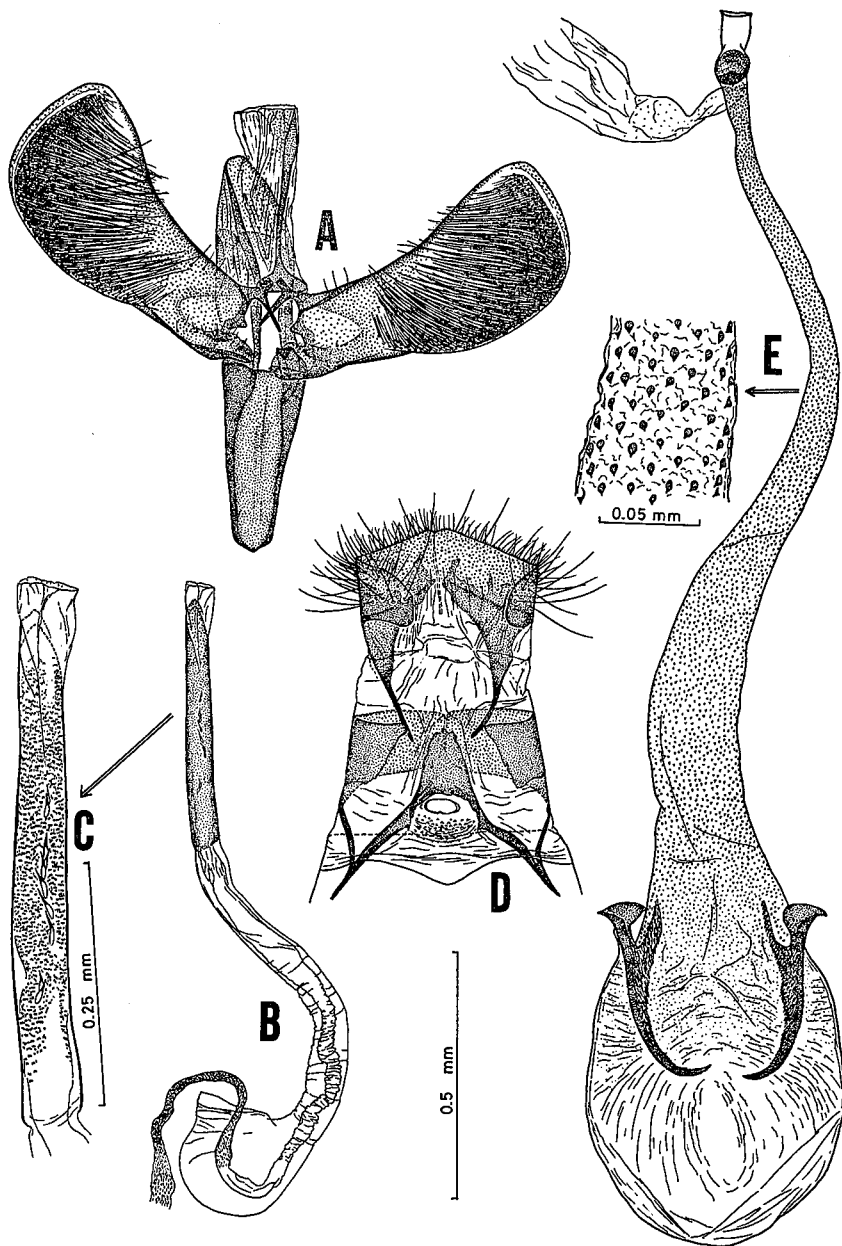


Fig. 15. *Caloptilia (Caloptilia) hisoensis*, sp. nov. A: Male genitalia [Grc-2032, Kaida, Nagano-ken, Honsyû, em. 21/vii/1975, ex *Acer ginnala* (1440)] — B: Aedeagus [ditto] — C: Ditto, enlarged — D: Female genitalia [Grc-2033, Kaida, em. 18/vii/1975, ex *A. ginnala* (1440)] — E: Bursa copulatrix [ditto].

dots along its costa; discal area near apex of wing irregularly dotted with darker scales; indistinct dark strigulae scattered on dorsal margin throughout; cilia around apex of wing and along termen ochreous-brown with 3 dark apical lines, and those along dorsal margin pale gray. Hind wing dark gray, with cilia pale gray.

Male genitalia: Subscaphium slender, suddenly widened triangularly at its basal extremity. Valva very slightly upturned, dilated apically, round on ventroapical corner, with usual long setae especially thickly on ventroapical area. Vinculum a little shorter than $2/3$ length of valva, gradually narrowed towards round apex. Aedoeagus slightly longer than $2/3$ length of valva, with 10–15 very small corniform cornuti in a row, and with numerous, microscopic spines throughout vesica. Seventh and 8th abdominal segments very sparsely covered with elongated scales; both pair of coremata consisting of long hairs and moderately elongated scales, the anterior pair about $2/3$ as long as the posterior; sclerite of 7th sternite acutely pointed posteriorly, with a very short interior process less than $1/5$ length of median ridge of 8th tergite.

Female genitalia: Lamella postvaginalis elongate, tongue-shaped, laterally connected with apophyses anteriores through ventral prongs; lamella antevaginalis very weakly membranous, covered with microscopic spines. Antrum very short; ductus bursae long, membranous, gradually dilated towards corpus bursae, densely covered with microspines on almost whole inner surface; corpus bursae pyriform, with 2 curved sickle-shaped signa, which are symmetrical in position.

Specimens examined: 10♂♂ & 13♀♀. HONSYŪ—1♂ & 2♀♀, Kaida, Kiso, Nagano-ken, em. 18–21/vii/1975, ex *Acer ginnala* (1440); 9♂♂ (one the holotype, G. sl. Grc-2096) & 9♀♀, ditto, em. 9–27/x/1975, ex *A. ginnala* (1567); 1♀, ditto, 25/ix/1975; 1♀, Todai, Ina, Nagano-ken, em. 7/x/1975, ex *A. mono* (1585). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū).

Food plants: *Acer ginnala* Maxim. and *A. mono* Maxim. (Aceraceae).

Remarks: In general colour-pattern this species is closely related to "*Gracilaria*" *bimaculatella* known to attack the leaf of *Acer saccharum* in North America, but it may be separated from the latter by the yellowish face (in *bimaculatella* the face is white) and by the size of the 1st triangular costal blotch of the fore wing (in *kisoensis* this blotch is widely truncated on the wing-fold and does not reach to the dorsal margin of the wing, whereas in *bimaculatella* it reaches beyond the fold to the dorsal margin of the wing).

Caloptilia (Caloptilia) gloriosa Kumata

[Figs. 51(C) & 83(E)]

Caloptilia gloriosa Kumata, 1966, Ins. matsum. 29: 9, pls. 2 (10), 7 (33) and 16 (53); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 109.

Specimens examined: 18♂♂ & 31♀♀. HOKKAIDŌ—6♂♂ & 6♀♀, Nopporo, em. 15–29/ix/1964, ex *Acer mono*; 2♀♀, ditto, em. 17/ix/1964, ex *A. sieboldianum*; 1♂ & 1♀, ditto, em. 22/ix/1964, ex *A. japonicum*; 1♂ (holotype of *gloriosa*, G. sl. Grc-1103), Sapporo, em. 9/vii/1964, ex *A. mono*; 7♂♂ & 13♀♀, ditto, em. 14/ix.–1/x/1964, ex *A. mono*; 1♀, ditto, em. 10/ix/1966, ex *A. mono*; 2♂♂ & 1♀, ditto, em. 17–22/ix/1964, ex *A. sieboldianum*; 1♀, ditto, 2/vi/1967; 1♀, ditto, 8/v/1978, S. Matsuda leg.; 1♂ & 1♀, Moiwai,

Sapporo, em. 4-16/ix/1975, ex *A. mono* (1497). HONSYŪ— 4♀♀, Kozagawa, Wakayama-ken, em. 31/v.-8/vi/1964, ex *A. palmatum* (672). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū); and USSR (Far East).

Food plants: *Acer japonicum* Thunb., *A. mono* Maxim., *A. palmatum* Thunb. and *A. sieboldianum* Miq. (Aceraceae) in Japan.

Remarks: The present species, having the purplish-glossy fore wing with 2 brassy-yellow, triangular costal blotches, is easily distinguished from any other Japanese species of the genus *Caloptilia* by the following peculiar characters of the genitalia: — In male, valva with a short remarkable projection at the ventroapical corner; aedoeagus with 2 very long corniform cornuti; and posterior pair of coremata mixed with long, hairy scales and short normal-shaped scales. In female, bursa copulatrix gradually widened towards cephalic end, its ductus and corpus being not distinguished from each other; and antrum long, a little longer than 1/3 length of ductus and corpus combined.

Caloptilia (Caloptilia) wakayamensis Kumata

[Figs. 51(D-E), 76(B) & 82(C-E)]

Caloptilia wakayamensis Kumata, 1966, Ins. matsum. 29: 5, pls. 1(5), 5(28) and 14 (48).

Specimens examined: 6♂♂ & 5♀♀. HONSYŪ— 1♂, Nati-san, Wakayama-ken, em. 21/vi/1957, ex *Acer* sp., T. Kodama leg.; 1♂ & 1♀, Ōsugidani, Wakayama-ken, em. 2/vi/1952, ex *Acer* sp., S. Issiki leg.; 2♂♂ (one the holotype of *wakayamensis*, G. sl. Grc-1059) & 1♀, Kozagawa, Wakayama-ken, em. 2-8/vi/1964, ex *A. palmatum* (172); 2♂♂ & 3♀♀, ditto, em. 5-13/vi/1970, ex *A. palmatum* (1016). The holotype of *wakayamensis* is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū).

Food plants: *Acer* spp. including *palmatum* Thunb. (Aceraceae).

Remarks: *C. (C.) wakayamensis* is very closely related to *C. (C.) heringi* in external colour-pattern, but is distinctly separated not only from *heringi* but also from any other species by the genital characters as follows: — In male, vinculum peculiarly long, about 1.5 times as long as valva; and aedoeagus with a single cornutus which is hook-shaped and stretched from the apex of the aedoeagus. In female, lamella antevaginalis much larger than lamella postvaginalis, with a long lobe at each laterocephalic angle.

Caloptilia (Caloptilia) hidakensis Kumata

[Figs. 16(A-E) & 51(F-G)]

Caloptilia hidakensis Kumata, 1966, Ins. matsum. 29: 4, pls. 1(4) and 17(55); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 110.

This species is originally described from 2 female specimens emerged in early September. Having examined further specimens collected in June, July, and mid to late September, I have found that the species is represented by 2 colour forms. One is a light form (including type series) characterized by the light brownish ground colour, and the other a dark form characterized by the grayish-brown ground colour. According to the collecting data, these forms are mainly due to the difference in emerging seasons of the adult; namely, the light form emerged in

summer to early autumn and the dark form in late autumn. In mid September, however, both the forms emerged together.

On this occasion a redescription should be given.

Light form— ♂♀. Expanse of wings: 10.2–12.4 mm (11.0 mm in holotype and 11.4 mm in average of 6 specimens). Length of fore wing: 5.0–6.2 mm (5.4 mm in holotype and 5.6 mm in average of 6 specimens).

Face brassy-yellow; head ochreous-brown, mixed with a few whitish scales anteriorly. Palpi pale yellow; labial palpus with dark brown subapical ring. Antenna ochreous-yellow, annulated with dark brown; scape and pecten pale ochreous-yellow. Thorax ochreous-brown dorsally, dark brown ventrally. Fore and mid legs dark brown, sparsely irrorated with ochreous-brown scales, with an ochreous-yellow, ill-defined patch at middle of femora and tibiae, the tarsi white, with a blackish apical ring in each segment, the ring on 1st segment much broader; hind coxa and femur brassy-yellow, the latter having a large dark brown blotch on apical half; hind tibia and tarsus ochreous-yellow, darkened apically in each segment. Fore wing very narrow, nearly parallel-sided; ground colour ochreous-brown, irregularly irrorated with blackish-brown scales on apical area and along costal and dorsal margins, the blackish scales on costal and dorsal margins forming small spots or strigulae; an obtuse-triangular, brassy-yellow blotch extending on costa from basal $1/4$ to $3/5$, truncated at wing-fold, margined with blackish-brown irrorations laterally, with 4–6 small, blackish spots along its costal margin; cilia pale ochre-gray, with 3 lines of dark brown irrorations around apex of wing. Hind wing dark gray, with cilia pale ochreous-gray.

Dark form — ♂♀. Expanse of wings a little larger: 12.5–14.0 mm (13.3 mm in average of 3 specimens). Length of fore wing: 6.2–7.0 mm (6.6 mm in average of 3 specimens).

Face and head brownish-gray, the former being sparsely mixed with creamy-yellow scales. Palpi brownish-gray, whitish on upper side; 2nd and 3rd segments of labial palpus much darkened apically. Antenna dark brownish-gray, annulated with pale gray narrowly; pecten dark gray. Thorax blackish-brown, rather heavily mixed with ochreous-gray scales along inner margins of tegulae. Fore and mid legs reddish-brown, irregularly intermixed with blackish and ochreous scales, each tarsal segment white basally and blackish apically. Fore wing grayish-brown, irregularly marked with blackish-brown strigulae or blotches throughout, and irrorated with dark gray scales on dorsal and discal areas; a triangular costal blotch silvery-white, sparsely mixed with ochreous-gray scales, with 6 or 7 blackish spots along its costal margin; cilia around apex of wing dark ochreous-gray, with 3 lines of blackish irrorations, and those along dorsal margin pale ochreous-gray.

Male genitalia: Subscaphium narrow, suddenly widened into a T-shape at basal extremity. Valva slightly upturned, rather long, gradually dilated apically, round on terminal margin, with a few short spines at basal area of cucullus besides usual slender marginal setae. Vinculum about $2/3$ as long as valva, blunt apically. Aedoeagus about as long as valva, straight, tubular, very shortly trifurcated at apex, with a long, acute cornutus on apex. Seventh and 8th abdominal segments rather densely covered with scales; coremata consisting of hairy scales, the posterior pair being half as long as the anterior; interior process of 7th sternite long.

Female genitalia: Lamella postvaginalis rather large, semicircular in shape; lamella antevaginalis absent. Antrum strongly sclerotized, much dilated towards very large ostium bursae; membranous part of ductus bursae rather narrow, about

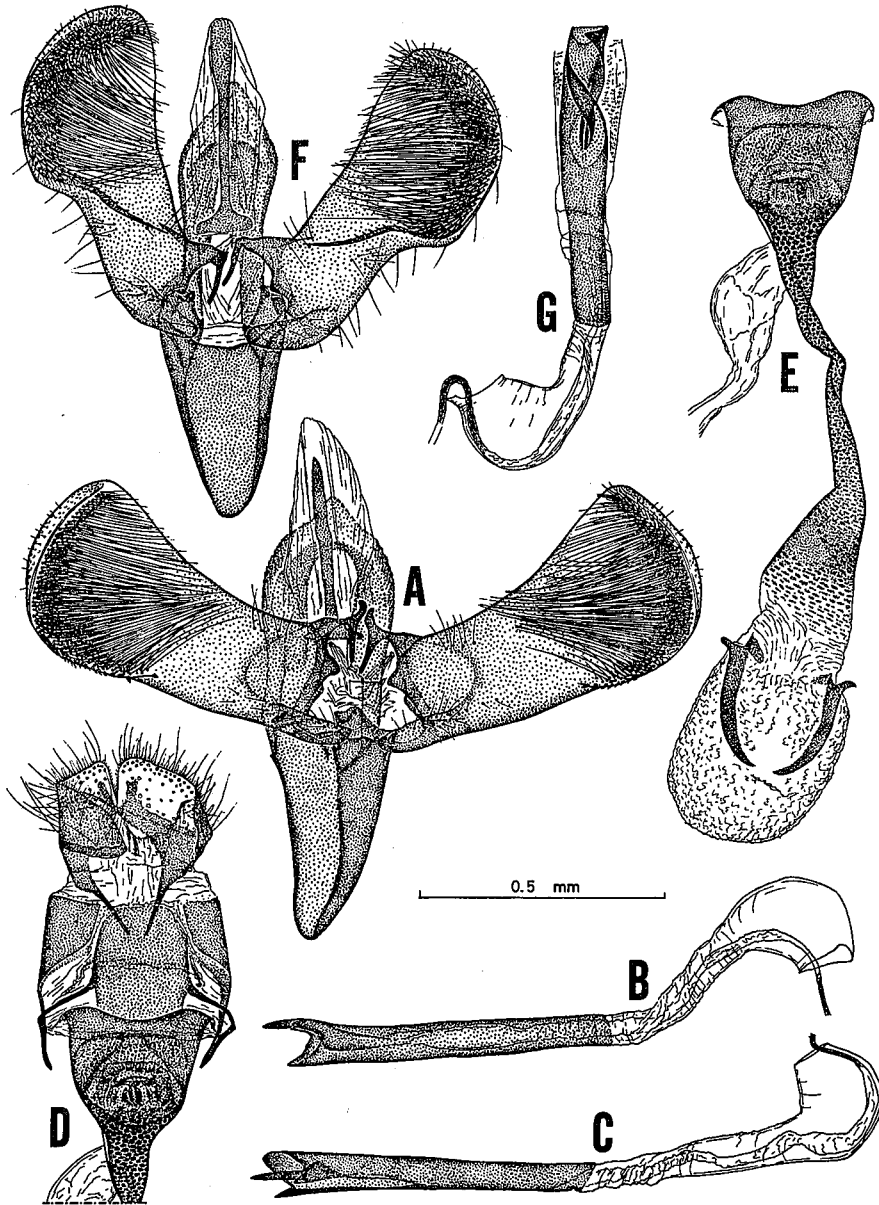


Fig. 16. A-E: *Caloptilia (Caloptilia) hidakensis* Kumata. A: Male genitalia [Grc-1422, Misumai, Sapporo, Hokkaido, em. 19/ix/1967, ex *Acer mono* (891)] — B: Aedoeagus [ditto] — C: Ditto [Grc-1133, Sapporo, 8/ix/1964] — D: Female genitalia [Grc-248, holotype] — E: Bursa copulatrix [ditto].
 F-G: *Caloptilia (Caloptilia) monspessulanella* (Klimesch). F: Male genitalia [Grc-1371, Dalmatia, Europe, em. 10/vi/1939, ex *Acer monspessulanum*, paratype] — G: Aedoeagus [ditto].

twice as long as antrum, densely scobinated or weakly shagreened; cervix bursae rather weakly shagreened on whole area; corpus bursae ovoid, membranous, with 2 slightly curved, corniform signa, which are equal in size.

Specimens examined: 7♂♂ & 5♀♀. Light form: HOKKAIDŌ— 1♀, Peipan, Asahigawa, 30/vii/1966; 2♀♀ (one the holotype of *hidakensis*, G. sl. Grc-248), Apoi, Hidaka, em. 3-4/ix/1957, ex *Acer mono*; 1♂, ditto, em. 12/vii/1967, ex *A. mono* (873); 1♀, Misumai, Sapporo, em. 22/vi/1974, ex *A. mono* (1274). HONSYŪ— 2♂♂ & 1♀, Siobara, Totigi-ken, em. 26-29/vii/1975, ex *A. mono* (1477). Dark form: HOKKAIDŌ— 1♀, Nopporo, em. 11/ix/1971, ex *A. mono* (1104); 1♂, Moiwa, Sapporo, 8/ix/1964; 1♀, ditto, 24/ix/1971; 1♂, Misumai, Sapporo, em. 19/ix/1967, ex *A. mono* (891). The holotype of *hidakensis* is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū); and USSR (Far East).

Food plant: *Acer mono* Maxim. (Aceraceae) in Japan.

Remarks: By the courtesy of Dr. J. Klimesch, I have had the opportunity to examine 1 male paratype of *C. (C.) monspessulanella*, from which the present species is distinguished at once by the shape of the valva and by the structure of the aedoeagus as shown in Fig. 16.

Caloptilia (Caloptilia) yasudai, sp. nov.

[Figs. 17 & 51(H)]

♂♀. Expanse of wings: 12.0-14.5 mm (14.0 mm in holotype and 13.7 mm in average of 4 specimens). Length of fore wing: 6.0-7.2 mm (6.8 mm in holotype and average of 5 specimens).

Face and palpi pale brassy-yellow, the labial palpus with a dark brown subapical ring. Head dark brownish-gray, with violet reflections. Antenna ochre-whitish, annulated with dark brown broadly; scape ochre-yellowish above, dark brown below, with pecten ochreous-gray. Thorax dark brown, deeply violet-glossy, with a large brassy-yellow blotch at posterior area. Fore and mid legs blackish-brown, slightly violet-glossy, the tarsi being snow-white, with a dark brown apical ring in each segment; hind coxa and femur brassy-yellow, the femur blackish-brown on its apical half; hind tibia and tarsus dark ochre-gray. Fore wing dark brown, deeply violet-glossy; dorsal margin narrowly brassy-yellow towards base; a brassy-yellow, scalene-triangular costal blotch extending on costa from basal 1/4 to 3/4 of wing, obtusely pointed at fold, without any dots along its costal margin; cilia around apex of wing dark brownish-gray with 2 pale lines, and those along dorsal margin gray. Hind wing and its cilia gray.

Male genitalia: Subscaphium widened into a T-shape at basal extremity. Valva suddenly widened on apical 1/3, obtusely angulated at ventroapical corner, with a much sclerotized, slightly dentate ridge from centre of disc to ventroapical corner, and with usual marginal setae. Aedoeagus about as long as valva, tubular, slightly sinuate on apical half, with a short, corniform cornutus at apex of aedoeagus. Seventh and 8th abdominal segments sparsely covered with scales; posterior coremata consisting of normal scales, about 1/3 as long as the anterior, which consist of hairy scales; 7th sternite without an interior process.

Female genitalia: Apophysis posterioris dilated at median area. Lamella postvaginalis large, triangular; lamella antevaginalis much larger than lamella postvaginalis, circular, with a pair of short projections at laterocaudal corners.

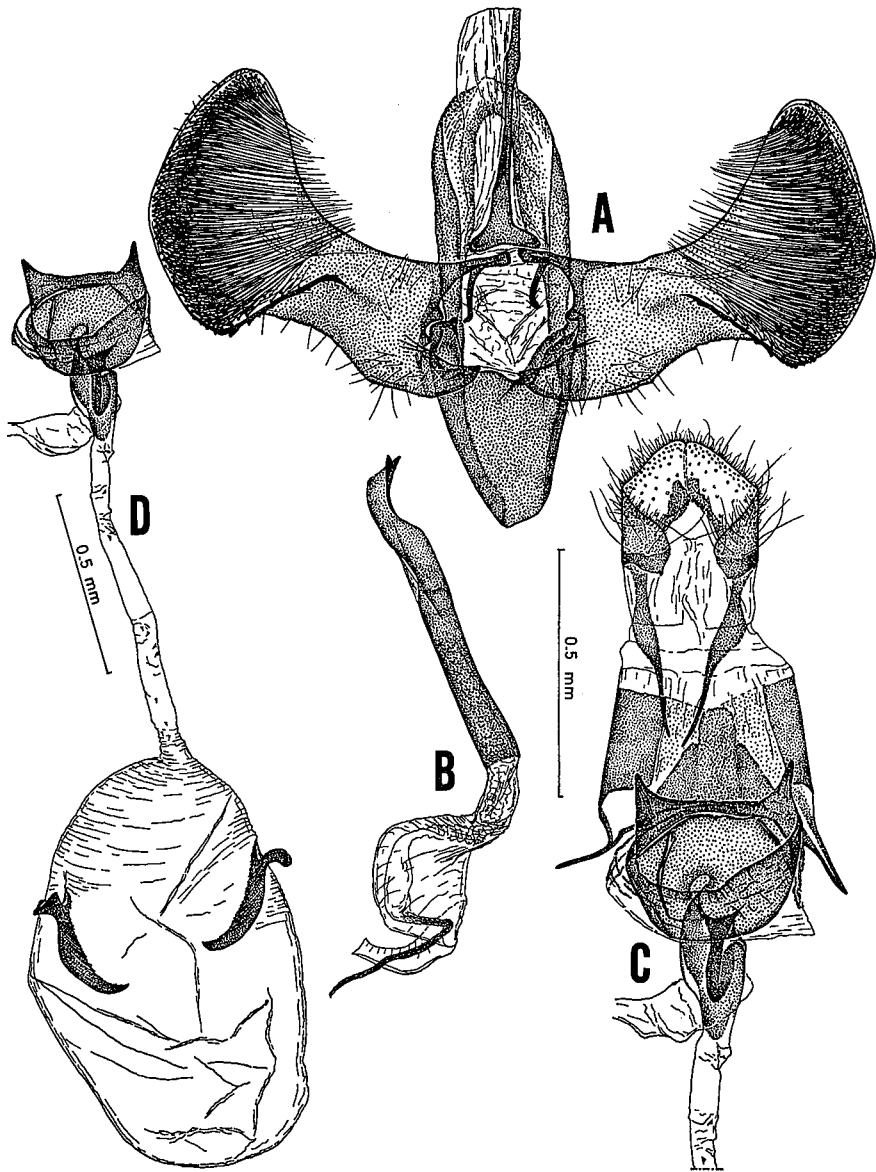


Fig. 17. *Caloptilia (Caloptilia) yasudai*, sp. nov. A: Male genitalia [Grc-1063, holotype] — B: Aedeagus [ditto] — C: Female genitalia [Grc-700, Iwawakisan, Ôsaka, Honsyû, 28/v/1955] — D: Bursa copulatrix [ditto].

Ostium bursae situated in centre of lamella antevaginalis; antrum well sclerotized, thickened, sinuate; ductus bursae slender, membranous; corpus bursae very large, ellipsoidal, membranous, with 2 curved, hornlike signa, which are nearly equal in size, but asymmetrical in position.

Specimens examined: 2♂♂ & 3♀♀. HOKKAIDÔ — 1♀, Apoi-dake, Hidaka, 29/vi/1973. HONSYÛ — 1♂ & 1♀, Nippara, Tôkyô, 1/vi/1976, M. Suwa leg.; 1♂ (the holotype, G. sl.

Grc-1063), Iwawakisan, Ôsaka, 12/v/1951, S. Issiki leg.; 1♀, ditto, 28/v/1955, T. Yasuda, leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû).

Food plant: Unknown.

Remarks: In the general colouration of the fore wing, this new species is very similar to *C. (C.) aceris*. It is, however, easily distinguished not only from *aceris* but also from any other members of the genus in the characteristic shapes of the valva, aedoeagus and lamella antevaginalis.

The present species is named in honour of Dr. Tosiro Yasuda of the University of Ôsaka Prefecture.

Caloptilia (Caloptilia) heringi Kumata

[Fig. 51(I-J)]

Caloptilia heringi Kumata, 1966, Ins. matsum. 29: 3, pls. 1(3), 4(27) and 13(47); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 107.

Specimens examined: 5♂♂ & 9♀♀. HOKKAIDÔ — 1♀, Wassamu, Kamikawa, em. 2/x/1962, ex *Acer mono*; 1♂ (the holotype of *heringi*, G. sl. Grc-705), ditto, em. 17/ix/1963, ex *A. mono*; 1♀, ditto, em. 6/x/1964, ex *A. mono*; 1♀, ditto, em. xii/1964, ex *A. mono*; 1♂, Peipan, Asahigawa, 30/vii/1966; 1♀, Apoi, Hidaka, em. 23/vii/1963, ex *A. mono*; 1♂, Sapporo, em. 24/vii/1956, ex *A. mono*; 1♀, ditto, em. 29/ix/1964, ex *A. mono*; 1♂, Teine, em. 19/ix/1958, ex *A. mono*; 1♀, ditto, em. 20/v/1962, ex *A. mono*; 2♀♀, Misumai, Sapporo, em. 6/ix/1967, ex *A. mono*; 1♂, Zyôzankei, em. 1/viii/1956, ex *A. mono*; 1♀, Tomakomai, 11/x/1969. The holotype of *heringi* is in the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô); and USSR (Far East).

Food plant: *Acer mono* Maxim. (Aceraceae) in Japan.

Remarks: This species is distinctly characterized by the ductus bursae which has a long, narrow projection pointing towards corpus bursae, and by the very long cornuti, 1 or rarely 2 of which are as long as the aedoeagus itself.

Caloptilia (Caloptilia) semifasciella Kumata

[Figs. 52 (A-C) & 63(D)]

Caloptilia semifasciella Kumata, 1966, Ins. matsum. 29: 5, pls. 1 (6 & 7), 5 (29) and 14 (49).

Specimens examined: 15♂♂ & 15♀♀. HOKKAIDÔ — 3♀♀, Aizankei, Daisetu-zan, em. 12/viii/1957, ex *Acer tschonoshkii* (316); 1♂, ditto, em. 18/viii/1966, ex *A. tschonoshkii*; 2♂♂ (one the holotype of *semifasciella*, G. sl. Grc-1134), Soranuma-dake, 6/ix/1964, ex *A. tschonoshkii*. HONSYÛ — 1♀, Nisinasuno, Totigi-ken, 1/x/1975; 2♀♀, ditto, em. 17-23/x/1975, ex *A. crataegifolium* (1626); 1♀, Siobara, Totigi-ken, em. 25/vii/1975, ex *A. micranthum* (1476); 1♀, ditto, em. 26/vii/1975, ex *A. distylum* (1478); 1♂ & 1♀, ditto, em. 26/vii/1975, ex *A. rufinerve* (1475); 1♂ & 3♀♀, ditto, em. 17-27/x/1975, ex *A. crataegifolium* (1668); 2♂♂, Ôtaki, Kiso, Nagano-ken, em. 4-11/x/1975, ex *A. rufinerve* (1540); 3♂♂ & 1♀, Kaida, Kiso, em. 21-22/vii/1975, ex *A. ginnala* (1440); 2♂♂, Kyôto, em. 18/x/1966, ex *A. rufinerve*; 2♂♂, Nara, em. 26-29/vii/1956, ex *A. rufinerve*, S. Issiki leg.; 1♂, Iwawakisan, Ôsaka, 18/v/1954, ex *Acer* sp., T. Yasuda leg.; 2♀♀, Sasayama, Hyôgo-ken, em. 6/vii/1965, ex *A. crataegifolium* (669). KYÛSYÛ — 1♀, Hikosan, Hukuoka-ken, em. 15/x/1954, ex *A. crataegifolium*, H. Kuroko leg. The holotype of *semifasciella* is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû; Kyûsyû).

Food plants: *Acer crataegifolium* Sieb. et Zucc., *A. distylum* Sieb. et Zucc., *A. micranthum* Sieb. et Zucc., *A. rufinerve* Sieb. et Zucc. and *A. tschonoskii* Maxim. (Aceraceae).

Remarks: This species is more or less similar to *C. (C.) semifascia* in having an oblique brassy-yellow fascia on the fore wing, but is easily distinguished from the latter by the quadrangular valva and by the strongly sclerotized transtilla in the male, and by the single signum of the corpus bursae in the female.

Caloptilia (Caloptilia) monticola Kumata

[Figs. 52(F-H) & 76(C)]

Caloptilia monticola Kumata, 1966, Ins. matsum. 29: 8, pls. 2(9), 7(32) and 15(51); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 110; *ibid.*, 1979, in *Terrestrial Arthropoda of the Far East*: 28-31, figs. 1-2.

Specimens examined: 15♂♂ & 9♀♀. HOKKAIDÔ — 1♂, Aizankei, Daisetuzan, em. 14/viii/1957, ex *Acer tschonoskii*; 1♂, Sapporo, em. 10/vii/1967, ex *A. mono*. HONSYÛ — 1♂, Odagoe, Hayatine-dake, Iwate-ken, 5/x/1975, T. Oku leg.; 2♀♀, Siobara, Totigi-ken, em. 2-29/vii/1975, ex *A. micranthum* (1476); 3♂♂ & 1♀, ditto, em. 23-31/x/1975, ex *A. micranthum* (1661); 2♀♀, ditto, em. 23/vii.-2/viii/1975, ex *A. rufinerve* (1475); 2♂♂, ditto, em. 26-31/vii/1975, ex *A. distylum* (1468); 1♂, ditto, em. 29/vii/1975, ex *A. argutum* (1474); 1♀, Kaida, Kiso, Nagano-ken, em. 15/x/1975, ex *A. ginnala* (1576); 1♂, Haku-san, Isikawa-ken, em. 20/viii/1976, ex *A. ukurunduense*, I. Togashi leg.; 1♀, Kôzin-dake, Nara-ken, 3/vii/1971, F. Komai leg.; 1♂ & 2♀♀, Kozagawa, Wakayama-ken, em. 8-10/vi/1970, ex *A. trifidum* (1015); 4♂♂ (one the holotype of *monticola*, G. sl. Grc-692) & 2♀♀, Daisen, Tottori-ken, em. 23-26/viii/1963, ex *A. rufinerve*, T. Yasuda leg. The holotype of *monticola* is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû); and USSR (Far East).

Food plants: *Acer argutum* Maxim., *A. distylum* Sieb. et Zucc., *A. ginnala* Maxim., *A. micranthum* Sieb. et Zucc., *A. mono* Maxim., *A. rufinerve* Sieb. et Zucc., *A. ukurunduense* Trautv. et Mey. and *A. tschonoskii* Maxim. (Aceraceae) in Japan. *Acer semenovi* Regel et Herd. in USSR.

Caloptilia (Caloptilia) kurokoi Kumata

[Fig. 52(E)]

Caloptilia kurokoi Kumata, 1966, Ins. matsum. 29: 7, pls. 1 (8), 6 (30) and 15 (50).

Specimens examined: 2♂♂ & 1♀. KYÛSYÛ — 1♂ (the holotype of *kurokoi*, G. sl. Grc-1180) & 1♀, Hikosan, Hukuoka-ken, em. 29 & 27/x/1960, ex *Acer rufinerve*, H. Kuroko leg.; 1♂, ditto, 3/xi/1979, I. Kanazawa leg. The holotype of *kurokoi* is in the collection of the Entomological Laboratory, Kyûsyû University.

Distribution: Japan (Kyûsyû).

Food plant: *Acer rufinerve* Sieb. et Zucc. (Aceraceae).

Remarks: This is the largest species in the Japanese members of the genus *Caloptilia*, being 16.0 to 17.0 mm in the expanse of wings. On account of the once coiled ductus bursae of the female genitalia, it is related to *C. (C.) monticola* and *C.(C.) hemidactylella*, both of which also attack the leaves of *Acer* trees. It is, however, easily distinguished from the latter 2 species by the much more deeply reddish ground colour and by the whitish costal triangular blotch of the fore wing.

Caloptilia (Caloptilia) aurifasciata, sp. nov.

[Figs. 18 & 53 (A-B)]

♂♀. Expanse of wings: 9.8 mm (in holotype) to 11.0 mm. Length of fore wing: 4.8 mm (in holotype) to 5.5 mm.

Head and face ochreous, rather heavily irrorated with dark gray, much darker at sides. Palpi white, heavily dusted with black beneath. Antenna black, annulated with white; scape black, with basal pecten of grayish hairs. Thorax concolorous with head dorsally, much darker ventrally, with a very narrow, pale median stripe on dorsal surface. Fore and mid legs blackish; each tarsal segment white on its basal half. Hind leg brassy-yellow in coxa and femur, the former apically and the latter medianly dotted with black scales; tibia ochre-yellow, shaded with dark gray towards apex; tarsus black, irrorated with yellowish white, with a very narrow, ochre-yellow ring at base of each segment except for basal one. Fore wing brownish-gray, thickly irrorated with darker scales on whole surface, faintly purplish-iridescent, with 2 fasciae, 3 pairs of costal and dorsal spots and 1 small apical spot all brassy-yellow and edged with black scales; 1st fascia placed near base of wing, strongly oblique outwardly, slightly detached from costa, narrowed towards costal margin, sometimes finely interrupted at its middle; 2nd fascia at basal 2/5 of wing, rather perpendicular, widest on costa, then suddenly narrowed towards dorsal margin, with 3 or 4 black dots on its costal margin; 1st pair of spots at middle of wing, triangular or semicircular, the costal one about 3 times as long as dorsal one, and placed a little more outwards than the dorsal; 2nd pair of spots at about apical 1/4 of wing, very small, the intervening space between the spots marked with jet-black scales; 3rd pair of spots just before apex of wing, usually fused with each other into a perpendicular fascia; cilia around apex and along termen blackish-gray with 2 or 3 pale subapical lines, and those along dorsal margin pale gray. Hind wing dark gray, with cilia pale gray.

Male genitalia: Subscaphium Y-shaped at basal extremity. Valva nearly straight, very slightly widened on apical half, round on ventroapical margin, with usual long setae along apical margin and apical half of ventral margin. Vinculum a little longer than half length of valva, triangular, bluntly pointed apically. Aedoeagus 1.3 times as long as valva, sinuate on apical half, truncated apically; vesica covered with numerous microscopic thornlike cornuti on apical half. Both 7th and 8th abdominal segments covered with elongate scales rather densely; coremata consisting of hairy scales, the posterior pair about half as long as the anterior. Interior process of 7th sternite very slender, about 1/3 as long as median ridge of 8th tergite.

Female genitalia: Lamella postvaginalis large, elongate-trapezoid, connected with apophyses anteriores through short prongs. Antrum large, about 1.4 times as long as apophysis anterioris, gradually narrowed cephalad; caudal half of ductus bursae beyond antrum membraneous, lined with thorn-like spines especially thickly around ductus seminalis; cephalic half of ductus bursae heavily sclerotized, gradually widened cephalad. Corpus bursae oval, membraneous, with 2 slender, curved, sickle-shaped signa, which are nearly symmetrical in position.

Specimens examined: 2♂♂ & 2♀♀. HONSHŪ — 1♂ (the holotype, G. sl. Grc-1806) & 1♀, Kozagawa, Wakayama-ken, em. 15-19/x/1974, ex *Rhus sylvestris* (1286). SHIKOKU — 1♀, Ino, Kōti-ken, em. 4/xi/1980, ex *R. succedanea* (2195). KYŪSHŪ — 1♂, Ariake-yama,

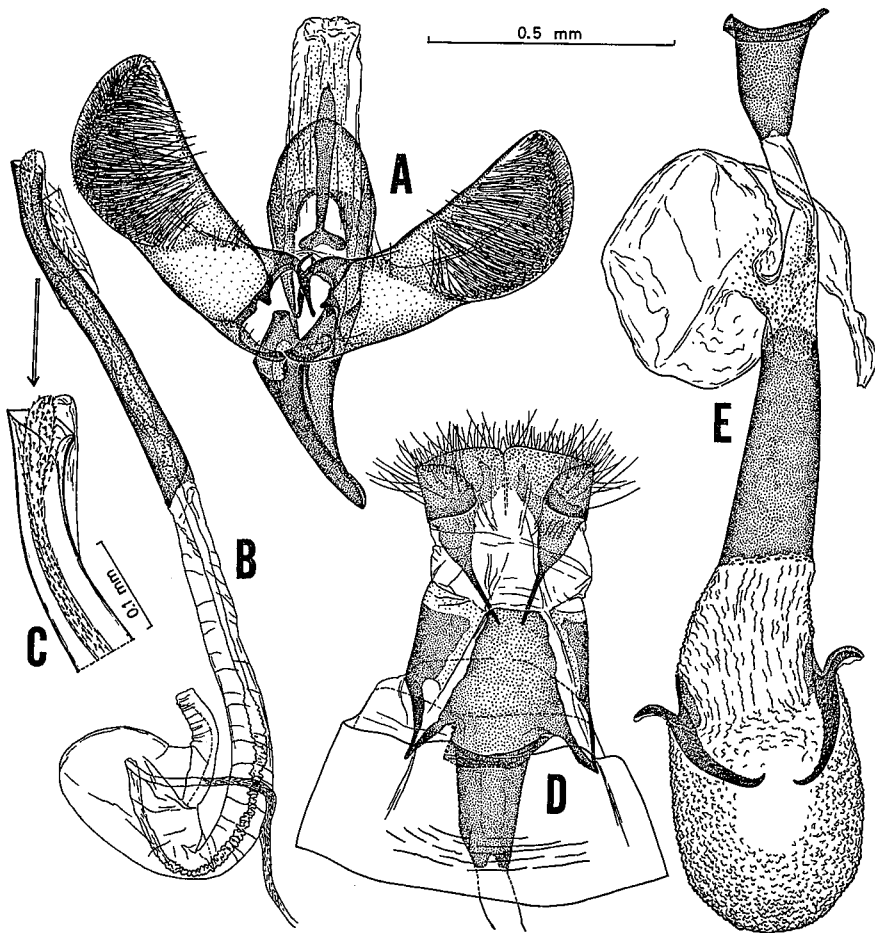


Fig. 18. *Caloptilia (Caloptilia) aurifasciata*, sp. nov. A: Male genitalia [Grc-1806, holotype] — B: Aedeagus [ditto] — C: Ditto, apical part enlarged — D: Female genitalia [Grc-1807, Kozagawa, Wakayama-ken, Honsyû, em. 19/x/1974, ex *Rhus sylvestris* (1286)] — E: Bursa copulatrix [ditto].

Izuhara-tyô, Tu-sima, 20/x/1979, K. Yasuda leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû; Sikoku; Kyûsyû).

Food plants: *Rhus succedanea* Linné and *R. sylvestris* Sieb. et Zucc. (Anacardiaceae).

Remarks: This species is separated at once from any other members of the genus *Caloptilia* by the colour-pattern. It is somewhat similar to *C. leptophanes* of South Africa, but is distinguished from the latter by the vesica covered with numerous microscopic spines in male and by the ductus bursae membranaceous on the caudal half beyond the antrum in female. In *leptophanes*, the vesica bears 9 moderately long cornuti which are arranged in a row; the ductus bursae is heavily sclerotized on the caudal 2/3.

Caloptilia (Caloptilia) recitata (Meyrick)

[Figs. 19, 22 (A-E), 53 (C-E) & 81 (E-F)]

Gracilaria recitata Meyrick, 1918, Exot. Microlep. 2: 178.

Caloptilia recitata: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30, pl. 4 (115) (part).

The specimens examined are classified into 2 forms, aestival and autumnal, which are distinct in colour-pattern alone; that is, the aestival form has ochre-brown fore wing marked distinctly with a yellowish costal blotch, while the autumnal form has darker fore wing with no distinct costal mark.

Aestival form — ♂♀. Expanse of wings: 10.0–12.0 mm (10.8 mm in average of 17 specimens). Length of fore wing: 4.8–5.8 mm (5.3 mm in average of 17 specimens).

Face yellowish anteriorly and whitish posteriorly; head and thorax dark ochre-brown. Palpi ochre-whitish; 2nd segment of labial palpus infuscated beneath, the 3rd with a blackish subapical band beneath. Antenna dark grayish-brown, annulated with ochre-white faintly; scape dark brown below and ochre-yellowish above, with pecten brownish. Fore and mid legs blackish-brown, strongly violet-glossy, the tarsi being white, with a blackish apical ring in each segment. Hind leg golden-yellow in coxa and femur, blackish on apical half of femur; tibia and tarsus ochre-yellow, shaded with gray apically in tibia. Fore wing ochre-brown, slightly purplish-iridescent, irrorated or strigulated with dark brown scales especially densely on costa near base, along dorsal margin throughout and on apical area; a pale ochre-yellow costal blotch extending along costa from basal 1/4 to 5/6 of wing, with its basal third occupying more than half width of wing, then the remaining part abruptly narrowing towards apex; 5–8 blackish dots scattered along costal margin of blotch at irregular intervals; cilia around apex of wing pale brownish-gray with 3 dark apical lines, and those along dorsal margin pale gray. Hind wing gray, with cilia pale gray.

Autumnal form — ♂♀. Expanse of wings a little larger: 10.2–13.0 mm (11.6 mm in average of 8 specimens). Length of fore wing: 5.1–6.5 mm (5.8 mm in average of 8 specimens).

Ground colour much darker than aestival form on almost whole surface; head, thorax and fore wing fuscous-brown, with a purplish iridescence much deeper. Costal blotch of fore wing a little paler than the ground colour, and often hardly discriminated from the ground; in some specimens the blotch visible on basal part alone and triangular; 2 blackish spots placed in disc of fore wing just above wing-fold, one at basal 1/4 and the other at middle of wing. The other characters in the colour-pattern well agree with those of the aestival form.

Male genitalia: Subscaphium very narrow, strongly widened at basal extremity. Valva slightly upturned, gradually dilated apically, round on terminal margin, with usual long setae. Vinculum elongate, a little shorter than valva, tapering towards blunt apex. Aedeagus a little longer than valva, needle-shaped, with a row of 3 small, corniform cornuti, among which the basalmost has a long, bifurcated basal projection. Seventh abdominal segment sparsely covered with scales, while the 8th is bare; coremata consisting of hairy scales, the posterior pair 1/2 as long as the anterior; interior process of 7th sternite very minute.

Female genitalia: Lamella postvaginalis subtrapezoid in shape; lamella

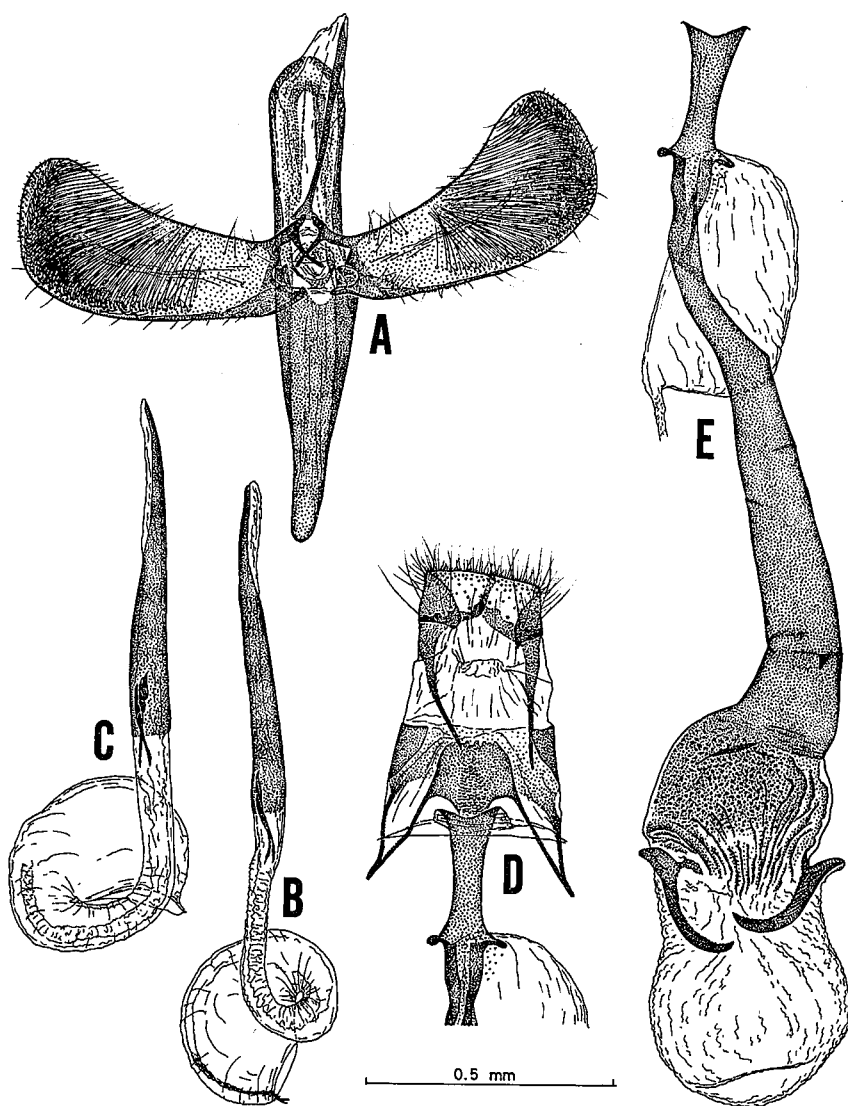


Fig. 19. *Caloptilia (Caloptilia) recitata* (Meyrick). A: Male genitalia [Grc-258, Hikosan, Kyūsyū, em. 16/vi/1957, ex *Rhus trichocarpa*] — B: Aedeagus [ditto] — C: Ditto [Grc-1093, Kozagawa, Wakayama-ken, Honsyū, em. 3/vi/1964, ex *R. trichocarpa* (663)] — D: Female genitalia [Grc-1094, Kii-Ōsima, Wakayama-ken, em. 6/vi/1964, ex *R. trichocarpa* (663, a)] — E: Bursa copulatrix [ditto].

antevaginalis absent. Antrum weakly sclerotized, slightly narrowed at median area, always longer than twice width, with a pair of small projections at its cephalic end. Ductus bursae widened cephalad, heavily sclerotized on whole length, the sclerotization gradually weakened towards corpus bursae; a small, cone-shaped recess occurring on ductus bursae near its cephalic end; corpus bursae membranous, with 2 curved, sickle-shaped signa.

Specimens examined: 15♂♂ & 18♀♀. Aestival form: Honsyû — 2♂♂ & 2♀♀, Kozagawa, Wakayama-ken, em. 3–12/vi/1964, ex *Rhus trichocarpa* (663); 2♂♂, ditto, em. 5–10/vi/1970, ex *R. trichocarpa* (1026); 3♀♀, Kii-Ôsima, Wakayama-ken, em. 6–8/vi/1964, ex *R. trichocarpa* (663, a). Kyûsyû — 4♂♂ & 6♀♀, Hikosan, Hukuoka-ken, em. 16–23/vi/1957, ex *R. trichocarpa* (198); 1♂, ditto, em. 8/vii/1965, ex *R. javanica*. NEPAL — 2♂♂ & 2♀♀, Balaju, Kathmandu Valley, em. 2–18/vii/1968, ex *R. javanica* (Npl-60). Autumnal form: Honsyû — 1♂ & 1♀, Ôtaki, Kiso, Nagano-ken, em. 17–20/x/1975, ex *R. javanica* (1557); 4♀♀, Kozagawa, em. 9–16/x/1974, ex *R. sylvestris* (1286); 1♂, Yosimi, Simonoseki, em. 17/xi/1959, ex *R. trichocarpa*, H. Kuroko leg. Kyûsyû — 1♂, Hikosan, em. 8/xi/1954, ex *Rhus* sp., H. Kuroko leg. NANSEI Is. — 1♂, Yaku-sima, em. 6/xi/1973, ex *R. javanica* (1262).

Distribution: Japan (Honsyû; Sikoku; Kyûsyû; Nansei Is.); India (Assam); and Nepal (new record).

Food plants: *Rhus javanica* Linné, *R. sylvestris* Sieb. et Zucc. and *R. trichocarpa* Miq. (Anacardiaceae) in Japan. *Rhus javanica* Linné in Nepal.

Remarks: This redescription, based only on Japanese material, may appear to disagree with the original description given by Meyrick. The type-series of *recitata*, represented by 2 specimens collected from Assam in September, is now preserved in the British Museum (N.H.). Mr. D.J. Carter of the Museum kindly compared some specimens of the aestival form sent by me with the type-series, and informed me that the Japanese material agrees well enough with the syntypes of *recitata* in the genitalia of both sexes, but is at all different in the wing colour-pattern.

Recently, I have examined material from Nepal as mentioned in Specimens examined. The Nepalese specimens agree quite well with the aestival form from Japan not only in the genital characters of both sexes but also in the wing colour-pattern. Moreover, the autumnal form collected in Japan approaches the original form in the border of the costal blotch of the fore wing not distinct and in the 2 blackish spots placed in the disc of the wing just above wing-fold, although it is different from the type-series in the much darker ground colour. This species seems to be variable in the wing colour-pattern, and the Japanese forms probably fall within its variation.

Caloptilia (Caloptilia) matsumurai, sp. nov.

[Figs. 20, 22(F-J) & 53 (F-G)]

Gracillaria elongella: Matsumura, 1931, 6000 Ill. Ins. Jap.: 1101, fig. 2284. [Misidentification.]

In this new species there are 2 seasonal colour forms as in the preceding *recitata*.

Aestival form — ♂♀. Expense of wings: 11.7–12.0 mm. Length of fore wing: 5.8–6.0 mm.

Face wholly golden-yellowish; head and thorax pale reddish-brown, with a purplish iridescence. Palpi ochre-yellowish; labial palpus with a blackish subapical band beneath. Antenna dark brownish-gray, annulated with grayish-white; scape ochre-yellowish, infuscated below; pecten dark brown. Fore and mid legs dark brown, infuscated on outer surface, the tarsi whitish, with a blackish apical ring in each segment. Hind leg golden-yellowish in coxa and femur, the apical half of femur blackish; tibia and tarsus entirely pale ochre-yellow. Fore

wing pale reddish-brown with a very strong purplish iridescence, slightly infuscated with dark scales on basal 1/4 of costa, along dorsal margin on its apical half and on discal area near apex; a yellow blotch extending on costa from basal 1/4 to near apex of wing, with its basal 1/3 expanding towards fold and sometimes forming a triangle, and the remaining part occupying costal area less than 1/3 width of wing;

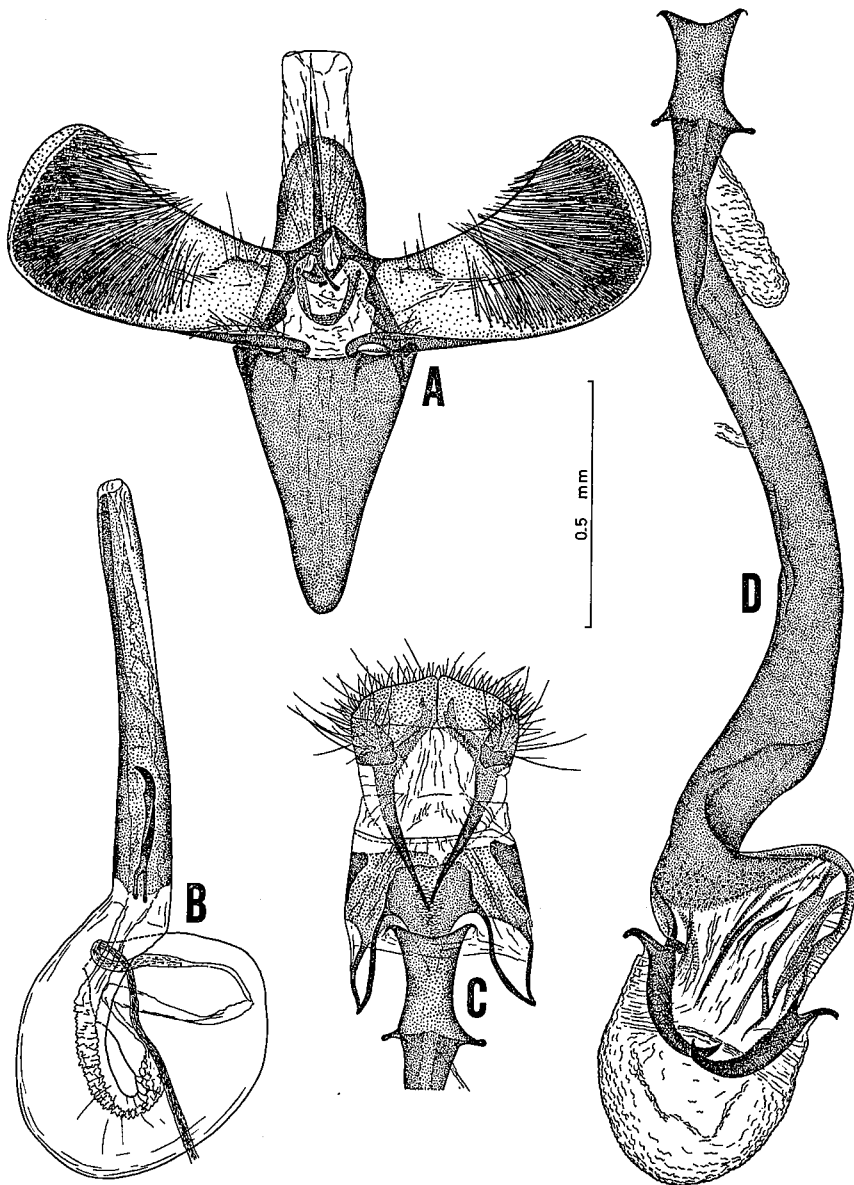


Fig. 20. *Caloptilia (Caloptilia) matsumurai*, sp. nov. A: Male genitalia [Grc-1803, Kozagawa, Wakayama-ken, Honsyû, em. 9/x/1974, ex *Rhus trichocarpa* (1303)] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1804, Kozagawa, em. 7/x/1974, ex *R. trichocarpa* (1303)] — D: Bursa copulatrix [ditto].

4-7 blackish dots arranged along costal margin of the blotch, one at middle being largest; cilia around apex of wing yellowish-gray with 3 blackish apical lines, those along dorsal margin pale gray. Hind wing gray, with cilia pale gray.

Autumnal form — ♂♀. Expanse of wings a little larger: 12.2-13.2 mm (12.8 mm in holotype and average of 5 specimens). Length of fore wing: 6.0-6.6 mm (6.4 mm in holotype and 6.3 mm in average of 6 specimens).

Colour-pattern differs from that of the aestival form by the following points. Face and palpi ochre-yellow, the labial palpus infuscated below throughout; head and thorax dark reddish-brown. Fore and mid tarsi yellowish-white, intermixed with brownish scales on upper sides sparsely; hind tibia shading into gray towards apex; hind tarsus finely dotted above with black at apex of each segment. Fore wing reddish-brown, irrorated with dark brown scales especially densely on basal area just basad of costal blotch and on discal area between middle and apex of wing; costal blotch pale ochre-brownish, intermixed with dark scales, sometimes interrupted at its middle into 2 parts, the apical part being reduced into a narrow, obscure costal line. Hind wing and its cilia dark gray.

Genitalia: In both sexes the genitalia are very similar to those of *C. (C.) recitata*, but are different by the following points:—

♂. Vesica with 2 corniform cornuti of moderate length, the basal one about 1/7 as long as aedeagus (see Fig. 22 & Table 2).

♀. Antrum about twice as long as wide; sclerotized part of ductus bursae narrowest just before corpus bursae, then suddenly widened towards corpus bursae, the terminal end being distinct and clearly contrasted with membranous corpus bursae; no recess of ductus bursae (see Fig. 22).

Specimens examined: 6♂♂ & 4♀♀. Aestival form: HONSYŪ — 1♂ & 1♀, Sasayama, Hyōgo-ken, em. 5-8/vii/1965, ex *Rhus sylvestris*. Autumnal form: HONSYŪ — 1♂, Nisinasuno, Totigi-ken, em. 23/x/1975, ex *R. trichocarpa* (1633); 1♂ (the holotype, G. sl. Grc-2090) & 1♀, Ōtaki, Kiso, Nagano-ken, em. 6-17/x/1975, ex *R. trichocarpa* (1542); 1♂, Kyōto, no date, Suzuki leg., determined as *Gracillaria elongella* by Matsumura; 2♂♂ & 2♀♀, Kozagawa, Wakayama-ken, em. 7-18/x/1974, ex *R. trichocarpa* (1303). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū).

Food plants: *Rhus sylvestris* Sieb. et Zucc. and *R. trichocarpa* Miq. (Anacardiaceae).

Remarks: *C. (C.) matsumurai* is very closely related to *C. (C.) recitata* in external colour-pattern, and is difficult to distinguish from the latter by this feature except for the ground colour more deeply reddish in both seasonal forms. In the genital characters, however, it can be clearly distinguished from *recitata* as mentioned in the above description and as shown in the figures (Fig. 22).

The specimen determined as *Gracillaria elongella* by Matsumura is in a rather bad condition and lacks the abdomen. Insofar as the available characters are concerned, this specimen is different from the European *Caloptilia elongella* in having the blackish marginal lines in the cilia of the fore wing and agrees with the autumnal form of the present new species.

Caloptilia (Caloptilia) rhois, sp. nov.

[Figs. 21, 22 (K-P) & 53 (H-I)]

Caloptilia recitata: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30, pl. 4 (114) (part).

Aestival form — ♂♀. Expanse of wings: 11.8–13.2 mm (12.4 mm in average of 6 specimens). Length of fore wing: 5.9–6.6 mm (6.1 mm in average of 8 specimens).

Face light yellowish anteriorly and whitish posteriorly; head grayish-brown. Palpi light yellowish beneath, shining white above; labial palpus with a small blackish ring just before tip. Antenna dark grayish-brown, annulated with light ochre-yellow; scape and its basal pecten dark brown. Thorax ochre-yellow dorsally and dark brown ventrally, somewhat darkened anteriorly on dorsal surface. Fore and mid legs blackish-brown, tarsi shining white, with a fine blackish ring at apex of each segment. Hind leg golden-yellowish in coxa and femur, the apical half of femur black; tibia and tarsus ochre-yellowish, shading into gray apically in tibia. Fore wing ochre-yellow, darkened with purplish-brown scales along costa near base and dorsal margin from basal 2/5 to apex of wing, the darkened area of dorsal margin being widened apically, sometimes occupying more than half width of wing near apex; 2 indistinct blackish spots placed in disc above wing-fold, one at basal 1/4 and the other at middle of wing; 4–10 blackish dots scattered along costal margin of wing at irregular intervals, 1 of them at middle being the largest and prominent; cilia around apex of wing light brownish-gray with 3 apical lines of blackish irrorations, and those along dorsal margin light gray. Hind wing and its cilia light gray.

Autumnal form — ♂♀. Expanse of wings a little larger: 12.5–14.0 mm (13.0 mm in holotype and 13.1 mm in average of 9 specimens). Length of fore wing: 6.2–7.0 mm (6.5 mm in holotype and average of 9 specimens).

Colour-pattern differs from that of the aestival form by the ground colour much darker on almost the whole surface. Palpi infuscated below throughout. Head and thorax ochre-brown, with a purplish iridescence. Fore and mid tarsi suffused with yellowish-brown scales on upper sides, with a distinct blackish ring at apex of each segment; hind tarsus with a fine blackish ring at apex of 2nd to 5th segments. Fore wing uniformly dark brown, with a strongly purplish iridescence; in a few specimens costal margin very narrowly lighter; sometimes a lighter costal blotch placed just before middle of wing, expanding towards wing-fold between 2 blackish discal spots; blackish spots in disc and dots along costal margin of wing are very prominent, in addition to these spots and dots, some smaller dots are irregularly scattered along dorsal margin and wing-fold; cilia around apex of wing dark brown with 3 blackish apical lines, and those along dorsal margin gray. Hind wing and its cilia dark gray.

Genitalia: In both sexes the genitalia are very similar to those of the preceding 2 species, especially to those of *C. (C.) matsumurai*, but may be distinctly separated by the following characters.

♂. Vesica with 2 cornuti much longer, the basal one nearly 1/4 as long as aedoeagus (see Fig. 22 & Table 2).

♀. Ductus bursae partly weakened in sclerotization at its caudal 1/4, gradually widened towards its cephalic 1/6, then suddenly much widened on

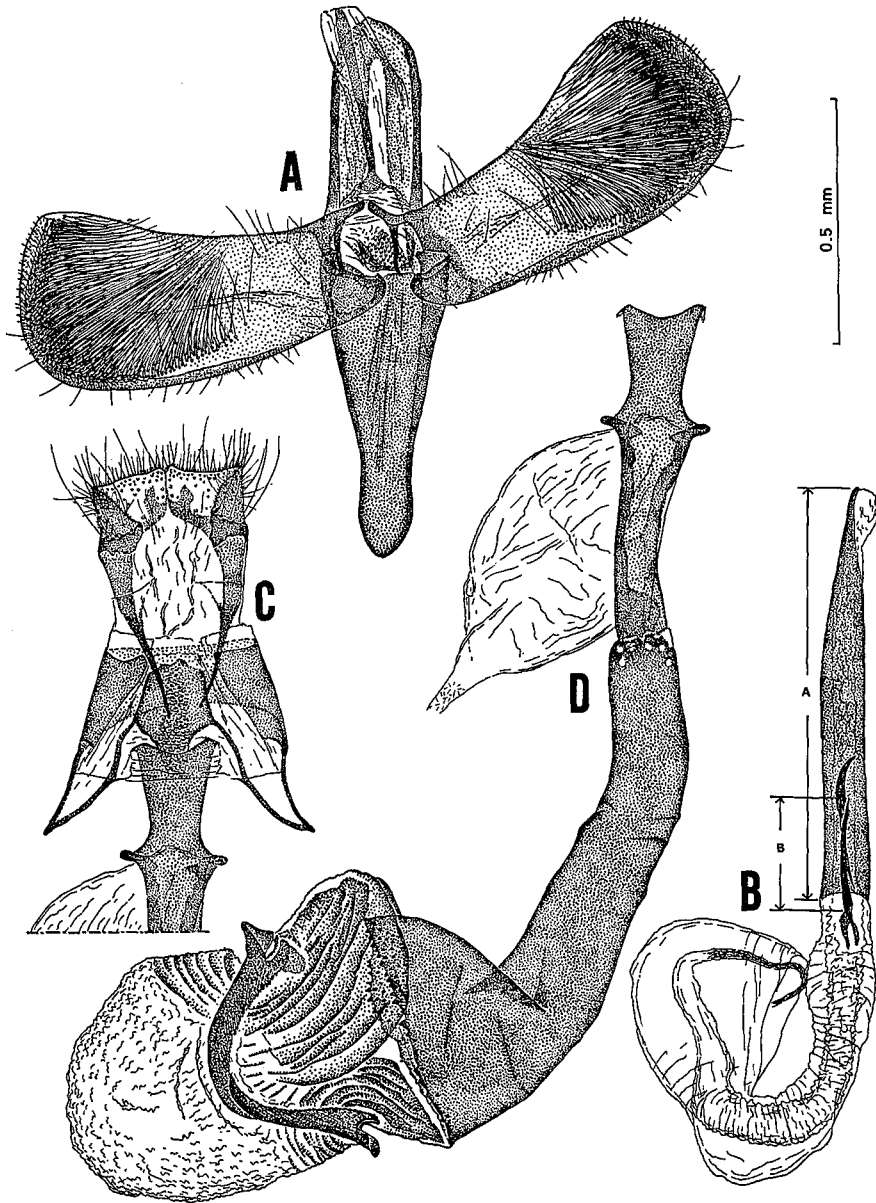


Fig. 21. *Caloptilia (Caloptilia) rhois*, sp. nov. A: Male genitalia [Grc-265, Yamamoto, Ōsaka, Honsyū, em. 3/x/?, ex *Rhus succedanea*] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1114, Sakai, Ōsaka, em. 3/vii/1954, ex *R. javanica*] — D: Bursa copulatrix [ditto].

remaining part, the widened part near terminal end being much larger than that of *C. (C.) matsumurai* (see Fig. 22).

Specimens examined: 5♂♂ & 12♀♀. Aestival form: HOKKAIDŌ — 1♂ & 1♀, Kikonai, Osima, em. 26/vii/1976, ex *Rhus javanica* (1692). HONSYŪ — 1♀, Todai, Ina,

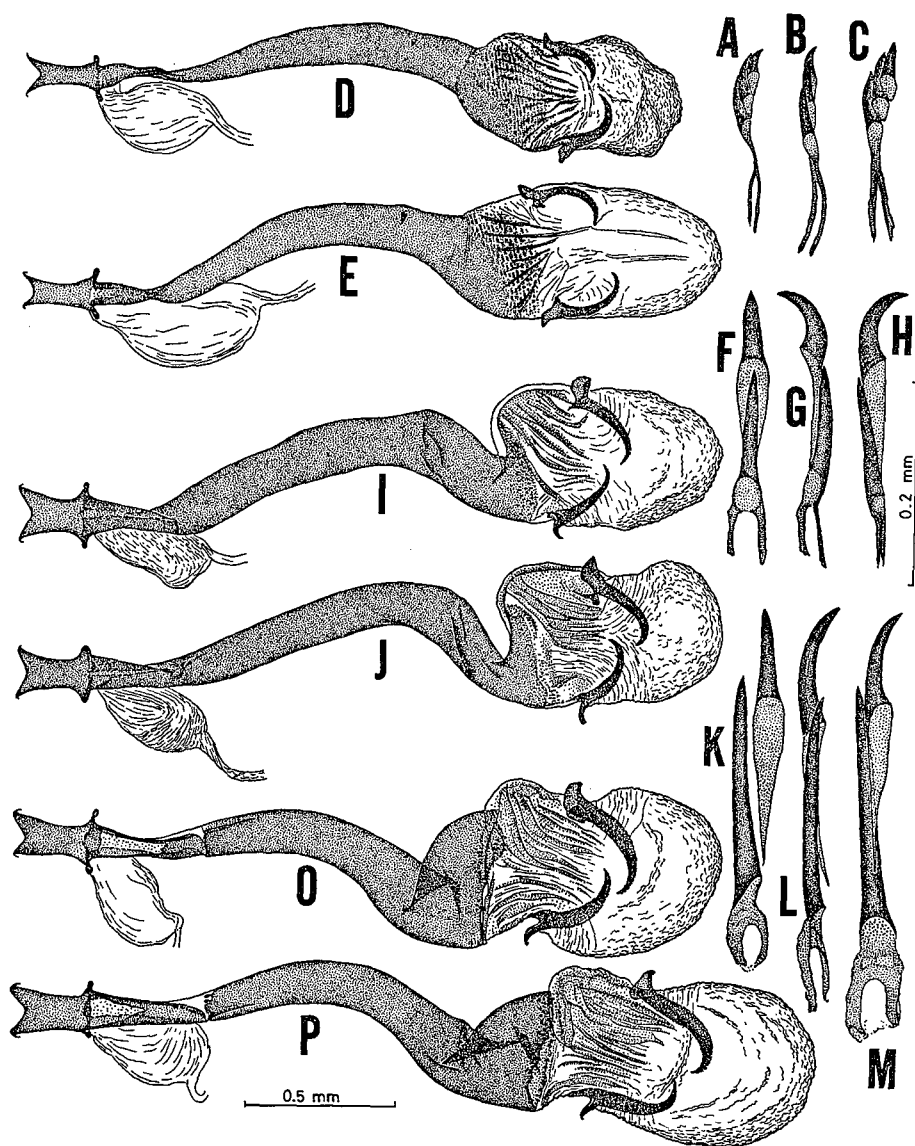


Fig. 22. A-E: *Caloptilia (Caloptilia) recitata* (Meyrick). A: Cornuti [Grc-1226, Hikosan, Kyûsyû, em. 8/vii/1965, ex *Rhus javanica*] — B: Ditto [Grc-258, Hikosan, em. 16/vi/1957, *R. trichocarpa* (198)] — C: Ditto [Grc-1093, Kozagawa, Wakayama-ken, Honsyû, em. 3/vi/1964, ex *R. trichocarpa* (663)] — D: Bursa copulatrix [Grc-1810, Kozagawa, em. 16/x/1974, ex *R. sylvestris* (1286)] — E: Ditto [Grc-263, Hikosan, em. 20/vi/1957, ex *R. trichocarpa* (198)].
 F-J: *Caloptilia (Caloptilia) matsumurai*, sp. nov. F: Cornuti [Grc-1215, Sasayama, Hyôgo-ken, Honsyû, em. 5/vii/1965, ex *R. sylvestris*] — G: Ditto [Grc-1803, Kozagawa, em. 9/x/1974, ex *R. trichocarpa* (1303)] — H: Ditto [Grc-2090, holotype] — I: Bursa copulatrix [Grc-1225, Sasayama, em. 8/vii/1965, ex *R. sylvestris*] — J: Ditto [Grc-2105, Ôtaki, Kiso, Nagano-ken, em. 17/x/1957, ex *R. trichocarpa* (1542)]. (Continued on p. 65)

Table 2. Relative length of aedoeagus (A) to basal cornutus (B) in *Caloptilia* (*Caloptilia*) *rhois* and *C. (C.) matsumurai*. (Measurement as shown in Fig. 21, B.)

Gen. sl. no.	<i>C. (C.) rhois</i>				<i>C. (C.) matsumurai</i>			
	*1800	1186	265	1215	1803	*2090	2121	2122
A	67	59	67	61	64	63	64	64
B	19	16	17	9	9	9	8.5	9.5
A/B	3.5	3.7	3.9	6.8	7.1	7.0	7.5	6.5

* Asterisk indicates the holotype.

Nagano-ken, em. 19/vii/1975, ex *R. javanica* (1410); 1 ♀, Yugasima, Sizuoka-ken, em. 10/viii/1971, ex *R. javanica* (1080); 1 ♀, Sakai, Ôsaka, em. 3/vii/1954, ex *R. javanica*, T. Kodama leg. KYÛSYÛ — 2 ♀♀, Hikosan, Hukuoka-ken, em. 25-29/vi/1957, ex *R. javanica* (209); 1 ♂, ditto, em. 18/vi/1955, ex *R. javanica*, H. Kuroko leg. Autumnal form: HONSYÛ — 1 ♀, Kishokusima, Nagano-ken, em. 13/x/1975, ex *R. javanica* (1524); 1 ♂, Yamamoto, Ôsaka, em. 3/x/?, ex *R. succedanea*, S. Issiki leg., determined as *C. recitata* by Issiki; 1 ♂ (the holotype, G. sl. Grc-1800) & 3 ♀♀, Kozagawa, Wakayama-ken, em. 8-15/x/1974, ex *R. javanica* (1317). KYÛSYÛ — 1 ♀, Hikosan, em. 9/x/1954, ex *R. javanica*, H. Kuroko leg.; 1 ♂, Mine, Tu-sima, em. 6/xi/1979, ex *R. succedanea* (2103). KOREA — 1 ♀, Namhan San Sung, 6/x/1974, K.-T. Park leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû; Kyûsyû); and Korea.

Food plants: *Rhus javanica* Linné and *R. succedanea* Linné (Anacardiaceae).

Remarks: The present species is very closely related to the preceding 2 species, *C. (C.) matsumurai* and *C. (C.) recitata*, and has sometimes been confused with them. In genitalia, however, it may be distinctly separated from the latter two as shown in Fig. 22. In male, *recitata* unvariably has 3 cornuti on the vesica, while *matsumurai* and *rhois* have 2 longer ones; moreover, in *matsumurai* the cornuti are shorter than those of *rhois* in relative length to the aedoeagus (see Table 2). In female, the sclerotization of the ductus bursae in *recitata* is gradually weakened towards corpus bursae, while it is suddenly ended in *matsumurai* and *rhois*; thus the border between the sclerotized ductus bursae and membranous corpus bursae is very clear in the latter 2 species. The distinction between *matsumurai* and *rhois* in female genitalia is given under the description of *rhois*.

Caloptilia (Caloptilia) azaleella (Brants)

[Figs. 23, 53(J), 76(D) & 84(C)]

Gracilaria azaleella Brants, 1913, Tijdsch. Ent. 56: 72.

Caloptilia azaleella: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 29, pl. 4 (111); Okano, 1959, Icon. Ins. Jap. Colore Natur. 1: 275, pl. 182 (8); Kuroko, 1959, Enum. Ins. Montis Hikosan 1, Lep. Suppl. 1: 3; Hirashima et al., 1974, Sci. Bull. Fac. Agr. Kyushu Univ. 29: 93, pl. 3 (8).

Gracilaria anthracosperma Meyrick, 1931, Exot. Microlep. 4: 171. Syn. nov.

K-P: *Caloptilia (Caloptilia) rhois*, sp. nov. K: Cornuti [Grc-1186, Hikosan, em. 18/vi/1955, ex *R. javanica*] — L: Ditto [Grc-265, Yamamoto, Ôsaka, em. 3/x/?, ex *R. succedanea*] — M: Ditto [Grc-1800, holotype] — O: Bursa copulatrix [Grc-264, Hikosan, em. 25/vi/1957, ex *R. javanica*] — P: Ditto [Grc-1639, Yugasima, Amagi, Honsyû, em. 10/viii/1971, ex *R. javanica* (1080)].

♂♀. Expanse of wings: 8.0–11.0 mm (9.3 mm in average of 25 specimens). Length of fore wing: 4.0–5.0 mm (4.6 mm in average of 25 specimens).

Face and palpi shining white; 2nd segment of labial palpus infuscated with ochreous scales below, the 3rd with a rather broad, blackish apical ring. Head dark ochreous-gray with purplish reflections. Antenna ochreous-yellow, annulated with dark brown; scape ochreous-yellow above, blackish-brown below; pecten dark gray. Thorax ochreous-brown, intermixed with ochreous-yellow scales on dorsum; pleural and ventral faces blackish-brown. Fore and mid legs blackish-brown, with a slightly purplish iridescence, the tarsi white, with a narrow apical ring in each segment; hind coxa and femur brassy-yellow, the femur with a large, blackish-brown blotch on apical half; hind tibia and tarsus ochreous-yellow, distinctly darkened apically in all segments. Fore wing dark ochreous-brown with a purplish-iridescence in ground colour, mixed with yellowish scales along dorsal margin especially densely on base below wing-fold; a brassy-yellow costal blotch very elongate, extending on costa from basal 1/4 to just before apex, with its basal 1/4–1/3 widened towards fold across wing, the remaining apical part becoming abruptly narrow and occupying less than half width of wing, with the dorsal margin shading into ground colour; a series of minute blackish spots arranged on costa at irregular intervals; cilia around apex of wing dark brownish with 2 pale gray lines, and those along dorsal margin gray. Hind wing and its cilia gray.

Male genitalia: Subscaphium narrow, abruptly widened into a triangle or T-shape at basal extremity. Valva curved, gradually dilated apically, round on terminal margin, with a row of minute, spinelike setae along outside of usual marginal setae. Vinculum about 2/3 as long as valva. Aedoeagus a little shorter than valva, much dilated basally, with 12–20 corniform cornuti clustered on aedoeagus. Seventh and 8th abdominal segments sparsely covered with scales; coremata consisting of hairy scales, the posterior pair 1/2 as long as the anterior; interior process of 7th sternite long, slender.

Female genitalia: Lamella postvaginalis elongate-triangular; lamella antevaginalis absent. Antrum heavily sclerotized; ductus bursae weakly sclerotized on whole length, slightly sinuate, dilated near cephalic end where it is heavily scobinated; basal area of ductus seminalis rather widened, well sclerotized; corpus bursae oval in form, with 2 rather short, slightly curved, sickle-shaped signa which are equal in size.

Specimens examined: 24♂♂ & 19♀♀. HOKKAIDŌ — 1♀, Sapporo, em. 22/vii/1963, ex *Rhododendron* sp. HONSHŪ — 1♀, Nisinasuno, Totigi-ken, 1/x/1975; 1♀, Mino, Ōsaka, 18/iv/1977, T. Saito leg.; 1♀, Iwawakisan, Ōsaka, em. 29/vi/1954, ex *R. macrosepalum*, T. Yasuda, leg.; 1♂, ditto, em. 30/vi/1953, ex *R. macrosepalum*, S. Issiki leg.; 1♂ & 1♀, Kimitōge, Wakayama-ken, 24/v/1971, F. Komai leg.; 1♂, Kozagawa, Wakayama-ken, em. 3/vi/1964, ex *R. macrosepalum*; 3♀♀, ditto, em. 2–12/xi/1974, ex *R. macrosepalum* (1291); 2♂♂, ditto, em. 3–9/vi/1964, ex *R. decandrum* (662); 2♂♂ & 2♀♀, ditto, em. 11–17/vi/1970, ex *R. kaempferi* (1033); 1♂, ditto, em. 11/vi/1964, ex *R. trichocarpa*; 1♂ & 1♀, ditto, 14–20/v/1964; 1♂, ditto, 23/ix/1974; 1♂ & 2♀♀, Kii-Ĉsima, Wakayama-ken, em. 8–20/vi/1964, ex *R. macrosepalum*; 1♂, Natisan, Wakayama-ken, 27/v/1964; 1♂, Sasayama, Hyōgo-ken, em. 6/vii/1965, ex *R. macrosepalum*. KYŪSHŪ — 1♂, Hikosan, Hukuoka-ken, em. 22/vi/1957, ex *R. trichocarpa* (199); 1♀, ditto, 7/ix/1979, I. Kanazawa leg.; 4♂♂ & 1♀, Mikazuki-yama, Hukuoka-ken, em. 20–30/vi/1957, ex *Rhododendron* sp. (239); 5♂♂ & 3♀♀, Takakuma-yama, Kagosima-ken, em. 1–7/vii/1965, ex *R. viscistylum*; 1♀, Sata-misaki, Kagosima-ken, 4/vi/1956, T. Oku leg. EUROPE — 1♂, Posen (Posnan), Poland, em. iv/1940, ex *R. indicum*, collector not mentioned, determined as *C. azaleella* by Klimesch.

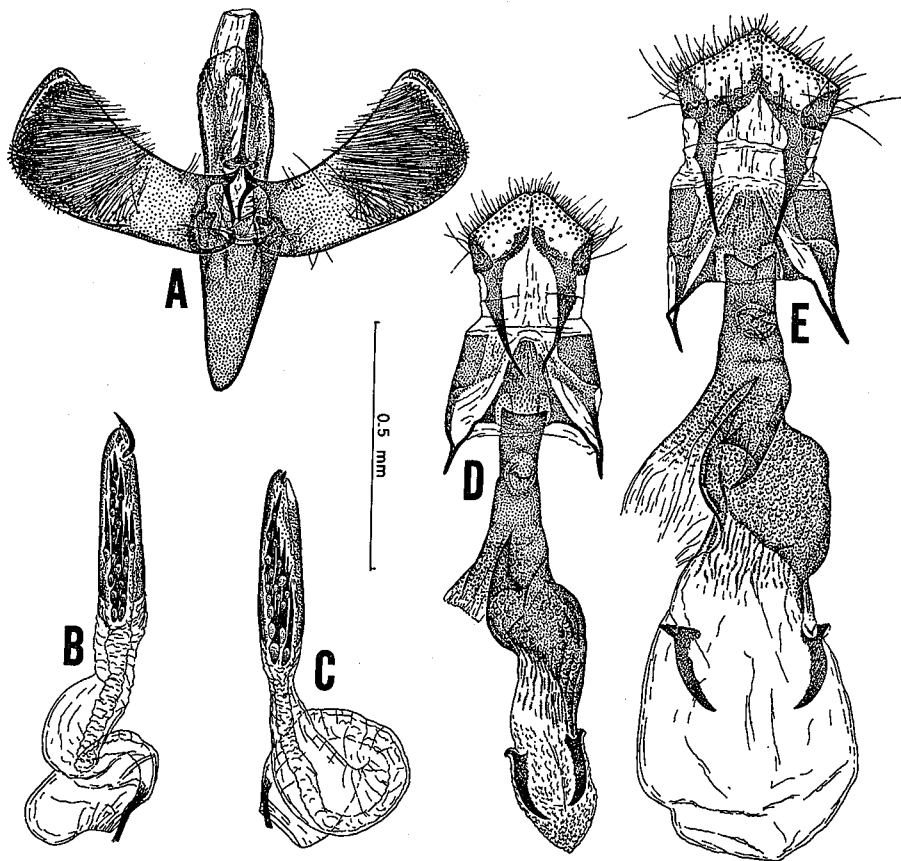


Fig. 23. *Caloptilia (Caloptilia) azaleella* (Brants). A: Male genitalia [Grc-1081, Kozagawa, Wakayama-ken, Honsyû, em. 9/vi/1964, ex *Rhododendron decandrum* (622)] — B: Aedeagus [ditto] — C: Ditto [Grc-1097, Nati, Wakayama-ken, 27/v/1964] — D: Female genitalia [Grc-1082, Kii-Ôsima, Wakayama-ken, em. 12/vi/1964, ex *R. macrosepalum*] — E: Ditto [Grc-1098, Kozagawa, 14-20/v/1964].

Distribution: Japan (Hokkaidô; Honsyû; Sikoku; Kyûsyû); East Asia; Europe; and North America.

Food plants: *Rhododendron decandrum* Makino, *R. indicum* Sweet, *R. kiusianum* Makino (after Hirashima et al., 1974), *R. macrosepalum* Maxim., *R. kaempferi* Planch and *R. viscistylum* Nakai (Ericaceae) in Japan. *Rhododendron indicum* Sweet in other countries.

Remarks: Mr. D.J. Carter of British Museum (N.H.) kindly compared the specimens of *C. (C.) azaleella* sent by me with the type-series of *Gracilaria anthracosperma* which was originally described by Meyrick on the basis of 2 specimens collected from Wakayama, Japan, and informed me as follows: — "The male genitalia of your specimens match those of holotype of *G. anthracosperma* Meyr., and the wing-pattern also agrees well enough." Accordingly, "*G.*" *anthracosperma* Meyrick, 1931, is a junior synonym of *C. (C.) azaleella* (Brants, 1913).

The present species was first found in Holland in 1912 on young plants of

Rhododendron indicum imported from Japan, and is now widely spread throughout the north temperate zone as a serious pest of azalea. In Japan infestation by this insect is common on many kinds of *Rhododendron*-trees (*Azalea* section) not only in gardens but also in natural forests.

Caloptilia (Caloptilia) leucothoes, sp. nov.

[Figs. 24 & 54 (A-B)]

♂♀. Expanse of wings: 8.2–11.0 mm (10.5 mm in holotype and 10.3 mm in average of 24 specimens). Length of fore wing: 4.2–5.5 mm (5.2 mm in holotype and 5.1 mm in average of 25 specimens).

Face and palpi snow-white, the apical segment of labial palpus blackish on apical 1/3, or wholly infuscated in a few specimens. Head dark brownish-gray, sometimes violet-glossy or leaden-metallic. Antenna dark brownish-gray, annulated with ochre-white narrowly; scape and pecten dark brown. Fore and mid legs usually violet-blackish, mixed with white scales on femora and tibiae, the tarsi snow-white, with a blackish apical ring in each segment. Hind leg whitish; femur blackish on apical half; tibia becoming dark gray towards apex; tarsus ochre-gray except for base of each segment. Thorax and fore wing variable in ground colour, dark reddish-brown with deep violet reflections, or ochre-yellowish without violet reflections in some specimens; the wing usually darkened on apical area, with some blackish dots along costa, and with indistinct, blackish dots or strigulae along dorsal margin; cilia gray, with 3 blackish lines around apex of wing. Hind wing and its cilia gray.

Male genitalia: Subscaphium slender, T-shaped at basal extremity. Valva elongate, upturned at apical 1/3, more or less truncated apically, setose as usual; upper process of labidis longer than labidis itself. Aedeagus a little longer than valva, tubular, sinuate, with 4–9 cornuti, 1 at apex being rather long, barlike, peculiarly spiniferous on upper side, and the rest small, corniform, clustered on median area of aedeagus. Seventh and 8th abdominal segments sparsely covered with scales; coremata consisting of hairy scales, the posterior pair 2/5 as long as the anterior; interior process of 7th sternite long.

Female genitalia: Lamella postvaginalis very small, oblong, united with dorsal wall of ostium bursae, which has 2 acute, lateral projections. Ductus bursae slender, well sclerotized on caudal half, with a large, heavily sclerotized, globular protuberance at middle of dorsal side; corpus bursae membranous, elongate-pyriform, with 2 signa, which are very small, hook-shaped, and much widened at the base.

Specimens examined: 14♂♂ & 11♀♀. HOKKAIDŌ — 1♂ & 2♀♀, Aizankei, Daisetuzan, em. 16–20/viii/1966, ex *Rhododendron dauricum*; 1♂ & 3♀♀, Apoi, Hidaka, em. 4–11/ix/1957, ex *Leucothoe grayana* (319); 1♂ & 2♀♀, ditto, em. 15–22/vii/1963, ex *L. grayana*; 1♀, ditto, em. 11/vii/1967, ex *L. grayana* (871); 2♂♂ (one the holotype, G. sl. Grc-1135), Soranuma-dake, em. 3/ix/1964, ex *Rhododendron* sp. (? *albrechti*). HONSHŪ — 2♂♂, Hirai, Ōsaka, 23/ii/1951, S. Issiki leg.; 1♂, ditto, 24/x/?, S. Issiki leg.; 1♂, Ōmata, Wakayama-ken, em. 23/vi/1957, ex *R. dilatatum*, T. Yasuda leg. KYŪSHŪ — 4♂♂ & 3♀♀, Mine, Tu-sima, em. 5–21/xi/1979, ex *R. reticulatum* (2116); 1♂, Toyo, Kamitusima-tyō, Tu-sima, 17/x/1979, K. Yasuda leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

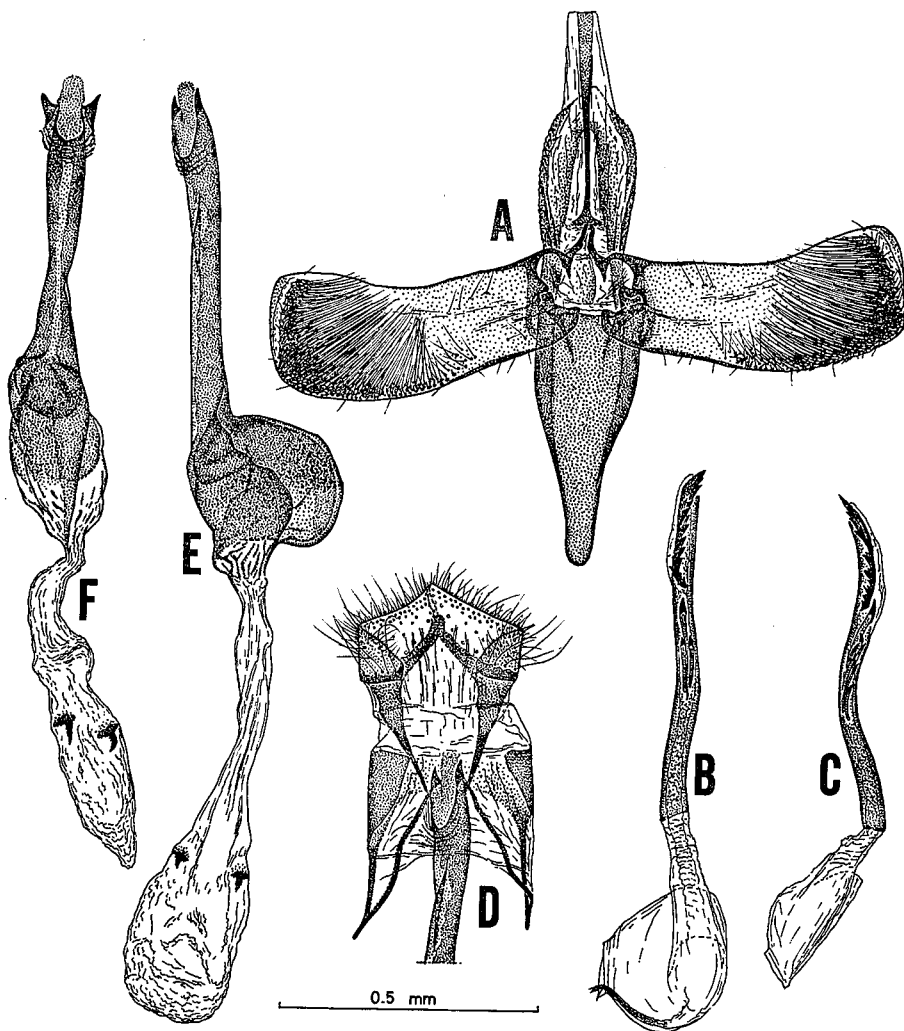


Fig. 24. *Caloptilia (Caloptilia) leucothoes*, sp. nov. A: Male genitalia [Grc-1049, Hirai, Ôsaka, Honsyû, 23/ii/1951] — B: Aedeagus [ditto] — C: Ditto [Grc-1048, Hirai, Ôsaka, 23/ii/1951] — D: Female genitalia [Grc-654, Apoi, Hidaka, Hokkaidô, em. 11/ix/1957, ex *Leucothoe grayana* (319)] — E: Bursa copulatrix [ditto] — F: Ditto [Grc-652, Apoi, em. 15/vii/1963, ex *L. grayana*].

Distribution: Japan (Hokkaidô; Honsyû; Kyûsyû).

Food plants: *Leucothoe grayana* Maxim., *Rhododendron dauricum* Linné, *R. dilatatum* Miq., *R. reticulatum* D. Don and *Rhododendron* sp. (? *albrechti* Maxim.) (Ericaceae).

Remarks: This is a quite peculiar species, and distinguished from any other members of the genus *Caloptilia* by the very small, hook-shaped signa on the corpus bursae, by the very long, spiniferous cornutus on the apex of the aedeagus in

addition to the corniform cornuti, and by the very long upper process of the labidis.

Caloptilia (Caloptilia) mongolicae, sp. nov.

[Figs. 25, 54(C-E), 63(C) & 77(A)]

There are 2 colour forms in adult stage, one is a yellow form with a straw-yellow ground colour, and the other a brown form with a chestnut-brown ground colour.

Yellow form — ♂♀. Expanse of wings: 10.2–12.5 mm (11.5 mm in holotype and 11.6 mm in average of 19 specimens). Length of fore wing: 5.2–6.2 mm (5.8 mm in holotype and average of 21 specimens).

Palpi, face and head pale yellow to straw-yellow; 2nd segment of labial palpus at apex, the 3rd segment at subapex and face at sides blackish; head sometimes mixed with dark gray at vertex between antennae. Antenna grayish-yellow, annulated with black, the annulations becoming broadened towards apex of antenna; scape blackish, with a narrow pale yellow ring; pecten blackish. Thorax pale yellow to straw-yellow dorsally, tegula at base blackish; pleural surfaces blackish. Fore and mid legs blackish, the tarsi silvery-white, with a blackish apical ring in each segment; hind leg grayish- to yellowish-white, the femur with a large, blackish median blotch, the tibia darkened towards apex, and the tarsus infuscated outside except for base of each segment. Fore wing brownish-black in ground colour; dorsal margin below wing-fold pale yellow to straw-yellow throughout, sparsely strigulated or dotted with dark gray or black; a large, pale yellow to straw-yellow costal blotch extending on costa from basal 1/4 to middle of wing, slightly oblique, quadrangular, always confluent to straw-yellow dorsal area, with black spots on its costal margin; costal margin from this blotch to apex of wing dotted with straw-yellow at irregular intervals; cilia around apex of wing dark gray with 3 blackish lines, and those along dorsal margin ochre-gray. Hind wing dark gray, with cilia gray.

Brown form — Expanse of wings: 10.0–12.0 mm (11.0 mm in average of 4 specimens). Length of fore wing: 4.8–6.0 mm (5.5 mm in average of 4 specimens).

Palpi and face heavily irrorated with dark grayish-brown on almost whole surface; head brownish-gray, heavily irrorated with dark brown; fore wing chestnut-brown, with a broad, dark ochre-yellow blotch which is quite similar to the straw-yellow costal blotch of the yellow form in position and shape; a series of blackish dots scattered on costal margin of wing throughout; cilia around apex of wing chestnut-brown, with 3 dark brown lines. The other characters in the colour-pattern are as in yellow form.

Male genitalia: Subscaphium slender, T-shaped at basal extremity. Valva upturned near base, rather strongly dilated apically, round on terminal margin, with minute spinelike setae arranged in a row on just outside of usual long marginal setae. Aedoeagus a little longer than valva, needle-shaped, with a long phallobase which is about 2.5 times as long as aedoeagus itself; 30–40 minute, corniform cornuti arranged in a row. Seventh and 8th abdominal segments sparsely covered with scent scales; coremata consisting of hairy scales, the posterior pair about half as long as the anterior; interior process of 7th sternite minute.

Female genitalia: Lemella postvaginalis moderate in size, trapezoid in

shape; lamella antevaginalis absent. Antrum very narrow, weakly sclerotized; ductus bursae well sclerotized and lined with many spines on caudal part, then membranous, twice coiled, and roughly lined with large spines on succeeding median part, the remaining cephalic part strongly sclerotized, widened and straight; corpus bursae membranous, with 2 curved, sickle-shaped signa, which are equal in size.

Specimens examined: 11♂♂ & 16♀♀. Yellow form: HOKKAIÐŌ — 1♂, Kenebetu,

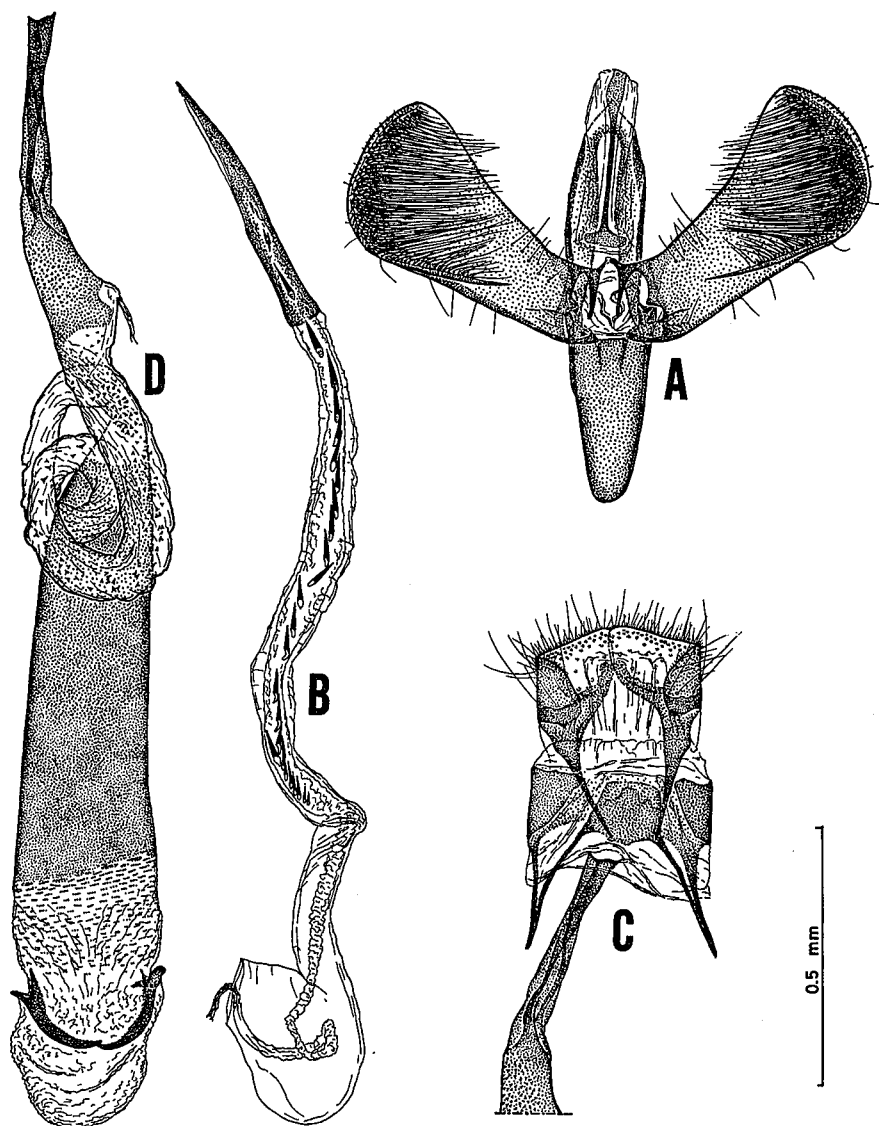


Fig. 25. *Caloptilia (Caloptilia) mongolica*, sp. nov. A: Male genitalia [Grc-1088, Wassamu, Hokkaidō, em. 14/ix/1963, ex *Quercus mongolica* var. *grosseserrata*] — B: Aedeagus [ditto] — C: Female genitalia [Grc-694, Wassamu, em. 15/ix/1962, ex *Q. m.* var. *grosseserrata*] — D: Bursa copulatrix [ditto].

Nemuro, em. 13/viii/1973, ex *Quercus dentata*; 3♂♂ (one the holotype, G. sl. Gr-693) & 4♀♀, Wassamu, Kamikawa, em. 10-15/ix/1962, ex *Q. mongolica* var. *grosseserrata*; 1♂ & 4♀♀, ditto, em. 12-17/ix/1963, ex *Q. mongolica* var. *grosseserrata*; 1♂ & 2♀♀, ditto, em. 1-6/x/1964, ex *Q. mongolica* var. *grosseserrata*; 1♀, Peipan, Asahigawa, 30/vii/1966; 1♂, Apoi, Hidaka, 21/viii/1957; 1♂, Nopporo, em. 27/ix/1971, ex *Q. mongolica* var. *grosseserrata* (1135); 1♀, Sapporo, em. 14/ix/1964, ex *Q. mongolica* var. *grosseserrata*; 1♂, ditto, em. 4/vii/1967, ex *Q. mongolica* var. *grosseserrata*; 1♂ & 1♀, Misumai, Sapporo, em. 13/ix/1967, ex *Q. mongolica* var. *grosseserrata* (889). Brown form: HOKKAIDŌ — 1♀, Kōsyunai, Bibai, em. 19/ix/1967, ex *Castanea crenata*. HONSYŪ — 2♀♀, Turuki, Isikawa-kem, em. 17/ix/1957, ex *C. crenata*, I. Togashi leg.; 1♂, Hirai, Ōsaka, em. 2/x/?, ex *Q. acutissima*, S. Issiki leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū).

Food plants: *Castanea crenata* Sieb. et Zucc., *Quercus acutissima* Carr., *Q. dentata* Thunb. and *Q. mongolica* Fisch. var. *grosseserrata* Rehd. et Wils. (Fagaceae).

Remarks: I have examined no representatives of "*Gracilaria*" *mandshurica* described from East Siberia. According to the original description, this is quite similar to the present new species and also makes a leaf roll on *Quercus mongolica*. The new species, however, is distinguished from *mandshurica* by the following characters in colour-pattern: — Fore wing without any blackish spot in the centre or at the apex. Tarsi of fore and mid legs silvery-white, and those of hind legs dark gray (in *mandshurica* tarsi of all legs reddish-gray).

Caloptilia (Caloptilia) bicolor Ermolaev

[Figs. 26, 52(D) & 84(B)]

Caloptilia bicolor Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 105 & 110.

♀♀. Expanse of wings: 11.0-12.0 mm. Length of fore wing: 5.5-6.2 mm.

Face and head brownish-black, mixed with grayish scales on vertex between antennae very sparsely. Palpi black, whitish on inner side towards base of each segment. Antenna black, with ochreous-brown, narrow annulations; scape and pecten brownish-black. Thorax black dorsally and ventrally, mixed with a few ochreous scales on anterior area of dorsum. Fore and mid legs black, with 2 or 3 white spots on femora and tibiae, the tarsi white, with a very minute black spot at apex of each segment; hind leg black, the coxa and basal half of the femur white, the tibia and tarsus dark brownish-gray, paler towards base of each segment. Fore wing black; a series of very small, whitish spots along both costal and dorsal margins, 2 or 3 similar spots in disc near base, and 1 at apex of wing; a narrow, brassy-yellow fascia at basal 1/3 of wing, slightly oblique outwardly, detached from dorsal margin of wing; cilia around apex of wing and along termen blackish, with 2 paler lines, and those along dorsal margin uniformly gray. Hind wing pale gray, with cilia a little darker.

Male genitalia: Subscaphium slender, suddenly widened triangularly at basal extremity. Valva upturned, strongly dilated apically, round on terminal margin, with dense marginal setae. Vinculum a little longer than half length of valva, triangular, bluntly pointed apically. Aedoeagus a little shorter than valva, sinuate near apex, with an apical prong shortly bifurcated or trifurcated apically; 9-10 minute, corniform cornuti arranged in a single or double row on median area of aedoeagus and 1 long, curved, hook-shaped cornutus at apex of aedoeagus.

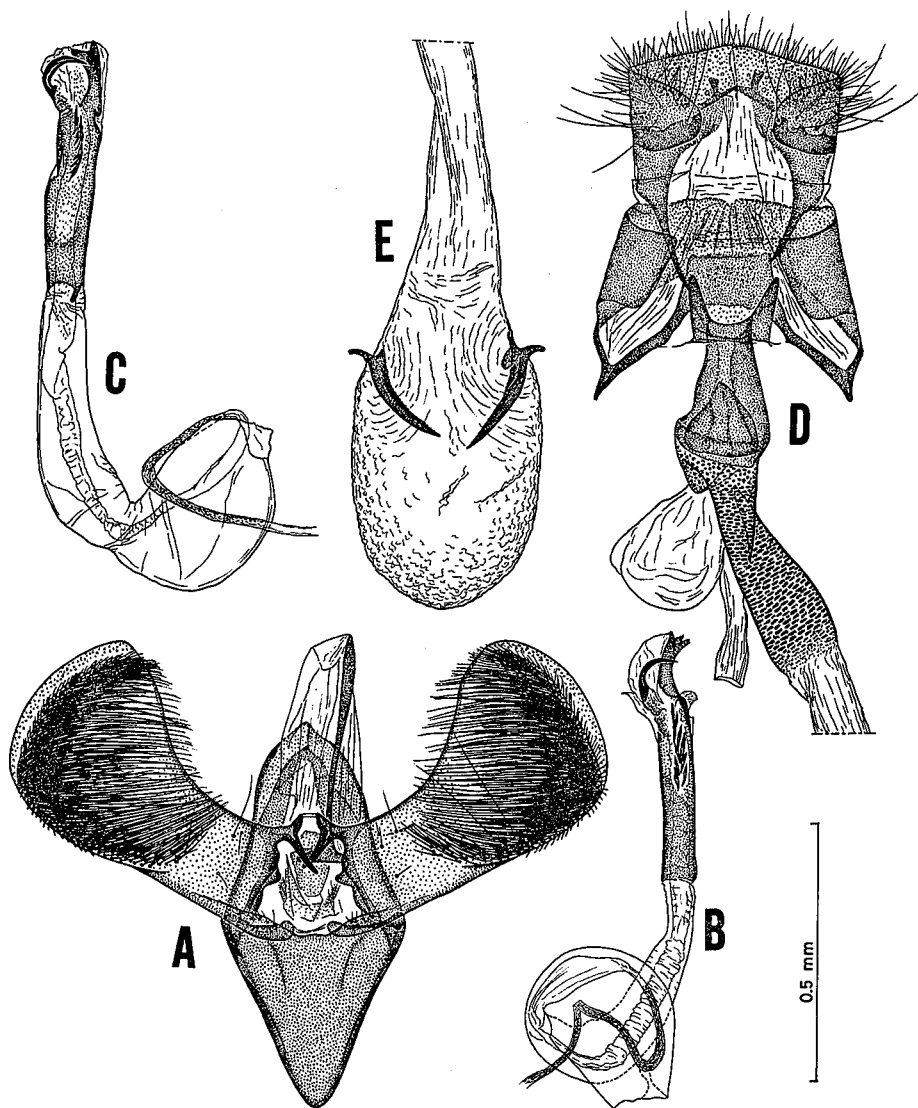


Fig. 26. *Caloptilia (Caloptilia) bicolor* Ermolaev. A: Male genitalia [Grc-1569, Ginsendai, Daisetu-zan, Hokkaidô, em. 4/ix/1970, ex *Betula ermanii* (1066)] — B: Aedeagus [ditto] — C: Ditto [Grc-1805, Kozagawa, Wakayama-ken, Honsyû. em. 12/x/1974, ex *B. grossa* (1310)] — D: Female genitalia [Grc-2137, Tomurausi-onsen, Tokati, Hokkaidô, em. 14/viii/1976, ex *B. ermanii* (1702)] — E: Corpus bursae [ditto].

Seventh and 8th abdominal segments sparsely covered with elongate scales; coremata consisting of hairy scales, the posterior pair about half as long as the anterior; interior process of 7th sternite very short.

Female genitalia: Apophysis posterioris much widened on basal half. Lamella postvaginalis trapezoid, covered with dense microspines on whole surface, connected with apophyses anteriores through ventral prongs; antrum

strongly sclerotized, rather long, moderately dilated at base of ductus seminalis, with a pair of processes at caudal end, the process pointing caudad and about 1/3 as long as apophysis posterioris. Ductus bursae shagreened on its caudal half, then membranous on its cephalic half; corpus bursae membranous, with 2 signa slightly curved, sickle-shaped and denticulated inside.

Specimens examined: 3♂♂ & 2♀♀. HOKKAIDŌ — 2♀♀, Tomurausi-onsen, Tokati, em. 14/viii/1976, ex *Betula ermanii* (1702); 1♂, Ginsendai, Daisetuzan, em. 4/ix/1970, ex *B. ermanii* (1066). HONSHŪ — 1♂, Kozagawa, Wakayama-ken, em. 12/x/1974, ex *B. grossa* (1310). USSR — 1♂, Sapovdenik, Primorskij Kraj, 31/vii/1974, V.P. Ermolaev leg., determined as *C. bicolor* by Ermolaev.

Distribution: Japan (Hokkaidō; Honshū); and USSR (Far East).

Food plants: *Betula ermanii* Cham. and *B. grossa* Sieb. et Zucc. (Betulaceae) in Japan. *Betula dahurica* Pall. in USSR.

Remarks: In the colouration of the fore wing, *C. (C.) bicolor* is very similar to the dark form of *C. (C.) semifasciella*, but is distinguished from the latter by the blackish face and also by the genitalia as follows: — In *bicolor*, the valva is shell-shaped as usual; the transtillae are not united with each other, narrow as usual; the aedoeagus has an apical prong which is bifurcated or trifurcated apically; and the ductus bursae is straight. In *semifasciella* the valva is quadrangular; transtillae complete, tightly united with each other, and very wide; aedoeagus acutely pointed apically, without any apical prong; and ductus bursae distinctly coiled.

Caloptilia (Caloptilia) ulmi, sp. nov.

[Figs. 27, 54(F-G) & 59(F)]

♂♀. Expanse of wings: 11.0–14.0 mm (14.0 mm in holotype and 13.0 mm in average of 15 specimens). Length of fore wing: 5.4–7.0 mm (7.0 mm in holotype and 6.5 mm in average of 15 specimens).

Face, head, palpi, thorax, legs and fore wing more or less uniformly covered with brownish-fuscous scales which are shortly ochreous-whitish at the tip, thus these scales give an ochreous-gray appearance to the ground colour of those parts. Vertex between antennae sometimes whitish. Labial palpus whitish on upper side. Antenna ochreous-whitish, with dark brown annulations; scape and pecten concolorous with head. All tarsal segments whitish towards base, the whitish part being much longer on fore and mid legs than on hind one. Fore wing concolorous with dorsal surface of thorax in ground colour, tinged with bluish or greenish reflections in some light; 10 to 12 whitish spots alternated with blackish spots along costal margin beyond basal 1/4 of wing; in some specimens including holotype, a very obscure, grayish-white, narrow, transverse streak present at basal 1/3 of wing, oblique outwardly from costa, nearly reaching dorsal margin; cilia dark ochreous-gray, with 2 or 3 darker bands along termen. Hind wing brownish-fuscous, with cilia dark ochreous-gray.

Male genitalia: Subscaphium rather slender, T-shaped at basal extremity. Valva upturned, much dilated apically, round on terminal margin, with dense, marginal setae. Vinculum about 2/3 as long as valva, narrowed towards acutely pointed apex. Aedoeagus a little shorter than valva, rather thick, terminating in a much sclerotized, pointed apex, with 40–50 corniform cornuti clustered on median

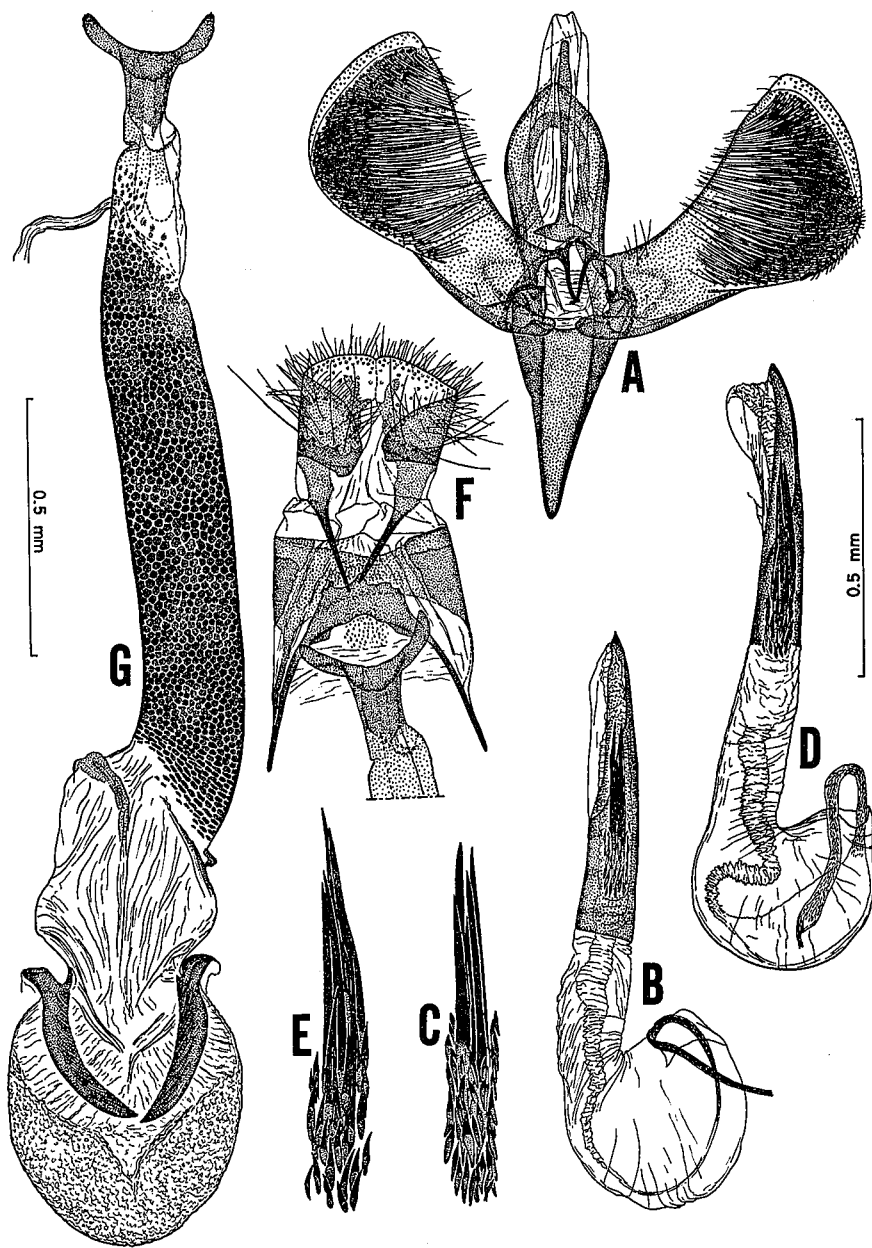


Fig. 27. *Caloptilia (Caloptilia) ulmi*, sp. nov. A: Male genitalia [Grc-1637, holotype] — B: Aedoeagus [ditto] — C: Cornuti enlarged [ditto] — D: Aedoeagus [Grc-2085, Todai, Ina, Nagano-ken, Honsyû, em. 27/ix/1975, ex *Zelkova serrata* (1758)] — E: Cornuti enlarged [ditto] — F: Female genitalia [Grc-1658, Nopporo, Hokkaidô, em. 4/x/1971, ex *Ulmus davidiana* var. *japonica* f. *suberosa* (1108)] — G: Bursa copulatrix [ditto].

area, 5-6 of these cornuti being much longer and needle-shaped. Seventh and 8th abdominal segments sparsely squamose; coremata consisting of hairy scales, the posterior pair about half as long as the anterior; interior process of 7th sternite rather long, about 1/3 as long as median ridge of 8th tergite.

Female genitalia: Lamella postvaginalis trapezoid in shape, with cephalic margin shallowly concave medianly; lamella antevaginalis narrowly crescent-shaped, with lateral corners slightly produced posteriorly. Ductus bursae rather short, gradually thickened anteriorly, sclerotized on short antrum, then membranous on basal area of ductus seminalis, and again much sclerotized and covered with hexagonal sclerites on remaining anterior 3/4; corpus bursae elongate-pyiform, membranous, with 2 curved, long, sickle-shaped signa.

Specimens examined: 11♂♂ & 5♀♀. HOKKAIDŌ — 4♂♂ (one the holotype, G. sl. Grc-1637) & 2♀♀, Nopporo, em. 6/ix.-4/x/1971, ex *Ulmus davidiana* var. *japonica* forma *suberosa* (1108); 2♂♂ & 1♀, ditto, em. 4/ix/1972, ex *U. davidiana* var. *japonica* forma *suberosa* (1147). HONSYŪ — 5♂♂ & 2♀♀, Todai, Ina, Nagano-ken, em. 27/ix.-13/x/1975, ex *Zelkova serrata* (1758). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū).

Food plants: *Ulmus davidiana* Planch. var. *japonica* Nakai forma *suberosa* Nakai and *Zelkova serrata* Makino (Ulmaceae).

Remarks: This new species is distinguished at once from any other members of the genus *Caloptilia* by the peculiar colouration, which is uniformly ochreous gray on almost the whole surface; nevertheless, it has some affinity with *C. (C.) celtina*, *C. (C.) celtidis*, *C. (C.) fidella*, *C. (C.) alchimiella* and *C. (C.) sapporella* in having the ductus bursae covered with minute hexagonal sclerites on almost the whole surface.

Caloptilia (Caloptilia) celtidis, sp. nov.

[Figs. 28 (A-D), 52 (I-J) & 84 (A)]

There are 2 seasonal colour forms: the autumnal form represented by specimens (including the holotype) with a whitish, triangular costal blotch on the fore wing and the aestival form with a brassy-yellow costal blotch. The autumnal form emerged in October and November, while the aestival form in July.

Autumnal form — ♂♀. Expanse of wings: 10.5-12.0 mm (10.8 mm in holotype and 11.1 mm in average of 15 specimens). Length of fore wing: 5.2-5.8 mm (5.3 mm in holotype and 5.5 mm in average of 15 specimens).

Face whitish, sometimes mixed with dark brown scales in centre; head covered with dark brown scales of which the tips are shortly gray-whitish. Palpi whitish; labial palpus with a black line beneath, the apical segment blackish on its apical half. Antenna blackish, faintly annulated with ochreous white; scape concolorous with head; pecten pale ochre-brown. Thorax dark brown, with narrow, ill-defined, longitudinal ochre-gray lines. Fore and mid legs dark chestnut-brown, the tarsi white, with a blackish apical ring in each segment; hind leg yellowish-white in coxa and femur, the femur chestnut-brown on the apical half, the tibia and tarsi ochre-gray, darkened apically in each segment. Fore wing dark chestnut- or reddish-brown, becoming paler towards apex, slightly tinged with bluish reflections; a triangular costal blotch extending from basal 1/3 to apical 1/4 of costa of wing,

silvery-white, mixed with brownish gray, with blackish dots along its costal margin; cilia around apex of wing chestnut-brown with a paler line, and those along dorsal margin brownish-gray. Hind wing dark gray, with cilia brownish-gray.

Aestival form — ♂♀. Expanse of wings: 9.2–10.2 mm (9.8 mm in average of 5 specimens). Length of fore wing: 4.5–5.0 mm (4.8 mm in average of 5 specimens).

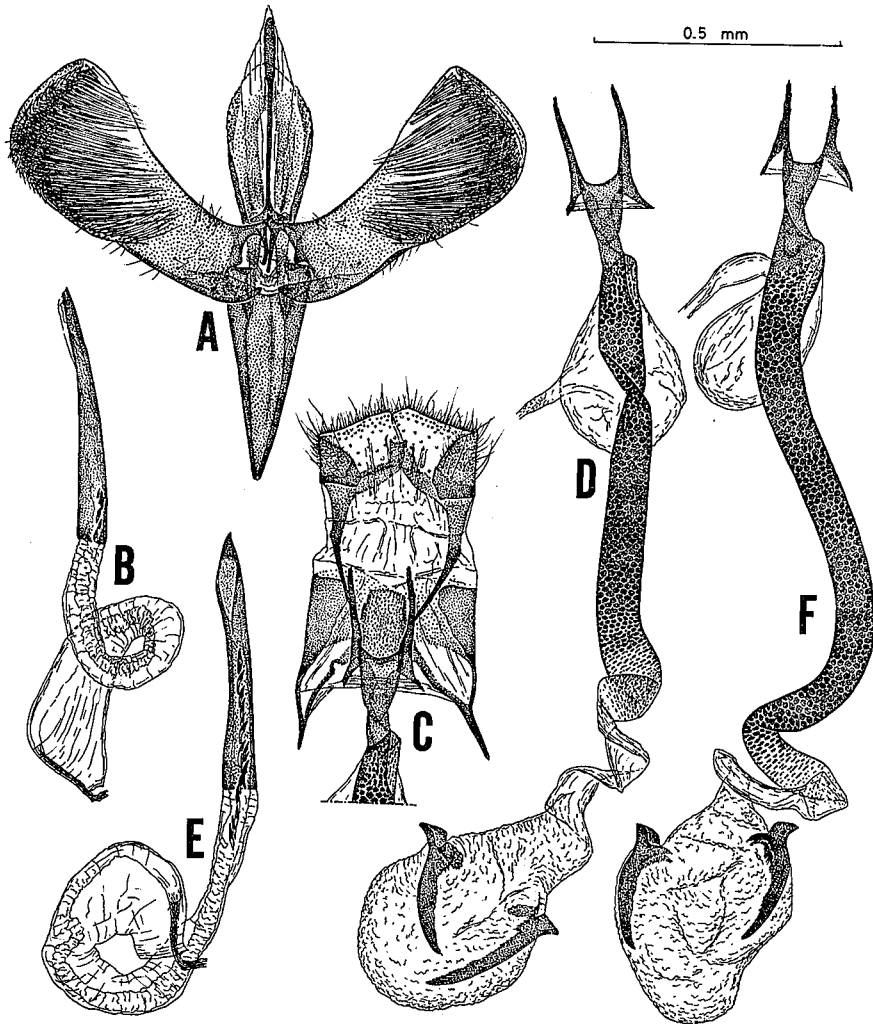


Fig. 28. A–D: *Caloptilia (Caloptilia) celtidis*, sp. nov. A: Male genitalia [Grc-1004, Ikeda, Ōsaka, Honsyū, em. 21/ix/1949, ex *Celtis sinensis*] — B: Aedoeagus [ditto] — C: Female genitalia [Grc-1006, Ikeda, em. 24/ix/1949, ex *C. sinensis*] — D: Bursa copulatrix [ditto].

E–F: *Caloptilia (Caloptilia) fideella* (Reutti). E: Aedoeagus [Grc-1172, Linz, Austria, em. 25/x/1940, ex *Humulus lupulus*] — F: Bursa copulatrix [Grc-992, Karlsruhe, Europe, 10/x/1882, ex *H. lupulus*].

Differing from the autumnal form by the following characters in colour-pattern. Face brassy-yellow, the posterior half white; palpi yellowish, with a blackish ring at apex of labial palpus. Hind coxa and basal half of hind femur brassy-yellowish; hind tibia and tarsus ochre-yellow. Fore wing dark ochre-brown, more strongly tinged with violet reflections; a triangular costal blotch entirely brassy-yellow, not irrorated with grayish scales.

Male genitalia: Subscaphium widened triangularly at basal extremity. Valva slightly elongate, upturned, nearly parallel-sided on basal 2/5, then gradually widened apically, round on terminal margin, with slender marginal setae. Aedoeagus about as long as valva, needle-shaped, with a row of 5 or 6 corniform cornuti. Seventh and 8th abdominal segments sparsely covered with scent scales; coremata consisting of hairy scales, the posterior pair being about 1/3 as long as the anterior; interior process of 7th sternite rather long, about 1/3 as long as median ridge of 8th tergite.

Female genitalia: Lamella postvaginalis oblong, the apex nearly reaching caudal margin of 8th abdominal segment; lamella antevaginalis very small, with 2 long lateral processes. Antrum weakly sclerotized, slender, about as long as lateral process of lamella antevaginalis; ductus bursae densely covered with hexagonal sclerites on caudal 2/3-3/4, then membraneous and twice coiled; basal area of ductus seminalis well sclerotized; corpus bursae pyriform, with 2 curved, sickle-shaped signa, which are asymmetrical in position.

Specimens examined: 13♂♂ & 10♀♀. Autumnal form: HONSYŪ — 4♂♂ (one the holotype, G. sl. Grc-1351) & 4♀♀, Kyôto, em. 20/x.-7/xi/1966, ex *Celtis sinensis*; 4♂♂, Ikeda, Ôsaka, em. 21-24/ix/1949, ex *C. sinensis*, S. Issiki leg.; 1♀, Sakai, Ôsaka, em. 24/xi/1954, ex *C. sinensis*, S. Issiki leg. KYŪSYŪ — 1♀, Tutu, Izuhara-tyô, Tu-sima, em. 5/xi/1979, ex *C. jessoensis* (2076); 2♀♀, Toyo, Kamitusima-tyô, Tu-sima, em. 22/x.-1/xi/1979, ex *C. jessoensis* (2123); 1♀, Hitakatu, Kamitusima-tyô, em. 27/x/1979, ex *C. jessoensis* (2149); 1♂, Kagosima-si, em. 27/xi/1973, ex *C. sinensis* (1255). Aestival form: HONSYŪ — 3♂♂, Sakai, Ôsaka, em. 13-15/vii/1975, ex *C. sinensis* (1407). KYŪSYŪ — 1♂ & 1♀, Hikosan, Hukuoka-ken, em. 27-29/vii/1956, ex *C. sinensis*, H. Kuroko leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû; Kyûsyû).

Food plants: *Celtis jessoensis* Koidz. and *C. sinensis* Pers (Ulmaceae).

Remarks: This species is closely related to *C. (C.) celtina*, which also attacks the leaf of *Celtis* in South Africa and has similar seasonal forms. Dr. L. Vári of Pretoria has kindly examined material from Japan and has informed me as follows:-

"Japanese form reared from *Celtis sinensis* is very, very close to *C. celtina* Vári, and apart from a slight difference in the whitish triangle on the fore wing I cannot find differences either in the genitalia or colour-pattern. The aedoeagus is slightly different in the cornuti, and the lateral processes of the sterigma are a little heavier. The colour of the Japanese form is also a little darker, but all details of head, palpi, abdomen and legs are almost exactly the same. Nevertheless, taking into consideration the fact of the widely separated localities and different food plants, I would suggest to treat the Japanese form as a separate species." As I have not examined any representatives of *celtina* by myself, I would like to follow Dr. Vári as to the systematic treatment of the Japanese form.

The new species is also related to *C. (C.) fidella* attacking the leaf of *Humulus* spp. (Moraceae) in Central Europe, but is distinguished from the latter by the

aedoeagus with 5 or 6 cornuti and by the longer membranous area of the ductus bursae; in *fidella* the cornuti of the aedoeagus are 11 or 12 in number.

Caloptilia (Caloptilia) sapporella (Matsumura)

[Figs. 29 (A-B), 30 (A-B), 54 (H-I) & 69 (A)]

Gracillaria sapporella Matsumura, 1931, 6000 Ill. Ins. Jap.: 1101, f. 2286.

Caloptilia sapporella: Inoue, 1954, Check List Lep. Jap. 1: 26; Okano, 1954, Tinea 1: 46.

Caloptilia rhodinella: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 29, pl. 4 (119); Okano, 1959, Icon. Ins. Jap. Color. Natur. 1: 275, pl. 182 (9). [Misidentification.]

♀. Expanse of wings: 10.0–13.5 mm (11.9 mm in average of 25 specimens). Length of fore wing: 5.2–6.8 mm (6.5 mm in holotype and 6.0 mm in average of 25 specimens).

Face, head and thorax golden-yellow; head mixed with purplish brown at vertex between antennae; tegula purplish-brown on basal half. Palpi ochre-white; labial

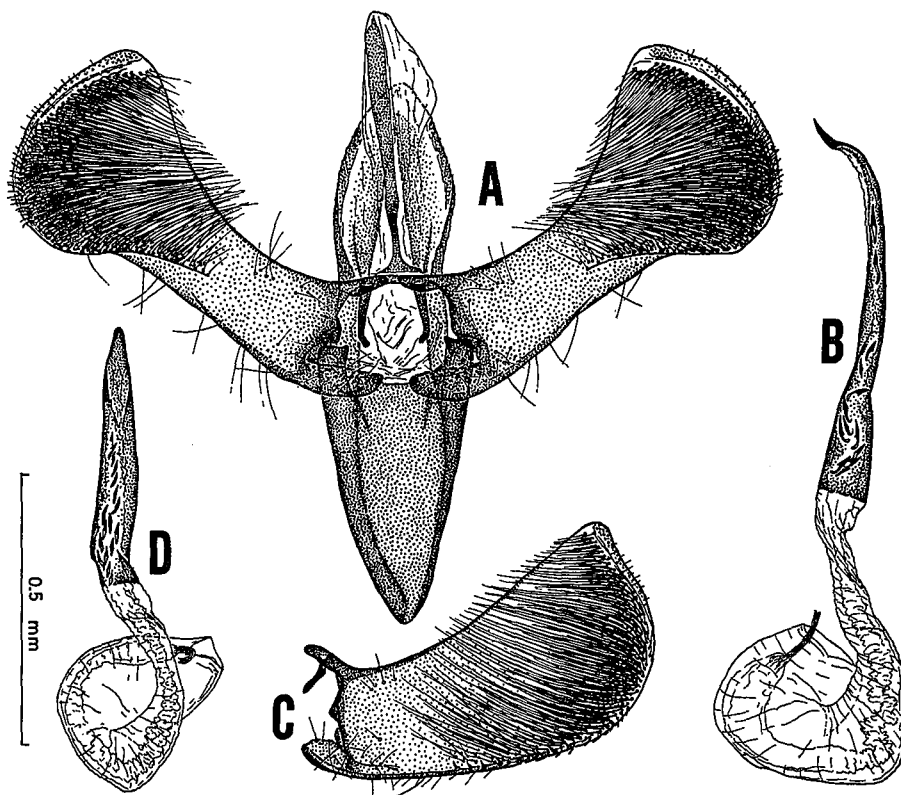


Fig. 29. A-B: *Caloptilia (Caloptilia) sapporella* (Matsumura). A: Male genitalia [Grc-670, Eniwa, Hokkaidō, 6/vi/1961] — B: Aedoeagus [ditto]. C-D: *Caloptilia (Caloptilia) alchimiella* (Scopoli). C: Right valva [Grc-916, Austria, em. v/1952, ex *Quercus robur*] — D: Aedoeagus [ditto].

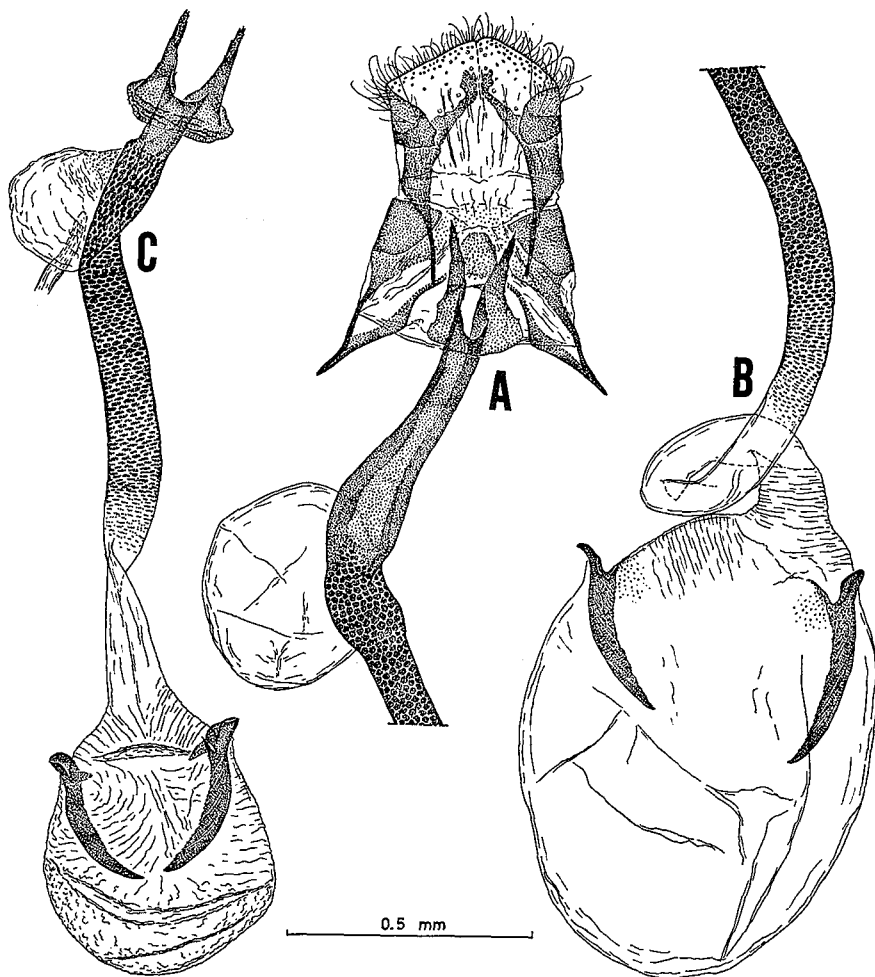


Fig. 30. A-B: *Caloptilia (Caloptilia) sapporella* (Matsumura). A: Female genitalia [Grc-738, Zenibako, Hokkaidô, 7/vi/1956] — B: Corpus bursae [ditto].
 C: *Caloptilia (Caloptilia) alchimiella* (Scopoli), bursa copulatrix [Grc-913, Austria, em. v/1952, ex *Quercus robur*].

palpus with a blackish ring near apex. Antenna ochreous, annulated with dark brown; scape ochreous-brown above, blackish below, with pecten brownish. Fore and mid legs blackish-brown, the tarsi white, with a blackish apical ring in each segment; hind coxa and femur pale golden-yellow, with a large, blackish blotch at apical 1/3 of femur; hind tibia and tarsus ochre-whitish, the tibia becoming dark gray towards apex. Fore wing pale reddish-brown, slightly tinged with violet reflections; dorsal margin suffused with golden yellow towards base; a golden-yellow, triangular costal blotch very elongate along costa, extending from basal 1/4 to apical 1/6 of wing, widely truncated at fold, more or less constricted at its middle, with a few blackish dots along its costal margin; cilia around apex of wing ochre-brown

with 3 dark lines, and those along dorsal margin ochre-whitish. Hind wing dark gray, with cilia pale gray.

Male genitalia: Subscaphium widened triangularly at basal extremity. Valva elongate, narrow and parallel-sided on basal 3/5, then suddenly widened towards apex, round on terminal margin, with dense marginal setae. Vinculum about 2/3 as long as valva, round apically. Aedoeagus a little longer than valva, needle-shaped, terminating in a sclerotized, long spine, with 9–13 minute, spinelike cornuti scattered on aedoeagus. Seventh and 8th abdominal segments sparsely covered with scent scales; coremata consisting of hairy scales, the posterior pair about 3/5 as long as the anterior; interior process of 7th sternite minute, 1/5–1/4 as long as median ridge of 8th tergite.

Female genitalia: Lamella postvaginalis small, triangular or semielliptical; lamella antevaginalis a little larger, with 2 long lateral processes. Antrum weakly sclerotized, very long, more than 3 times as long as lateral process of lamella antevaginalis; ductus bursae covered with hexagonal sclerites on almost whole area; corpus bursae oval or pyriform, with 2 slightly curved, sickle-shaped signa.

Specimens examined: 31♂♂ & 20♀♀. HOKKAIDŌ — 1♀, Abasiri, 7/vi/1961; 1♂, Kenebetu, Nemuro, em. 13/viii/1973, ex *Quercus dentata*; 5♂♂ & 2♀♀, ditto, em. 22–26/v/1980, ex *Q. dentata* (2012); 1♀, Totaki, em. 26/vii/1956, ex *Q. dentata* (133); 1♂, Horokanai, Tokati, em. 12/viii/1958, ex *Q. mongolica* var. *grosseserrata*; 1♂ (the holotype of *sapporella*, G. sl. Grc–679), Sapporo, 11/vi/1898, S. Matsumura leg.; 1♂, ditto, em. 24/vii/1956, ex *Castanea crenata* (149); 2♂♂ & 1♀, Eniwa, 6/vi/1961; 1♂, Teine, em. 31/vii/1956, ex *Q. mongolica* var. *grosseserrata* (158); 1♀, Zenibako, Siribesi, 7/vi/1956; 3♂♂ & 1♀, Ônuma, Osima, em. 11–15/v/1978, ex *Q. mongolica* var. *grosseserrata* (1785). HONSYŪ — 1♂, Morioka, 8/v/1953, M. Okano leg.; 1♂ & 1♀, ditto, em. 17–29/vii/1957, ex *Q. serrata*; 1♂, Maki-tyô, Niigata-ken, 2/viii/1970, F. Komai leg.; 1♂, Nagano-si, em. 8/iv/1958, ex *Q. acutissima*, K. Kamijo leg.; 1♂, Kisohukusima, Ngano-ken, em. 19/vii/1975, ex *Q. acutissima* (1434); 1♂, Todai, Ina, Nagano-ken, em. 26/iv/1976, ex *Q. dentata* (1623); 9♂♂ & 8♀♀, Kawatinagano, Ôsaka, em. 14–20/vi/1957, ex *Q. acutissima* (189); 1♂, Sayama, Ôsaka, 17/vi/1955, ex *Rhododendron macrosepalum*, S. Issiki leg., determined as *C. rhodinella* by Issiki; 1♀, Sasayama, Hyôgo-ken, em. 6/vii/1965, ex *Q. acutissima*; 1♀, Kozagawa, Wakayama-ken, em. 11/vi/1970, ex *Castanea crenata* (1058). SIKOKU — 1♀, Ino, Kôti-ken, 22/vi/1957. NANSEI IS. — 1♀, Nisinomote, Tanega-sima, em. 1/vii/1965, ex *C. crenata*. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû; Sikoku; Kyûsyû, after Kuroko, 1959; Nansei Is.).

Food plants: *Castanea crenata* Sieb. et Zucc., *Quercus acutissima* Carr., *Q. dentata* Thunb., *Q. mongolica* Fisch. var. *grosseserrata* Rehd. et Wils. and *Q. serrata* Thunb. (Fagaceae), and ? *Rhododendron macrosepalum* Maxim. (Ericaceae).

Remarks: The holotype of *sapporella* is in rather bad condition, being covered with fungi. The above redescription is mainly based upon recently collected material which agrees well with the type in genitalia and other characters available to examine.

So far as examined, the specimens determined as *rhodinella* by several Japanese authors are not identical with *rhodinella*, but with *sapporella*. *C. (C.) sapporella* is much more closely related to *C. (C.) alchimiella* and *C. (C.) robustella* than to *C. (C.) rhodinella*, all of which attack the leaves of oaks in Europe. It is, however, distinguished from *alchimiella* and *robustella* by the aedoeagus which

terminates in a sclerotized, long spine, by the characteristic shape of the valva, and by the very long antrum.

Caloptilia (Caloptilia) issikii, sp. nov.

[Figs. 31 & 54(J)]

Caloptilia elongella (!): Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30, pl. 4 (118) (part). [Misidentification.]

Caloptilia elongella: Okano, 1959, Icon. Ins. Jap. Color. Natur. 1: 275, pl. 182 (7). [Misidentification.]

Having examined 1 specimen identified as *C. elongella* by Issiki, I have concluded that it belongs to a new species described here. Furthermore, judging from the notes and figure given by Okano (1956), his *elongella* is also identical with the present new species.

♂. Expanse of wings: 10.8 (in holotype) to 11.5 mm. Length of fore wing: 5.2 (in holotype) to 5.8 mm.

Face pale golden-yellow; head and thorax reddish-brown, irrorated with darker scales, the thorax with a narrow, yellowish median stripe. Palpi ochre-yellowish, with a dark subapical ring on apical segment of labial palpus. Antenna grayish-brown, annulated with pale gray; scape dark brown, with an ochre-brown apical ring; pecten ochre-brown. Fore and mid legs dark reddish-brown, much darker than thorax; tarsi white, with a blackish apical ring on each segment, the ring on 1st segment occupying about 1/3 length of the segment. Hind coxa and femur pale golden-yellow, with a blackish blotch at middle of femur; hind tibia and tarsus ochre-gray, darkened towards apex of each segment. Fore wing reddish-brown, very slightly tinged with purplish reflections in some light; a brassy-yellow costal blotch semicircular or trapeziform, extending on costa from basal 1/4 to middle of wing, widely truncated on wing-fold, with 3 or 4 blackish dots along its costal margin; cilia around apex of wing ochre-brownish with 3 dark brown lines, and those along dorsal margin pale gray. Hind wing dark gray, with cilia pale gray.

Male genitalia: Subscaphium very slender, slightly widened at basal extremity. Valva strongly dilated apically, round on terminal margin, setose as usual. Vinculum narrow, much shorter than valva. Aedoeagus a little shorter than valva, needle-shaped, with a narrow, simple apical prong; a double row of about 20 spinelike cornuti placed on apical area of phallobase, and 10 smaller cornuti irregularly scattered on basal half of aedoeagus. Seventh and 8th abdominal segments sparsely squamose; coremata consisting of hairy scales, the posterior pair about 1/2 as long as the anterior; interior process of 7th sternite about 1/4 as long as median ridge of 8th tergite.

Specimens examined: 2♂♂. HOKKAIDŌ — 1♂, Apoi, Hidaka, em. 10/vii/1973, ex *Alnus japonica* (1159). HONSYŪ — 1♂ (the holotype, G. sl. Grc-1009), Kagata, Kyōto, em. 8/x/1954, ex *Alnus* sp., S. Issiki leg., determined as *C. elongella* by Issiki. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū).

Food plants: *Alnus* spp. including *japonica* Steud. (Betulaceae).

Remarks: This species is distinguished at once from *C. (C.) elongella* and *C. (C.) alni* by the fore wing with a well-defined, brassy-yellow, trapeziform or semicircular costal blotch, by the cilia around the apex of the fore wing with 3 dark

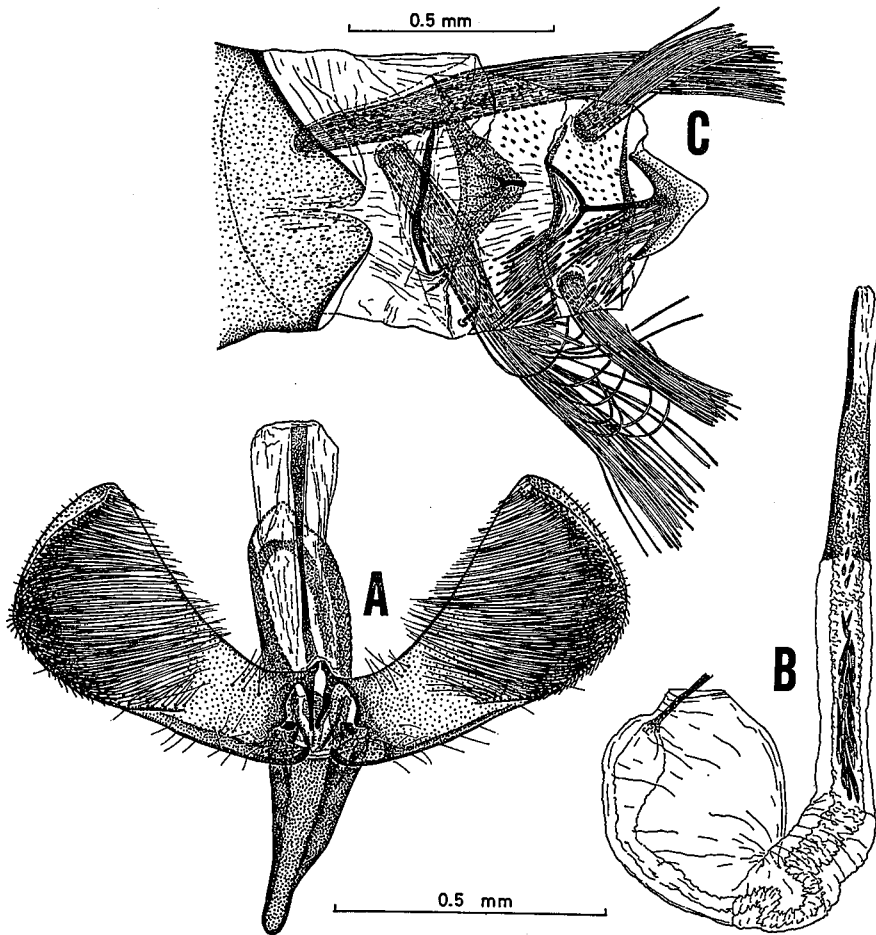


Fig. 31. *Caloptilia (Caloptilia) issikii*, sp. nov. A: Male genitalia [Grc-1009, holotype] — B: Aedoeagus [ditto] — C: 6th to 8th abdominal segments of male, dorsal view [Grc-1686, Apoi, Hidaka, Hokkaidô, em. 10/vii/1973, ex *Alnus japonica* (1159)].

brown lines, by the golden-yellow hind femur with a blackish median blotch, by the 1st segment of the fore and mid tarsi with a very broad, blackish apical ring, and by the aedoeagus with a single apical prong which is not spiniferous. It may also be distinguishable from "*Gracillaria*" *glutinella* described from North America by the colouration of the legs and by the smaller size.

The name of the present species is dedicated to the late Prof. Dr. S. Issiki of the University of Ôsaka Prefecture.

Caloptilia (Caloptilia) alni Kumata

[Fig. 55 (A-C)]

Caloptilia alni Kumata, 1966, *Ins. matsum.* 29: 12, pls. 2 (13 & 14), 8 (34) and 17 (56); Ermolaev, 1977, *Proc. Zool. Inst. Acad. Sci. USSR* 70: 109; *ibid.*, 1979, in *Terrestrial Arthropoda of the Far East*: 24.

Caloptilia elongella [!]: Issiki, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 30 (part).
[Misidentification.]

Specimens examined: 23♂♂ & 31♀♀. HOKKAIDŌ — 1♀, Wassamu, Kamikawa, em. 22/ix/1963, ex *Alnus hirsuta*; 1♀, ditto, em. 3/x/1964, ex *A. hirsuta*; 3♂♂ & 2♀♀, Haboro, Rumoi, em. 29/viii.-5/ix/1973, ex *A. hirsuta*; 1♂ & 1♀, Maruseppu, Kitami, em. 26/vii/1974, ex *A. hirsuta*; 1♀, Rubesibe, Kitami, 4/vii/1974; 1♂ & 1♀, ditto, em. 16/vii/1974, ex *A. hirsuta*; 3♂♂ & 1♀, Tomurausi-onsen, Tokati, em. 2/viii/1976, ex *A. hirsuta* (1701); 1♂, Nukabira, Tokati, em. 28/vii/1959, ex *A. hirsuta*; 1♀, Aizankei, Daisetuzan, em. 12/vii/1957, ex *A. hirsuta*; 1♀, ditto, em. 20/viii/1966, ex *A. hirsuta*; 1♀, ditto, em. 2/viii/1966, ex *A. hirsuta*; 1♀, Peipan, Asahigawa, em. 22/viii/1966, ex *A. hirsuta*; 1♀, Porosiri-dake (ca 500 m), Hidaka, 24/vii/1967; 4♂♂ & 4♀♀, Apoi, Hidaka, em. 4-16/ix/1957, ex *A. hirsuta* (65); 1♂, ditto, em. 21/vii/1959, ex *A. hirsuta*; 1♀, ditto, em. 12/vii/1967, ex *A. hirsuta* (875); 1♂ & 2♀♀, ditto, em. 11-17/vii/1973, ex *A. hirsuta* (1159); 1♂ (the holotype of *alni*, G. sl. Grc-1140) & 1♀, Nopporo, em. 6/ix/1964, ex *A. japonica*; 2♂♂, ditto, em. 11-29/ix/1964, ex *A. hirsuta*; 1♂ & 2♀♀, ditto, em. 7-10/ix/1971, ex *A. hirsuta* (1101); 1♂, ditto, em. 14/ix/1972, ex *A. japonica* (1146); 1♀, Sapporo, em. 12/vii/1956, ex *A. hirsuta* (65); 1♂, ditto, 19/vii/1959; 1♂, ditto, em. 3/vii/1967, ex *A. hirsuta* (861); 1♂ & 3♀♀, Misumai, Sapporo, em. 13/ix/1967, ex *A. hirsuta* (886); 1♂, Muine-dake, em. 12/ix/1963, ex *A. hirsuta*; 1♀, Soranuma-dake, 9/viii/1962. HONSHŪ — 2♂♂, Yatuga-dake, Nagano-ken, em. 21/x/1957, ex *A. hirsuta*, K. Kamijo leg.; 1♀, Utukusigahara, Nagano-ken, 17/v/1953, A. Mutuura leg.; 1♀, Ōtaki, Kiso, Nagano-ken, em. 22/vii/1957, ex *A. hirsuta* (1462); 1♂, Todai, Ina, Nagano-ken, em. 7/x/1975, ex *A. hirsuta* (1582). The holotype of *alni* is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honshū); and USSR (Far East).

Food plants: *Alnus japonica* Steud. and *A. hirsuta* Turcz. (Betulaceae) in Japan.

Remarks: The present species is all alike to *C. (C.) elongella* and *C. (C.) betulicola*, but it is easily distinguished from the latter 2 species by the arrangement of the cornuti of the aedoeagus in the male and the shape of the ductus bursae in the female as follows: — Aedoeagus with 2 very slender apical prongs, one being simple, and the other bifurcated apically and spiniferous on its basal 2/3; a double longitudinal row of 20-30 small spinelike cornuti placed on median area of phallobase. Well-sclerotized ductus bursae irregularly curved and twice coiled on its cephalic part.

Caloptilia (Caloptilia) betulicola (Hering)

[Figs. 32 & 55 (D-E)]

Gracilaria betulicola Hering, 1927, Zeit. Ang. Ent. 13: 168.

♂♀. Expanse of wings: 14.0-18.0 mm (15.9 mm in average of 16 specimens). Length of fore wing: 7.0-9.0 mm (7.9 mm in average of 17 specimens).

Face yellowish-white; head and thorax pale ochre-yellow to reddish-brown. Palpi pale ochre-yellow; apical segment of labial palpus reddish-brown on lower side. Antenna blackish-brown, slightly annulated with yellowish-white; scape and pecten concolorous with head. Fore and mid legs dark reddish-brown, mixed with many blackish and a few ochreous scales, the tarsi white, faintly ringed with black at apex of each segment; hind leg pale ochre-gray, the coxa and basal 2/3 of femur suffused with blackish scales. Fore wing variable in ground colour, uniformly deep reddish-brown to ochre-yellow, sometimes paler along margin, with small blackish dots along costa in most specimens, but variable in number, and with further black

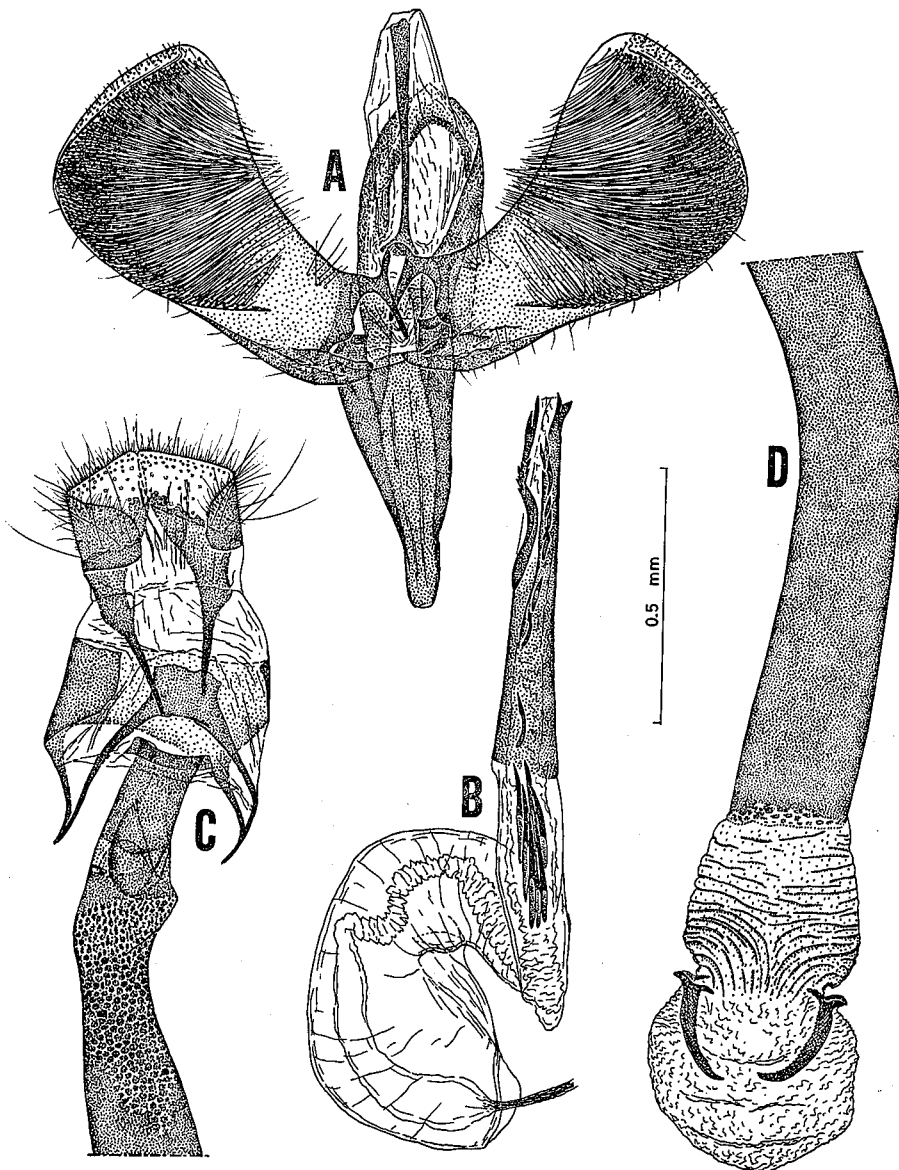


Fig. 32. *Caloptilia (Caloptilia) betulicola* (Hering). A: Male genitalia [Grc-588, Muine-dake, Hokkaidô, em. 11/ix/1963, ex *Betula platyphylla*] — B: Aedeagus [ditto] — C: Female genitalia [Grc-595, Zyôzankei, Hokkaidô, em. 10/viii/1963, ex *B. platyphylla*] — D: Ductus bursae and corpus bursae [ditto].

dots at basal 1/5 and 2/5 on wing-fold in a few specimens; cilia around apex of wing ochreous, shaded with dark brown apically, and those along dorsal margin dark gray. Hind wing and its cilia dark gray.

Male genitalia: Aedeagus about 1.5 times as long as vinculum, with 2 much

sclerotized apical prongs, one being sinuate, bifurcated at apex and spiniferous on median area, and the other straight and bifurcated at apex; 6-7 long, corniform cornuti clustered on apical area of phallobase, and 5-10 smaller cornuti scattered on whole area of aedeagus. Other characters almost as in *C. (C.) alni*.

Female genitalia: Lamella postvaginalis trapezoid in shape; lamella antevaginalis transversely band-shaped, straight on its caudal margin. Antrum weakly sclerotized, short. Ductus bursae moderate in length, almost straight, heavily sclerotized except for shagreened caudal area; corpus bursae elongate pyriform, membraneous, with 2 sickle-shaped signa.

Specimens examined: 10♂♂ & 9♀♀. HOKKAIDŌ — 2♂♂, Wassamu, Kamikawa, em. 14/ix/1963, ex *Betula platyphylla*; 3♂♂ & 2♀♀, ditto, em. 1-17/x/1964, ex *B. platyphylla*; 1♀, Horokanai, 29/vii/1958; 1♀, Zyōzankei, em. 10/viii/1963, ex *B. platyphylla*; 5♂♂ & 2♀♀, Muine-dake, em. 11-17/ix/1963, ex *B. platyphylla*; 1♀, Sapporo, em. 27/ix/1958, ex *B. platyphylla*; 2♀♀, Misumai, Sapporo, em. 27/ix/1971, ex *B. platyphylla* (1126).

Distribution: Japan (Hokkaidō); Central and North Europe.

Food plants: *Betula platyphylla* Sukatchev (Betulaceae) in Japan. *Betula* spp. in Europe.

Remarks: This species is new to the fauna of Japan.

Caloptilia (Caloptilia) pulverea Kumata

[Figs. 55 (F-H) & 63 (E)]

Caloptilia pulverea Kumata, 1966, Ins. matsum. 29: 13, pls. 2 (15 & 16), 9 (37) and 18 (58); Ermolaev, 1977, Proc. Zool. Inst. Acad. Sci. USSR 70: 109; *ibid.*, 1979, in Terrestrial Arthropoda of the Far East: 24.

Specimens examined: 9♂♂ & 22♀♀. HOKKAIDŌ — 1♂ & 1♀, Risiri-tō, em. 23-25/viii/1958, ex *Alnus maximowiczii*; 1♀, Rausu, Nemuro, em. 10/viii/1971, ex *A. maximowiczii*; 1♀, Apoi, Hidaka, em. 15/vii/1967, ex *A. maximowiczii*; 1♀, ditto, em. 11/vii/1973, ex *A. maximowiczii*; 1♂ & 6♀♀, Sapporo, em. 14-30/viii/1957, ex *A. japonica* (261); 1♀, ditto, em. 10/viii/1964, ex *A. japonica*; 2♂♂ (one the holotype of *pulverea*, G. sl. Grc-1141) & 3♀♀, Soranuma-dake, em. 22/viii/1963, ex *A. maximowiczii*. HONSYŪ — 1♀, Hakusan, Isikawa-ken, em. 19/viii/1976, ex *A. matsumurae*, I. Togashi leg.; 1♀, ditto, em. 1/viii/1976, ex *A. maximowiczii*; 1♂ & 1♀, Sunagawa, Ōsaka, em. 19/vi/1952, ex *A. japonica*, T. Kodama leg. SIKOKU — 1♀, Ino, Kōti-ken, em. 1/vii/1957, ex *A. serrulatooides* (261). KYŪSYŪ — 4♂♂ & 4♀♀, Takakuma-yama, Kagosima-ken, em. 1-25/vii/1965, ex *A. firma* (665). The holotype of *pulverea* is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū; Sikoku: Kyūsyū); and USSR (Far East).

Food plants: *Alnus firma* Sieb. et Zucc., *A. japonica* Steud., *A. matsumurae* Callier, *A. maximowiczii* Callier and *A. serrulatooides* Callier (Betulaceae) in Japan. *Alnus japonica* Steud. in USSR.

Remarks: This species is very peculiar in having the following characters: — The basal pecten of the antenna is absent. The tegumen has a pair of triangular lobes on the inner face in the male genitalia. The sclerous sterigma is completely absent in the female genitalia. The larva in late instars does not roll up but folds the leaf upwardly. These characters are unusual in the members of the subgenus *Caloptilia*. On the other hand, the wing venation and larval body chaetotaxy

indicate that *pulverea* surely falls under the subgenus *Caloptilia*. This species may form a subgroup together with "*Gracilaria*" *alnivorella*, "*G.*" *strictella*, *Caloptilia populetorum* and *C. suberinella*, all associated with Betulaceae in their larval stage. This subgroup is characterized by the shape of the valva, which is strongly dilated apically and shallowly concave on the terminal margin.

Caloptilia (Caloptilia) soyella (Deventer)
[Figs. 33, 55 (I-J), 59 (G), 63 (F) & 73 (C)]

Gracilaria soyella Deventer, 1904, Tijdschr. Ent. 47: 22, pl. 2 (1).

Caloptilia soyella: Issiki, 1950, Icon. Ins. Jap. 451, f. 1217; *ibid.*, 1957, Icon. Heterocer. Jap. Color. Natur. 1: 29, pl. 4 (113).

♂♀. Expanse of wings: 9.0–10.2 mm (9.6 mm in average of 7 specimens). Length of fore wing: 4.5–5.0 mm (4.8 mm in average of 8 specimens).

Face ochre-yellow; palpi slightly paler than face; 2nd segment of labial palpus infuscated below, the 3rd blackish-brown on apical half. Head brownish-gray, purplish-glossy, sparsely mixed with darker scales. Antenna dark brownish-gray, annulated with ochre-white narrowly; scape and pecten brownish. Thorax dark ochre-brown dorsally and ventrally, slightly purplish-glossy. Fore and mid legs blackish-brown, purplish-glossy, the tarsi snow-white with a blackish apical ring in each segment; hind coxa and femur ochre-yellow, the femur with a blackish blotch near apex; hind tibia and tarsus pale ochre-gray, somewhat darkened apically in tibia. Fore wing very narrow, nearly parallel-sided; ground colour dark ochre-brown, moderately purplish-glossy, sprinkled with darker scales on discal area, with blackish dots along costal margin and blackish strigulae along dorsal margin, the dots and strigulae being very variable in number and rarely absent entirely; cilia around apex of wing pale brownish-gray with 3 dark lines, and those along dorsal margin pale gray. Hind wing gray, with cilia pale gray.

Male genitalia: Tegumen with a pair of triangular lobes on inner face near base; subsclerium slightly widened on its apical half. Valva rather straight, gradually dilated apically, straight on terminal margin; a ridge running from base of costa to ventroapical corner of valva, with 2 rows of stout setae throughout; a number of slender setae scattered densely near costoapical and discal areas of valva. Aedoeagus about 4/5 as long as valva, needle-shaped, without any cornutus. Seventh and 8th abdominal segments sparsely covered with scales; coremata consisting of hairy scales, the posterior pair being about 2/5 as long as the anterior; interior process of 7th sternite absent.

Female genitalia: Sterigma very large, trapezoid in shape; ostium bursae located in centre of sterigma, with a well-sclerotized, small, M-shaped lobe in centre. Ductus bursae slender, tubular, membranous on whole length; corpus bursae elongate-pyriform, membranous, with 2 curved, sickle-shaped signa. Seventh sternite heavily sclerotized.

Specimens examined: 3♂♂ & 6♀♀. HONSHŪ — 1♂, Hirai, Ōsaka, em. 20/x/1950, ex *Azuki* *angularis*, S. Issiki leg.; 1♂, ditto, em. 19/ix/1950, ex *Glycine* *max*, S. Issiki leg.; 3♀♀, Nisinomiya, Ōsaka, em. 19/ix.-1/x/1949, ex *G. max*, S. Issiki leg; these specimens were determined as *C. soyella* by Issiki. KYŪSHŪ — 1♂ & 2♀♀, Soeda Hukuoka-ken, em. 8/vii/1959, ex *Lespedeza* *cyrtobotrya*, H. Kuroko leg.; 1♀, Abura-yama, Hukuoka-ken, em. 1/viii/1957, ex *Kummerovia* *striata*, H. Kuroko leg.

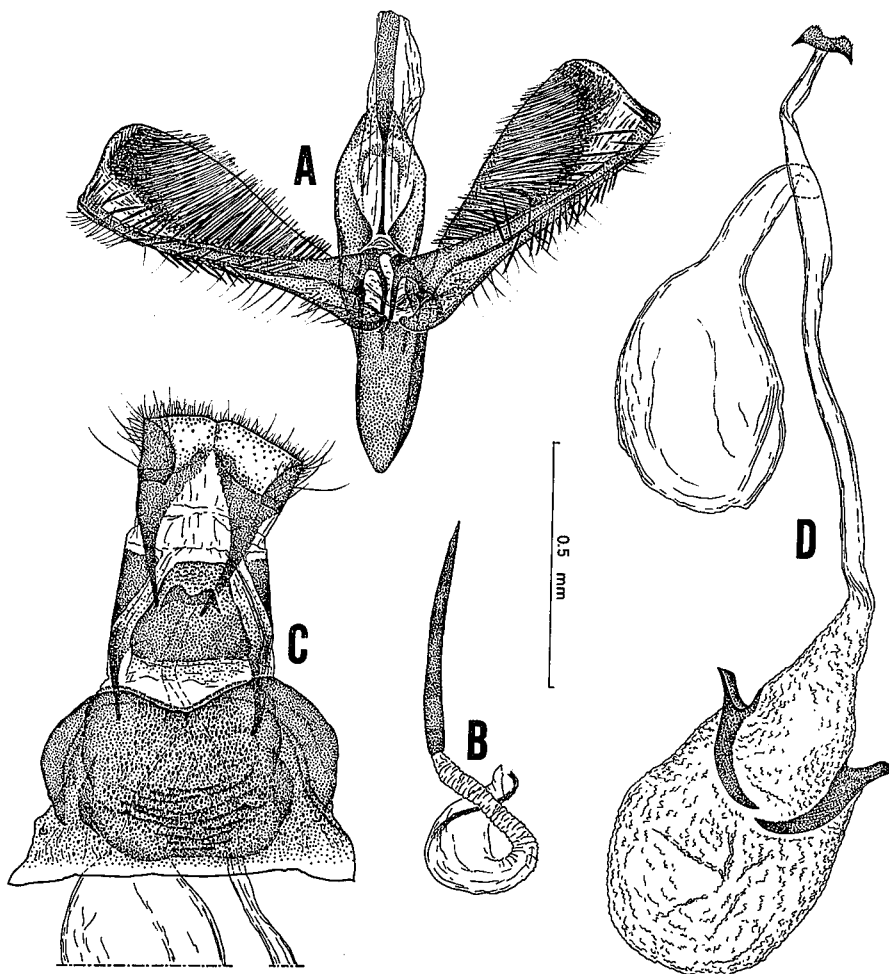


Fig. 33. *Caloptilia (Caloptilia) soyella* (Deventer). A: Male genitalia [Grc-1046, Hirai, Ôsaka, Honsyû, em. 19/ix/1950, ex *Glycine max*] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1124, Nisinomiya, Ôsaka, em. 1/x/1949, ex *G. max*] — D: Bursa copulatrix [ditto].

Distribution: Japan (Honsyû; Sikoku; Kyûsyû); Java; and India.

Food plants: *Azuki* *angularis* Ohwi, *Glycine max* Merr. (soya-bean), *Kummerovia striata* Schindler and *Lespedeza cyrtobotrya* Miq. (Leguminosae) in Japan. *Cajanus indicus* Sprengel (= *Cajanus cajan* Millspaugh) and *Phaseolus mungo* Linné in India (after Fletcher, 1920). *Soya hispida* Moench (= *Glycine max* Merr.) in Java (after Deventer, 1904).

Remarks: One of the syntypes of *soyella* is deposited in the Rijksmuseum van Natuurlijke Historie at Leiden, Netherlands. After his comparison between the syntype and a photograph of a Japanese specimen, Dr. A. Diakonoff kindly informed me as follows:— "The syntype lacks the abdomen; otherwise the

specimen is absolutely intact. It agrees entirely with your photograph – more so than with the coloured plate, in fact”.

This species is peculiarly characterized by the structure of the valva in the male and by the sclerotized 7th sternite in the female. These characters are seen also in the South African *C. porphyranthes*, which may be most closely allied to *soyella*.

“*Gracilaria*” *acrotherma* Meyrick, 1908, described from Ceylon, has been treated as a synonym of the present species by some authors. Mr. D.J. Carter of British Museum (N.H.) has informed me that *acrotherma* is a distinct species, being distinguished from *soyella* by the genitalia of both sexes.

SUBGENUS PHYLLOPTILIA NOV.

Type-species: *Caloptilia magnoliae* Kumata, 1966.

♂♀. Antenna 1.1–1.2 times as long as fore wing; scape very slightly thickened, without pecten. Labial palpus long, upturned; 2nd segment slightly thickened or rarely tufted beneath apically; 3rd segment smooth-scaled entirely or rarely thickened apically with rough scales, and about as long as the 2nd segment. Maxillary palpus slender, smooth-scaled or rarely roughened with scales apically, and about as long as 3rd segment of labial palpus. Fore wing very narrowly lanceolate, nearly parallel-sided, with 13 veins; vein R_2 arising from apical 1/6–1/15 of upper vein of discoidal cell; vein Cu_{1b} arising from apical 1/4–1/6 of lower vein of cell, always basal to arising position of vein R_2 ; veins M_2 and M_3 well separated or sometimes connate at their bases. The other external structures agree well with those of the subgenus *Caloptilia*.

Male genitalia: Very similar to those of the subgenus *Caloptilia* in essential structures. Tegumen simple, without any paired processes or sclerites; tuba analis with a narrowly sclerotized subsclerium, which is sometimes covered with microspines on the basal area. Valva simple, shell-shaped, with dense, long setae along terminal and ventral margins; transtilla complete, with a pair of long processes pointing cephalad. Vinculum elongately triangular, rarely with a pair of tufts of long hairy scales at sides near base. Aedoeagus tubular, with or without cornuti. Seventh and 8th abdominal segment weakly membraneous, each with a pair of coremata; the 8th segment sparsely covered with scent scales; 7th sternite reduced into a narrow transverse band, with an interior process present or absent.

Female genitalia: Closely resemble those of the subgenus *Caloptilia*, but slightly differ from the latter in the following characters:— Lamella postvaginalis always developed, more or less produced caudally into a tongue-shaped flap. Ductus bursae always membraneous, slender, long; corpus bursae with 2 narrower sickle-shaped signa.

Body chaetotaxy of last instar larva: Seta D_1 on 9th abdominal segment placed dorsocephalad of seta D_2 as in the preceding abdominal segments. The other characters in chaetotactic pattern well agree with that of the subgenus *Caloptilia*.

Arrangement of crochets: Same with that of the subgenus *Caloptilia*.

Remarks: This subgenus is very similar to the nominate subgenus in essential characters including the genitalia, but is distinguished from the latter by the following points:— the vein R_2 of the fore wing branches from the cell more distal than the vein Cu_{1b} does; the antenna lacks a basal pecten of hairs or scales. Moreover, it is clearly separated from the subgenus *Caloptilia* by the larval

chaetotaxy, that is, the seta D_1 is situated dorsocephalad of the seta D_2 on the 9th abdominal segment. This difference might appear rather insignificant, but the dorsal groups of the larval body setae are generally very stable in position, and sometimes used to define genera or even families of Microlepidoptera (Hinton, 1946; MacKay, 1972). The larvae of 4 out of the 6 species of the present subgenus have been examined, and they all agree in exhibiting this chaetotactic character. On the other hand, in the examined larvae of more than 20 species of the subgenus *Caloptilia* the seta D_1 is located ventrocephalad of the seta D_2 on the 9th abdominal segment.

In spite of this difference in the body chaetotaxy, the larval habit of this group is quite similar to that of the subgenus *Caloptilia*. The larva is a leaf miner in early instars and a leaf roller in the late instars. The cocoon is ordinarily spun at a separate place from the larval leaf roll, and boat-shaped, without bubbles on outer surface.

Insofar as the larval food plants are known, the members of the present subgenus are associated with family Magnoliaceae or Lauraceae.

Key to the species of the subgenus *Phylloptilia*

- 1 Second and 3rd segments of labial palpus thickened and shortly tufted with scales below apically; fore wing very brilliantly brassy-yellow in ground colour, with an ochre-gray zigzag mark throughout surface. Larva on *Illicium*. .. *illicii* Kumata
- Labial palpus smooth or slightly roughened below, but not tufted; fore wing brownish, reddish-brownish or purplish-blackish in ground colour. 2
- 2 Pleural surface of thorax dark fuscous, with a pair of brilliantly white streaks; basal half of fore coxa brilliantly white. 3
- Pleural surface of thorax dark fuscous wholly, without any pale streak; basal half of fore coxa lemon-yellowish or dark brownish. 4
- 3 Fore wing dark reddish-brown in ground colour, with an outwardly oblique streak of white irrorations originated from basal 1/3 of costa; the costal margin beyond this streak heavily irrorated with white scales which are alternated with numerous ground-coloured strigulae; aedoeagus without cornuti; 7th sternite with an interior process; lamella postvaginalis elongate-triangular. Larva on *Magnolia*.
..... *magnoliae* Kumata
- Fore wing light ochre-brownish, suffusedly strigulated or mottled with dark brown throughout, not irrorated with white scales at all; aedoeagus with 2 bar-shaped cornuti; 7th sternite without interior process; lamella postvaginalis crescent-shaped. Larva on *Persea*. *crinotibialis*, sp. nov.
- 4 Vinculum with a pair of long and thick tufts at sides near base; aedoeagus with 2 bar-shaped cornuti; subscaphium not spinose; lamella antevaginalis heavily sclerotized, transversely band-shaped. Larva on *Persea*. *perseella*, sp. nov.
- Vinculum simple, without such tufts; aedoeagus without any cornutus; subscaphium densely spinose on basal half; lamella antevaginalis absent. 5
- 5 Vinculum nearly as long as valva; 7th abdominal sternite of male with a long interior process; posterior pair of coremata consisting of spindle-shaped scales, which are arranged in a narrow, transverse band; lamella postvaginalis trapezoid in shape, the apex reaching at most caudal margin of 8th abdominal segment. Larva on *Kadsura*. *kadsurae* Kumata
- Vinculum about 2/3 as long as valva; 7th abdominal sternite of male without interior process; posterior pair of coremata consisting of long hairy scales, which are gathered in a bundle; lamella postvaginalis very large, semioval in form, extending far beyond caudal margin of 8th abdominal segment. Larva on *Schisandra*. *schisandrae* Kumata

Caloptilia (Phylloptilia) magnoliae Kumata
[Figs. 34, 56(A), 60(D), 64(A), 77(B) & 85(A-B)]

Caloptilia magnoliae Kumata, 1966, Ins. matsum. 29: 17, pls. 3 (20), 11 (41) and 19 (61).

Specimens examined: 86♂♂ & 117♀♀. HOKKAIDŌ — 1♀, Apoi, Hidaka, 22/vi/1959; 1♀, Yuni, Sorati, 24/vi/1961; 1♀, Umaoiyama, Naganuma, Sorati, 14/vi/1973; 41♂♂ (one the holotype of *magnoliae*, G. sl. Grc-1136) & 62♀♀, Nopporo, em. 8-22/ix/1964, ex *Magnolia kobus* (713); 15♂♂ & 20♀♀, ditto, em. 9-13/ix/1971, ex *M. kobus* (1107); 13♂♂ & 11♀♀, ditto, em. 1-8/ix/1972, ex *M. kobus* (1145); 2♂♂, Sapporo, 19/vii/1959; 13♂♂ & 17♀♀, ditto, em. 15-22/ix/1964, ex *M. kobus*. HONSYŪ — 2♂♂ & 4♀♀, Kaida, Kiso, Nagano-ken, em. 16-17/vii/1975, ex *M. kobus* (1448). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū).

Food plant: *Magnolia kobus* DC. (Magnoliaceae).

Remarks: In the larval stage this species is characteristically gregarious. Five to 20 larvae live together within a large blotch-mine on the underside of leaves in the early instars, and within a cigarettelike leaf roll in the late instars.

Caloptilia (Phylloptilia) schisandrae Kumata
[Figs. 56(B-C) & 60 (E)]

Caloptilia schisandrae Kumata, 1966, Ins. matsum. 29: 18, pls. 3 (21 & 22), 11 (42) and 19 (62).

Specimens examined: 5♂♂ & 5♀♀. HOKKAIDŌ — 1♂, Horokanai, Tokati, 29/vii/1958; 1♀, Apoi, Hidaka, em. 15/vii/1967, ex *Schisandra chinensis*; 1♂, Soranuma-dake, em. 8/ix/1964, ex *S. chinensis*; 2♂♂ (one the holotype of *schisandrae*, G. sl. Grc-1099) & 2♀♀, Tomakomai, em. 18/viii/1964, ex *S. chinensis* (702); 1♀, ditto, em. 20/x/1969, ex *S. chinensis*. HONSYŪ — 1♀, Iwawakisan, Ōsaka, 31/viii/1951, S. Issiki leg.; 1♂, ditto, 24/vii/1952, S. Issiki leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō; Honsyū).

Food plant: *Schisandra chinensis* Baill. (Magnoliaceae).

Caloptilia (Phylloptilia) kadsurae Kumata
[Figs. 56(D-E), 60 (F), 64 (B), 77 (C) & 85 (C-D)]

Caloptilia kadsurae Kumata, 1966, Ins. matsum. 29: 19, pls. 3 (23), 12 (43) and 20 (64).

Specimens examined: 13♂♂ & 16♀♀. HONSYŪ — 1♀, Kyōto, no date, Suzuki leg., determined as *Gracilaria purpureascens* (MS) by Matsumura; 1♀, Minoo, Ōsaka, 4/vi/1976, T. Saito leg.; 6♂♂ (one the holotype of *kadsurae*, G. sl. Grc-1162) & 4♀♀, Kozagawa, Wakayama-ken, em. 30/v.-10/vi/1964, ex *Kadsura japonica* (642); 3♂♂ & 3♀♀, ditto, em. 8/vi/1970, ex *K. japonica* (1028); 1♀, Kii-Ōsima, Wakayama-ken, 21-24/v/1964. KYŪSYŪ — 1♀, Hakozaki, Hukuoka-si, 29/ix/1979, K. Yamagishi leg.; 1♂, Miiike, Kirisima, 16/xi/1979, I. Kanazawa leg.; 1♀, Takakuma, Kagosima-ken, em. 7/vii/1965, ex *K. japonica*; 2♀♀, Sata, Kagosima-ken, em. 19/v/1958, ex *Eurya japonica*, S. Issiki & T. Yasuda leg. NANSEI Is. — 2♂♂, Yaku-sima, em. 14-21/xi/1973, ex *K. japonica* (1230). RYŪKYŪ Is. — 1♂ & 3♀♀, Mt. Usiku, Iriomote, 3-10/xi/1963, G.A. Samuelson leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū; Kyūsyū; Nansei Is.; Ryūkyū Is.)

Food plants: *Kadsura japonica* Dunal (Magnoliaceae), and ? *Eurya japonica* Thunb. (Theaceae).

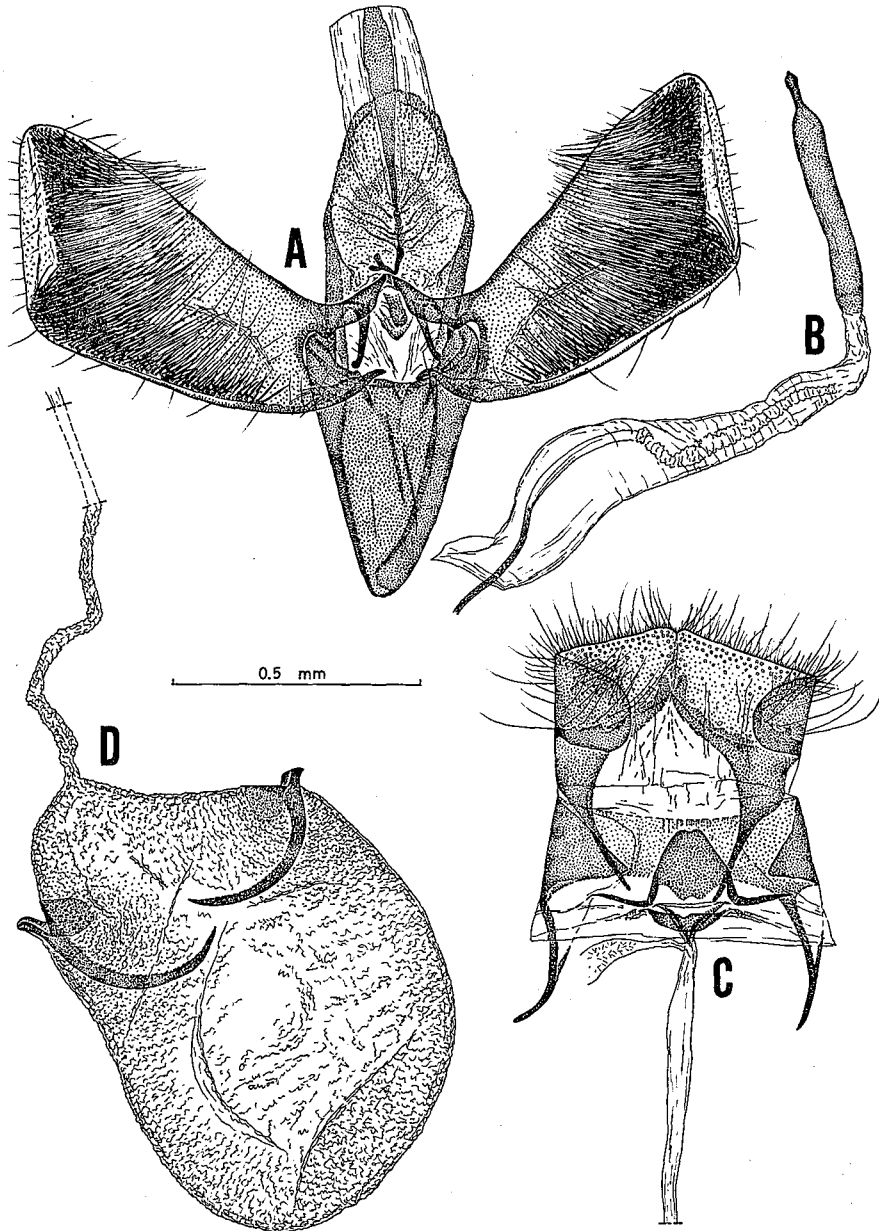


Fig. 34. *Caloptilia (Phylloptilia) magnoliae* Kumata. A: Male genitalia [Grc-1137, Nopporo, Hokkaidô, em. 8/ix/1964, ex *Magnolia kobus* (713)] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1139, Nopporo, em. 11/ix/1964, ex *M. kobus* (713)] — D: Corpus bursae [ditto].

Caloptilia (Phylloptilia) illicii Kumata

[Figs. 56 (F) & 60 (C)]

Caloptilia illicii Kumata, 1966, *Ins. matsum.* 29: 20, pls. 3 (24), 12 (44) and 20 (65).

Specimens examined: 1 ♂ & 4 ♀♀. HONSYŪ — 2 ♀♀, Ôsugidani, Wakayama-ken, em. 4-5/vii/1952, ex *Illicium religiosum*, T. Kodama leg.; 2 ♀♀ (one the holotype of *illicii*, G. sl. Grc-1117), Nati, Wakayama-ken, em. 25/vi/1964, ex *I. religiosum*. SIKOKU — 1 ♂, Omogokei, 27/viii/1957, M. Okada leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû; Kyûsyû).

Food plant: *Illicium religiosum* Sieb. et Zucc. (Magnoliaceae).

Caloptilia (Phylloptilia) perseella, sp. nov.

[Figs. 35, 56 (G-H), 64 (D), 70 (A) & 73 (D)]

♂♀. Expanse of wings: 13.5-16.5 mm (14.0 mm in holotype and 15.5 mm in average of 15 specimens). Length of fore wing: 6.7-8.2 mm (7.0 mm in holotype and 7.7 mm in average of 18 specimens).

Almost whole surface dark fuscous-brown with purplish reflections. Face and head sometimes ochre-gray with leaden-lusters; palpi ochre-whitish on upper side. Antenna blackish-brown, annulated with ochre-white narrowly. Ventral surface of thorax with a pair of broad, white streaks. Fore and mid legs much darker than thorax, nearly purplish-black, the tarsi suffusedly sprinkled with ochre-yellow except for basal area of the 1st segment and apical area of all the segments; hind coxa and basal 1/3 of hind femur pale ochre-yellow, sparsely irrorated with fuscous scales; hind tibia and tarsus dark gray, the 2nd to 4th tarsal segments ochreous on basal 1/4 to 1/5. Fore wing very narrow, nearly parallel-sided; ground colour fuscous-brown, with purplish reflections, sparsely spotted with ochreous yellow throughout, the spots being very variable in appearance, sometimes forming strigulae on costal and dorsal margins, the strigulae alternated with blackish dots on costal margin; cilia around apex of wing brownish-black with a vertical pale line at subapex, and those along dorsal margin gray. Hind wing dark gray, with cilia pale gray.

Male genitalia: Caudal margin of tegumen well sclerotized, with a series of slender scales; subscaphium rather slender on entire length. Valva spatulate in shape, round on terminal margin, with long setae on inner surface as usual, and with some setae also on outer surface as shown in Fig. 35, A. Vinculum very narrow apically, with a pair of membraneous areas at sides near base, the membraneous area bearing a long tuft of hairy scales. Aedoeagus about as long as valva, straight, tubular, with 2 bar-shaped cornuti about half as long as aedoeagus. Seventh abdominal segment bare; the 8th segment sparsely covered with scent scales; posterior pair of coremata consisting of normal scales and long, hairy ones, 2/3-3/4 as long as the anterior, which consists of long, hairy scales alone; interior process of 7th sternite very short.

Female genitalia: Lamella postvaginalis wide-trapezoid in shape; lamella antevaginalis similar to postvaginalis in shape, but smaller and more heavily sclerotized. Ductus bursae very slender, wholly membraneous except for weakly sclerotized, short antrum. Corpus bursae ovoid, with 2 narrow, sickle-shaped

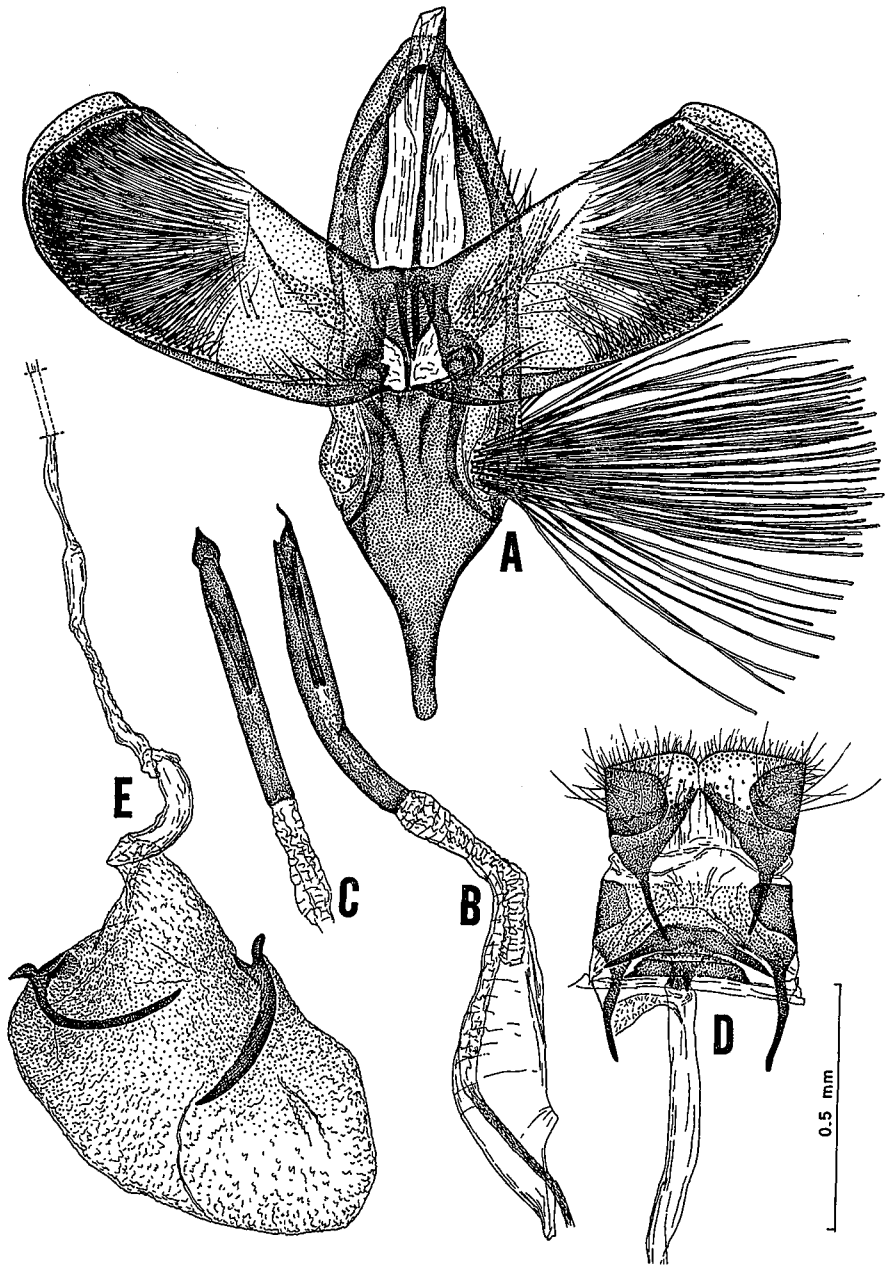


Fig. 35. *Caloptilia (Phylloptilia) perseella*, sp. nov. A: Male genitalia [Grc-648, holotype] — B: Aedeagus [ditto] — C: Ditto [Grc-253, Hikosan, Kyúsyú, em. 25/vi/1957, ex *Persea thunbergii* (196)] — D: Female genitalia [Grc-1131, Mt. Usiku, Iriomote, Ryúkyú Is., 7-10/xi/1963] — E: Corpus bursae [ditto].

signa, one of which is more strongly curved, narrower and slightly longer than the other.

Specimens examined: 13♂♂ & 8♀♀. Honsyû — 1♀, Nati, Wakayama-ken, 1/vii/1957, T. Yasuda leg. Kyûsyû — 1♂, Ariake-yama, Izuhara-tyô, Tu-sima, 6/vii/1979, I. Kanazawa leg.; 1♂, ditto, 20/x/1979, K. Yasuda leg.; 1♂, Mokoku-yama, Izuhara-tyô, 15/x/1979, K. Yasuda leg.; 5♂♂ & 3♀♀, Hikosan, Hukuoka-ken, em. 23-29/vi/1957, ex *Persea thunbergii* (195); 1♂ (the holotype, G. sl. Grc-648) & 3♀♀, Sata, Kagosima-ken, em. 13-30/iv/1958, ex *P. thunbergii*, S. Issiki & T. Yasuda leg. Ryûkyû Is. — 4♂♂ & 1♀, Mt. Usiku, Iriomote, 3-10/xi/1963, G.A. Samuelson leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû; Kyûsyû; Ryûkyû Is.).

Food plant: *Persea thunbergii* Kosterm. (Lauraceae).

Remarks: This species is characteristic by the very long tufts of hairy scales on the vinculum and the valva covered with setae on the outer surface. Apart from the genitalia it is related to "*Gracilaria*" *zopherotarsa* described from China, but may be distinguished from the latter in lacking white spots on the tegula.

Caloptilia (Phylloptilia) crinotibialis, sp. nov.

[Figs. 36, 56 (I), 60 (G) & 64 (C)]

♂♀. Expanse of wings: 16.2-16.8 mm (16.5 mm in holotype). Length of fore wing: 7.8-8.3 mm (8.2 mm in holotype and 8.1 mm in average of 4 specimens).

Face and head ochre-gray, slightly violet-glossy, with anterior extremity of face paler. Palpi fuscous brown, ochreous on upper side. Antenna dark brown, annulated with ochre-whitish narrowly. Thorax dark grayish-brown, slightly purplish-glossy, the ventral surface with a pair of silvery-whitish stripes. Fore coxa silvery-whitish, with apical 2/5 blackish-brown; fore and mid femora and tibiae blackish-brown, the mid tibia very thickly tufted apically with long scales, which are ochre-brown with blackish apices; tarsi whitish, with a minute, blackish median dot and a broad, blackish apical band in 1st segment, and a blackish apical band alone in other segments. Hind coxa and femur silvery-whitish, the femur being blackish-brown on its apical 3/5; hind tibia and tarsus ochreous, usually darkened apically in all segments. Fore wing very narrow, parallel-sided, lanceolate; ground colour light ochreous-brownish, slightly violet-glossy, suffusedly strigulated or mottled with dark brown throughout, the strigulae or mottles becoming black towards costal and dorsal margins of wing; 3 blackish, ill-defined spots situated on costa of wing at basal 1/5, middle and apical 1/4, and a blackish, elongate spot on dorsal margin at basal 1/3; cilia on apex of wing pale ochre-brown with 2 blackish apical lines, those along termen slightly shorter, ochre-brown, and broadly shading into black apically, and those along dorsal margin dark gray. Hind wing gray, with cilia dark gray.

Male genitalia: Subscaphium rather broad. Valva upturned near base, slightly widened on apical 4/5, straight on costal margin, round on ventral and terminal margins, with slender, usual marginal setae. Vinculum a little shorter than valva, moderately narrowed apically, with apical extremity bluntly pointed. Aedoeagus a little shorter than valva, tubular, straight, with 2 cornuti which are bar-shaped and about 3/5 as long as aedoeagus. Seventh abdominal segment bare; the 8th segment sparsely covered with scent scales; posterior pair of coremata

consisting of hairy scales, rather thickened (anterior pair damaged); interior process of 7th sternite absent.

Female genitalia: Lamella postvaginalis nearly crescent-shaped; ostium bursae surrounded by a short, ring-shaped lamella antevaginalis, which is weakly

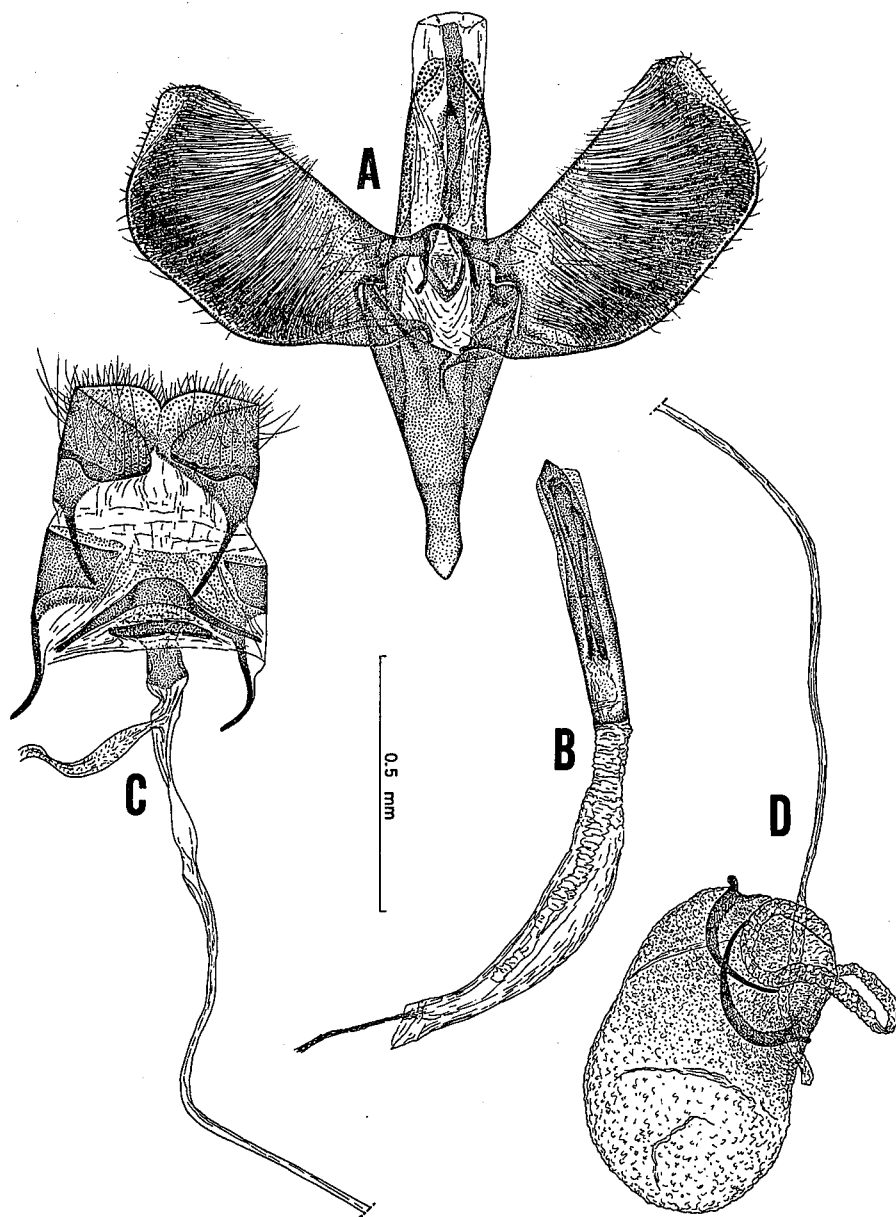


Fig. 36. *Caloptilia (Phylloptilia) crinotibialis*, sp. nov. A: Male genitalia [Grc-1074, holotype] — B: Aedeagus [ditto] — C: Female genitalia [Grc-649, Natsisan, Wakayama-ken, Honsyû, em. 23/vi/1957, ex *Persea japonica*] — D: Corpus bursae [ditto].

sclerotized, spinose on the whole surface. Ductus bursae very slender, membraneous except for slightly widened and weakly sclerotized antrum. Corpus bursae membraneous, ellipsoidal, with 2 slender, much curved, sickle-shaped signa which are nearly symmetrical in position and similar in size.

Specimens examined: 2♂♂ & 2♀♀. HONSYŪ — 1♂ (the holotype, G. sl. Grc-1074), Iwawakisan, Ōsaka, 16/x/1950, S. Issiki leg.; 1♀, Nati, Wakayama-ken, em. 23/vi/1957, ex *Persea japonica*, T. Yasuda leg. KYŪSYŪ — 1♂ & 1♀, Ariake-yama, Izuhara-tyō, Tushima, 14/x/1979, K. Yasuda leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū; Kyūsyū).

Food plant: *Persea japonica* Sieb. (Lauraceae).

Remarks: On account of the thickly tufted mid tibia, this species is very similar to "*Gracilaria*" *zonotarsa* attacking the leaf of *Phoebe lanceolata* (Lauraceae) in India, but may be distinguished from the latter by the silvery-whitish fore coxa and by the absence of the whitish scales on the costal margin of the fore wing.

SUBGENUS TIMODORA MEYRICK

Timodora Meyrick, 1886, Trans. R. Ent. Soc. Lond. 1886: 259; Vári, Transvaal Mus. Mem. 12: 2, pls. 24(2) and 44 (3). [Type-species: *Timodora chrysochroa* Meyrick, 1886.]

Meyrick (1886) described the genus *Timodora* based on only 1 male specimen of *T. chrysochroa* collected from Tonga I. In his redescription, Vári (1961) stated that "This genus [*Timodora*] is closely allied to *Caloptilia*, and except for the rough haired head and rough scales on hind tibiae it is hardly distinguishable from it".

In the course of the present study, I have found from Japan 1 species which is assumed to be congeneric with *chrysochroa* on the basis of the male genitalia and wing venation compared with the figures of those features of *chrysochroa* given by Vári (1961). In the Japanese species, however, the head is usually smoothly scaled or very rarely roughened with normal scales (not hairy), and the hind tibia is covered by very slightly raised scales on its upper side. Therefore, the Japanese species cannot clearly be distinguished from the members of the genus *Caloptilia* by these characters in spite of Vári's statement. Moreover, the membraneous 7th and 8th abdominal segments of male indicate that it belongs to the genus *Caloptilia*. It is also similar to the species here referred to the subgenus *Caloptilia* in the larval chaetotaxy and the arrangement of crochets on prolegs except for the lack of the seta SD₂ on the 9th abdominal segment (see Fig. 77, D).

Nevertheless, the Japanese species and *chrysochroa* differ from the subgenus *Caloptilia* by the following combination of characters:— The antenna lacks the basal pecten. The vein R₂ of the fore wing branches from the discoidal cell a little more apical than the vein Cu_{1b} does. The lateral face of the tuba analis is covered with a weakly sclerotized, narrow band (peniculus or gnathos), which has a row of long setae along the caudal margin. The anellus also has long setae on the dorsal area.

Based on all this, I propose that *Timodora* should be treated as a subgenus under the genus *Caloptilia*.

In Japan the subgenus *Timodora* is so far represented by the following new species alone, which is associated with *Rhus* spp. in its larval stage. The larval

behaviour is similar to that of the members of the subgenus *Caloptilia*, that is, the larva is a leaf miner in early instars and a leaf roller in late instars.

Caloptilia (Timodora) elongata, sp. nov.

[Figs. 37, 56 (J), 61 (A), 66 (A), 71 (A), 73 (E) & 77 (D)]

♂♀. Expanse of wings: 10.5–12.5 mm (11.0 mm in holotype and 11.8 mm in average of 18 specimens). Length of fore wing: 5.2–6.2 mm (5.5 mm in holotype and 5.9 mm in average of 20 specimens).

Face and head brilliantly grayish-ochreous with purplish reflections, the head ochre-yellow on posterior half. Palpi ochre-brown, infuscated below. Antenna long, about 1.3 times as long as fore wing, dark gray, annulated with ochre-yellow narrowly; scape without a pecten. Thorax ochre-yellow dorsally and ventrally. Fore and mid legs brownish, heavily infuscated with black, the tarsi snow-white, with a blackish apical spot in each segment; hind coxa and femur ochre-yellow, the femur darkened on its apical 3/5; hind tibia very slightly roughened on upper edge, ochreous; hind tarsus ochreous, with grayish apical band in each segment. Fore wing very narrow, ochre-yellow, bluish-iridescent in some light, somewhat suffused with purple brown along termen and at apex narrowly, dotted with black along costa throughout, with further prominent blackish spots arranged as follows: 1 situated near base of costa, 1 at middle of costa, sometimes the most prominent among blackish spots, 1 at basal 2/5 below wing-fold, and further 3 to 5 along termen; cilia around apex of wing pale brownish-gray with 3 blackish lines, and those along dorsal margin dark gray. Hind wing and its cilia dark gray.

Male genitalia: Tegumen simple; tuba analis on its lateral face covered with a weakly sclerotized narrow band (peniculus or gnathos) which has a row of long setae along its caudal margin; subscaphium very short, narrowed basally. Valva very elongate, slightly upturned near base, with 4 kinds of setae on inner face as shown in Fig. 37, A. Vinculum long, but slightly shorter than valva, narrowed apically. Anellus with long setae on its dorsal area. Aedoeagus about 3/5 as long as valva, slightly curved, tubular, without any cornutus. Seventh abdominal segment membranous, bare; 8th segment membranous, sparsely covered with scales; coremata consisting of hairy scales, the posterior pair about half as long as the anterior; interior process of 7th sternite long, about half as long as median ridge of 8th tergite.

Female genitalia: Lamella postvaginalis much sclerotized, subdivided by a pair of weak ridges into 3 parts, the lateral parts of which are oval in shape, and the median one trapezoid; lamella antevaginalis absent. Ductus bursae slender, long, membranous, with slightly widened antrum. Corpus bursae large, ovoid or ellipsoidal in form, membranous, with 2 curved, sickle-shaped signa which are asymmetrical in situation.

Specimens examined: 11♂♂ & 12♀♀. KYŪSVŪ — 1♂ & 1♀, Tatura-yama, Izuhara-tyō, Tu-sima, em. 20–24/x/1979, ex *Rhus succedanea* (2047); 1♂, ditto, 14/x/1979; 1♂, Ōbosi-yama, Mine-tyō, Tu-sima, 17/x/1979, K. Yasuda leg.; 5♂♂ & 5♀♀, Kagosima-si, em. 25/x. -2/xi/1973, ex *R. sylvestris* (1265). NANSEI IS. — 2♂♂ (one the holotype, G. sl. Grc-1200) & 1♀, Nisinoomote, Tanega-sima, em. 1/vii/1965, ex *R. succedanea*; 2♀♀, Anbō, Yaku-sima, em. 1/vii/1965, ex *R. succedanea* (659); 1♂ & 2♀♀, Miyanoura, Yaku-sima, em. 4–11/ix/1971, ex *R. succedanea* (1140), K. Kusigemati leg. RYŪKYŪ IS. — 1♀, Iriomote,

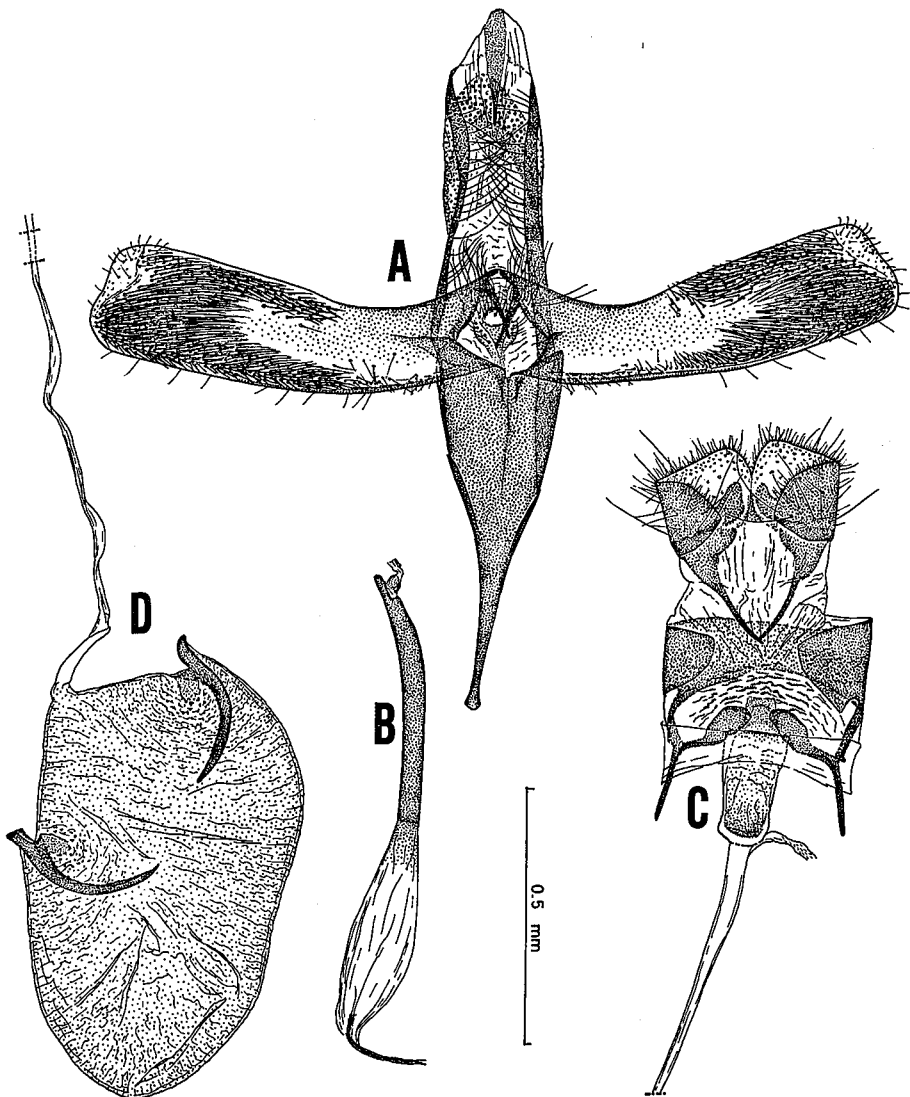


Fig. 37. *Caloptilia (Timodora) elongata*, sp. nov. A: Male genitalia [Grc-1200, holotype] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1201, Nisinoomote, Tanega-sima, Satunan Is., em. 1/vii/1965, ex *Rhus succedanea*] — D: Corpus bursae [ditto].

18/iv/1962, G. Kuno leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Kyûsyû; Nansei Is.; Ryûkyû Is.).

Food plants: *Rhus succedanea* Linné and *R. sylvestris* Sieb. et Zucc. (Anacardiaceae).

Remarks: The new species may be easily distinguished from *C. (T.) chrysochroa* by the smoothly scaled head, by the lack of undulating streaks formed by blackish

spots on the fore wing, and by the smaller size (in *chrysochroa* the wing expanse is 14 mm, whereas in *elongata* it is 11.8 mm in average).

SUBGENUS POVOLNYA KUZNETZOV

Povolnya Kuznetzov, 1979, Rev. Ent. URSS 58: 851. [Type-species: (*Tinea sulphurella* Haworth, 1828) = *Tinea leucapennella* Stephens, 1835.]

Sauter (1963) pointed out that *Coriscium sulphurellum* (= *Caloptilia leucapennella* in the sense of recent authors) is included in a new genus differing from *Caloptilia*, but he did not give any name for his new genus. According to his key to the genera of Gracillariidae occurring in Europe, *sulphurellum* is separated from the other members of the genus *Caloptilia* by the absence of the basal pecten of the antenna and by the presence of a long scale-tuft on the lower side of the 2nd segment of the labial palpus. On the other hand, when Kuznetzov (1979) erected the genus *Povolnya* for the same species, he paid attention to the structure of the male genitalia in addition to the characters emphasized by Sauter.

Having examined the type-species and 2 other Japanese ones treated herein, I agree with Sauter and Kuznetzov in that *Povolnya* is a good taxon. It may be distinguished from *Caloptilia* (s. str.) by the following characters:— Antennal scape smooth, without pecten of hairs or scales; 2nd segment of labial palpus with a long, triangular tuft beneath, the tuft being nearly as long as the apical segment; mid tarsus thickened with raised scales especially on the 1st segment. In male genitalia, tegumen with a pair of peniculi projected from caudal margin just above appendices angulares, the peniculi connected with tegumen through a spinose membrane stretched from their dorsal sides; valva similar to that of subgenus *Caloptilia* in many respects, but usually having thickened setae near base of the ventral margin. In female genitalia, ostium bursae covered with a large, flap-like lamella antevaginalis; corpus bursae with 2 signa which are short, corniform, and usually covered with numerous spines on the outer surface entirely. It may differ further in the body chaetotaxy of the last instar larva; that is, on the 6th and 7th abdominal segments seta SV_2 is absent and seta SV_3 dorsocephalic to seta SV_1 in *Povolnya*, whereas seta SV_3 is absent and seta SV_2 ventrocephalic to seta SV_1 in *Caloptilia* (s. str.).

Povolnya and *Caloptilia* (s. str.) undoubtedly differ as stated above, while they agree in wing venation and pregenital segments of the male abdomen. The chaetotactic pattern of the last instar larva is also quite similar between them except for the difference pointed out in the preceding lines. So far as known, the larva of *Povolnya* is a leaf miner in early instars and a leaf roller in late instars as in *Caloptilia*. Taking into consideration the fact that these essential structures and habit are very similar between the two, I would propose here to treat *Povolnya* as a subgenus under the genus *Caloptilia*.

In addition to the type-species and the 2 Japanese ones, the following species seem also to fall into the subgenus *Povolnya*:— "*Gracilaria*" *aeolopsila* described from Yunnan, China; "*G.*" *platycosma* known to occur in India and Ceylon; and "*G.*" *quercinigrella* described from Connecticut, North America. Insofar as known, the subgenus seems to be associated with Fagaceae and Lauraceae.

Key to the Japanese species of the subgenus *Povolnya*

- At a glance, fore wing reddish-brown in ground colour, with a broad, white-margined, blackish, inwardly oblique fascia placed at middle; peniculus of tegumen curved, bifurcated near apex; valva simple, without any ridge on inner face; lamella antevaginalis semicircular in posterior margin, very large, about as wide as 8th abdominal segment. Larva on *Quercus acutissima*.
..... *obliquatella* (Matsumura)
- At a glance, fore wing uniformly ochre-brownish, without such a fascia; peniculus narrowed apically, twisted, hook-shaped; valva with finely serrated ridge running from centre of valva to base of costa; lamella antevaginalis spatulate in form, about 1/3 as wide as 8th abdominal segment. Larva on various species of Fagaceae. *querci*, sp. nov.

Caloptilia (Povolnya) obliquatella (Matsumura)

[Figs. 38 (A-B), 39 (A-B), 57 (A-B) & 60 (B)]

Gracillaria obliquatella Matsumura, 1931, 6000 Ill. Ins. Jap.: 1101, f. 2285; *ibid.*, 1931, Ins. matsum. 6: 200.

Caloptilia obliquatella: Inoue, 1954, Check List Lep. Jap. 1: 26.

♀♀. Expanse of wings: 11.0–13.0 mm (13.0 mm in holotype and 12.2 mm in average of 4 specimens). Length of fore wing: 5.4–6.4 mm (6.4 mm in holotype and 6.1 mm in average of 6 specimens).

Face whitish, brownish at sides; head ochre-whitish, sparsely irrorated with brown. Maxillary palpus whitish above, light brown beneath. Labial palpus whitish; 2nd segment with a long, triangular tuft on lower side, the tuft being mixed with sparse white scales and dense brown scales, and about as long as the apical segment, which is smooth, with 2 narrow, dark brown bands beneath. Antenna whitish, annulated with dark brown; scape smooth, whitish, with brown irrorations above. Thorax ochre-whitish dorsally, irrorated with light brown especially densely at anterior area of tegula; ventral surface reddish-brown, with 2 pairs of broad, whitish bands. Fore and mid legs reddish-brown, with 2 whitish bands in each of coxae, femora and tibiae; tarsi white, the 1st segment with a pale brown median ring and a broad, black apical ring, the 2nd with light brown apical and median rings, the 3rd with a blackish apical ring, the 4th and 5th blackish wholly. Hind coxa and femur ochre-whitish, apically irrorated with reddish brown in each; hind tibia and tarsus grayish-whitish, irrorated with dark brown especially densely near apex of tibia, the tarsus with a blackish ring at apex of each segment. Fore wing reddish-brown, suffusedly irrorated with ochre-whitish scales along costal margin from basal 1/4 to apex of wing, the whitish irrorations being alternated with numerous ground-coloured strigulae; an oblique streak of ochre-whitish irrorations extending from base of costa to basal 1/4 of dorsal margin; a broad, blackish fascia situated at middle of wing, oblique inwardly, becoming narrow and obsolescent towards costa, sparsely mixed with whitish and brownish scales, and margined with ochre-whitish irrorations broadly on both sides; 1 or 2 narrow, blackish-brown fasciae placed near apex of wing, mixed with a few grayish-white scales; a very minute, blackish spot at apex of wing; cilia around apex of wing reddish-brown with a pale vertical subapical line, those along termen ochre-brown with 2 or 3 dark apical lines, and those along dorsal margin pale ochre-gray. Hind wing dark gray, with cilia gray.

Male genitalia: Tegumen weakly sclerotized, with a wide densely spinose membrane connected with a pair of peniculi, which are about $2/5$ as long as valva, curved, and bifurcated apically; subscaphium short, narrow. Valva upturned near base, slightly dilated near apex, widely truncated on terminal margin, with long marginal setae as usual, but the setae near base being unusually thickened. Vinculum about $2/5$ as long as valva, widely round apically. Aedoeagus about

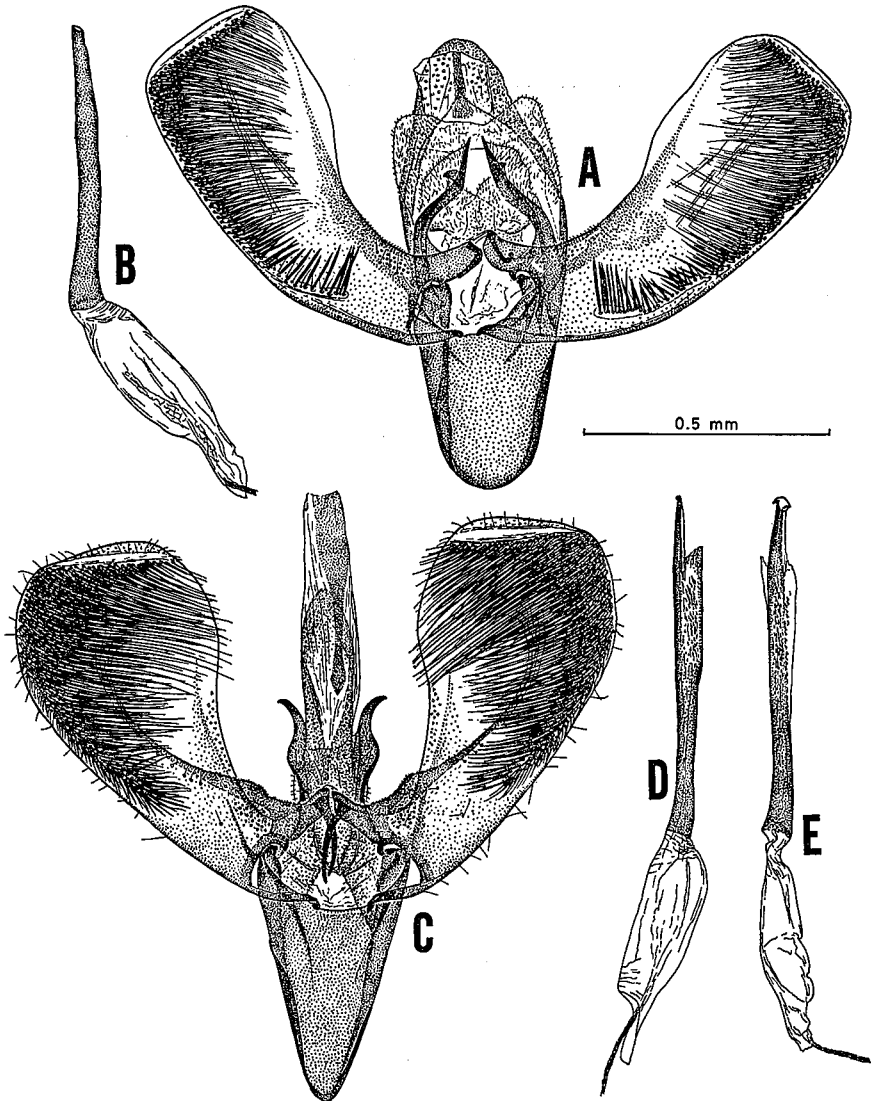


Fig. 38. A-B: *Caloptilia (Povolnya) obliquatella* (Matsumura). A: Male genitalia [Grc-743, holotype] — B: Aedeagus [ditto]. C-E: *Caloptilia (Povolnya) querci*, sp. nov. C: Male genitalia [Grc-1145, holotype] — D: Aedeagus [ditto] — E: Ditto [Grc-1119, Mt. Usiku, Iriomote, Ryûkyû Is., 3-7/xi/1963].

3/4 as long as valva, tubular, straight, slightly narrowed apically, without cornuti. Seventh abdominal segment bare; the 8th segment covered with small scent scales densely; both pairs of coremata consisting of long, hairy scales, the anterior one about twice as long as the posterior; interior process of 7th sternite slender, finger-shaped, about 3/5 as long as median ridge of 8th tergite.

Female genitalia: Papilla analis much prolonged, acutely pointed at ventral corner, with apophysis posterioris much widened on its basal half. Apophysis anterioris with ventral prong. Ostium bursae placed at depth of well sclerotized, large invagination lying under a large lamella antevaginalis, which is round on caudal margin. Antrum weakly sclerotized, short, about twice as long as wide; ductus bursae long, slender, membraneous; corpus bursae globular, membraneous, granulated around 2 signa, which are short, corniform, covered with minute spines; one of signa larger than the other.

Specimens examined: 3♂♂ & 4♀♀. HONSYŪ — 1♂ (the holotype of *Gracillaria obliquatella*, not ♀ as stated in the original description, G. sl. Grc-743), Kyōto, no date, Suzuki leg.; 1♂ & 1♀, Yamamoto, Ōsaka, em. 20/x/?, ex *Quercus acutissima*, S. Issiki leg.; 1♂, Sakai, Ōsaka, 18/vii/1954, T. Yasuda leg.; 1♀, Iwawakisan, Ōsaka, em. 22/ix/1954, ex *Q. acutissima*, T. Yasuda leg. KOREA — 1♀, Suweon, em. 17/x/1973, ex *Quercus* sp., K.-T. Park leg.; 1♀, ditto, em. 16/x/1974, ex *Quercus* sp., K.-T. Park leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū); and Korea (new record).

Food plants: *Quercus acutissima* Carr. (Fagaceae) in Japan. *Quercus* sp. in Korea.

Remarks: The present species is distinguishable at once from *C. (P.) leucapennella* by the presence of the blackish median fascia of the fore wing and by the simple and oar-shaped valva.

Caloptilia (Povolnya) querci, sp. nov.

[Figs. 38 (C-E), 39 (C-D), 57 (C-E), 60 (A), 65 (A), 70 (B), 74 (B), 78 (A) & 85 (E-F)]

♂♀. Expanse of wings: 12.0–14.2 mm (13.0 mm in holotype and 13.3 mm in average of 26 specimens). Length of fore wing: 6.0–7.0 mm (6.5 mm in holotype and 6.6 mm in average of 26 specimens).

Face and head light yellowish-gray to dark ochre-yellow, irrorated with dark scales sparsely, the face always paler than head. Palpi whitish above, reddish-brown below; the 2nd segment of labial palpus with a brownish, elongate-triangular tuft a little longer than the apical segment, which is smooth and has 2 oblique, brownish streaks beneath. Antenna light ochre-yellow, annulated with dark brown; scape reddish-brown, somewhat paler above, without pecten. Thorax ochre-yellow to ochre-brown dorsally, with tegula usually darkened anteriorly; pleural surface reddish-brown, with 2 pairs of ochre-whitish streaks. Fore and mid legs dark reddish-brown; fore coxa with 2 ochre-whitish bands, one at base and the other at middle; femora and tibiae with 2 or 3 indistinct, ochre-whitish spots; tarsi light brownish, the 1st and 2nd segments with a whitish median ring, the 3rd with a whitish median ring and a narrow, blackish apical one, the 4th and 5th with a blackish apical ring; mid tarsus rather flattened laterally, somewhat thickened with rough scales especially in the 1st segment. Hind leg ochre-whitish in coxa and

femur, sparsely mixed with reddish-brown scales at the joints; tibia and tarsus ochre-brown, the tibia darkened on upper side, the tarsus with a blackish apical ring in each segment. Fore wing ochre-brownish, slightly violet-glossy in fresh specimens, irrorated with ochre-yellowish or whitish scales in variable degrees, especially densely along costal and dorsal margins in most specimens; 2 dark brown or blackish fasciae situated near apex, narrow, outwardly oblique, narrowly margined with whitish iridescent scales outwardly, the basal one of them disappearing in some specimens; in a few specimens, in addition to those fasciae, there are 4 ill-defined blackish streaks or spots placed in discal area, 1st near base of wing, 2nd at basal $2/5$ forming an outwardly oblique costal streak, 3rd at middle

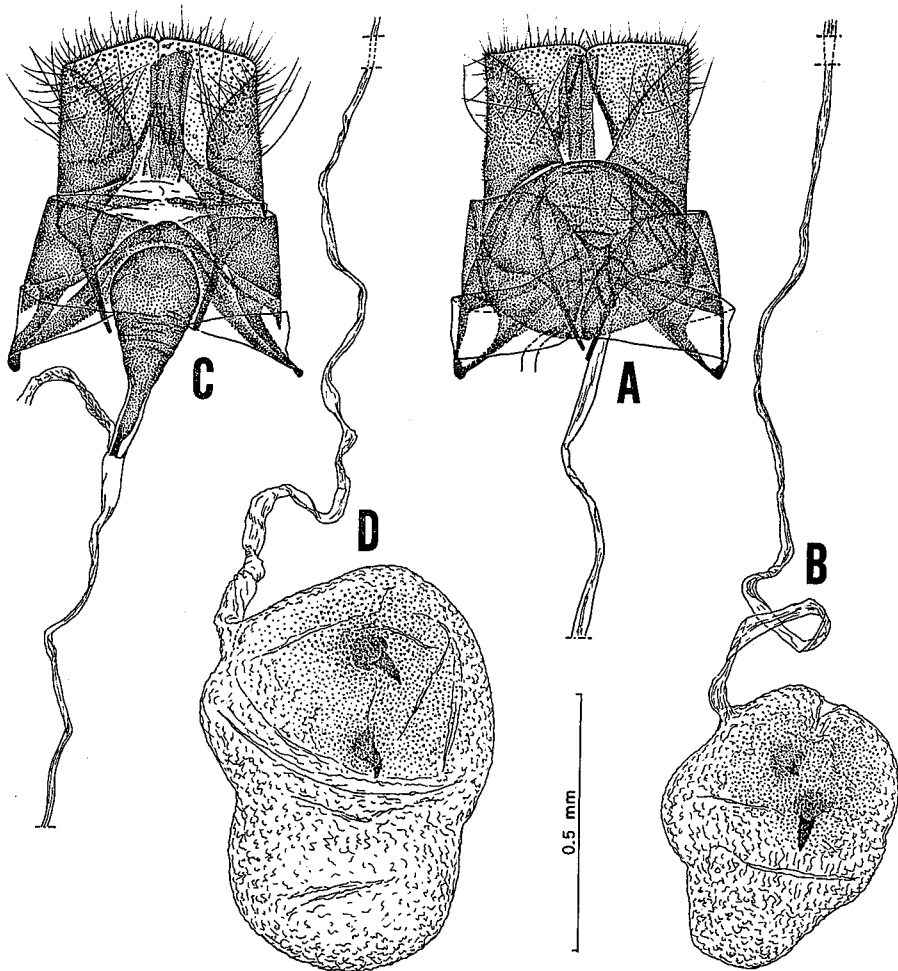


Fig. 39. A-B: *Caloptilia (Povolnya) obliquatella* (Matsumura). A: Female genitalia [Grc-744, Iwawakisan, Ôsaka, Honsyû, em. 22/ix/1954, ex *Quercus acutissima*] — B: Corpus bursae [ditto]. C-D: *Caloptilia (Povolnya) querci*, sp. nov. C: Female genitalia [Grc-746, Sata-tyô, Kagosima-ken, Kyûsyû, em. 22/v/1952, ex *Q. glauca*] — D: Corpus bursae [ditto].

forming an inwardly oblique narrow fascia, and the last at apical 1/4 forming a small discal spot; cilia around apex of wing reddish-brown with a pale vertical subapical line, those along termen light brownish with 3 dark apical lines, and those along dorsal margin gray. Hind wing and its cilia dark gray.

Male genitalia: Tegumen simple; peniculi about 1/3 as long as valva, slender, twisted, hook-shaped; subsclaphium moderate in length, slightly widened apically. Valva slightly upturned, strongly widened towards widely truncated apex, with a faintly serrated ridge running from centre of valva to base of costa; usual marginal setae becoming stouter towards base of valva. Vinculum narrowly round apically, about half as long as valva. Aedoeagus a little shorter than valva, straight, needle-shaped; membraneous anellus with numerous corniform spines. Seventh abdominal segment bare; the 8th segment covered with small scent scales rather densely; both pairs of coremata consisting of long hairy scales, the posterior pair 1/2 to 2/3 as long as the anterior; interior process of 7th sternite slender, a little shorter than median ridge of 8th tergite.

Female genitalia: Papilla analis moderate in length, round at ventral corner. Apophysis anterioris with ventral prong widened on ventral area. Lamella antevaginalis spatulate in form, usually fused with ventral wall of antrum which is narrowed cephalad. Ductus bursae very narrow, long, membraneous; corpus bursae ellipsoidal, heavily granulated around signa; 2 signa short, corniform, spinose on outer surface, one of them being slightly shorter and slenderer than the other.

Specimens examined: 37♂♂ & 34♀♀. HOKKAIDŌ — 1♀, Apoi, Hidaka, em. 7/vii/1973, ex *Quercus mongolica* var. *grosseserrata* (1150). HONSYŪ — 1♂, Amagi, Sizuoka-ken, em. 31/viii/1971, ex *Q. acutissima* (1076); 1♂, Ôsimizu, Isikawa-ken, em. 19/vii/1976, ex *Castanea crenata*, I. Togashi leg.; 1♂, Hutagoyama, Isikawa-ken, em. 19/vii/1976, ex *C. crenata*, I. Togashi leg.; 1♂ (the holotype, G. sl. Grc-1145) & 1♀, Katuura, Wakayama-ken, em. 29/v/1957, ex *Castanopsis cuspidata*, T. Kodama leg.; 1♂, Taizi, Wakayama-ken, em. 26/v/1964, ex *Q. glauca* (647); 4♂♂ & 3♀♀, Kozagawa, Wakayama-ken, em. 30/v.-8/vi/1964, ex *Q. glauca* (647); 2♂♂ & 2♀♀, ditto, em. 10-13/vi/1970, ex *Q. glauca* (1021); 1♂, ditto, em. 11/vi/1970, ex *C. crenata* (1058). KYŪSYŪ — 1♂ & 3♀♀, Ariake-yama, Izuhara-tyô, Tu-sima, 14/x/1979, K. Yasuda leg.; 14♂♂ & 12♀♀, ditto, 20/x/1979, K. Yasuda leg.; 1♂ & 1♀, ditto, 20/x/1979, I. Kanazawa leg.; 1♀, ditto, 6/vii/1979, I. Kanazawa leg.; 1♂ & 1♀, Mokkoku-yama, Izuhara-tyô, 15/x/1979, K. Yasuda, leg.; 1♂, Ôbosi-yama, Mine-tyô, Tu-sima, 17/x/1979, K. Yasuda leg.; 4♂♂ & 5♀♀, Mikazuki-yama, Hukuoka-ken, em. 13-21/vi/1957, ex *Q. glauca* (226); 1♀, Sata, Kagosima-ken, em. 22/v/1952, ex *Q. glauca*, S. Issiki leg. NANSEI IS. — 4♂♂ & 1♀, Nisinomote, Tanega-sima, 13/v/1965; 1♀, Yuwan, Amami-Ôsima, 27/iv/1959, K. Kamijo leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Hokkaidô; Honsyû; Kyûsyû; Nansei Is.).

Food plants: *Castanea crenata* Sieb. et Zucc., *Castanopsis cuspidata* Schottky, *Quercus acutissima* Carr., *Q. glauca* Thunb., and *Q. mongolica* Fischer var. *grosseserrata* Rehd. et Wils. (Fagaceae).

Remarks: The species may be separated from "*Gracilaria*" *aeolospila* by the absence of a white, median dorsal mark on the fore wing and by the smaller size.

SUBGENUS RHADINOPTILIA NOV.

Type-species: *Caloptilia* (*Rhadinoptilia*) *camphorae*, sp. nov.

♂♀. Face and head covered with appressed scales; ocellus absent; proboscis moderately developed. Labial palpus moderately long, slender, drooping; 2nd

segment slightly thickened apically; apical segment slightly rough-scaled beneath, slightly curved, sharpened apically, about as long as 2nd segment. Maxillary palpus minute, pointing anteriorly in most cases, about 2/3 as long as apical segment of labial palpus. Antenna slender, simple, as long as or slightly longer than fore wing; scape slightly thickened, with a pecten of a few fine hairs. Thorax clothed with appressed scales, without crest. Legs long, slender, fore tibia slightly and mid femur and mid tibia moderately thickened apically, hind tarsus about 1.4 times as long as hind tibia, which has 2 pairs of spurs. Fore wing narrowly lanceolate, nearly parallel-sided, with 13 veins; venation as in the subgenus *Caloptilia*, radial veins except for R_1 , median veins and cubital veins with their branching points concentrated around apical 1/7 of discoidal cell, vein R_2 branched from cell nearly on same level with the branching point of vein Cu_{1b} in the type-species and a little distal to the latter in the other species. Hind wing very narrow, less than 2/3 width of fore wing; venation as in the subgenus *Caloptilia*, but vein R_{2+3} not visible.

Male genitalia: Tegumen simple, round apically, with a pair of narrow peniculi protruded from caudal margin dorsal to the appendices angulares as in the subgenus *Povolnya*. Seventh and 8th abdominal segments weakly membranous, not covered with scent scales except for coremata; posterior pair of coremata consisting of spindle-shaped scales, while anterior one consisting of hairy long scales as usual. The other structures are essentially not different from those of the subgenus *Caloptilia*.

Female genitalia: The whole structure is not obviously different from that of the subgenus *Caloptilia*.

Body chaetotaxy of last instar larva: Only the larva of the type-species examined. Three setae of the subventral group on 2nd abdominal segment arranged in a straight line oblique to the body axis as in the subgenus *Sphyrophora*. Seta D_1 on 9th abdominal segment dorsocephalic to seta D_2 as in the subgenus *Phylloptilia*. The other setal pattern and the arrangement of the crochets on the ventral and anal prolegs are quite similar to those of the subgenus *Caloptilia*.

Larval habit: The larva is a leaf miner throughout the feeding period, and does not make a leaf cone. The mine usually occurs on the upper surface of the leaf, very large, linear-blotchy, sometimes blisterlike. At a glance it is quite similar to the mine of some *Acrocercops* species, but the fully mature larva is greenish in colour. When full-grown, the larva leaves the mine through a semicircular slit for a spinning site. The cocoon is usually found on the upper surface of leaf and boat-shaped, without bubbles on the upper surface.

Remarks: The present subgenus much resembles the subgenus *Caloptilia* in the structures of the head, legs, wing venation and female genitalia, but may be separated from the latter by the male genitalia, in which the tegumen has a pair of narrow peniculi as in the subgenus *Povolnya*. From *Povolnya* it can be separated much more clearly by the following combination of characters: — antenna with a basal pecten; corpus bursae with 2 long, curved sickle-shaped signa as in the subgenus *Caloptilia*; 8th abdominal segment of male not covered with scent scales except for posterior coremata which consist of large, spindle-shaped scales. The present subgenus may also be characterized by the body chaetotaxy of the last instar larva; in *Rhadinoptilia* 3 setae of the subventral group on the 2nd abdominal segment are arranged in a straight line, whereas in the other subgenera except *Sphyrophora* they are arranged in a triangle. Furthermore, *Rhadinoptilia* is

separated from *Povolnya* and *Sphyrphora* in that the seta SV_2 is ventrocephalic to the seta SV_1 on the 6th and 7th abdominal segments. From the subgenus *Caloptilia* it is also distinguished by the position of D_1 on the 9th abdominal segment as mentioned above. The larva of this subgenus is a leaf miner throughout the larval period, and does not roll up the leaf of the food plant to make a cone. This larval habit is also characteristic to the present subgenus among the members of the genus *Caloptilia* except for the member of the subgenus *Minyoptilia* (subgen. nov.).

In the course of the present study the following 2 Japanese species have been found to belong to this subgenus. Furthermore, "*Gracilaria*" *mastopis* originally described from Assam, India, surely falls under the subgenus; this conclusion is based on an examination of the male genital slide of the type specimen of *mastopis* by Dr. H. Kuroko. These 3 species feed on the leaves of Lauraceae in their larval stage.

Key to the Japanese species of the subgenus *Rhadinoptilia*

- Fore wing with 2 prominent, blackish spots in disc between golden-yellowish costal area and purplish-brown dorsal area, which occupies about 1/3 breadth of wing; peniculus of tegumen nearly straight, short, at most as long as ventral process of transtilla; vinculum+saccus capitate apically, about as long as valva; apophysis anterioris longer than signum; antrum long, about twice as long as wide. Larva on *Neolitsea*. *bipunctata*, sp. nov.
- Fore wing without such prominent spots in disc; brownish dorsal area of wing very narrow, occupying less than 1/4 breadth of wing; peniculus of tegumen long, upturned, about 1.3 times as long as ventral process of transtilla; vinculum+saccus bluntly pointed apically, about 3/5 as long as valva; apophysis anterioris shorter than signum; antrum short, at most as long as wide. Larva on *Cinnamomum*, *Actinodaphne* and *Parabenzoïn*. *camphorae*, sp. nov.

Caloptilia (*Rhadinoptilia*) *bipunctata*, sp. nov.

[Figs. 40, 41 (F), 57 (F-G), 61 (F) & 65 (C)]

♂♀. Expanse of wings: 10.2–11.5 mm (11.2 mm in holotype and 11.0 mm in average of 4 specimens). Length of fore wing: 5.0–5.7 mm (5.5 mm in holotype and 5.4 mm in average of 5 specimens).

Face yellow, darkened laterally; head dark brownish-gray, slightly purplish-iridescent. Palpi orange-yellow, whitish above narrowly; apical segment of labial palpus with a narrow median band and a broad subapical ring blackish. Antenna yellowish-white, annulated with dark brown; scape dark brown, irrorated with light brown scales, with a pecten of 2 or 3 brownish hairs. Thorax dark purplish-brown dorsally, brownish-gray ventrally; tegula brassy-yellow, with anterior extremity dark purplish-brown. Fore and mid coxae brassy-yellow, dark brown at apex; femora and tibiae blackish-brown, spotted with light brown; tarsi shining white, the 1st segment with a broad, orange-yellow median band and a blackish apical ring, and the other segments each with a narrow, blackish apical ring alone. Hind leg brassy-yellow in coxa and femur, the latter with a blackish apical blotch on outer surface; tibia and tarsus ochre-yellowish, dark gray above narrowly in tibia and 1st tarsal segment, with a fine, blackish apical ring in each tarsal segment. Fore wing very narrowly lanceolate, bluntly pointed apically, brilliantly brassy-yellow in ground colour; a dorsal streak light reddish-brown with purplish

iridescences, extending throughout wing, occupying about 1/3 width of wing, strigulated or reticulated with dark bluish-brown scales at nearly regular intervals; 2 bluish-black, prominent spots placed just above wing-fold between brassy-yellow costal area and reddish-brown dorsal area, one at basal 1/3 and the other beyond middle of wing; a few fine, blackish dots scattered on costal margin of wing at irregular intervals, sometimes disappearing entirely; cilia around apex of wing brownish-black with a light gray subapical line, and those along dorsal margin gray. Hind wing and its cilia dark gray.

Male genitalia: Peniculus of tegumen at most as long as ventral process of transtilla, nearly straight, with its acute apex pointing downwards. Tuba analis very weakly sclerotized; subscaphium rather narrow, moderate in length, blunt at basal extremity. Valva oar-shaped, slightly upturned, with a round lobe just

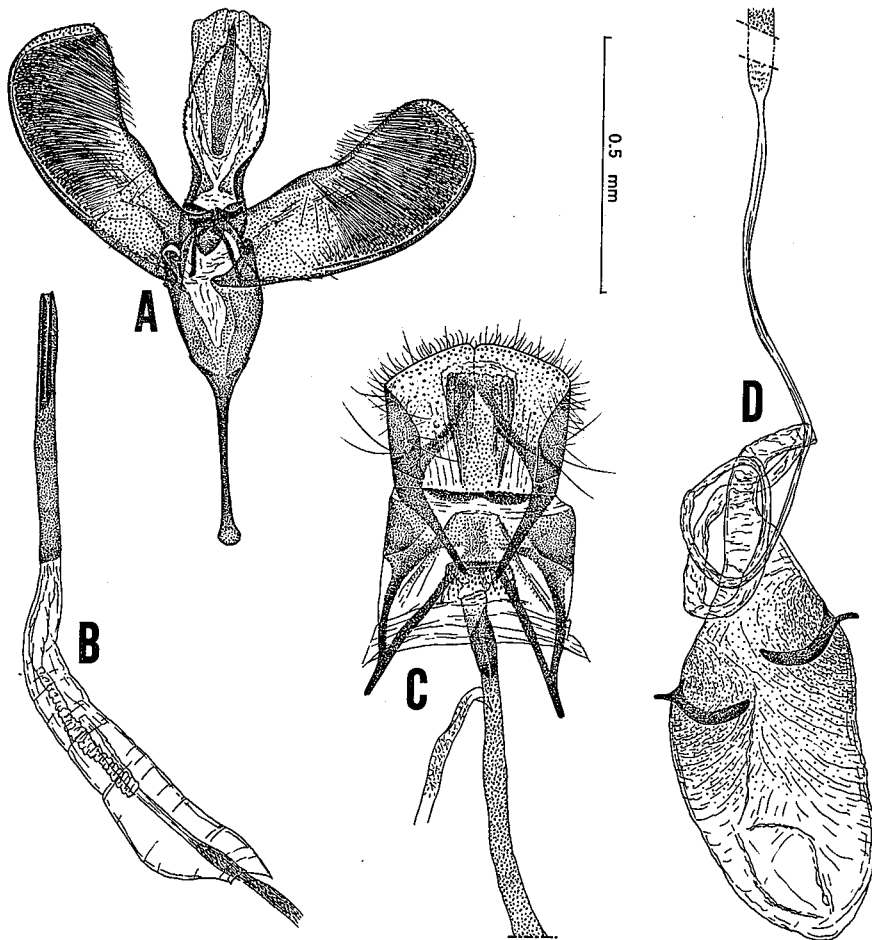


Fig. 40. *Caloptilia* (*Rhadinoptilia*) *bipunctata*, sp. nov. A: Male genitalia [Grc-1286, holotype] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1287, Kii-Ôsima, Wakayama-ken, Honsyû, em. 19/v/1956, ex *Neolitsea sericea*] — D: Corpus bursae [ditto].

before middle of costal margin, and with a number of slender, long marginal setae. Vinculum with a very long saccus, which is capitate apically; saccus+vinculum about as long as valva. Aedoeagus as long as valva, tubular, straight; vesica with a cornutus which is flat and about half as long as aedoeagus. Posterior pair of coremata consisting of large, spindle-shaped scales, about 1/4 as long as the anterior coremata, which consist of hairy long scales. Interior process of 7th sternite long, subcapitate, a little shorter than median ridge of 8th tergite, which has no glandular organ.

Female genitalia: Apophyses anteriores very long, much longer than signum, with ventral prongs united with each other through a short lamella postvaginalis. Ostium bursae surrounded by a granulated, genital plate; sclerotized antrum slightly apart from ostium, tubular, about twice as long as wide. Ductus bursae long, slender, membraneous, sparsely granulated on its cephalic 1/4; corpus bursae elongate-pyriform, with 2 curved, sickle-shaped signa which are asymmetrical in position.

Specimens examined: 3♂♂ & 2♀♀. Honsyû — 2♂♂ (one the holotype, G. sl. Grc-1286) & 2♀♀, Kii-Ôsima, Wakayama-ken, em. 19-28/v/1956, ex *Neolitsea sericea*, S. Issiki leg.; 1♂, Inunaki-yama, Ôsaka, em. 19/vi/1956, ex *N. sericea*, T. Kodama leg. The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû).

Food plant: *Neolitsea sericea* Koids. (Lauraceae).

Remarks: This species is distinguished from *C. (Rhadinoptilia) mastopis* (Meyrick) (comb. nov.) by the short peniculus of the male genitalia; in the present species the peniculus is less than 1/4 length of the valva, whereas in *mastopis* it is nearly 1/2 as long as the valva. Moreover, the spots in the disc of the fore wing are blackish and very prominent in the present species, while in *mastopis*, according to the original description, they are protrusions from the violet-ochreous dorsal streak.

Caloptilia (Rhadinoptilia) camphorae, sp. nov.

[Figs. 41 (A-E), 57 (H), 61 (E), 65 (B), 71 (B), 74 (A), 78 (B) & 86 (A-C)]

♂♀. Expanse of wings: 8.0-10.0 mm (10.0 mm in holotype and 9.3 mm in average of 25 specimens). Length of fore wing: 4.0-5.0 mm (5.0 mm in holotype and 4.6 mm in average of 25 specimens).

Face pale yellow, blackish at sides; head brownish-gray, with a purplish lustre in some light. Maxillary palpus pale brassy-yellow; labial palpus orange-yellow, whitish above, the apical segment with a narrow median band and a broad apical ring blackish. Antenna yellowish-white, annulated with dark brown; scape and its pecten dark brown. Thorax orange-yellow on dorsal surface, with a broad median stripe brownish-gray and purplish-iridescent; the ventral surface dark brown. Fore and mid coxae brassy-yellow, usually blackish at apical extremities; femora and tibiae purplish-black, with 2 or 3 brownish spots in each; tarsi shining white, the 1st segment with an orange-yellow median band and a blackish apical ring, and the other segments each with a blackish apical ring alone. Hind leg brassy-yellow, darkened apically; tarsus whitish, with a dark gray apical ring in each segment. Fore wing pale lemon-yellow with a metallic lustre in ground colour; a narrow, violet-glossy, ochreous streak extending along dorsal margin throughout,

occupying less than 1/4 width of wing, with numerous dots or strigulae of bluish-black scales at irregular intervals; similar blackish dots scattered on costa from base to basal 1/4 of wing; a small, blackish spot placed at apex of wing; cilia around apex of wing blackish with a pale subapical line, and those along dorsal margin dark gray. Hind wing and its cilia dark gray.

Male genitalia: Tegumen weakly sclerotized; peniculus a little longer than ventral process of transtilla, slender, upturned near base, and acutely pointed

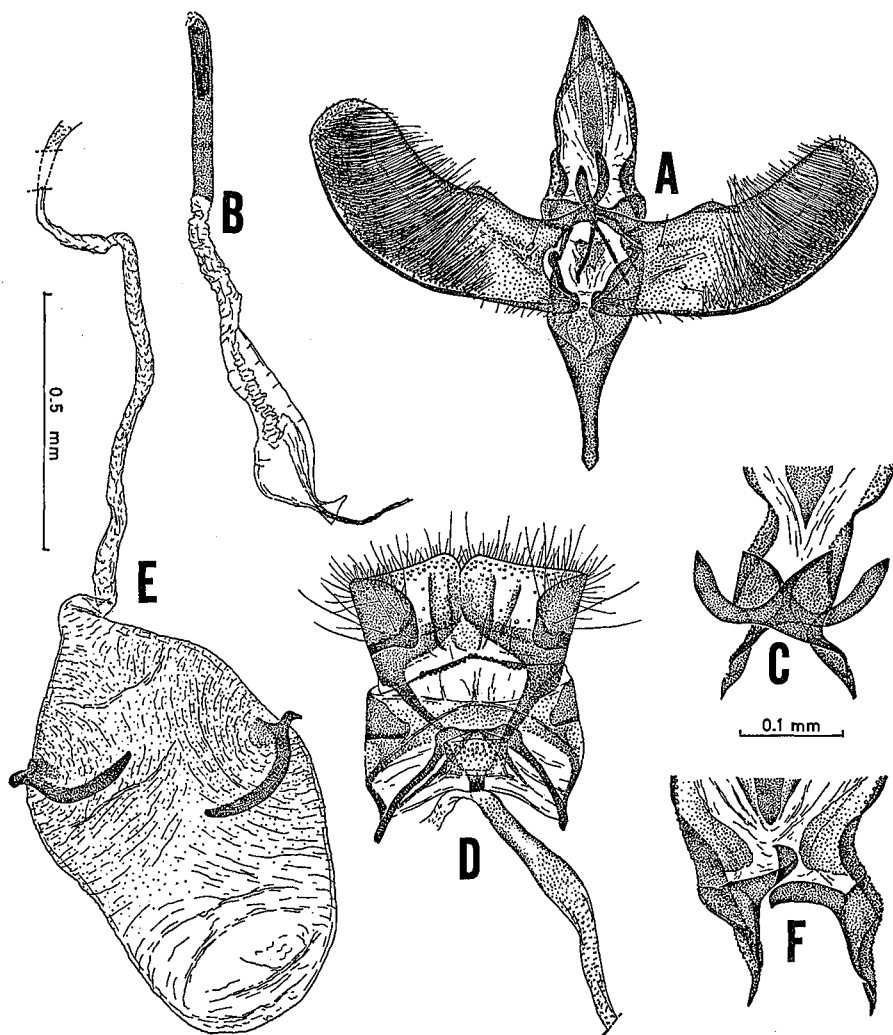


Fig. 41. A-E: *Caloptilia* (*Rhadinoptilia*) *camphorae*, sp. nov. A: Male genitalia [Grc-1106, Kyôto, Honsyû, em. 8/vi/1964, ex *Cinnamomum camphora*] — B: Aedeagus [ditto] — C: Peniculi of tegumen [Grc-1288, Anbô, Yaku-sima, Satunan Is., 12/vi/1965] — D: Female genitalia [Grc-1289, Kyôto, em. 10/vi/1964, ex *C. camphora*] — E: Corpus bursae [ditto].
F: *Caloptilia* (*Rhadinoptilia*) *bipunctata*, sp. nov., peniculi of tegumen [Grc-728, Inunaki-yama, Ôsaka, Honsyû, em. 19/vi/1956, ex *Neolitsea sericea*].

apically. Subscaphium short, narrowed towards both ends. Valva upturned, slightly dilated at median area, round on terminal margin, with a round lobe near middle of costa, and with a number of slender, long marginal setae. Vinculum with a saccus short, slender and bluntly pointed apically; saccus + vinculum about $\frac{3}{5}$ as long as valva. Aedoeagus about $\frac{3}{5}$ as long as valva, tubular, straight; vesica with a flat cornutus about $\frac{1}{2}$ as long as aedoeagus. Posterior pair of coremata consisting of large, spindle-shaped scales, $\frac{1}{3}$ as long as the anterior coremata, which consist of hairy long scales. Interior process of 7th sternite slender, subcapitate, a little longer than median ridge of 8th tergite, which has a pair of small blotches covered with microscopic glandular pores.

Female genitalia: Apophysis anterioris moderate in length, about as long as signum, with a ventral prong slightly dilated at distal end where it is connected with a narrow lamella postvaginalis. Lamella antevaginalis membranous, sparsely granulated on outer side. Antrum very short, about as long as wide; ductus bursae long, slender, membranous on whole length, sparsely granulated on its cephalic $\frac{1}{4}$. Corpus bursae elongate-pyriform; 2 signa curved, sickle-shaped, slightly asymmetrical in position.

Specimens examined: 37♂♂ & 41♀♀. HONSYŪ — 23♂♂ & 28♀♀, Tôkyô, em. 14–21/vi/1971, ex *Cinnamomum camphora* (1072), K. Kobayashi leg.; 11♂♂ (one the holotype, G. sl. Grc-1163) & 9♀♀, Kyôto, em. 6–25/vi/1964, ex *C. camphora*; 1♂, Asaka-yama, Sakai, Ôsaka, em. 15/v/1959, ex *C. camphora*, T. Saito leg.; 1♀, Sakai, em. 2/vi/1959, ex *C. camphora*, S. Issiki leg.; 1♀, Kasuga-yama, Nara-ken, 11/iv/1956, T. Yasuda leg.; 1♀, Kozagawa, Wakayama-ken, em. 11/vi/1970, ex *Actinodaphne lancifolia* (1017). KYŪSYŪ — 1♀, Uearata, Kagosima-si, em. 11/vii/1970, ex *C. camphora*, K. Kusigemati leg. NANSEI IS — 1♂, Anbô, Yaku-sima, 12/vi/1965; 1♂, ditto, em. 6/vi/1965, ex *Parabenzoin praecox* (640). The holotype is in the collection of the Entomological Institute, Hokkaidô University.

Distribution: Japan (Honsyû; Kyûsyû; Nansei Is.).

Food plants: *Actinodaphne lancifolia* Meisn., *Cinnamomum camphora* Siebold. and *Parabenzoin praecox* Nakai (Lauraceae).

Remarks: This species is distinguishable at once from *C. (R.) mastopis* and *C. (R.) bipunctata* by the absence of spots or marks of any colour in the disc between brassy-yellow costal area and brownish dorsal area of the fore wing.

The bionomics of this species was reported by Furuta (1969, 1970) in detail under the common name "Camphor leaf miner".

SUBGENUS MINYOPTILIA NOV.

Type-species: *Caloptilia (Minyoptilia) callicarpae*, sp. nov.

♂♀. Head, antenna, labial and maxillary palpi, legs and venation of hind wing not essentially different from those of the subgenus *Caloptilia*. Fore wing also as in the subgenus *Caloptilia* in shape and in the number of veins, but the all veins well separated at their bases, and vein R_2 branched from cell a little distal to level of branching point of vein Cu_{1b} .

Male genitalia: Not obviously different from those of the subgenus *Caloptilia* in all respects. Tegumen simple, without peniculi, gnathi or socii. Valva simply shell-shaped, with long marginal setae as in most species of the subgenus *Caloptilia*. Vinculum elongate-triangular, with a small triangular lobe on each lateral margin. Aedoeagus simply tubular, without cornuti. Seventh and 8th

abdominal segments weakly membranous, the former sparsely and the latter densely covered with round scent scales, each with a pair of coremata which consists of long hairy scales; the anterior pair of coremata a little longer than the posterior.

Female genitalia: Papilla analis rather long, nearly as long as wide. Apophysis anterioris without a ventral prong connected with lamella postvaginalis, which is simply quadrangular; lamella antevaginalis absent. Ductus bursae membranous in whole length, without sclerotized antrum; corpus bursae with a single signum, which is short, thornlike, not sickle-shaped. The other structures are as in the subgenus *Caloptilia*.

Body chaetotaxy of last instar larva and arrangement of crochets: On 7th abdominal segment subventral group of setae represented by a single seta SV₁, and SV₂ and SV₃ absent; on 9th abdominal segment seta SD₂ absent. The other characters in chaetotactic pattern and arrangement of crochets on the ventral and anal prolegs agree quite well with those of the subgenus *Caloptilia*.

Larval habit: The larva is a leaf miner throughout its feeding period. The mine in final phase is very large, tentiformed, and found on the upper surface along the margin of the leaf of the food plant. When fully grown, the larva leaves the mine for a spinning site through a small round hole (not a semicircular slit seen on the mine of the subgenus *Rhadinoptilia*). The cocoon is boat-shaped, without bubbles on the upper surface as in most species of the genus *Caloptilia*.

Remarks: This subgenus is very similar to the subgenus *Caloptilia* in adult structures except for the slight differences of the fore wing venation and female genitalia, but can distinctly be separated from the latter by the larval habit and chaetotactic pattern of the last instar larva. Especially the fact that the larva is a leaf miner throughout the feeding period and makes a large, tentiformed mine in final stage gives a good reason for recognizing the subgenus. From the subgenus *Rhadinoptilia*, which is also a leaf miner throughout the larval stage, the present subgenus is distinguished by the absence of the peniculi on the male tegumen, by the triangular arrangement of the subventral setae on the 2nd abdominal segment of the last instar larva and by the round hole through which the larva leaves the mine.

Only the following species, which feeds on the leaf of *Callicarpa* (Verbenaceae), is included in the present subgenus.

Caloptilia (Minyoptilia) callicarpae, sp. nov.

[Figs. 42, 57 (I-J), 61 (D), 65 (D), 72 (A), 74 (C), 78 (C) & 86 (D-F)]

♂♀. Expanse of wings: 6.5–8.2 mm (8.0 mm in holotype and 7.6 mm in average of 25 specimens). Length of fore wing: 3.2–4.0 mm (4.0 mm in holotype and 3.8 mm in average of 25 specimens).

Palpi, face and head ochre-whitish; face anteriorly and vertex posteriorly irrorated with dark leaden-metallic scales; labial palpus with 2 blackish rings, one at middle and the other at apex and broad. Antenna ochreous, distinctly annulated with brownish black except for 2nd segment; scape mixed with dark brown scales, with a pecten of a few ochreous hairs. Thorax brownish-black dorsally and ventrally; tegula ochre-yellowish on its apical 2/3. Fore and mid legs brownish-black, the fore coxa being whitish at base; the tarsi white wholly, with a blackish apical spot in each segment. Hind coxa and femur white, the femur being brownish-black on its apical half; hind tibia and tarsus ochre-brownish, usually darkened

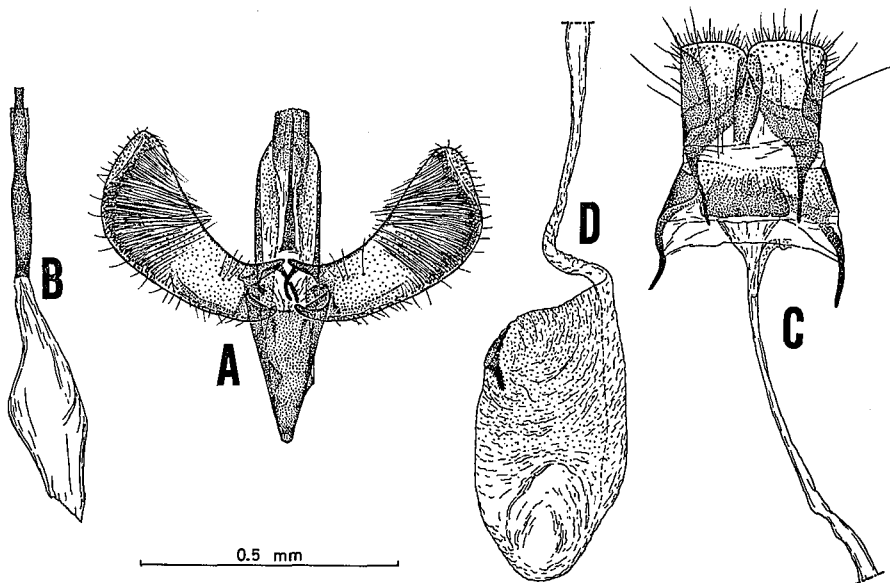


Fig. 42. *Caloptilia (Minyoptilia) callicarpae*, sp. nov. A: Male genitalia [Grc-1212, Anbô, Yaku-sima, Satunan Is., 12/vi/1965] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1232, Anbô, em. 20/vi/1965, ex *Callicarpa japonica* var. *luxurians* (637)] — D: Corpus bursae [ditto].

apically in all segments. Fore wing brownish-black, sprinkled throughout with ochre-whitish scales, which form 5 to 7 ill-defined, oblique fasciae, and with whitish spots at costal and dorsal margins of wing; 3 of these fasciae at median area of wing most prominent; cilia blackish, with a vertical, grayish line around apex of wing, and 2 or 3 narrow, grayish lines along termen. Hind wing dark brownish-gray, with cilia gray.

Male genitalia: Tuba analis weakly sclerotized on whole area, with a more strongly sclerotized, narrow subscaphium, which is suddenly widened trinangularly at the basal extremity. Valva upturned, gradually dilated apically, round on terminal margin, with slender marginal setae. Vinculum elongate-triangular, with a small triangular lobe on each lateral margin. Aedeagus a little shorter than valva, straight, tubular, slightly constricted at middle and just before apex, without any cornutus. Seventh abdominal segment sparsely covered with ovate scales on dorsum, and the 8th thickly with similar scales on whole surface; both pairs of coremata consisting of hairy scales, the posterior pair a little shorter than the anterior; interior process of 7th sternite moderate in length.

Female genitalia: Papilla analis rather prolonged. Lamella postvaginalis very weakly sclerotized, quadrangular, without lateral prongs connected with apophyses anteriores; lamella antevaginalis absent. Ductus bursae slender, long, membranous on whole length; corpus bursae ovoid or ellipsoidal in form, membranous, with a thornlike, short signum, which is spinose on the whole surface.

Specimens examined: 28♂♂ & 25♀♀. SIKOKU — 4♂♂, Ino, Kôti-ken, em. 6/vii/1957, ex *Callicarpa* sp. (274). NANSEI IS. — 1♂, Anbô, Yaku-sima, 12/vi/1965; 13♂♂ (one the holotype, G. sl. Grc-1230) & 13♀♀, ditto, em. 15/vi.-1/vii/1965, ex *Callicarpa japonica*

var. *luxurians* (637); 10♂♂ & 12♀♀, Kurió, Yaku-sima, em. 22/x.-13/xi/1973, ex *C. japonica* var. *luxurians* (1214). The holotype is in the collection of the Entomological Institute, Hokkaidó University.

Distribution: Japan (Sikoku; Nansei Is.).

Food plants: *Callicarpa* spp. including *japonica* Thunb. var. *luxurians* Rehder (Verbenaceae).

Remarks: In addition to the characters stated under the discussion of the subgenus, the following may be useful to separate the present species from any other members of the genus *Caloptilia*: — Moth of smaller size, at most 8.2 mm in wing expanse, while at least more than 9.0 mm in other species; fore wing brownish-black in ground colour, with 6 to 7 ill-defined, oblique, ochreous fasciae; vinculum of male genitalia with a small triangular lobe on each side.

The larva is a leaf miner throughout its feeding period as stated above. The mine occurs on the upper surface of the leaf; at first it is long-linear, epidermal, running along the leaf vein or leaf margin, thereupon it broadens into an elongate blotch, being usually located along leaf margin, tentiformed, sometimes completely folded upwardly. The cocoon is found at a position separated from the mine; in rearing condition it is found at the tip or margin of the mining leaf, boat-shaped and whitish.

SUBGENUS SPHYROPHORA VÁRI

Sphyrophora Vári, 1961, Transvaal Mus. Mem. 12: 26, pls. 4 (3), 53 (4) and 80 (1); Kumata, 1981, Ins. matsum. n. s. 24: 4. [Type-species: *Caloptilia (Sphyrophora) sapina* Vári, 1961.]

Up to the present, this subgenus has contained only 2 species, *C. (S.) sapina* known from South Africa and *C. (S.) octopunctata* from Australia, New Zealand and India. These species feed on the leaf of *Sapium* or *Homalanthus* (Euphorbiaceae) in the larval stage (Kumata, 1981).

In the present study I have found 1 undescribed species which feeds on *Sapium japonicum* in Japan. This species is essentially different from the 2 known species of the subgenus by the simply shell-shaped male valva as in most species of the subgenus *Caloptilia*. It is, however, distinguished from the subgenus *Caloptilia* by the fore wing with all the veins well separated, by the male tegumen covered with some slender setae on the lower face lateral to the tuba analis, by one of 2 signa of the female corpus bursae serrated on both the curves, and by the last instar larva with the seta SV_3 dorsocaudal to the seta SV_1 on the 1st, 2nd, 6th and 7th abdominal segments. It differs also in the fact that in the late instars the larva cuts a stripe off the leaf and rolls it up to form a cone on the underside of the leaf. These characters agree well with those of the 2 known species of the subgenus *Sphyrophora* (Kumata, 1981). Moreover, the Japanese species is associated with the genus *Sapium* likewise.

Based on these facts, the species will be provisionally placed in the present subgenus despite the completely dissimilar structure of the male valva.

Caloptilia (Sphyrophora) sapiivora, sp. nov.

[Figs. 43, 58 (B-C), 61 (B), 65 (E), 72 (B), 74 (D) & 78 (D)]

♂♀. Expanse of wings: 11.2–12.2 mm (12.0 mm in holotype and 11.8 mm in average of 8 specimens). Length of fore wing: 5.2–6.0 mm (6.0 mm in holotype and 5.8 mm in average of 10 specimens).

Face and head whitish, sprinkled with black rather sparsely. Palpi whitish, sprinkled with black below except at apex and base of apical segment of labial palpus. Antenna about as long as fore wing, brownish-black, annulated with ochre-white narrowly; scape about as long as 2nd segment of labial palpus, white, sparsely sprinkled with black; pecten of dense whitish scales with blackish tips. Legs brownish-black, very sparsely sprinkled with yellowish white; fore and mid tarsi pale yellowish-white, with 2 broad, blackish rings, one at middle and the other at apex; hind femur with a blackish median blotch; hind tarsus with a broad, whitish median ring in 1st segment, and with a similar ring at base in other segments. Thorax blackish, heavily sprinkled with white except for posterior margin, the pleural surface with an ill-defined, narrow, yellowish-white streak. Fore wing

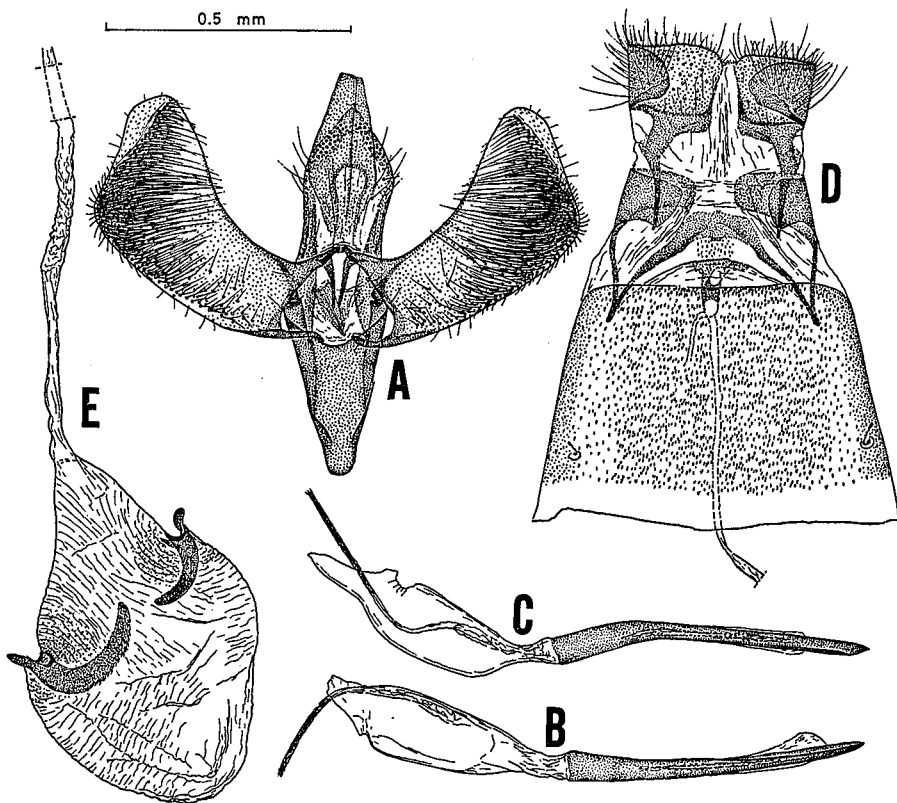


Fig. 43. *Caloptilia (Sphyrophora) sapiivora*, sp. nov. A: Male genitalia [Grc-1175, Hikosan, Kyûsyû, em. 10/xi/1960, ex *Sapium japonicum*] — B: Aedoeagus [ditto] — C: Ditto [Grc-1174, Hikosan, em. 10/xi/1960, ex *S. japonicum*] — D: Female genitalia [Grc-1176, Hikosan, em. 10/xi/1960, ex *S. japonicum*] — E: Corpus bursae [ditto].

rather broad; ground colour blackish on basal 2/5 and dark brownish on apical 3/5, rather densely irrorated with pale brownish or grayish speckles throughout the surface, with 2 dense tufts of raised blackish scales on dorsal margin, one near base and the other at basal 1/4; 3 narrow, oblique, lemon-yellow fasciae, the 1st fascia placed near base of wing, sometimes reduced into minute discal and dorsal spots or rarely completely disappearing, the 2nd fascia placed just apical margin of blackish basal area of wing, very narrow, rarely reduced into a short costal streak, the 3rd fascia at basal 2/3 of wing, always detached from dorsal margin, surrounded by black scales, sometimes separated into 2 spots; an indistinct blackish fascia placed just before apex of wing, with a short black streak stretched from middle of the fascia towards base of wing; an indistinct, blackish apical spot followed by an indistinct, small whitish mark; cilia ochre-brown, somewhat sinuate on terminal margin, with a few blackish lines. Hind wing dark gray, with cilia gray.

Male genitalia: Tegumen with several setae on lower surface lateral to tuba analis, which is weakly sclerotized on almost whole the ventral surface. Valva curved, gradually widened apically, rather straight on terminal margin, with usual marginal setae occurring especially thickly on ventroapical corner. Vinculum about 3/5 as long as valva, gradually narrowed towards round apex. Aedeagus about 1.2 times as long as valva, tubular, without any cornutus. Seventh abdominal segment bare; the 8th sparsely covered with scent scales; coremata consisting of long hairy scales, the posterior pair being a little shorter than the anterior; interior process of 7th sternite absent.

Female genitalia: Lamella postvaginalis short, trapezoid, with lateral prongs connected with apophyses anteriores; lamella antevaginalis absent. Antrum dilated cephalad, weakly sclerotized at its cephalic half; ductus bursae very slender, long, membranous; corpus bursae pyriform, membranous, with 2 large, sickle-shaped signa, one of which is longer, wider and situated more cephalad than the other, and acutely serrated on its outer and inner curves.

Specimens examined: 9♂♂ & 8♀♀. Honsyū — 3♂♂ (one the holotype, G. sl. Grc-1347) & 3♀♀, Kyōto, em. 17-26/x/1966, ex *Sapium japonicum* (813); 1♂, Ibaragi, Ōsaka, em. 4/x/1975, ex *S. japonicum* (1675), F. Komai leg. Sikoku — 3♂♂ & 3♀♀, Nametoko, near Uwazima, Ehime-ken, em. 25/x.-4/xi/1980, ex *S. japonicum* (2273). Kyūsyū — 1♂, Hikosan, Hukuoka-ken, em. 16/x/1958, ex *S. japonicum*, H. Kuroko leg.; 2♂♂ & 1♀, ditto, em. 10/xi/1960, ex *S. japonicum*, H. Kuroko leg. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū; Sikoku; Kyūsyū).

Food plant: *Sapium japonicum* Pax et Hoffm. (Euphorbiaceae).

Remarks: The new species is distinguished at once from *C. (S.) octopunctata* by the colour-pattern of the fore wing and the structure of the valva.

As already stated in the discussion of the subgenus, the larval habit of this species is similar to that of *octopunctata*. In early instars the larva makes a tentiform blotch-mine on the lower side of the leaf. When the leaf tissue has been consumed within the mine, the larva leaves the mine and migrates towards the edge of the same leaf or another, which it cuts off from the edge towards the midrib. The edge cut off is rolled up to form a cone on the underside of the leaf. The larva continues to feed inside the cone till it is full-grown. The cocoon is formed inside the cone, whitish and spindle-shaped.

SUBGENUS CECIDOPTILIA NOV.

Type-species: *Caloptilia cecidophora* Kumata, 1966.

♂♀. Head and face covered with appressed scales; vertex between antennae slightly protruded anteriorly; ocellus absent; proboscis moderately developed. Labial palpus turned anteriorly, rather short, nearly reaching apex of vertex, smooth-scaled above, slightly rough-scaled beneath; apical segment sharpened apically, about 2/3 as long as 2nd segment. Maxillary palpus minute, about 2/3 as long as apical segment of labial palpus. Antenna slender, simple, nearly as long as fore wing; scape slightly thickened, with a pecten of 2 or 3 fine hairs. Legs slender, long, smooth-scaled; mid femur and tibia thickened beneath with scales as in the subgenus *Caloptilia*; hind tibia very slightly roughened with raised spinelike scales on lower and upper sides apically, with 2 pairs of spurs; hind tarsus about 1.3 times as long as hind tibia. Fore wing rather broad, lanceolate, with long termen; discoidal cell truncated apically; 13-veined, all veins well separated at their bases, vein R_2 nearly opposite vein Cu_{1b} . Hind wing 8-veined, vein R_{2+3} set close to costal margin and shortened, but distinct. The other venations of both the fore and hind wings are as in the subgenus *Caloptilia*.

Male genitalia: Tegumen simple, without any paired processes or sclerites; tuba analis with a narrowly sclerotized subscaphium. Valva simply shell-shaped, the inner face almost wholly covered with rather dense, slender setae; transtilla with a pair of slender processes. Vinculum simply elongate-triangular. Aedoeagus simply tubular, without cornuti. Seventh and 8th abdominal segments weakly membranous, both rather thickly covered with round scent scales, with a pair of coremata in each segment, the coremata consisting of long hairy scales, the anterior pair a little longer than the posterior; 7th sternite reduced into a small sclerite, with a short interior process.

Female genitalia: Papilla analis moderate in length, setose as usual; apophysis posterioris rather long, widened on basal half. Eighth abdominal segment rather short; apophysis anterioris similar to apophysis posterioris in shape, without ventral prong. Genital plate simple, represented only by a small lamella postvaginalis. Ductus bursae long, slender, membranous except on short antrum; corpus bursae ellipsoidal, membranous, with 2 moderately long, sickle-shaped signa.

Body chaetotaxy of last instar larva: On prothorax no seta supposed to be XD_2 is found. Lateral groups of setae on mesothorax, metathorax, and 1st to 9th abdominal segments unisetose, with setae L_2 and L_3 absent. Subventral groups of setae on 1st, 2nd, and 6th to 9th abdominal segments also unisetose, and those on 3rd to 5th abdominal segments bisetose. Seta SD_2 absent on 9th abdominal segment. Seta D_1 always dorsocephalic to seta D_2 on all abdominal segments.

Arrangement of crochets: Crochets arranged in a lateral penellipse alone on ventral prolegs and in a semicircular row on anal prolegs.

Larval habit: The larva is a leaf miner in early instars (perhaps until the 3rd instar), thereupon it makes an elongate gall on the upper side of the leaf at the mining part. The mine is at first linear and epidermal, then changes to lower parenchymal and slightly widened linear. The leaf with a mine is swollen on the upper surface opposite to the mine. The larva then continues to feed on the leaf tissues within the swollen part. Finally the swollen part becomes a moderately large ellipsoidal gall. Pupation always takes place inside the gall.

Remarks: In most adult structures the present subgenus exactly agrees with

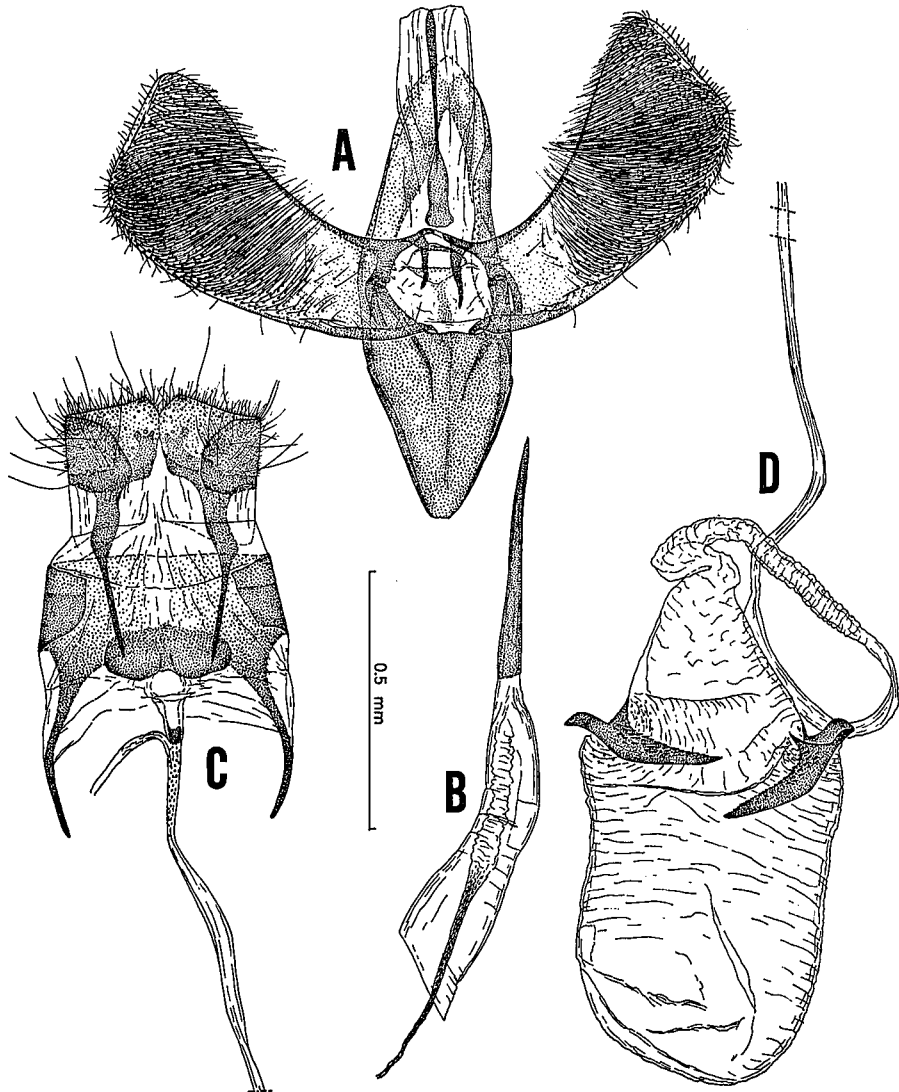


Fig. 44. *Caloptilia (Cecidoptilia) cecidophora* Kumata. A: Male genitalia [Grc-1188, holotype] — B: Aedeagus [ditto] — C: Female genitalia [Grc-1189, Nisinomote, Tenaga-sima, Satunan Is., em. 5/vii/1965, ex *Glochidion obovatum* (663)] — D: Corpus bursae [ditto].

the subgenus *Caloptilia*. Different characters are as follows:— the fore wing is rather broad, with a very long termen; all the veins of the fore wing are broadly separated at their bases; and the valva is covered with a number of slender setae on almost the whole inner surface (in the other subgenera, such setae are mainly arranged along the terminal and ventral margins of the valva). On the other hand, in larval structures and habit it is quite different from any other subgenera as follows: — the

prothorax lacks seta XD_2 ; the lateral groups are unisetose on the mesothorax, metathorax, and 1st to 8th abdominal segments; the subventral groups are represented by only 1 seta (SV_1) on the 1st, 2nd, 6th and 7th abdominal segments, and those on the 3rd to 5th segments by 2 setae, SV_1 and SV_2 ; the ventral prolegs have uniordinal crochets arranged in a lateral penellipse alone (in the other members of the genus *Caloptilia* and allies the crochets are arranged in a lateral penellipse plus a transverse row); and the larva makes a gall on the upper surface of the leaf in the late instars.

As described in the previous lines, the larva of the present subgenus exhibits a very reduced state in the number of setae; it lacks even primary setae such as XD_2 of the prothorax and L_2 of the mesothorax, metathorax and 1st to 8th abdominal segments. It is not sure whether such a reduced pattern of the body setae is adaptive to the gall living or any other habit. As far as I know, a similar reduced pattern is seen in the members of the genus *Phyllonorycter* alone, which is regarded as highly specialized to the leaf mining habit in the family. This similarity between *Cecidoptilia* and *Phyllonorycter* in the larval chaetotaxy seems to owe to convergence and may not show a close relationship in phylogeny.

Cecidoptilia may better be treated as a distinct genus separated from the genus *Caloptilia* on the basis of the specialized larval chaetotaxy. In this paper, however, I would like to describe it as a subgenus under the genus *Caloptilia*, because in the adult structure it is quite similar to the subgenus *Caloptilia*.

In the course of the present study, only the following species, a gall maker on the leaf of *Glochidion* (Euphorbiaceae), is included in this subgenus.

Caloptilia (Cecidoptilia) cecidophora Kumata

[Figs. 44, 58 (A), 61 (C), 66 (B), 69 (B), 79 (A) & 87]

Caloptilia cecidophora Kumata, 1966, Ins. matsum. 29: 14, pls. 3 (17), 10 (38) and 18 (60)

Specimens examined: 1 ♂ & 2 ♀♀. NANSEI Is. — 1 ♂ (the holotype of *cecidophora*, G. sl. Grc-1188) & 1 ♀, Nisinomote, Tanega-sima, em. 3-5/vii/1965, ex *Glochidion obovatum* (663). RYŪKYŪ Is. — 1 ♀, Hunaura, Iriomote, 26/xiii/1979, I. Kanazawa leg. Although I have examined only 3 adult specimens stated above, I have collected many galls of this species from the following localities: — Kii-Ōsima, Wakayama-ken, Honsyū; Makurazaki, Kagosima-ken, Kyūsyū; and Anbō, Yaku-sima, Nansei Is. The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Honsyū; Kyūsyū; Nansei Is.; Ryūkyū Is.).

Food plant: *Glochidion obovatum* Sieb. et Zucc. (Euphorbiaceae).

Remarks: So far as I am aware, "*Gracillaria*" *hercoscelis* described from Fiji and "*G.*" *murtfeldtella* known from North America are also gall makers in the larval stage, but they are very different from *C. (C.) cecidophora* by the colouration of the fore wing.

GENUS CALYBITES HUEBNER

Calybites Hübner, 1822, Syst.-alph. Verz. Samml. Eur. Schmett.: 66; Bradley, 1967, Ent. Gaz. 18: 45. [Type-species: *Tinea phasianipennella* Hübner, 1810-13, designated by Bradley, 1967.]

Euspilapteryx Stephens, 1835, Ill. Brit. Ent. Haust. 4: 362; Vári, 1961, Transv. Mus. Mem. 12: 33. [Type-species: *Tinea phasianipennella* Hübner, 1810-13.]

♂♀. Head and face smooth-scaled, with ocelli absent; proboscis developed. Antenna about as long as fore wing, smooth; scape moderately thickened, with a pecten of a few hairs. Labial palpus long, upturned, acutely pointed apically, the 2nd segment very slightly roughened beneath apically and as long as the apical one; maxillary palpus small, smooth-scaled, $1/3-1/2$ as long as apical segment of labial palpus. Thorax smooth-scaled, without a crest. Legs rather smooth-scaled; fore tibia, mid femur and mid tibia slightly thickened with raised scales; hind tarsus slightly longer than hind tibia. Fore wing narrow, lanceolate, pointed; discoidal cell slightly dilated apically, with distal margin rather vertical; 12- or 13-veined, the veins M_2 and M_3 coincident in type-species; radial veins well separated at bases, vein R_1 arising from cell near base of wing and ending in costal margin at basal $1/2-3/5$, vein R_2 from cell at apical $1/11-1/15$, and vein R_3 from upper angle of cell; vein M_2 or M_3 short-stalked with, or connate to, vein Cu_{1a} at bases, both the veins arising from lower angle of cell; vein Cu_{1b} arising from cell slightly more distal than vein R_2 ; vein R_1 and upper vein of cell obsolescent towards base. Hind wing about $2/3$ as wide as and about $4/5$ as long as fore wing, very narrowly lanceolate, acutely pointed, with cell opened between veins M_2 and M_3 ; 8-veined, vein R_{2+3} very short, set close to apical part of vein $Sc+R_1$; veins M_1 and M_2 short-stalked; veins M_3 , Cu_{1a} and Cu_{1b} nearly equidistant, or vein Cu_{1a} closer to vein M_3 than to vein Cu_{1b} .

Male genitalia: Tegumen weakly sclerotized, sparsely setose on inner face lateral to tuba analis, without any produced uncus, gnathos or peniculus; tuba analis weakly sclerotized on lower side wholly, without a slender, distinct sub-scapium. Valva upturned, moderate in length, strongly dilated apically, rather densely setose on inner face along apical and ventral margins, with a slender process produced from transtilla. Vinculum very large, with or without produced saccus. Diaphragma with a weakly sclerotized juxta. Aedeagus simple, slender, tubular; vesica with or without cornuti. Seventh and 8th abdominal segments weakly membraneous, with a pair of coremata on each segment in type-species or without coremata in *trimaculata* (sp. nov.); if coremata present, then posterior pair being always obsolescent and consisting of a few hairy scales.

Female genitalia: Papilla analis rather short, setose as usual; apophysis posterioris long, very much dilated on its basal half; apophysis anterioris similar to posterioris in form, without ventral prong. Ostium bursae located in depth of an indentation of caudal margin of 7th sternite; ductus bursae slender, long, strongly sclerotized or weakly membraneous; corpus bursae membraneous, with a single signum present or absent.

Body chaetotaxy of last instar larva: Lateral groups on prothorax and 1st to 8th abdominal segments bisetose, and those on mesothorax and metathorax trisetose; seta L_2 absent in all abdominal segments. Subventral groups on 1st and 6th to 9th abdominal segments unisetose, those on 2nd segment bisetose, and those on 3rd to 5th segments trisetose. Seta D_1 on 9th abdominal segment situated ventrocephalad of seta D_2 , and that on 1st to 8th segments dorsocephalad of and far apart from the latter.

Arrangement of crochets: Ventral prolegs with uniordinal crochets arranged in a lateral penellipse plus a transverse row. Anal proleg with uniordinal crochets arranged in a semicircular row which is more or less transverse to body axis.

Remarks: This genus is related to the genus *Caloptilia* in external features of the adult stage, especially in the legs, antenna, wing venation and male pregenital

segments. It may be, however, distinguished from the latter by the following characters of the genital structures:— In male, the tuba analis is weakly sclerotized on the lower face wholly, without a distinctly sclerotized, narrow subscaphium; the tegumen is sparsely setose on the inner face lateral to the tuba analis. In female, the ostium bursae is located in the depth of an indentation of the caudal margin of the 7th sternite; the corpus bursae has only 1 signum or lacks any signum. In the larval chaetotaxy it is more clearly distinguished from the genus *Caloptilia* by the subventral groups of setae being unisetose on the 1st, 6th and 7th abdominal segments, and those on the 2nd segment bisetose. In the genus *Caloptilia* except for the subgenus *Cecidoptilia*, the subventral groups are composed of 2 setae, SV_1 and SV_2 or SV_1 and SV_3 , on the 1st, 6th and 7th segments, and of 3 on the 2nd segment.

It is often remarked by the former workers that *Calybites* is separated from *Caloptilia* by the veins M_2 and M_3 of the fore wing being coincident into 1 vein. In the species described here as new, the fore wing has a complete venation, with veins M_2 and M_3 free from each other. This new species is in reality included in *Calybites* on account of the characters of the genitalia and the larval chaetotaxy. It seems to me that the essential characteristics by which *Calybites* can be distinguished from *Caloptilia* is provided by the genital structure and the larval chaetotaxy as stated above.

The larva of this genus is a leaf miner in the early instars and a leaf roller in the late instars, as is usual in some species of the genus *Caloptilia*, but the leaf roll made by the late instar larva is very different in shape. The larva emerged from mine migrates to the margin of the same leaf or another one, then cuts off the leaf along the margin into a narrow stripe; the stripe cut off is rolled up to form a cone on the lower side of the leaf. In *Caloptilia* species, except the members of subgenus *Sphyrophora*, the larva does not cut off the leaf before rolling it up. The cocoon of *Calybites* species is formed inside the cone, and spindle-shaped.

The following 2 Japanese species belonging to *Calybites* are associated with Polygonaceae or Primulaceae in their larval stage.

Key to the Japanese species of the genus *Calybites*

- 1 Fore wing blackish, with lemon-yellow spots. 2
- Fore wing blackish-brown wholly, without lemon-yellow spots, but sometimes with light brown spots or traces of such spots. Larva on various species of Polygonaceae and Primulaceae. *phasianipennella* (Hübner) (autumnal form)
- 2 Fore wing with 3 lemon-yellow spots, 2 on costa and 1 on dorsal margin; aedoeagus without any cornutus; vinculum without a narrow saccus; ductus bursae wholly membranous; corpus bursae with a long, sickle-shaped signum. Larva on *Polygonum chinense*. *triamculata*, sp. nov.
- Fore wing with 4 lemon-yellow spots, 2 on costa and 2 on dorsal margin; aedoeagus with 6–10 corniform cornuti; vinculum with a narrow saccus produced shortly; ductus bursae heavily sclerotized on almost whole length; corpus bursae with a short signum, which is variable in shape, but not sickle-shaped. Larva on various species of Polygonaceae and Primulaceae. *phasianipennella* (Hübner) (aestival form)

Calybites phasianipennella (Hübner)

[Figs. 45, 58 (D-F), 61 (G), 66 (C), 72 (C), 74 (E), 79 (B) & 88 (A-B)]

Tinea phasianipennella Hübner, 1810–13, Samml. Eur. Schmettt.: f. 321.

Euspilapteryx phasianipennella: Miyazaki, 1979, Bull. Natl. Grassl. Res. Inst. 14: 128.

Gracilaria (Euspilapteryx) quadruplella Zeller, 1847, Linn. Ent. 2: 354.

Caloptilia isograptia: Issiki, 1950, Icon. Ins. Jap.: 452, f. 1220; Inoue, 1954, Check List Lep. Jap. 1: 26. [Misidentification.]

Euspilapteryx isograptia: Issiki, 1957, Icon. Heterocer. Jap. Color. Nat. 1: 29, pl. 4 (110). [Misidentification.]

This species was originally described from Europe, and now is known to occur widely in the Palaearctic Region. In Japan it was erroneously identified by authors as *isograptia* which was described from India.

The species is represented by 2 colour forms. The form with a very distinct, yellowish maculation on the fore wing is known as forma *quadruplella*, and the other with a very obscure maculation is known as the nominate form, forma *phasianipennella*. The difference between them seems to be associated with their breeding seasons. With a few exceptions, in Hokkaidô, the specimens belonging to the forma *quadruplella* emerged in June to mid September, whereas the representatives of the forma *phasianipennella* in mid September to October (Table 3). Although these forms were overlapped at mid September in emergence, they can be regarded as seasonal forms; namely, the forma *quadruplella* is an aestival form, and the forma *phasianipennella* is an autumnal melanic form of the same species. There are some exceptional specimens which show a colouration intermediate to some extent between the 2 forms and are scattered from August to late September in emergence.

Table 3. Number of moths, emerged or collected in different seasons, of different colour-forms of *Calybites phasianipennella* in Hokkaidô, Japan.

	June	July	August	September			October	March to May	Total
				Early	Mid	End			
Forma <i>quadruplella</i>	1	6	6	3	1				17
Intermediate form			1		1	2		4*	8
Forma <i>phasianipennella</i>	1*				5	24	14	13*	57
Total	2	6	7	3	7	26	14	17	82

* The specimens seem to have hibernated in adult stage.

On this occasion will be given a brief redescription based on the present material.

♂♀. Expanse of wings: Aestival form—7.2–10.0 mm (9.1 mm in average of 19 specimens). Autumnal form— a little larger, 9.0–11.0 mm (9.8 mm in average of 25 specimens). Length of fore wing: Aestival form — 3.6–5.0 mm (4.5 mm in average of 19 specimens). Autumnal form — 4.5–5.5 mm (4.9 mm in average of 25 specimens).

Colour: Aestival form— Almost whole surface dark fuscous in ground colour, more or less tinged with a leaden luster. Face and head strongly leaden-metallic, the vertex between antennae sometimes whitish. Second segment of labial palpus basally and the 3rd apically and basally whitish. Antenna annulated with ochre-white narrowly; pecten dark grayish. Basal extremity of fore coxa, basal 3/4 of hind coxa and median area of hind femur lemon-yellow; anterior 4 tarsi with 3 broad,

white bands each at base of 1st and 3rd segments and on whole area of the 2nd; hind tarsus whitish basally on 2nd to 5th segments. Ventral surface of thorax with a pair of broad, lemon-yellow streaks. Fore wing with 4 lemon-yellow spots, 1 at basal 1/3 of costa, 1 just beyond 2/3 of costa, 1 near base of dorsal margin and the last at middle of dorsal margin, all these spots surrounded by purple-blackish scales; an ill-defined, ochre-brownish spot situated on costa near apex of wing; a narrow, vertical, blackish fascia situated near apex of wing; cilia pale gray, with 2 or 3 dark fuscous lines around apex of wing. Hind wing pale fuscous, with cilia gray.

Autumnal form — Slightly differs from the aestival form as follows: — Ground colour of almost whole surface a little more strongly tinged with brown, especially

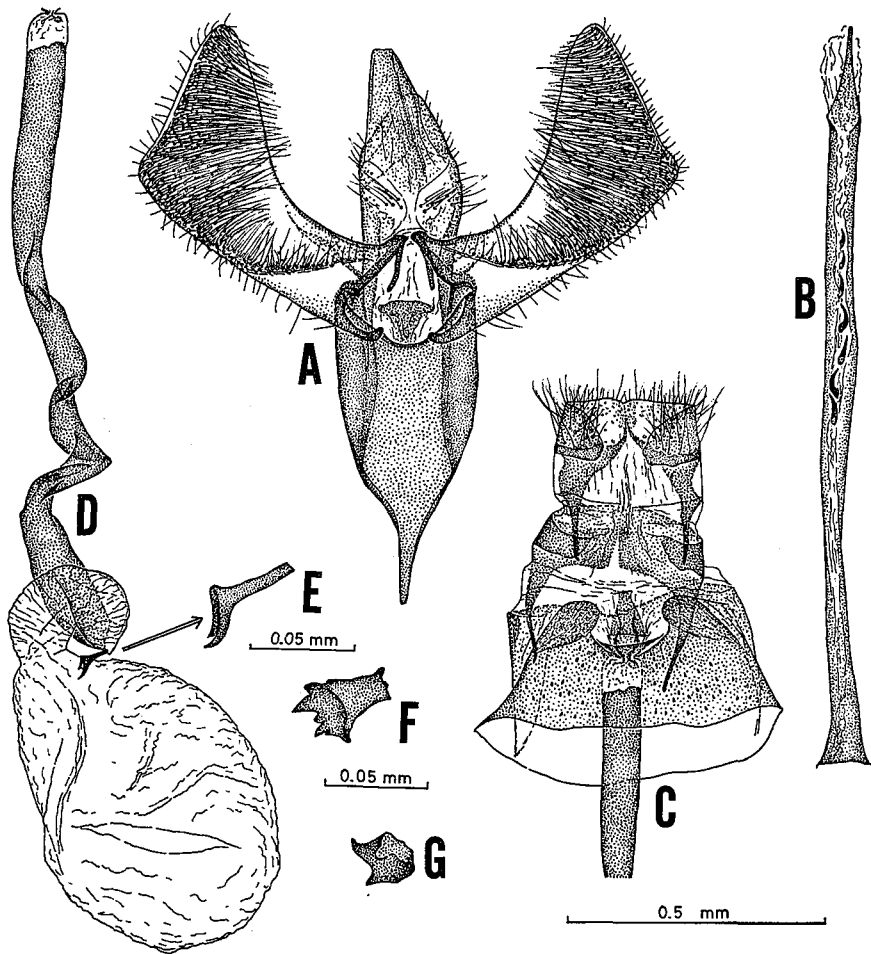


Fig. 45. *Calybites phasianipennella* (Hübner). A: Male genitalia [Grc-760, Tomakomai, Hokkaidō, em. 1/ix/1957, ex *Lysimachia vulgaris* (320)] — B: Aedeagus [ditto] — C: Female genitalia [Grc-758, Nisinomiya, Ōsaka, Honsyū, em. 31/viii/1949, ex *Polygonum orientale*] — D: Bursa copulatrix [ditto] — E: Signum enlarged [ditto] — F: Ditto [Grc-941, Austria, Europe, 26/ix/1953] — G: Ditto [Grc-940, Austria, 20/ix/1953].

on head and thorax. Basal extremity of fore coxa and whole area of hind coxa brownish. Ventral surface of thorax with a pair of brownish streaks instead of lemon-yellow ones. Lemon-yellow spots of fore wing almost wholly changed to dark brown or ground colour, but suggested by the presence of blackish marginal scales.

In some specimens, the spots of the fore wing are intermixed with lemon-yellow and brownish scales to some extent. These variations are treated here as the intermediate form.

Male genitalia: Valva strongly dilated apically, shallowly concave on terminal margin, the ventroapical corner bluntly angulated, and the costoapical corner pointed; 1 or 2 rows of spinelike, short setae occurring along terminal and ventral margins of valva, and a number of slender setae on inner surface; a setose ridge lying between middle of ventral margin and base of costa. Juxta wide-triangular. Vinculum about as long as valva, rather wide at base, with a narrow, short saccus. Aedoeagus very long, about 2.5 times as long as valva, straight, tubular, pointed apically, with a row of 6–10 corniform cornuti. Two pairs of coremata consisting of hairy scales, rather short, the posterior pair being reduced into 2–4 hairy scales, and a little shorter than the anterior. Seventh sternite without an interior process.

Female genitalia: Ostium bursae placed near depth of deeply notched caudal margin of 7th sternite; sterigma well sclerotized on sides, elongate-oval, finely spinose. Ductus bursae strongly sclerotized on whole length, slightly sinuate near cephalic end; cervix and corpus bursae membranous, with a short signum, which is variable in shape as shown in Fig 45, E-G.

Specimens examined: 42♂♂ & 58♀♀. Aestival form: HOKKAIDŌ — 1♀, Sapporo, em. 7/vi/1956, ex *Polygonum thunbergii* (25); 1♀, ditto, em. 27/viii/1956, ex *P. thunbergii* (25); 1♂, ditto, em. 19/ix/1957, ex *P. thunbergii*; 2♀♀, ditto, em. 15–18/viii/1964, ex *Polygonum* sp. (705); 1♀, ditto, 15/vii/1964; 1♂, ditto, 21/viii/1966; 1♀, ditto, 9/vii/1967; 1♂, Soranuma-dake, 9/vii/1962; 1♂ & 3♀♀, Tomakomai, em. 28/viii.–4/ix/1957, ex *Lysimachia vulgaris* (320); 1♀, Gamusi, Hiyama, 12/vii/1958; 3♀♀, Okusiri-tô, 14/vii/1958. HONSYŪ — 1♀, Morioka, Iwate-ken, 25/viii/1956, M. Okano leg.; 1♀, ditto, 1/ix/1970, S. Yamane leg.; 1♂ & 1♀, Nisinomiya, Ōsaka, em. 30–31/viii/1949, ex *P. orientale*, S. Issiki leg., determined as *Euspilapteryx isograptia* by Issiki. KYŪSYŪ — 1♂, Aso, Kumamoto-ken, em. 5/x/1972, ex *Rumex* sp., A. Naito leg. EUROPE — 1♀, Berling, em. 10/x/1947, ex *P. lapathifolium*, E. Hering leg., and 1♂, ditto, em. 25/i/1948, ex *P. lapathifolium*, E. Hering leg., both the specimens determined as *Euspilapteryx phasianipennella* f. *quadruplella* by Hering. Autumnal form: HOKKAIDŌ — 1♂ & 1♀, Yuni, 24/v/1961; 1♀, Nopporo, 6/vi/1979; 6♂♂ & 6♀♀, Sapporo, em. 18–28/ix/1957, ex *P. thunbergii*; 3♂♂ & 2♀♀, ditto, em. 21/ix/1970, ex *P. thunbergii*; 1♂ & 1♀, ditto, em. 17–21/ix/1957, ex *P. longisetum*; 1♂ & 4♀♀, Teine, em. 14–28/ix/1957, ex *P. longisetum*; 5♂♂ & 6♀♀, Zyôzankei, em. 7–12/ix/1957, ex *P. longisetum* (332); 2♂♂, Sapporo, em. 24/ix/1957, ex *P. filiforme* (273); 2♀♀, ditto, em. 11/x/1969, ex *P. filiforme*; 1♂, ditto, em. 10/x/1966, ex *Polygonum* sp.; 5♂♂ & 4♀♀, ditto, 3/v/1956; 1♂ & 1♀, ditto, 30/ix/1958; 3♂♂, ditto, 20/iv/1959; 1♂, Noboribetu, 29/ix/1962, T. Oku leg. HONSYŪ — 2♀♀, Nasu, Totigi-ken, em. 7/x/1972, ex *Rumex* sp., M. Miyazaki leg. EUROPE — 1♂ & 1♀, Berlin, em. 8–25/ix/1947, ex *P. lapathifolium*, E. Hering leg., determined as *Euspilapteryx phasianipennella* by Hering; 2♂♂ & 3♀♀, Austria, 20–26/ix/1953, J. Klimesch leg., and 1♀, ditto, em. 9/ix/1967, ex *P. hydropiperum*, J. Klimesch leg., all the specimens determined as *E. phasianipennella* by Klimesch. Intermediate form: HOKKAIDŌ — 2♀♀, Sapporo, em. 21–24/ix/1957, ex *P. thunbergii*; 1♀, ditto, em. 16/ix/1957, ex *P. filiforme* (373); 1♀, ditto, 18/iii/1965, S. Yamane leg.; 1♂, ditto, 22/iv/1959; 1♀, ditto, 10/v/1962; 1♀, ditto, 14/v/1965; 1♂, Tomakomai, em.

28/viii/1957, ex *Lysimachia vulgaris* (320). КΥΪΣΥΪ — 1 ♂, Kagosima-si, em. 2/xii/1957, ex *Polygonum* sp., T. Kodama leg.

Distribution: Japan (Hokkaidō; Honsyū; Kyūsyū); East Asia to Europe.

Food plants: *Lysimachia vulgaris* Linné (Primulaceae), *Polygonum filiforme* Thunb., *P. longisetum* De Bruyn, *P. orientale* Linné, *P. thunbergii* Sieb. et Zucc., *Rumex obtusifolius* Linné and *R. japonicus* Houtt. (Polygonaceae) in Japan. *Rumex* spp., *Oxyris* spp. and *Polygonum* spp. (Polygonaceae), *Lysimachia* spp. (Primulaceae), *Chenopodium* spp. (Chenopodiaceae) and *Lythrum* spp. (Lythraceae) in other countries (after Hering, 1957).

Calybites trimaculata, sp. nov.

[Figs. 46, 58 (G), 66 (D), 72 (D), 74 (F), 79 (C) & 88 (C-D)]

♂♀. Expanse of wings: 7.0–8.5 mm (8.5 mm in holotype and 7.9 mm in average of 25 specimens). Length of fore wing: 3.5–4.2 mm (4.2 mm in holotype and 3.9 mm in average of 25 specimens).

Almost whole surface blackish, more or less tinged with a leaden lustre. Face and head strongly leaden-metallic, the anterior half of head being sometimes tinged with yellow. Apical segment of labial palpus ringed with white at base. Antenna annulated with ochre-white faintly; scape with a blackish pecten. Ventral surface of thorax with a pair of lemon-yellow streaks. First and 3rd segments of anterior 4 tarsi with a narrow, whitish basal ring in each, and the 2nd with a broad, whitish basal ring; hind coxa and basal half of hind femur lemon-yellow; 2nd to 5th segments of hind tarsi with a whitish basal ring in each. Fore wing with a complete venation, the veins M_2 and M_3 distinctly separated, the vein M_3 connate to vein Cu_{1a} ; ground colour blackish-fuscous, with 3 lemon-yellow blotches, which are narrowly surrounded by purple-black scales; 2 of them placed on costa of wing just before basal 1/3 and just beyond 2/3, outwardly oblique, elongate-elliptical or quadrangular, extending to middle of wing-width; the remaining one situated at middle of dorsal margin of wing, triangular; a narrow, vertical, purple-black fascia placed just before apex of wing; cilia gray, with 3 dark lines around apex of wing. Hind wing dark fuscous, with cilia gray.

Male genitalia: Tegumen pointed apically, with some setae on each side of ventral surface; tuba analis weakly sclerotized on almost whole ventral surface. Valva slightly dilated apically, straight on terminal margin, the ventroapical corner slightly produced and acutely angulated, and the costoapical corner rather rounded; spinelike, short setae occurring thickly along terminal margin of valva, and a number of slender setae also on discal area from apex to base. Juxta triangular; vinculum a little shorter than valva, large, oval. Aedoeagus about twice as long as valva, tubular, almost straight, pointed apically, without any cornutus. Coremata not visible at all. Seventh sternite without an interior process.

Female genitalia: Sterigma absent. Ostium bursae placed in depth of a deep incision on caudal margin of 7th sternite; sterigma weakly sclerotized, elongate-elliptical, finely spinose on whole surface. Ductus bursae narrow and membranous on whole length; corpus bursae ellipsoidal, with a long, curved, sickle-shaped signum, which is denticulated along inner curve.

Specimens examined: 24♂♂ & 23♀♀. SIKOKU — 3♂♂ & 6♀♀, Asizuri-misaki, em. 29–30/vi/1957, ex *Polygonum chinense* (284). NANSEI Is. — 1♂ (the holotype, G. sl.

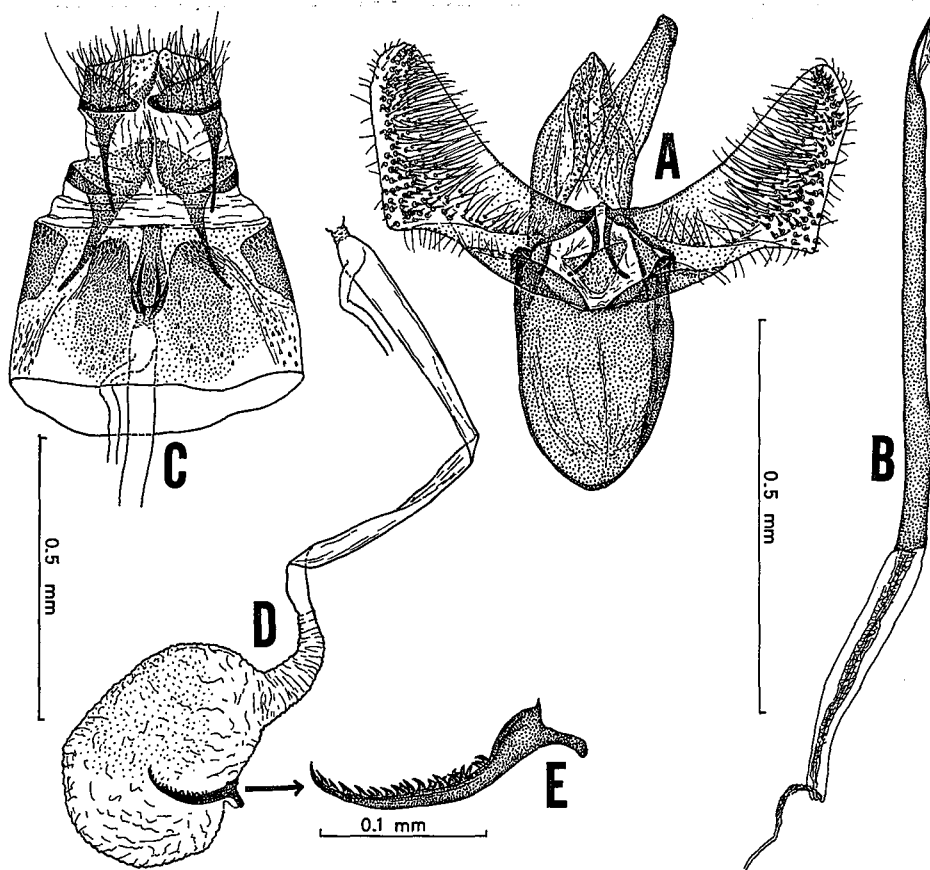


Fig. 46. *Calybites trimaculata*, sp. nov. A: Male genitalia [Grc-763, Asizuri-misaki, Sikoku, em. 29/vi/1957, ex *Polygonum chinense* (284)] — B: Aedoeagus [ditto] — C: Female genitalia [Grc-764, Asizuri-misaki, em. 29/vi/1957, ex *P. chinense* (284)] — D: Bursa copulatrix [ditto] — E: Signum enlarged [ditto].

Grc-1203) & 2♀♀, Anbō, Yaku-sima, em. 10-15/vi/1965, ex *P. chinense* (638); 1♂, Kosugidani, Yaku-sima, 7-10/vi/1965; 11♂♂ & 8♀♀, Mugiō, Yaku-sima, em. 19-20/x/1973, ex *P. chinense* (1185); 8♂♂ & 7♀♀, Onoaida, Yaku-sima, em. 20/x.-6/xi/1973, ex *P. chinense* (1211). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Sikoku; Nansei Is.).

Food plant: *Polygonum chinense* Linné (Polygonaceae).

Remarks: The larval habit of this species is very similar to that of the preceding *C. phasianipennella*. The larva is a leaf miner in the early stage, and a leaf roller in the late stage. The mine occurs upon the lower side of the leaf, being very small and tentiformed. When nearly half-grown, the larva leaves the mine and migrates to the margin of the leaf, then cuts off the leaf along the margin into a narrow stripe, which it rolls up to form a cone on the lower side of the leaf. The cocoon is formed inside the cone, whitish and spindle-shaped.

The present new species has a complete venation of the fore wing as in the genera *Caloptilia* and *Gracillaria*, and by this character it is difficult to separate from these genera. But the genital structures of both the sexes, the general colour-pattern of the fore wing, the larval habit and the larval chaetotaxy indicate that the new species in reality belongs to the genus *Calybites*. In the general colour design of the moth the present species is very similar to *Calybites phasianipennella*, *C. crypta*, "*Caloptilia*" *isograpta*, *Caloptilia (Sphyrophora) octopunctata* and *C. (S.) sapina*, but it is easily distinguished from all the latter species by the absence of the yellowish spot at the base of the dorsal margin of the fore wing.

GENUS EUCALYBITES NOV.

Type-species: *Eucalybites aureola*, sp. nov.

♂♀. Head and face smooth-scaled; crown on occiput very slightly roughened; ocelli absent; proboscis developed. Antenna about as long as fore wing, smooth in both sexes; scape slightly thickened, with pecten of 6-10 hairs. Labial palpus long, upturned, acutely pointed apically, the 2nd segment very slightly thickened beneath apically and about as long as apical one; maxillary palpus small, filiform, about $\frac{3}{5}$ as long as apical segment of labial palpus. Thorax smooth-scaled, without a crest. Legs rather smooth-scaled, while mid femur and tibia rather heavily thickened with scales as in the genus *Caloptilia*. Fore wing narrow, lanceolate, pointed; discoidal cell slightly dilated apically, with terminal margin nearly vertical; 12-veined, the vein M_2 and M_3 being coincident in a single vein; radial veins well separated, vein R_1 arising from basal $\frac{1}{8}$ of cell and ending just beyond middle of costal margin of wing, vein R_2 from apical $\frac{1}{5}$ of cell, R_3 from apical $\frac{1}{14}$ of cell, and vein R_4 from upper angle of cell; veins M_{2+3} and Cu_{1a} connate at bases and arising from lower angle of cell; vein Cu_{1b} from apical $\frac{1}{9}$ of cell; vein Cu_2 rudimentary, prominent merely on its apical part; vein An simple, sinuate, reaching dorsal margin near middle of wing. Hind wing about $\frac{2}{3}$ as wide as and $\frac{5}{6}$ as long as fore wing, very narrowly lanceolate, acutely pointed, 7-veined, with vein M_3 missing; cell opened between vein M_2 and Cu_{1a} ; vein R_{2+3} short, set close to vein $Sc+R_1$, but distinctly separated from the latter; veins M_1 and M_2 long-stalked; vein Cu_{1a} long, closer to vein M_2 than to vein Cu_{1b} .

Male genitalia: Tegumen weakly sclerotized, simple, without any setose area on inner face; tuba analis weakly sclerotized on almost whole lower face, without a distinctly sclerotized, narrow subsclerophium. Valva rather complicated; sacculus distinctly produced; cucullus widened, round, setose thickly near lower margin; costa widely lobated, with a short process directed cephalad. Vinculum very large, without a produced saccus. Aedoeagus tubular, with 2 long processes projected from middle of dorsal side; vesica with microscopic spines. Juxta very weakly sclerotized; a circular plate probably originated from dorsal side of diaphragma. Seventh and 8th abdominal segments weakly membraneous, with a pair of coremata in each segment, the posterior pair of coremata represented by 2 or 3 hairy scales, or sometimes entirely missing.

Female genitalia: Papilla analis rather short, setose as usual; apophysis posterioris moderate in length, widened on its basal half; apophysis anterioris slender on entire length, without ventral prong. Ostium bursae located under a lobe of caudal margin of 7th sternite; ductus bursae slender, long, membraneous;

corpus bursae membranous, with 2 sickle-shaped signa. Seventh abdominal segment heavily sclerotized, complicated in shape.

Body chaetotaxy of last instar larva: Seta D_1 on 9th abdominal segment dorsocephalic to seta D_2 as on the preceding abdominal segments. The other characters well agree with those of *Calybites*.

Arrangement of crochets: The crochets of ventral and anal prolegs are similar to those of *Calybites* in arrangement.

Remarks: The larval chaetotaxy of the present genus is quite similar to that of *Calybites* except for the difference in the relative positions of the setae D_1 and D_2 on the 9th abdominal segment, and this should indicate that both the genera are surely related to each other. In the adult stage, however, the new genus is distinguished at once from *Calybites* by the absence of the vein M_3 of the hind wing and by the complicated genital structures of both the sexes.

The larva of the type-species is a leaf miner in early instars, and a leaf-roller in late instars. The mine of a small tentiform type is found on the lower side of the leaf. The leaf roll is cone-shaped and rolled up downwardly from the tip of the leaf; when the larva makes the cone, it does not cut off the leaf into a narrow stripe. The cocoon is situated on the lower surface of the leaf, usually on the mid rib near the tip, and boat-shaped. Also by this larval habit and the shape of the cocoon *Eucalybites* is distinguishable from the genus *Calybites*.

The new genus is represented by the type-species alone, which attacks the leaf of *Hypericum* (Guttiferae) in the larval stage.

Eucalybites aureola, sp. nov.

[Figs. 47, 58 (I-J), 61 (H), 66 (E), 72 (E) & 79 (D)]

♂♀. Expanse of wings: 8.0–10.2 mm (9.0 mm in holotype and 9.3 mm in average of 18 specimens). Length of fore wing: 4.0–5.0 mm (4.5 mm in holotype and 4.6 mm in average of 19 specimens).

Colour: Face and vertex gray, with a leaden-metallic lustre deeply; crown on occiput blackish-gray. Palpi purplish-black, whitish on upper side; extreme apex of labial palpus whitish. Antenna brownish-gray, with apical 11–16 segments whitish; scape ochre-yellow, with a pecten of a few blackish hairs. Dorsal surface of thorax blackish-brown, with a purplish iridescence in some light, with 2 yellowish stripes along inner margins of tegulae, which are yellowish apically; ventral surface uniformly golden-yellowish. Fore and mid legs brownish-black; tarsi whitish, with a fine blackish ring at apex of each segment. Hind leg golden-yellowish; tibia shaded with dark gray apically; tarsus finely ringed with dark gray apically in each segment. Fore wing uniformly dark ochreous-yellow, with a deep golden lustre on whole surface; extreme base of costal margin slightly tinged with a purplish iridescence; cilia around apex and along termen concolorous with wing, with 2 or 3 irregular lines of dark gray irrorations, and those along dorsal margin dark gray with a golden lustre. Hind wing and its cilia dark gray, with a metallic lustre less strong than on fore wing.

Male genitalia: Tuba analis finely spinose on ventral surface. Valva stout; costal lobe widely round; scacculus protruded and acutely pointed apically, with some slender setae along serrated ventral margin; cucullus slightly upturned, covered with stout setae on ventrodiscal area rather densely and fine setae on dorsodiscal

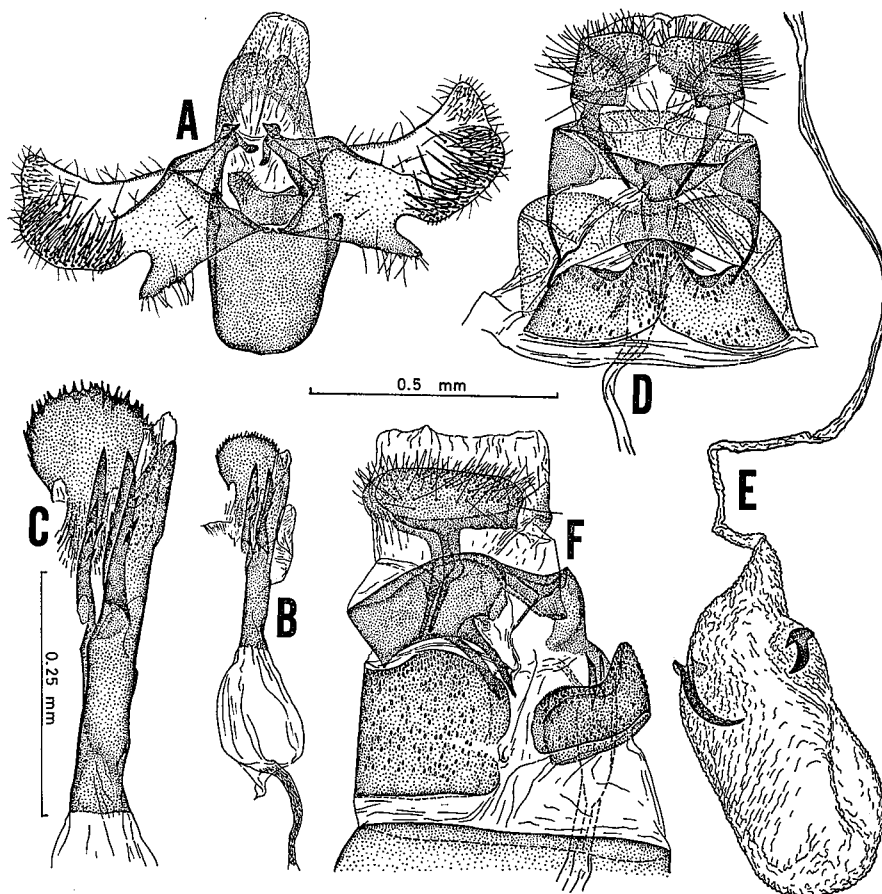


Fig. 47. *Eucalybites aureola*, sp. nov. A: Male genitalia [Grc-1681, holotype] — B: Aedeagus [ditto] — C: Aedeagus enlarged [ditto] — D: Female genitalia [Grc-1683, Kenebetu, Nemuro, Hokkaidō, em. 13/viii/1973, ex *Hypericum erectum* (1172)] — E: Corpus bursae [ditto] — F: Female genitalia, lateral view [Grc-1684, Kenebetu, em. 13/viii/1973, ex *H. erectum* (1172)].

area sparsely. Vinculum very large, widely round on distal margin, about $\frac{2}{3}$ as long as valva. A circular plate originated probably from dorsal side of diaphragma, with its margin serrulated. Aedeagus a little shorter than $\frac{2}{3}$ of valva, with a pair of long, antler-like processes projected from middle of aedeagus, and reaching nearly apex of aedeagus; vesica with numerous, triangular, microscopic spines. Seventh abdominal segment bare; 8th segment covered with small, round scales on whole surface rather densely.

Female genitalia: Lamella postvaginalis complicated in form, elongate towards caudal margin of 8th segment, where it is widened and much sclerotized as shown in Fig. 47, D & F. Seventh sternite heavily sclerotized, about half as long as the tergite, lobated on caudal margin. Ostium bursae located under a lobe of 7th sternite; ductus bursae membranous except for short antrum, very slender

throughout; corpus bursae ellipsoidal in form, with 2 curved sickle-shaped signa, one of which is about half as long as the other.

Specimens examined: 13♂♂ & 7♀♀. HOKKAIDŌ — 13♂♂ (one the holotype, G. sl. Grc-1681) & 7♀♀, Kenebetu, Nemuro, em. 11-18/viii/1973, ex *Hypericum erectum* (1172). The holotype is in the collection of the Entomological Institute, Hokkaidō University.

Distribution: Japan (Hokkaidō).

Food plant: *Hypericum erectum* Thunb. (Guttiferae).

Remarks: *E. aureola* is distinctly separated, by the vein M_3 missing in the hind wing, from *Calybites auroguttella* of Europe and "*Gracilaria*" *hypericella* of North America, both of which also attack the leaves of *Hypericum* spp. in their larval stage. Moreover, *aureola* is distinguished from *auroguttella* by the uniformly coloured fore wing, by the shape of the valva and vinculum, by the diaphragma having a peculiar circular plate, and by the corpus bursae having 2 signa. I have examined no specimen of *hypericella*, but, according to the original description of *hypericella*, it may be distinguished from *aureola* by the fore wing having purplish scales along dorsal margin.

HOST LIST

Food plant	Insect
<i>Acer</i> (Aceraceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>acericola</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>aceris</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>gloriosa</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>heringi</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>hidakensis</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>hisoensis</i> , sp. nov.
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>kurokoi</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>monticola</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>semifasciella</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>wakayamensis</i> Kumata
<i>Actinodaphne</i> (Lauraceae)	<i>Caloptilia</i> (<i>Rhadinoptilia</i>) <i>camphorae</i> , sp. nov.
<i>Alnus</i> (Betulaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>alni</i> Kumata
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>issikii</i> , sp. nov.
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>pulverea</i> Kumata
<i>Azuki</i> (Leguminosae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>soyella</i> Deventer
<i>Betula</i> (Betulaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>betulicola</i> (Hering)
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>bicolor</i> Ermolaev
? <i>Betula</i>	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>stigmatella</i> (Fabricius)
<i>Callicarpa</i> (Verbenaceae)	<i>Caloptilia</i> (<i>Minyoptilia</i>) <i>callicarpae</i> , sp. nov.
<i>Camellia</i> (Theaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>theivora</i> (Walsingham)
<i>Castanea</i> (Fagaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>mongolicae</i> , sp. nov.
	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>sapporella</i> (Matsumura)
	<i>Caloptilia</i> (<i>Povolnya</i>) <i>querci</i> , sp. nov.
<i>Castanopsis</i> (Fagaceae)	<i>Caloptilia</i> (<i>Povolnya</i>) <i>querci</i> , sp. nov.
<i>Celtis</i> (Ulmaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>cellidis</i> , sp. nov.
<i>Cinnamomum</i> (Lauraceae)	<i>Caloptilia</i> (<i>Rhadinoptilia</i>) <i>camphorae</i> , sp. nov.
<i>Cleyera</i> (Theaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>isochrysa</i> (Meyrick)
<i>Epimedium</i> (Berberidaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>magnifica morioakensis</i> , ssp. nov.
? <i>Eurya</i> (Theaceae)	<i>Caloptilia</i> (<i>Phylloptilia</i>) <i>hadsurae</i> Kumata
<i>Fraxinus</i> (Oleaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>cuculipennella</i> (Hübner)
	<i>Gracillaria albicapitata</i> Issiki
	<i>Gracillaria arsenievi</i> (Ermolaev)
	<i>Gracillaria ussuriella</i> (Ermolaev)

<i>Glochidion</i> (Euphorbiaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>ryukyuensis</i> Kumata <i>Caloptilia</i> (<i>Cecidoptilia</i>) <i>cecidophora</i> Kumata
<i>Glycine</i> (Leguminosae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>soyella</i> Deventer
<i>Helicia</i> (Proteaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>heliciae</i> Kumata
<i>Hypericum</i> (Guttiferae)	<i>Eucalybites aureola</i> , sp. nov.
<i>Illicium</i> (Magnoliaceae)	<i>Caloptilia</i> (<i>Phylloptilia</i>) <i>illicii</i> Kumata
<i>Kadsura</i> (Magnoliaceae)	<i>Caloptilia</i> (<i>Phylloptilia</i>) <i>kadsurae</i> Kumata
<i>Kummerovia</i> (Leguminosae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>soyella</i> Deventer
<i>Lespedeza</i> (Leguminosae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>soyella</i> Deventer
<i>Leucothoe</i> (Ericaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>leucothoes</i> , sp. nov.
<i>Ligustrum</i> (Oleaceae)	<i>Gracillaria japonica</i> , sp. nov.
<i>Lysimachia</i> (Primulaceae)	<i>Calybites phasianipennella</i> (Hübner)
<i>Magnolia</i> (Magnoliaceae)	<i>Caloptilia</i> (<i>Phylloptilia</i>) <i>magnoliae</i> Kumata
<i>Malus</i> (Rosaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>zachrysa</i> (Meyrick)
<i>Neolitsea</i> (Lauraceae)	<i>Caloptilia</i> (<i>Rhadinoptilia</i>) <i>bipunctata</i> , sp. nov.
<i>Parabenzoin</i> (Lauraceae)	<i>Caloptilia</i> (<i>Rhadinoptilia</i>) <i>camphorae</i> , sp. nov.
<i>Persea</i> (Lauraceae)	<i>Caloptilia</i> (<i>Phylloptilia</i>) <i>crinitibialis</i> , sp. nov. <i>Caloptilia</i> (<i>Phylloptilia</i>) <i>perseella</i> , sp. nov.
<i>Photinia</i> (Rosaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>zachrysa</i> (Meyrick)
<i>Polygonum</i> (Polygonaceae)	<i>Calybites phasinaiipennella</i> (Hübner) <i>Calybites trimaculata</i> , sp. nov.
<i>Populus</i> (Salicaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>chrysolampra</i> (Meyrick) <i>Caloptilia</i> (<i>Caloptilia</i>) <i>stigmatella</i> (Fabricius)
<i>Quercus</i> (Fagaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>mongolicae</i> , sp. nov. <i>Caloptilia</i> (<i>Caloptilia</i>) <i>sapporella</i> (Matsumura) <i>Caloptilia</i> (<i>Povolnya</i>) <i>obliquatella</i> (Matsumura) <i>Caloptilia</i> (<i>Povolnya</i>) <i>querci</i> , sp. nov.
<i>Rhododendron</i> (Ericaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>azaleella</i> (Brants) <i>Caloptilia</i> (<i>Caloptilia</i>) <i>leucothoes</i> , sp. nov.
? <i>Rhododendron</i>	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>sapporella</i> (Matsumura)
<i>Rhus</i> (Anacardiaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>aurifasciata</i> , sp. nov. <i>Caloptilia</i> (<i>Caloptilia</i>) <i>matsumurai</i> , sp. nov. <i>Caloptilia</i> (<i>Caloptilia</i>) <i>recitata</i> (Meyrick) <i>Caloptilia</i> (<i>Caloptilia</i>) <i>rhois</i> , sp. nov. <i>Caloptilia</i> (<i>Timodora</i>) <i>elongata</i> , sp. nov.
<i>Rubus</i> (Rosaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>zachrysa</i> (Meyrick)
<i>Rumex</i> (Polygonaceae)	<i>Calybites phasianipennella</i> (Hübner)
<i>Salix</i> (Salicaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>chrysolampra</i> (Meyrick) <i>Caloptilia</i> (<i>Caloptilia</i>) <i>stigmatella</i> (Fabricius)
<i>Sapium</i> (Euphorbiaceae)	<i>Caloptilia</i> (<i>Sphyrophora</i>) <i>sapiivora</i> , sp. nov.
<i>Schisandra</i> (Magnoliaceae)	<i>Caloptilia</i> (<i>Phylloptilia</i>) <i>schisandrae</i> Kumata
<i>Syringa</i> (Oleaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>cuculipennella</i> (Hübner) <i>Gracillaria albicapitata</i> Issiki <i>Gracillaria arsenievi</i> (Ermolaev)
<i>Thea</i> (Theaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>theivora</i> (Walsingham)
<i>Ulmus</i> (Ulmaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>ulmi</i> , sp. nov.
<i>Vaccinium</i> (Ericaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>geminata</i> Kumata
<i>Zelkova</i> (Ulmaceae)	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>ulmi</i> , sp. nov.
[Unknown	<i>Caloptilia</i> (<i>Caloptilia</i>) <i>yasudai</i> , sp. nov.]

A LIST OF GRACILLARIA GROUP OF JAPAN

- I. Genus *Gracillaria* Haworth, 1828.
= *Gracilaria* Zeller, 1838.

- = *Xanthospilapteryx* Spuler, 1910.
 1. *G. albicapitata* Issiki, 1930.
= *Lyonetia jezonella* Matsumura, 1931.
 2. *G. japonica* Kumata, 1982.
= *Gracillaria syringella*: sensu Issiki, 1957.
 3. *G. ussuriella* (Ermolaev, 1977).
 4. *G. arsenievi* (Ermolaev, 1977).

II. Genus *Caloptilia* Hübner, 1825.

II-1. Subgenus *Caloptilia* Hübner, 1825.

- = *Poeciloptilia* Hübner, 1825.
- = *Ornix* Tritschke, 1833, nec Zeller, 1839.
- = *Coriscium* Zeller, 1839.
- ? = *Antiolopha* Meyrick, 1894.
 5. *C. (C.) cuculipennella* (Hübner, 1828).
 6. *C. (C.) stigmatella* (Fabricius, 1781).
= *Gracillaria stigmatica* (!): Matsumura, 1931.
= *Gracillaria alchimella*: sensu Matsumura, 1931.
 7. *C. (C.) chrysolampra* (Meyrick, 1938).
 8. *C. (C.) theivora* (Walsingham, 1893).
= *Gracillaria theaeavora* (!): Hotta, 1918.
 9. *C. (C.) zachrysa* (Meyrick, 1907).
 10. *C. (C.) isochrysa* (Meyrick, 1908).
= *Caloptilia solaris* Kumata, 1966.
 11. *C. (C.) heliciae* Kumata, 1966.
 12. *C. (C.) magnifica moriokensis* Kumata, 1982.
 13. *C. (C.) geminata* Kumata, 1966.
 14. *C. (C.) ryukyuensis* Kumata, 1966.
 15. *C. (C.) aceris* Kumata, 1966.
 16. *C. (C.) acericola* Kumata, 1966.
 17. *C. (C.) kisoensis* Kumata, 1982.
 18. *C. (C.) gloriosa* Kumata, 1966.
 19. *C. (C.) wakayamensis* Kumata, 1966.
 20. *C. (C.) hidakensis* Kumata, 1966.
 21. *C. (C.) yasudai* Kumata, 1982.
 22. *C. (C.) heringi* Kumata, 1966.
 23. *C. (C.) semifasciella* Kumata, 1966.
 24. *C. (C.) monticola* Kumata, 1966.
 25. *C. (C.) kurokoi* Kumata, 1966.
 26. *C. (C.) aurifasciata* Kumata, 1982.
 27. *C. (C.) recitata* (Meyrick, 1918).
 28. *C. (C.) matsumurai* Kumata, 1982.
= *Gracillaria elongella*: sensu Matsumura, 1931.
 29. *C. (C.) rhois* Kumata, 1982.
= *Caloptilia recitata*: sensu Issiki, 1957 (part).
 30. *C. (C.) azaleella* (Brants, 1913).
= *Gracillaria anthracosperma* Meyrick, 1931.
 31. *C. (C.) leucothoes* Kumata, 1982.
 32. *C. (C.) mongolicae* Kumata, 1982.
 33. *C. (C.) bicolor* Ermolaev, 1977.
 34. *C. (C.) ulmi* Kumata, 1982.
 35. *C. (C.) celtidis* Kumata, 1982.
 36. *C. (C.) sapporella* (Matsumura, 1931).
= *Caloptilia rhodinella*: sensu Issiki, 1957.
 37. *C. (C.) issikii* Kumata, 1982.
= *Caloptilia ellongella* (!): Issiki, 1957 (part).

- = *Caloptilia elongella*: sensu Okano, 1959.
38. *C. (C.) alni* Kumata, 1966.
= *Caloptilia ellongella* (!): Issiki, 1957 (part).
39. *C. (C.) betulicola* (Hering, 1927).
40. *C. (C.) pulverea* Kumata, 1966.
41. *C. (C.) soyella* (Deventer, 1904).
- II-2. Subgenus *Phylloptilia* Kumata, 1982.
42. *Ç. (P.) magnoliae* Kumata, 1966.
43. *C. (P.) schisandrae* Kumata, 1966.
44. *C. (P.) kadsurae* Kumata, 1966.
45. *C. (P.) illicii* Kumata, 1966.
46. *C. (P.) perseella* Kumata, 1982.
47. *C. (P.) crinotibialis* Kumata, 1982.
- II-3. Subgenus *Timodora* Meyrick, 1886.
48. *C. (T.) elongata* Kumata, 1982.
- II-4. Subgenus *Povolnya* Kuznetzov, 1979.
49. *C. (P.) obliquatella* (Matsumura, 1931).
50. *C. (P.) querci* Kumata, 1982.
- II-5. Subgenus *Rhadinoptilia* Kumata, 1982.
51. *C. (R.) bipunctata* Kumata, 1982.
52. *C. (R.) camphorae* Kumata, 1982.
- II-6. Subgenus *Minyoptilia* Kumata, 1982.
53. *C. (M.) callicarpae* Kumata, 1982.
- II-7. Subgenus *Sphyrophora* Vári, 1961.
54. *C. (S.) sapiivora* Kumata, 1982.
- II-8. Subgenus *Cecidoptilia* Kumata, 1982.
55. *C. (C.) cecidophora* Kumata, 1966.
- III. Genus *Calybites* Hübner, 1822.
= *Euspilapteryx* Stephens, 1835.
56. *C. phasianipennella* (Hübner, 1810-13).
= *Gracilaria (Euspilapteryx) quadrupletta* Zeller, 1847.
= *Caloptilia isograptæ*: sensu Issiki, 1950.
57. *C. trimaculata* Kumata, 1982.
- IV. Genus *Eucalybites* Kumata, 1982.
58. *E. aureola* Kumata, 1982.

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EXPLANATION OF PLATES

Plate I.

Fig. 48. Adult specimens. A: *Gracillaria syringella* (Fabricius) (♀) [Linz, Austria, em. 15/ix/1950, ex *Syringa*] — B: *Gracillaria albicapitata* Issiki (♀) [Yûbari, Hokkaidô, em. 10/v/1978, ex *Syringa reticulata* (1732)] — C: Ditto (♂) [Kaida, Kiso, Nagano-ken, Honsyû, em. 26/vii/1975, ex *Fraxinus mandshurica* var. *japonica* (1437)] — D: *Gracillaria japonica*, sp. nov. (♂, holotype) — E: Ditto (♀) [Siobara, Totigi-ken, Honsyû, em. 31/x/1975, ex *Ligustrum obtusifolium* (1674)] — F: *Gracillaria ussuriella* (Ermolaev) (♂) [Sapovetnik, USSR, 22/vii/1975] — G: Ditto (♀) [Sapporo, Hokkaidô, em. 24/ix/1966, ex *Fraxinus mandshurica* var. *japonica* (794)] — H: *Gracillaria arsenievi* (Ermolaev) (♂) [Uladvostok, USSR, em. 6/vii/1978, ex *Fraxinus mandshurica*] — I: Ditto (♀) [Apoi, Hidaka, Hokkaidô, em. 11/vii/1973, ex *Syringa reticulata* (1151)] — J: Ditto (♂) [Apoi, Hidaka, Hokkaidô, em. 10/vii/1973, ex *Syringa reticulata* (1151)].

Plate II.

Fig. 49. Adult specimens. A: *Caloptilia (Caloptilia) cuculipennella* (Hübner) (♂) [Apoi, Hidaka, Hokkaidô, em. 17/vii/1973, ex *Syringa reticulata* (1153)] — B: *Caloptilia (Caloptilia) stigmatella* (Fabricius) (♀) [Nopporo, Hokkaidô, em. 10/ix/1971, ex *Salix* sp. (1099)] — C: Ditto (♀) [Misumai, Sapporo, Hokkaidô, em. 21/vi/1974, ex *Salix* sp.] — D: *Caloptilia (Caloptilia) chrysolampra* (Meyrick) (♂) [Nisinomiya, Ôska, Honsyû, em. 8/ix/1949, ex *Salix* sp.] — E: *Caloptilia (Caloptilia) theivora* (Walsingham) (♀) [Gozaïsyo, Mie-ken, Honsyû, em. 14/xi/1966, ex *Camellia japonica* (833)] — F: *Caloptilia (Caloptilia) zachrysa* (Meyrick) (♂) [Iwawakistan, Ôsaka, Honsyû, em. 22/viii/1954, ex *Malus pumila*] — G: Ditto (♀) [Hirai, Ôsaka, Honsyû, em. 21/x/1954, ex *Photinia glabra*] — H: *Caloptilia (Caloptilia) isochrysa* (Meyrick) (♂) [Kozagawa, Wakayama-ken, Honsyû, em. 20/vi/1970, ex *Cleyera japonica* (1024)] — I: Ditto (♂) [Kuïnibisona (ca 2000 m), No. 1 West, Nepal, em. 1/viii/1968, ex an undetermined species of Theaceae] — J: *Caloptilia (Caloptilia) heliciae* Kumata (♀) [Onoaida, Yaku-sima, em. 16/xi/1973, ex *Helicia cochinchinensis* (1244)].

Plate III.

Fig. 50. Adult specimens. A: *Caloptilia (Caloptilia) magnifica magnifica* (Stainton) (♀) [Trento, Italia, em. viii/1945, ex *Epimedium alpinum*] — B: *Caloptilia (Caloptilia) magnifica moriokensis*, ssp. nov. (♂, holotype) — C: Ditto (♀) [Tunagi, Morioka, Honsyû, 21/vi/1979] — D: *Caloptilia (Caloptilia) geminata* Kumata (♂, holotype). E: *Caloptilia (Caloptilia) ryukyensis* Kumata (♀) [Onoaida, Yaku-sima, em. 25/x/1973, ex *Glochidion hongkongensis* (1225)] — F: *Caloptilia (Caloptilia) aceris* Kumata (♂) [Tunagi, Morioka, Honsyû, em. 6/v/1970, ex *Acer mono* (969)] — G: Ditto (♂) [Sapporo, Hokkaidô, em. 1/v/1967, ex *Acer miyabei*] — H: *Caloptilia (Caloptilia) acericola* Kumata (♀) [Ônuma, Osima, Hokkaidô, em. 8/v/1978, ex *Acer japonicum* (1782)] — I: Ditto (♂) [Apoi, Hidaka, Hokkaidô, em. 21/iv/1975, ex *Acer palmatum* (1370)] — J: Ditto (♀) [Kisohukusima, Nagano-ken, Honsyû, em. 21/vii/1975, ex *Acer palmatum* (1429)].

Plate IV.

Fig. 51. Adult specimens. A: *Caloptilia (Caloptilia) kisoensis*, sp. nov. (♂, holotype) — B: Ditto (♀) [Kaida, Kiso, Nagano-ken, Honsyû, em. 18/viii/1975, ex *Acer gimnala* (1440)] — C: *Caloptilia (Caloptilia) gloriosa* Kumata (♂) [Moiwa, Sapporo, Hokkaidô, em. 4/ix/1975, ex *Acer mono* (1497)] — D: *Caloptilia (Caloptilia) wakayamensis* Kumata (♂, holotype) — E: Ditto (♀) [Kozagawa, Wakayama-ken, Honsyû, em. 3/vi/1964, ex *Acer palmatum* (172)] — F: *Caloptilia (Caloptilia) hidakensis* Kumata (♀, light form) [Misumai, Sapporo, Hokkaidô, em. 22/vi/1974, ex *Acer mono* (1274)] — G: Ditto (♂, dark form) [Misumai, Sapporo, Hokkaidô, em. 19/ix/1967, ex *Acer mono* (891)] — H: *Caloptilia (Caloptilia) yasudai*, sp. nov. (♂, holotype) — I: *Caloptilia (Caloptilia) heringi* Kumata (♂, holotype) — J: Ditto (♀) [Wassamu, Kamikawa, Hokkaidô, em. 6/x/1964, ex *Acer mono*].

Plate V.

Fig. 52. Adult specimens. A: *Caloptilia (Caloptilia) semifasciella* Kumata (♀) [Siobara, Totigi-ken, Honsyû, em. 25/vii/1975, ex *Acer micranthum* (1476)] — B: Ditto (♂, holotype) — C: Ditto (♂) [Aizankei, Daisetuzan, Hokkaidô, em. 18/vii/1966, ex *Acer tschonoshii*] — D: *Caloptilia (Caloptilia) bicolor* Ermolaev (♂) [Ginsendai, Daisetuzan, Hokkaidô, em. 4/ix/1970, ex *Betula ermanii* (1066)] — E: *Caloptilia (Caloptilia) kurokoi* Kumata (♂, holotype) — F: *Caloptilia (Caloptilia) monticola* Kumata (♂, holotype) — G: Ditto (♀) [Siobara, Totigi-ken, Honsyû, em. 23/vii/1975, ex *Acer rufinerve* (1475)] — H: Ditto (♀) [Siobara, Totigi-ken, Honsyû, em. 31/x/1975, ex *Acer micranthum* (1661)] — I: *Caloptilia (Caloptilia) celtidis*, sp. nov. (♂, aestival form) [Hikosan, Kyûsyû, em. 27/vii/1956, ex *Celtis sinensis*] — J: Ditto (♀, autumnal form) [Kamitsusima, Tu-sima, em. 27/x/1979, ex *Celtis jessoensis* (2149)].

Plate VI.

Fig. 53. Adult specimens. A: *Caloptilia (Caloptilia) aurifasciata*, sp. nov. (♂, holotype) — B: Ditto (♀) [Ino, Kōti-ken, Sikoku, em. 4/xi/1980, ex *Rhus succedanea* (2195)] — C: *Caloptilia (Caloptilia) recitata* (Meyrick) (♀, aestival form) [Balaju, Kathmandu Valley, Nepal, em. 18/vii/1968, ex *Rhus javanica* (Np1-60)] — D: Ditto (♂, aestival form) [Kozagawa, Wakayama-ken, Honsyū, em. 5/vi/1970, ex *Rhus trichocarpa* (1026)] — E: Ditto (♂, autumnal form) [Ôtaki, Kiso, Nagano-ken, Honsyū, em. 20/x/1975, ex *Rhus javanica* (1557)] — F: *Caloptilia (Caloptilia) matsumurai*, sp. nov. (♂, holotype, autumnal form) — G: Ditto (♂, aestival form) [Sasayama, Hyōgo-ken, Honsyū, em. 5/vii/1965, ex *Rhus sylvestris*] — H: *Caloptilia (Caloptilia) rhois*, sp. nov. (♂, holotype, autumnal form) — I: Ditto (♀) [Yugasima, Amagi, Honsyū, em. 10/viii/1971, ex *Rhus javanica* (1080)] — J: *Caloptilia (Caloptilia) azaleella* (Brants) (♀) [Takakuma, Kagosima-ken, Kyūsyū, em. 3/vii/1965, ex *Rhododendron viscistylum*].

Plate VII.

Fig. 54. Adult specimens. A: *Caloptilia (Caloptilia) leucothoos*, sp. nov. (♀) [Mine, Tushima, em. 21/xi/1979, ex *Rhododendron reticulatum* (2116)] — B: Ditto (♂) [Apoi, Hidaka, Hokkaidō, em. 15/vii/1963, ex *Leucothoe grayana*] — C: *Caloptilia (Caloptilia) mongolicae*, sp. nov. (♂, yellow form) [Kenebetu, Nemuro, Hokkaidō, em. 13/viii/1973, ex *Quercus dentata*] — D: Ditto (♂, yellow form) [Sapporo, Hokkaidō, em. 4/vii/1967, ex *Quercus mongolica* var. *grosseserrata*] — E: Ditto (♂, brown form) [Hirai, Ōsaka, Honsyū, em. 2/x/?, ex *Quercus acutissima*] — F: *Caloptilia (Caloptilia) ulmi*, sp. nov. (♂) [Nopporo, Hokkaidō, em. 4/ix/1972, ex *Ulmus davidiana* var. *japonica* forma *suberosa* (1147)] — G: Ditto (♂) [Todai, Ina, Nagano-ken, Honsyū, em. 13/x/1975, ex *Zelkova serrata* (1758)] — H: *Caloptilia (Caloptilia) sapporella* (Matsumura) (♂) [Todai, Ina, Nagano-ken, Honsyū, em. 26/iv/1976, ex *Quercus dentata* (1623)] — I: Ditto (♂) [Kenebetu, Nemuro, Hokkaidō, em. 25/v/1980, ex *Quercus dentata* (2012)] — J: *Caloptilia (Caloptilia) issikii*, sp. nov. (♂) [Apoi, Hidaka, Hokkaidō, em. 10/viii/1973, ex *Alnus japonica* (1159)].

Plate VIII.

Fig. 55. Adult specimens. A: *Caloptilia (Caloptilia) alni* Kumata (♀) [Ôtaki, Kiso, Nagano-ken, Honsyū, em. 22/vii/1975, ex *Alnus hirsuta* (1462)] — B: Ditto (♀) [Nopporo, Hokkaidō, em. 6/ix/1964, ex *Alnus japonica*] — C: Ditto (♂) [Nopporo, Hokkaidō, em. 29/ix/1964, ex *Alnus hirsuta*] — D: *Caloptilia (Caloptilia) betulicola* (Hering) (♀) [Wassamu, Kamikawa, Hokkaidō, em. 17/x/1964, ex *Betula platyphylla*] — E: Ditto (♀) [Misumai, Sapporo, Hokkaidō, em. 27/ix/1971, ex *Betula platyphylla* (1126)] — F: *Caloptilia (Caloptilia) pulvereae* Kumata (♂, holotype) — G: Ditto (♀) [Takakuma, Kagosima-ken, Kyūsyū, em. 25/vii/1965, ex *Alnus firma* (665)] — H: Ditto (♂) [Sunagawa, Ōsaka, Honsyū, em. 19/vi/1952, ex *Alnus japonica*] — I: *Caloptilia (Caloptilia) soyella* (Deventer) (♀) [Nisinomiya, Ōsaka, Honsyū, em. 1/x/1949, ex *Glycine max*] — J: Ditto [♀] [Soeda, Hukuoka-ken, Kyūsyū, em. 8/vii/1959, ex *Lespedeza cyrtobotrya*].

Plate IX.

Fig. 56. Adult specimens. A: *Caloptilia (Phylloptilia) magnoliae* Kumata (♂, holotype) — B: *Caloptilia (Phylloptilia) schisandrae* Kumata (♂, holotype) — C: Ditto (♂) [Sorანuma-dake, Hokkaidō, em. 8/ix/1964, ex *Schisandra chinensis*] — D: *Caloptilia (Phylloptilia) kadsurae* Kumata (♂, holotype) — E: Ditto (♂) [Yaku-sima, em. 14/xi/1973, ex *Kadsura japonica* (1230)] — F: *Caloptilia (Phylloptilia) illicii* Kumata (♀, holotype) — G: *Caloptilia (Phylloptilia) perseella*, sp. nov. (♂) [Hikosan, Kyūsyū, em. 25/vi/1957, ex *Persea thunbergii* (195)] — H: Ditto (♀) [Sata, Kagosima-ken, Kyūsyū, em. 19/iv/1958, ex *Persea thunbergii*] — I: *Caloptilia (Phylloptilia) crinotibialis*, sp. nov. (♀) [Izuhara, Tu-sima, 14/x/1979] — J: *Caloptilia (Timodora) elongata*, sp. nov. (♂, holotype).

Plate X.

Fig. 57. Adult specimens. A: *Caloptilia (Povolnya) obliquatella* (Matsumura) (♂) [Sakai, Ōsaka, Honsyū, 18/vii/1954] — B: Ditto (♀) [Suweon, Korea, em. 16/x/1974, ex *Quercus* sp.] — C: *Caloptilia (Povolnya) querci*, sp. nov. (♀) [Kozagawa, Wakayama-ken, Honsyū, em. 6/vi/1964, ex *Quercus glauca* (647)] — D: Ditto (♂) [Kozagawa, Wakayama-ken, Honsyū, em. 8/vi/1964, ex *Quercus glauca* (647)] — E: Ditto (♀) [Izuhara, Tu-sima, 20/x/1979] — F: *Caloptilia (Rhadinoptilia) bipunctata*, sp. nov. (♂, holotype) — G: Ditto (♂) [Kii-Ōsima, Wakayama-ken, Honsyū, em. 27/v/1956, ex *Neolitsea sericea*] — H: *Caloptilia (Rhadinoptilia) camphorae*, sp. nov. (♂, holotype) — I: *Caloptilia (Minyoptilia) callicarpae*, sp. nov. (♂, holotype) — J: Ditto (♂) [Kuriō, Yaku-sima, em. 11/xi/1973, ex *Callicarpa japonica* var. *luxurians* (1214)].

Plate XI.

Fig. 58. Adult specimens. A: *Caloptilia (Cecidoptilia) cecidophora* Kumata (♂, holotype) — B: *Caloptilia (Sphyrophora) sapiivora*, sp. nov. (♂, holotype) — C: Ditto (♂) [Nametoko, Ehime-ken, Shikoku, em. 25/x/1980, ex *Sapium japonicum* (2273)] — D: *Calybites phasianipennella* (Hübner) (♀, autumnal form) [Moiwa, Sapporo, Hokkaidō, em. 11/x/1969, ex *Polygonum filiforme*] — E: Ditto (♂, intermediate form) [Sapporo, Hokkaidō, em. 25/ix/1957, ex *Polygonum thunbergii*] — F: Ditto (♀, aestival form) [Sapporo, Hokkaidō, 15/vii/1964] — G: *Calybites trimaculata*, sp. nov. (♂) [Mugiō, Yaku-sima, em. 19/x/1973, ex *Polygonum chinense* (1185)] — H: *Calybites aurogutella* (Stephens) (♂) [Berlin, Germany, em. vii/?], ex *Hypericum* sp.] — I: *Eucalybites aureola*, sp. nov. (♂, holotype) — J: Ditto (♂) [Kenebetu, Nemuro, Hokkaidō, em. 11/viii/1973, ex *Hypericum erectum* (1172)].

Plate XII.

Fig. 59. Profiles of adult specimens. A: *Gracillaria ussuriella* (Ermolaev) (♀) [Sapporo, Hokkaidō, em. 10/ix/1968, ex *Fraxinus mandshurica* var. *japonica*] — B: *Gracillaria albicapitata* Issiki (♂) [Huzinosawa, Sapporo, Hokkaidō, 22/viii/1967] — C: *Caloptilia (Caloptilia) cuculipennella* (Hübner) (♀) [Zyōzankei, Hokkaidō, em. 17/vii/1976, ex *Fraxinus mandshurica* var. *japonica* (1691)] — D: *Caloptilia (Caloptilia) stigmatella* (Fabricius) (♀) [Zyōzankei, Hokkaidō, em. 17/ix/1958, ex *Populus nigra*] — E: *Caloptilia (Caloptilia) isochrysa* (Meyrick) (♀) [Kozagawa, Wakayama-ken, Honsyū, em. 12/vi/1964, ex *Cleyera japonica* (653)] — F: *Caloptilia (Caloptilia) ulmi*, sp. nov. (♀) [Nopporo, Hokkaidō, em. 4/x/1971, ex *Ulmus davidiana* var. *japonica* forma *suberosa* (1108)] — G: *Caloptilia (Caloptilia) soyella* (Deventer) (♂) [Hirai, Ōsaka, Honsyū, em. 20/x/1950, ex *Azukia angularis*].

Plate XIII.

Fig. 60. Profiles of adult specimens. A: *Caloptilia (Povolnya) querci*, sp. nov. (♂) [Mikazuki-yama, Hukuoka-ken, Kyūsyū, em. 21/vi/1957, ex *Quercus glauca* (226)] — B: *Caloptilia (Povolnya) obliquatella* (Matsumura) (♀) [Yamamoto, Ōsaka, Honsyū, em. 20/x/?, ex *Quercus acutissima*] — C: *Caloptilia (Phylloptilia) illicii* Kumata (♂) [Ōsugidani, Wakayama-ken, Honsyū, em. 5/vii/1952, ex *Illicium religiosum*] — D: *Caloptilia (Phylloptilia) magnoliae* Kumata (♀) [Apoi, Hidaka, Hokkaidō, 22/vi/1959] — E: *Caloptilia (Phylloptilia) schisandrae* Kumata (♂) [Iwawakisan, Ōsaka, Honsyū, 24/vii/1952] — F: *Caloptilia (Phylloptilia) kadsurae* Kumata (♀) [Kii-Ōsima, Wakayama-ken, Honsyū, 21–24/v/1964] — G: *Caloptilia (Phylloptilia) crinotibialis*, sp. nov. (♀) [Nati, Wakayama-ken, Honsyū, em. 23/vi/1957, ex *Persea japonica*].

Plate XIV.

Fig. 61. Profiles of adult specimens. A: *Caloptilia (Timodora) elongata*, sp. nov. (♂) [Kagosima, Kyūsyū, em. 25/x/1973, ex *Rhus sylvestris* (2165)] — B: *Caloptilia (Sphyrophora) sapiivora*, sp. nov. (♂) [Kyōto, Honsyū, em. 26/x/1966, ex *Sapium japonicum* (813)] — C: *Caloptilia (Cecidoptilia) cecidophora* Kumata (♀) [Nisinoomote, Tanegasima, em. 5/vii/1965, ex *Glochidion obovatum* (663)] — D: *Caloptilia (Minyoptilia)*

callicarpae, sp. nov. (♂) [Anbô, Yakusima, 12/vi/1965] — E: *Caloptilia* (*Rhadinoptilia*) *camphorae*, sp. nov. (♂) [Kyôto, Honsyû, em. 25/vi/1964, ex *Cinnamomum camphora*] — F: *Caloptilia* (*Rhadinoptilia*) *bipunctata*, sp. nov. (♀) [Kii-Ôsima, Wakayama-ken, Honsyû, em. 19/v/1956, ex *Neolitsea sericea*] — G: *Calybites phasianipennella* (Hübner) (♀) [Tomakomai, Hokkaidô, em. 4/ix/1957, ex *Lysimachia vulgaris*] — H: *Eucalybites aureola*, sp. nov. (♀) [Kenebetu, Nemuro, Hokkaidô, em. 11/viii/1973, ex *Hypericum erectum* (1172)].

Plate XV.

Fig. 62. Wing venation. A: *Gracillaria syringella* (Fabricius) [Austria, em. 4–14/iv/1963, ex *Fraxinus excelsior*] — B: *Gracillaria ussuriella* (Ermolaev) [Kamikawa, Hokkaidô, em. 12/viii/1957, ex *Fraxinus mandshurica* var. *japonica* (140)] — C: *Caloptilia* (*Caloptilia*) *cuculipennella* (Hübner) [Austria, em. 20/ix/1952, ex *Ligustrum* sp.] — D: *Caloptilia* (*Caloptilia*) *stigmatella* (Fabricius) [Zyôzankei, Hokkaidô, em. 17/ix/1958, ex *Populus nigra*] — E: *Caloptilia* (*Caloptilia*) *ryukyuensis* Kumata [Sirahama, Iriomote, Ryûkyû Is., 4–5/xi/1963].

Plate XVI.

Fig. 63. Wing venation. A: *Caloptilia* (*Caloptilia*) *theivora* (Walsingham) [Hikosan, Kyûsyû, em. 6/vii/1957, ex *Camellia japonica* (201)] — B: *Caloptilia* (*Caloptilia*) *heliciae* Kumata [Onoaida, Yaku-sima, Satunan Is., em. 19/xi/1973, ex *Helicia cochinchinensis* (1224)] — C: *Caloptilia* (*Caloptilia*) *mongolicae*, sp. nov. [Wassamu, Hokkaidô, em. 15/ix/1962, ex *Quercus mongolica* var. *grosseserrata*] — D: *Caloptilia* (*Caloptilia*) *semifasciella* Kumata [Aizankei, Daisetuzan, Hokkaidô, em. 12/viii/1957, ex *Acer tschonoskii* (316)] — E: *Caloptilia* (*Caloptilia*) *pulverea* Kumata [Ino, Kôti-ken, Sikoku, em. 1/vii/1957, ex *Alnus japonica* (261)] — F: *Caloptilia* (*Caloptilia*) *soyella* (Deventer) [Hirai, Ôsaka, Honsyû, em. 20/x/?, ex *Azukiangularis*].

Plate XVII.

Fig. 64. Wing venation. A: *Caloptilia* (*Phylloptilia*) *magnoliae* Kumata [Apoi, Hidaka, Hokkaidô, 22/vi/1959] — B: *Caloptilia* (*Phylloptilia*) *hadsurae* Kumata [Kii-Ôsima, Wakayama-ken, Honsyû, 21–24/v/1964] — C: *Caloptilia* (*Phylloptilia*) *crinotibialis*, sp. nov. [Nati, Wakayama-ken, em. 31/v/1957, ex *Persea japonica*] — D: *Caloptilia* (*Phylloptilia*) *perseella*, sp. nov. [Hikosan, Kyûsyû, em. 23/vi/1957, ex *Persea thunbergii* (196)].

Plate XVIII.

Fig. 65. Wing venation. A: *Caloptilia* (*Povolnya*) *querci*, sp. nov. [Mikazuki-yama, Hukuoka-ken, Kyûsyû, em. 21/vi/1957, ex *Quercus glauca* (226)] — B: *Caloptilia* (*Rhadinoptilia*) *camphorae*, sp. nov. [Kyôto, Honsyû, em. 25/vi/1964, ex *Cinnamomum camphora*] — C: *Caloptilia* (*Rhadinoptilia*) *bipunctata*, sp. nov. [Kii-Ôsima, Wakayama-ken, Honsyû, em. 19/v/1956, ex *Neolitsea sericea*] — D: *Caloptilia* (*Minyoptilia*) *callicarpae*, sp. nov. [Kurkô, Yaku-sima, Satunan Is., em. 12/xi/1973, ex *Callicarpa japonica* var. *luxurians* (1214)] — E: *Caloptilia* (*Sphyrophora*) *sapiivora*, sp. nov. [Hikosan, Kyûsyû, em. 10/xi/1960, ex *Sapium japonicum*].

Plate XIX.

Fig. 66. Wing venation. A: *Caloptilia* (*Timodora*) *elongata*, sp. nov. [Kagosima, Kyûsyû, em. 25/x/1973, ex *Rus sylvestris* (1265)] — B: *Caloptilia* (*Cecidoptilia*) *cecidophora* Kumata [Nisinoomote, Tanega-sima, Satunan Is., em. 5/vii/1965, ex *Glochidion obovatum* (663)] — C: *Calybites phasianipennella* (Hübner) [Sapporo, Hokkaidô, 30/v/1956] — D: *Calybites trimaculata*, sp. nov. [Kosugidani, Yaku-sima, Satunan Is., 7–10/vi/1965] — E: *Eucalybites aureola*, sp. nov. [Kenebetu, Nemuro, Hokkaidô, em. 13/viii/1973, ex *Hypericum erectum* (1172)].

Plate XX.

Fig. 67. Apical segments of male abdomen in lateral view; B: genital organs omitted. A: *Gracillaria syringella* (Fabricius) [Grc-1158, Berlin, Europe, em. 24/vi/1924, ex *Syringa vulgaris*] — B: *Caloptilia (Caloptilia) cuculipennella* (Hübner) [Grc-1687, Apoi, Hidaka, Hokkaidô, em. 17/vii/1973, ex *Syringa reticulata* (1153)] — C: *Caloptilia (Caloptilia) stigmatella* (Fabricius) [Grc-1164, Sapporo, Hokkaidô, em. 10/ix/1957, ex *Populus nigra* (365)].

Plate XXI.

Fig. 68. Apical segments of male abdomen in dorsal view, genital organs omitted. A: *Caloptilia (Caloptilia) magnifica moriokensis*, ssp. nov. [Grc-1565, holotype] — B: *Caloptilia (Caloptilia) heliciae* Kumata [Grc-1704, Yaku-sima, Satunan Is. em. 13/xi/1973, ex *Helicia cochinchinensis* (1244)].

Plate XXII.

Fig. 69. Apical segments of male abdomen in dorsal view, genital organs omitted. A: *Caloptilia (Caloptilia) sapporella* (Matsumura) [Grc-1690, Kenebetu, Nemuro, Hokkaidô, em. 13/viii/1973, ex *Quercus dentata*] — B: *Caloptilia (Cecidoptilia) cecidophora* Kumata [Grc-1188, holotype].

Plate XXIII.

Fig. 70. Apical segments of male abdomen in lateral view. A: *Caloptilia (Phylloptilia) perseella*, sp. nov. [Grc-1358, Hikosan, Kyûsyû, em. 25/vi/1957, ex *Persea thunbergii* (196)] — B: *Caloptilia (Povolnya) querci*, sp. nov. [Grc-1144, Kozagawa, Wakayama-ken, Honsyû, em. 3/vi/1964, ex *Quercus glauca* (647)].

Plate XXIV.

Fig. 71. Apical segments of male abdomen in lateral view. A: *Caloptilia (Timodora) elongata*, sp. nov. [Grc-1285, Nisinoomote, Tanega-sima, Satunan Is., em. 1/vii/1965, ex *Rhus succedanea*] — B: *Caloptilia (Rhadinoptilia) camphorae*, sp. nov. [Grc-1115, Kyôto, Honsyû, em. 25/vii/1964, ex *Cinnamomum camphora*].

Plate XXV.

Fig. 72. Apical segments of male abdomen in lateral view (A-D) and in dorsal view (E, genital organs omitted). A: *Caloptilia (Minyoptilia) callicarpae*, sp. nov. [Grc-1292, Anbô, Yaku-sima, Satunan Is., em. 1/vii/1965, ex *Callicarpa japonica* var. *luxurians* (637)] — B: *Caloptilia (Sphyrrophora) sapiivora*, sp. nov. [Grc-1353, Kyôto, Honsyû, em. 26/x/1966, ex *Sapium japonicum* (813)] — C: *Calybites phasianipennella* (Hübner) [Grc-1147, Sapporo, Hokkaidô, em. 19/ix/1957, ex *Polygonum thunbergii*] — D: *Calybites trimaculata*, sp. nov. [Grc-1355, Kosugidani, Yaku-sima, Satunan Is., 7-10/vi/1965] — E: *Eucalybites aureola*, sp. nov. [Grc-1681, Kenebetu, Nemuro, Hokkaidô, em. 11/viii/1973, ex *Hypericum erectum* (1172)].

Plate XXVI.

Fig. 73. Apical segments of female abdomen in lateral view. A: *Gracillaria ussuriella* (Ermolaev) [Grc-1360, Sapporo, Hokkaidô, em. 21/ix/1966, ex *Fraxinus mandshurica* var. *japonica* (794)] — B: *Caloptilia (Caloptilia) stigmatella* (Fabricius) [Grc-675, Zyôzan-kei, Hokkaidô, em. 17/ix/1958, ex *Populus nigra*] — C: *Caloptilia (Caloptilia) soyella* (Deventer) [Grc-1362, Nisinomiya, Ôsaka, Honsyû, em. 19/ix/1949, ex *Glycine max*] — D: *Caloptilia (Phylloptilia) perseella*, sp. nov. [Grc-1361, Sata-misaki, Kyûsyû, em. 13/v/1958, ex *Persea thunbergii*] — E: *Caloptilia (Timodora) elongata*, sp. nov. [Grc-1364, Anbô, Yaku-sima, Satunan Is., em. 1/vii/1965, ex *Rhus succedanea* (659)].

Plate XXVII.

Fig. 74. Apical segments of female abdomen in lateral view. A: *Caloptilia (Rhadinoptilia) camphorae*, sp. nov. [Grc-1359, Kyôto, Honsyû, em. 10/vi/1964, ex *Cinnamomum*

camphora] — B: *Caloptilia (Povolnya) querci*, sp. nov. [Grc-1366, Nisinoomote, Tanega-sima, Satunan Is., 13/vi/1965] — C: *Caloptilia (Minyoptilia) callicarpae*, sp. nov. [Grc-1363, Anbô, Yaku-sima, Statunan Is., em. 1/vii/1965, ex *Callicarpa japonica* var. *luxurians* (637)] — D: *Caloptilia (Sphyrophora) sapiivora*, sp. nov. [Grc-1354, Kyôto, Honsyû, 22/x/1966, ex *Sapium japonicum* (813)] — E: *Calybites phasianipennella* (Hübner) [Grc-1367, Sapporo, Hokkaidô, em. 15/viii/1964, ex *Polygonum* sp.] — F: *Calybites trimaculata*, sp. nov. [Grc-1356, Anbô, Yaku-sima, Satunan Is., em. 10/vi/1965, ex *Polygonum chinense* (638)].

Plate XXVIII.

Fig. 75. Body chaetotaxy of last instar larva. A: *Gracillaria albicapitata* Issiki — B: *Gracillaria arsenievi* (Ermolaev) — C: *Caloptilia (Caloptilia) stigmatella* (Fabricius) — D: *Caloptilia (Caloptilia) theivora* (Walsingham).

Plate XXIX.

Fig. 76. Body chaetotaxy of last instar larva. A: *Caloptilia (Caloptilia) geminata* Kumata — B: *Caloptilia (Caloptilia) wakayamensis* Kumata — C: *Caloptilia (Caloptilia) monticola* Kumata. D: *Caloptilia (Caloptilia) azaleella* (Brants).

Plate XXX.

Fig. 77. Body chaetotaxy of last instar larva. A: *Caloptilia (Caloptilia) mongolicae*, sp. nov. — B: *Caloptilia (Phylloptilia) magnoliae* Kumata — C: *Caloptilia (Phylloptilia) hadsurae* Kumata — D: *Caloptilia (Timodora) elongata*, sp. nov.

Plate XXXI.

Fig. 78. Body chaetotaxy of last instar larva. A: *Caloptilia (Povolnya) querci*, sp. nov. — B: *Caloptilia (Rhadinoptilia) camphorae*, sp. nov. — C: *Caloptilia (Minyoptilia) callicarpae*, sp. nov. — D: *Caloptilia (Sphyrophora) sapiivora*, sp. nov.

Plate XXXII.

Fig. 79. Body chaetotaxy of last instar larva. A: *Caloptilia (Cecidoptilia) cecidophora* Kumata — B: *Calybites phasianipennella* (Hübner) — C: *Calybites trimaculata*, sp. nov. — D: *Eucalybites aureola*, sp. nov.

Plate XXXIII.

Fig. 80. Larval leaf mines and leaf rolls. A: Leaf of *Syringa reticulata* (upper side) mined by *Gracillaria albicapitata* Issiki, showing a young mine [Moiwa, Sapporo, Hokkaidô, ix/1969] — B: Ditto, showing a nearly mature mine [ditto] — C: Leaves of *Syringa reticulata* (lower side) rolled by *G. albicapitata* [ditto] — D: Leaflets of *Fraxinus mendshurica* var. *japonica* (lower side), left and right, respectively, mined and rolled by *Caloptilia (Caloptilia) cuculipennella* (Hübner) [Zyôzankei, Hokkaidô, 29/vi/1976, breeding no. 1690] — E: Leaf of *Salix* sp. (lower side) mined by *Caloptilia (Caloptilia) stigmatella* (Fabricius), arrow showing a mine [Misumai, Sapporo, Hokkaidô, 10/ix/1971, breeding no. 1123]. — F: Leaves of *Salix* sp. (lower side) mined and rolled by *C. (Caloptilia) stigmatella*, arrow showing a mine [ditto].

Plate XXXIV.

Fig. 81. Larval leaf mines, leaf rolls and cocoon. A: Leaves of *Thea sinensis* (lower side) mined by *Caloptilia (Caloptilia) theivora* (Walsingham) [Kozagawa, Wakayama-ken, Honsyû, 21/v/1970, breeding no. 1027] — B: Twig of *Camellia japonica* with leaves mined and/or rolled by *C. (Caloptilia) theivora* [Kagosima, Kyûsyû, 22/x/1973, breeding no. 1250] — C: Leaves of *Cleyera japonica* (lower side), left and right, respectively, rolled and mined by *Caloptilia (Caloptilia) isochrysa* (Meyrick) [Kozagawa, Wakayama-ken, Honsyû, 21/v/1970, breeding no. 1024] — D: Cocoon of *C. (Caloptilia) isochrysa* [ditto] — E: Leaflet of *Rhus javanica* (lower side) mined and rolled by *Caloptilia (Caloptilia) recitata* (Meyrick) [Yugasima, Amagi, Honsyû, 15/vii/1971, breeding no. 1088] — F: Same leaflet with E (upper side).

Plate XXXV.

Fig. 82. Larval leaf mines, leaf rolls and cocoon. A: Leaf of *Epimedium grandiflorum* (lower side) mined by *Caloptilia (Caloptilia) magnifica moriokensis*, ssp. nov. [Tunagi, Morioka, Honsyû, 8/x/1969, breeding no. 973] — B: Twig of *Epimedium grandiflorum* with leaves mined or rolled by *C. (Caloptilia) magnifica moriokensis* [ditto] — C: Leaf of *Acer palmatum* (lower side) mined by *Caloptilia (Caloptilia) wakayamensis* Kumata, arrow showing a mine [Kozagawa, Wakayama-ken, Honsyû, 21/v/1970, breeding no. 1016] — D: Leaf of *Acer palmatum* rolled by *C. (Caloptilia) wakayamensis* [ditto] — E: Ditto, arrow showing a cocoon [ditto].

Plate XXXVI.

Fig. 83. Larval leaf mines, leaf rolls and cocoon. A: Leaf of *Acer mono* (lower side) mined and rolled by *Caloptilia (Caloptilia) aceris* Kumata [Moiwa, Sapporo, ix/1969] — B: Basal part of same leaf enlarged, arrow showing a mine — C: Leaf of *Acer sieboldianum* (lower side) rolled by *Caloptilia (Caloptilia) acericola* Kumata [Tunagi, Morioka, Honsyû, 8/x/1969, breeding no. 983] — D: Leaf of *Acer sieboldianum* (lower side) mined and rolled by *C. (Caloptilia) acericola*, arrow showing a mine [ditto] — E: Leaf of *Acer mono* (lower side) mined and rolled by *Caloptilia (Caloptilia) gloriosa* Kumata, arrows showing mine (a) and cocoon (b) [Moiwa, Sapporo, Hokkaidô, 25/viii/1975, breeding no. 1497] — F: Leaves of *Helicia cochinchinensis*, left and right, respectively, mined and rolled by *Caloptilia (Caloptilia) heliciae* Kumata (Onoaida, Yaku-sima, 17/x/1973, breeding no. 1224).

Plate XXXVII.

Fig. 84. Larval leaf mines and leaf rolls. A: Leaf of *Celtis sinensis* (lower side) mined and rolled by *Caloptilia (Caloptilia) celtidis*, sp. nov., arrows showing mines [Kagosima, Kyûsyû, 22/x/1973, breeding no. 1255] — B: Leaf of *Betula grossa* (lower side) mined and rolled by *Caloptilia (Caloptilia) bicolor* Ermolaev, arrows showing mines [Kozagawa, Wakayama-ken, Honsyû, 21/ix/1974, breeding no. 1310] — C: Twig of *Rhododendron kaempferi* with leaves (lower side) mined and/or rolled by *Caloptilia (Caloptilia) azaleella* (Brants), arrow showing a mine [Tunagi, Morioka, Honsyû, 8/x/1969, breeding no. 976] — D: Twig of *Vaccinium smallii* with leaves (lower side) mined or rolled by *Caloptilia (Caloptilia) geminata* Kumata, arrow showing a mine [Tunagi, Morioka, Honsyû, 8/x/1969, breeding no. 974].

Plate XXXVIII.

Fig. 85. Larval leaf mines, leaf rolls and cocoon. A: Leaves of *Magnolia kobus* (lower side) rolled by *Caloptilia (Phylloptilia) magnoliae* Kumata [Moiwa, Sapporo, Hokkaidô, 25/viii/1975, breeding no. 1481] — B: Leaf of *Magnolia kobus* (lower side) mined by *C. (Phylloptilia) magnoliae* [ditto] — C: Leaf of *Kadsura japonica* (lower side) mined by *Caloptilia (Phylloptilia) kadsurae* [Kozagawa, Wakayama-ken, Honsyû, 21/v/1970, breeding no. 1028] — D: Cocoon of *C. (Phylloptilia) kadsurae* [ditto] — E: Leaf of *Quercus glauca* (lower side) rolled by *Caloptilia (Povolnya) querci*, sp. nov. [Kozagawa, Wakayama-ken, Honsyû, 21/v/1970, breeding no. 1021] — F: Leaf of *Quercus glauca* (lower side) mined by *C. (Povolnya) querci* [ditto].

Plate XXXIX.

Fig. 86. Larval leaf mines and cocoon. A–C: Leaf of *Cinnamomum camphora* (upper side) mined by *Caloptilia (Rhadinoptilia) camphorae*, sp. nov., upper left corner of C showing a cocoon [Tôkyô, Honsyû, 21/v/1971, breeding no. 1072] — D–F: Leaf of *Callicarpa japonica* var. *luxurians* (upper side) mined by *Caloptilia (Minyoptilia) callicarpae*, sp. nov. [Kuriô, Yaku-sima, 16/x/1973, breeding no. 1214].

Plate XL.

Fig. 87. Larval leaf mines and galls. A: Leaf of *Glochidion obovatum* (lower side) mined by *Caloptilia (Cecidoptilia) cecidophora* Kumata, arrows showing mining part [Koza,

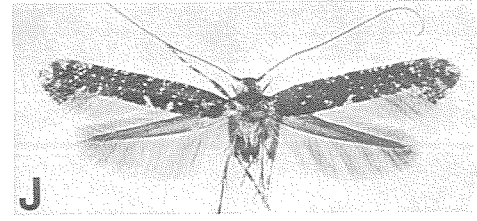
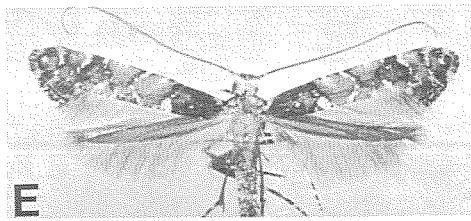
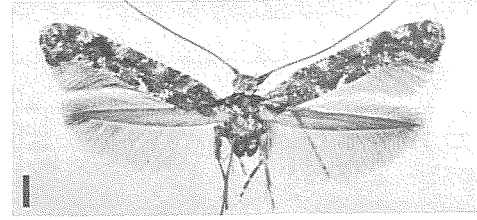
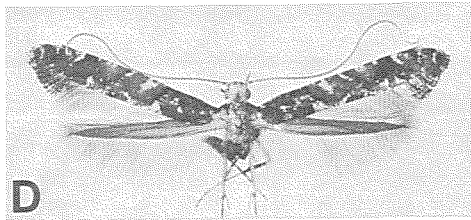
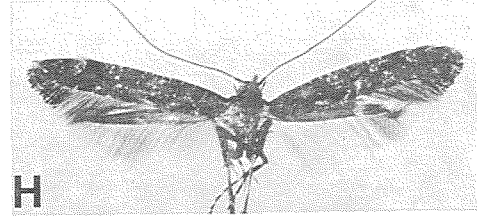
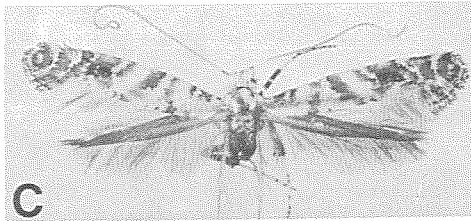
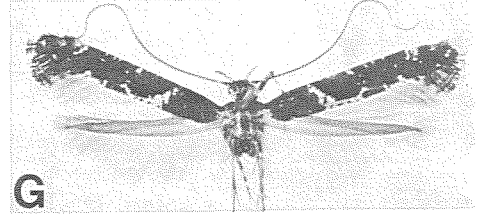
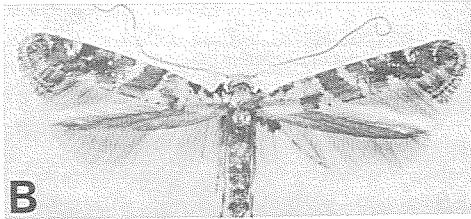
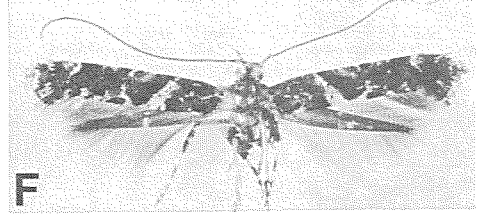
Wakayama-ken, Honsyû, 25/ix/1974] — B: Same leaf with A (upper side) having galls of *C. (Cecidoptilia) cecidophora* — C-D: Leaf of *Glochidion obovatum* (upper side) having galls of *C. (Cecidoptilia) cecidophora* [ditto].

Plate XLI.

Fig. 88. Larval leaf mines and leaf rolls. A: Leaf of *Polygonum thunbergii* (lower side) mined and rolled by *Calybites phasianipennella* (Hübner), arrow showing a mine [Sapporo, Hokkaidô, 7/ix/1970] — B: Same leaf with A (upper side), arrow showing a young, linear mine — C: Leaf of *Polygonum chinense* (lower side) mined and rolled by *Calybites trimaculata*, sp. nov., arrow showing a mine [Onoaida, Yaku-sima, 15/x/1973, breeding no. 1211] — D: Leaf of *Polygonum chinense* (lower side) rolled by *C. trimaculata* [ditto].

PLATES

Plate I (Fig. 48)



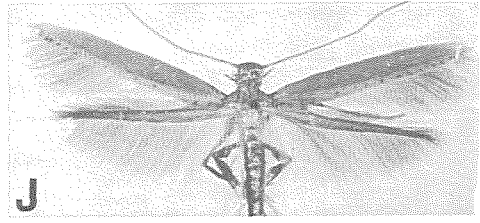
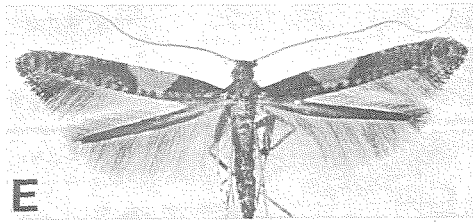
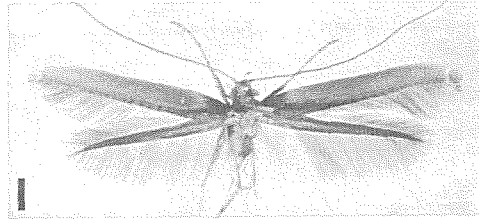
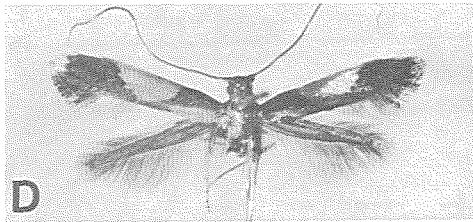
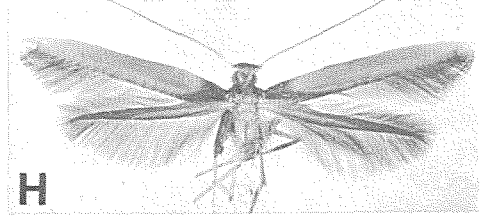
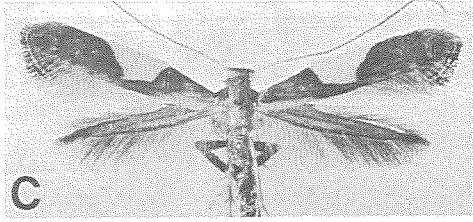
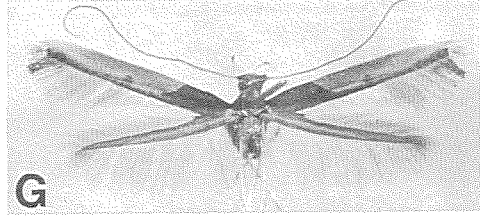
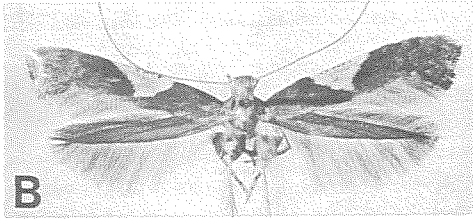
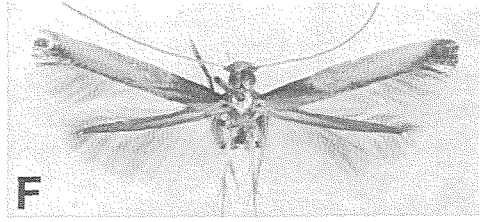
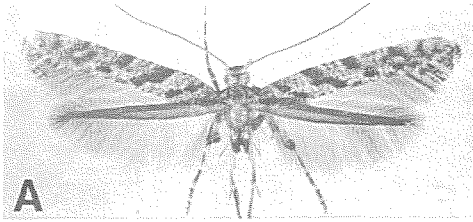
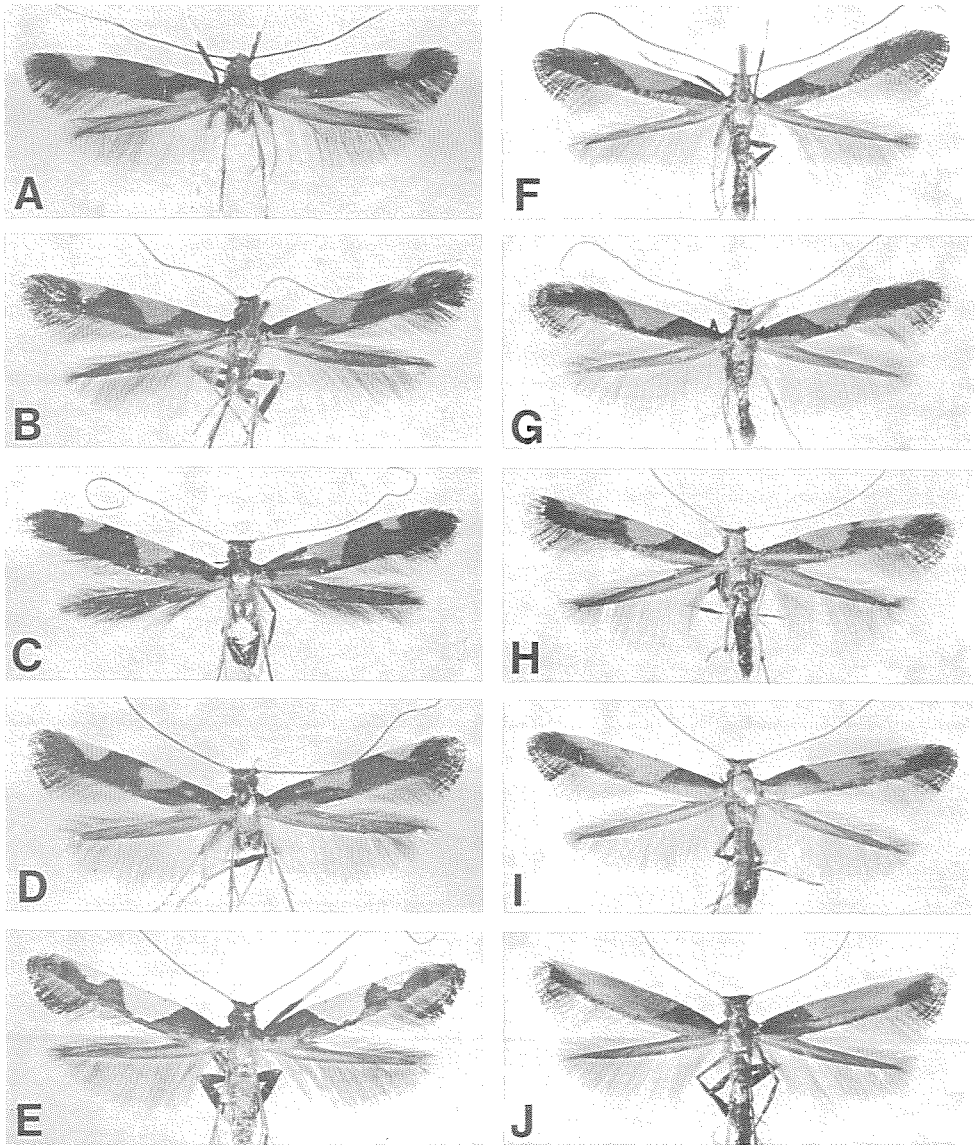


Plate III (Fig. 50)



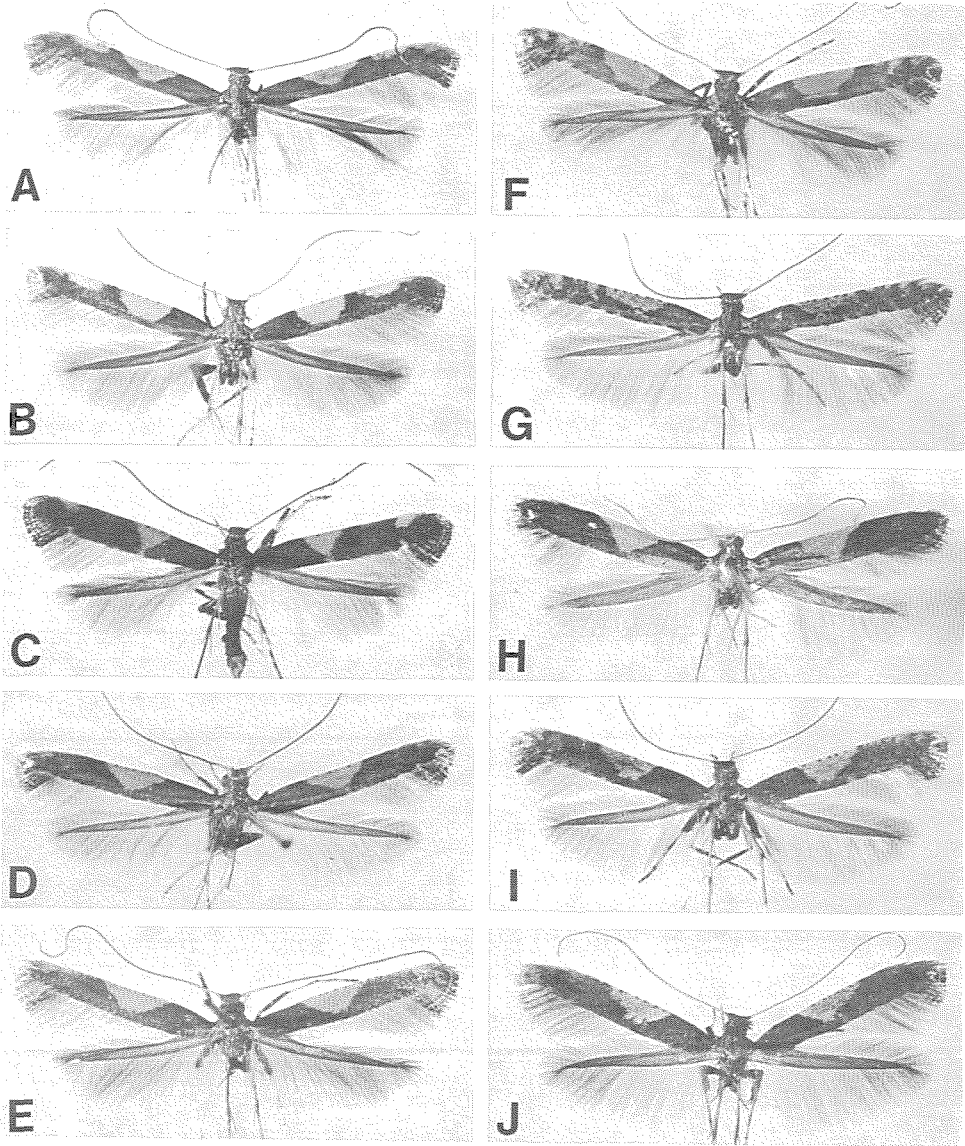
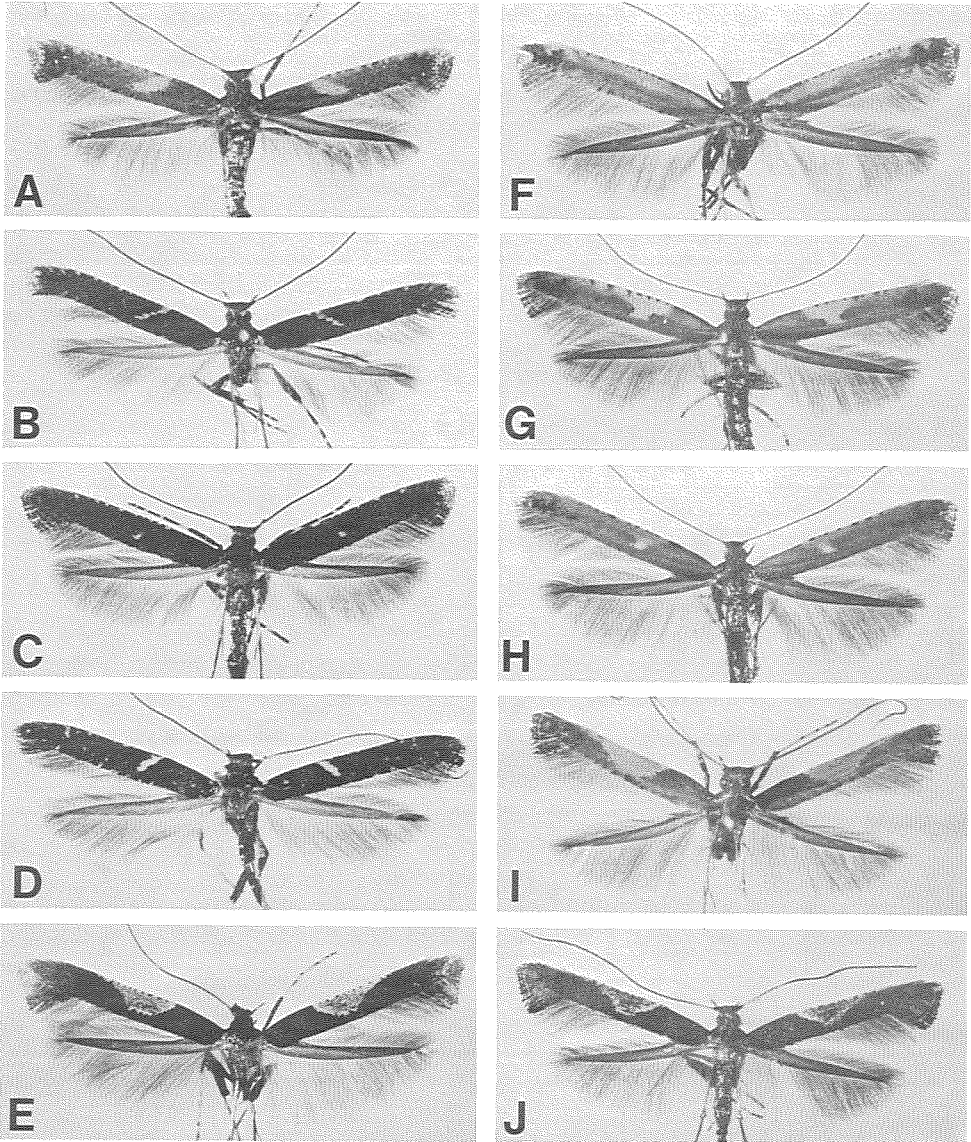


Plate V (Fig. 52)



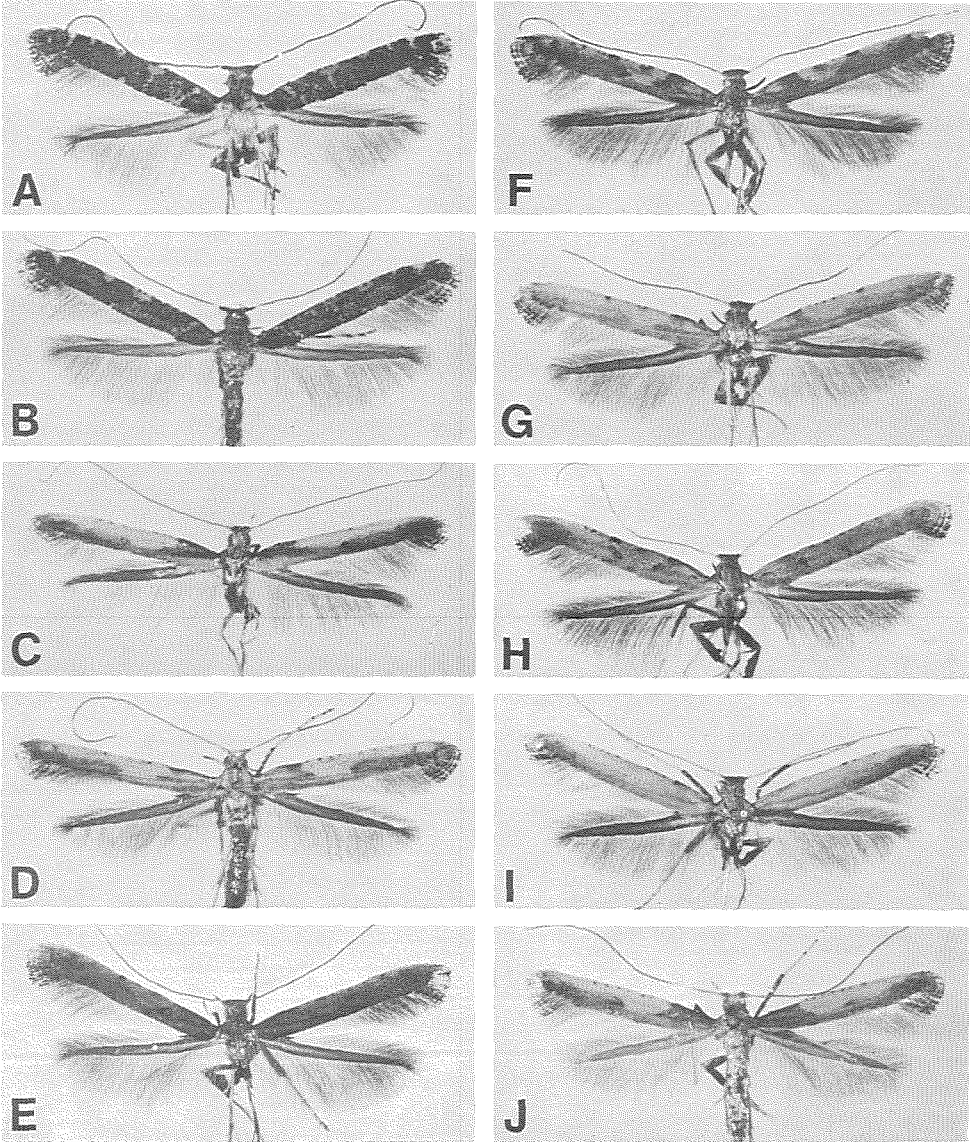
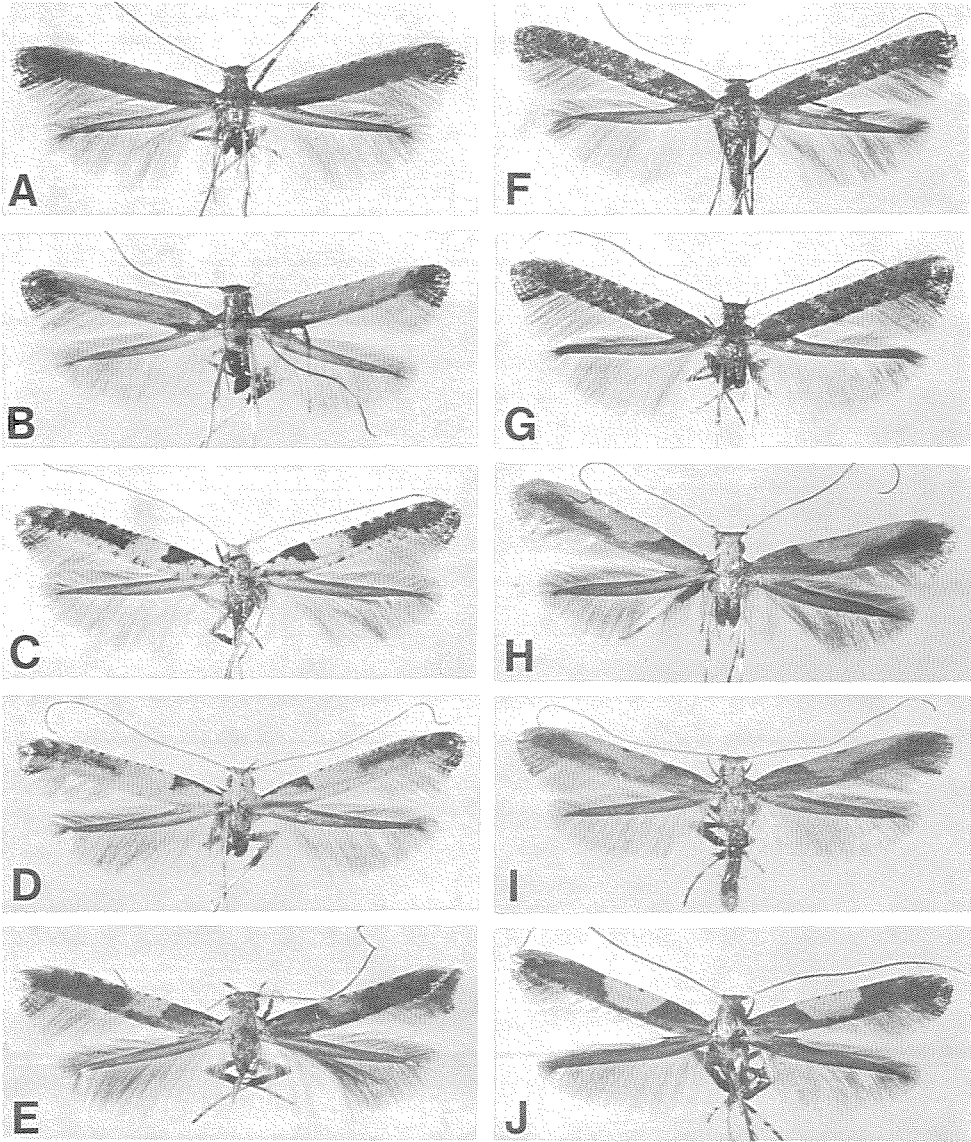


Plate VII (Fig. 54)



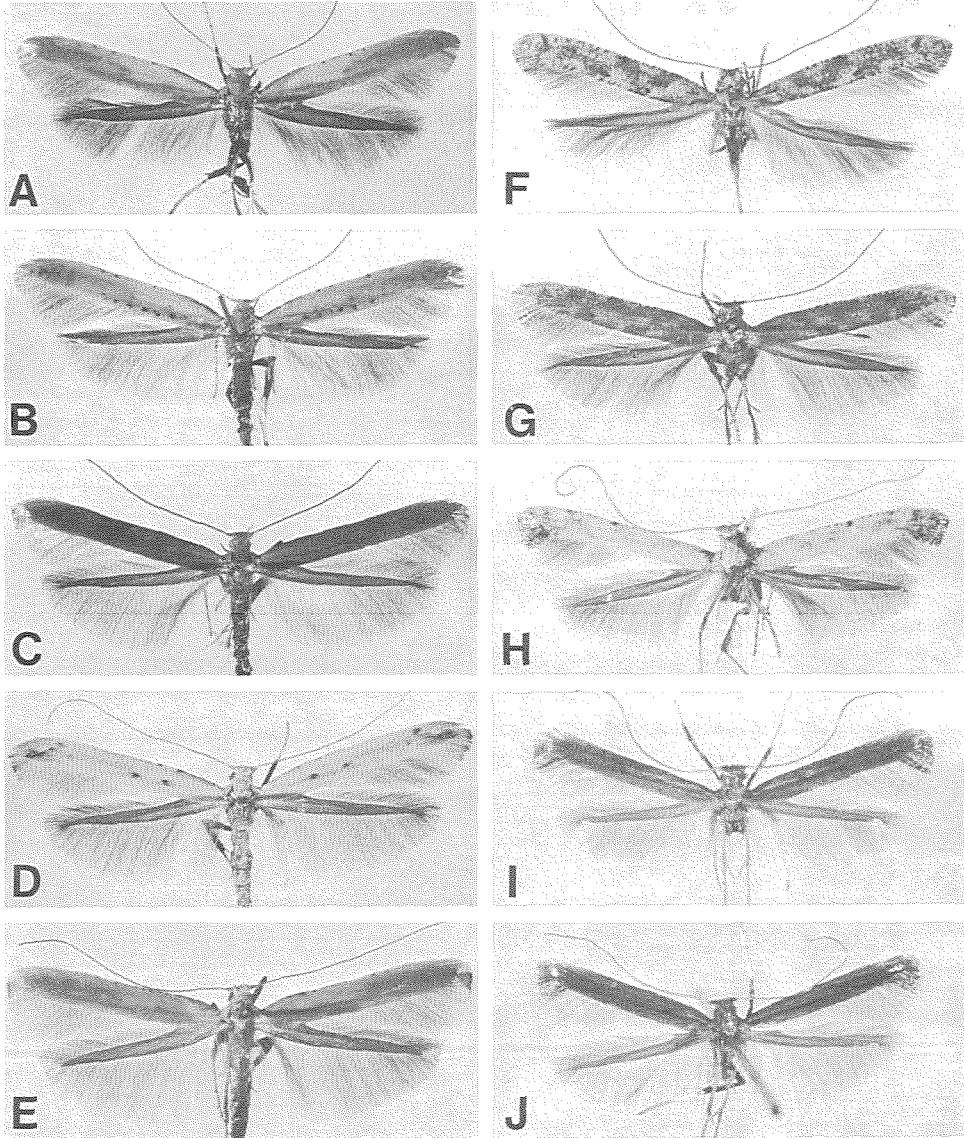
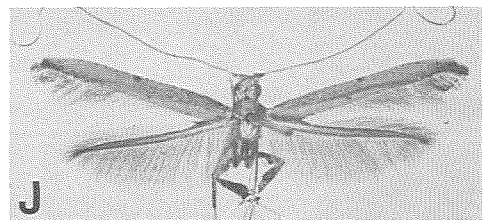
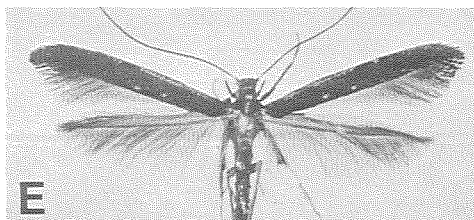
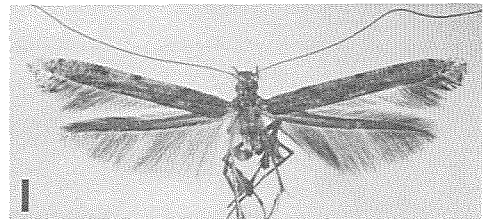
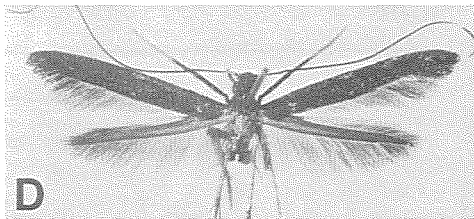
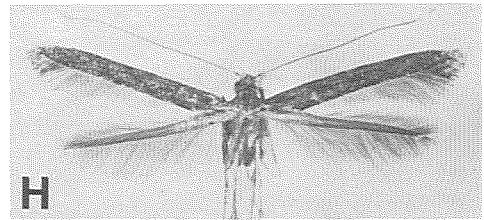
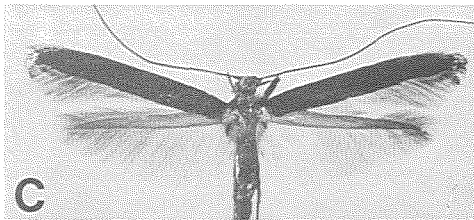
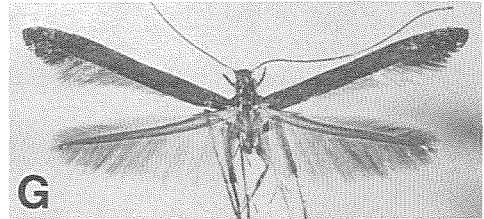
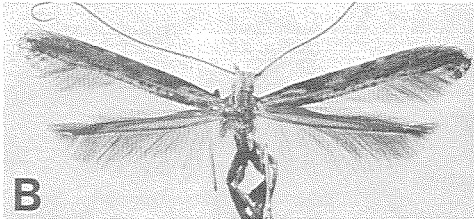
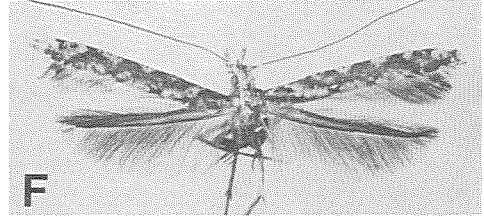
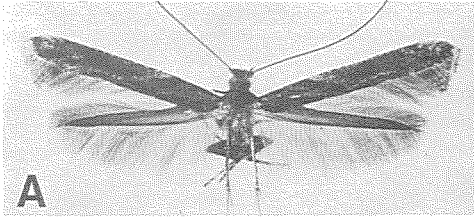


Plate IX (Fig. 56)



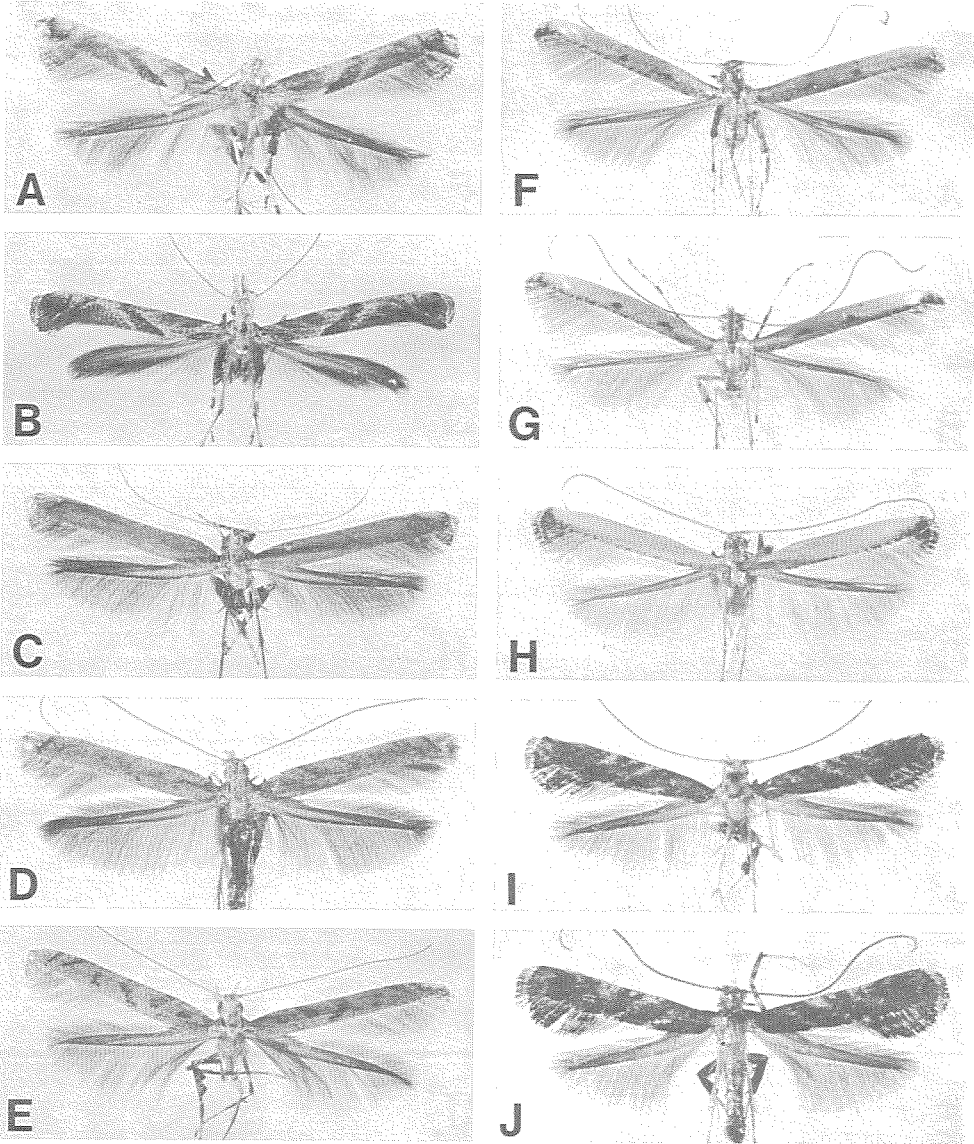
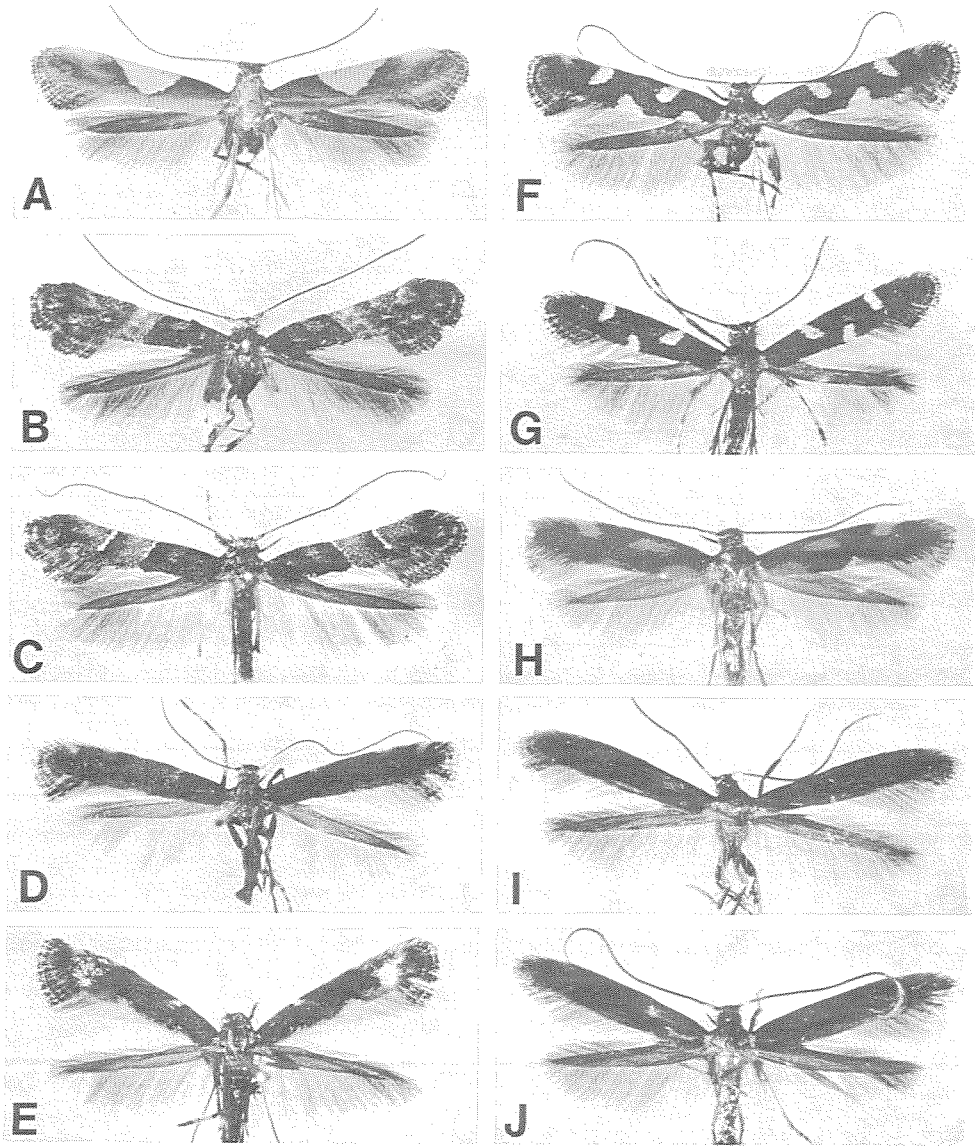


Plate XI (Fig. 58)



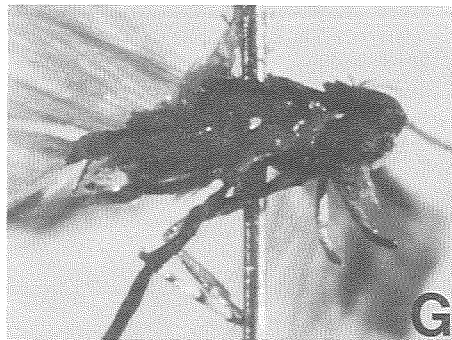
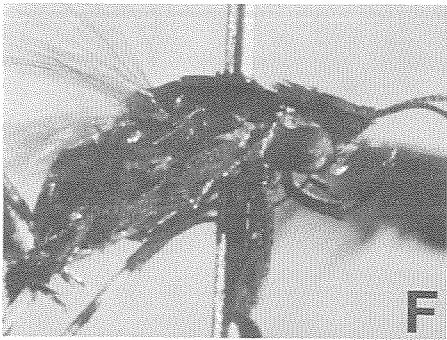
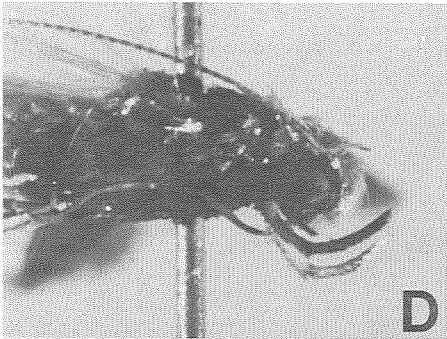
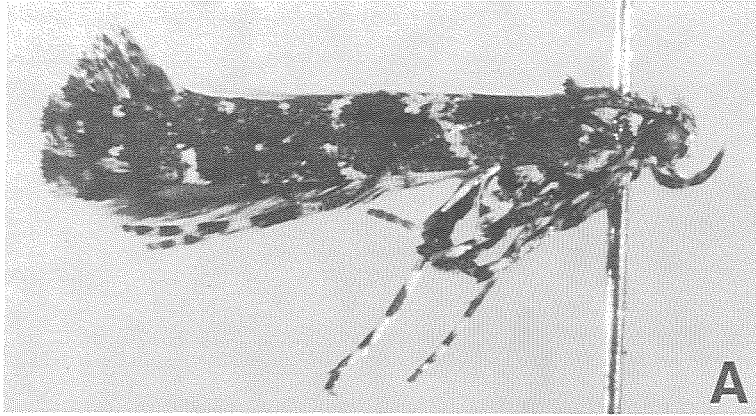
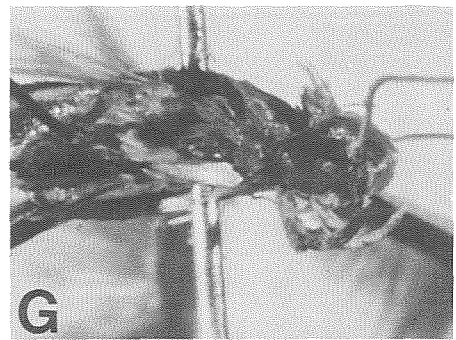
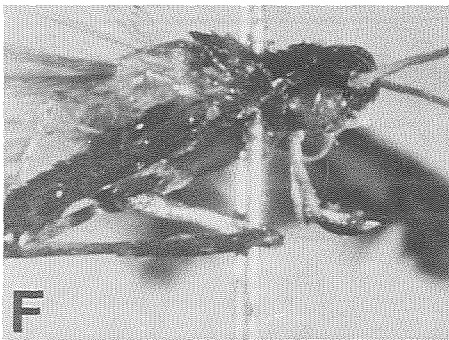
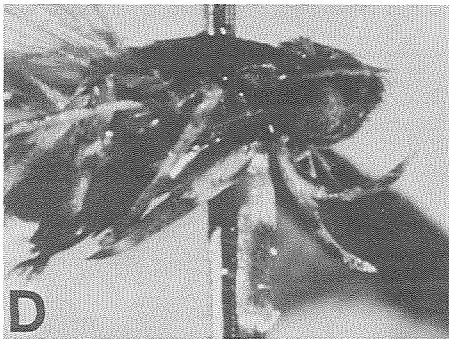
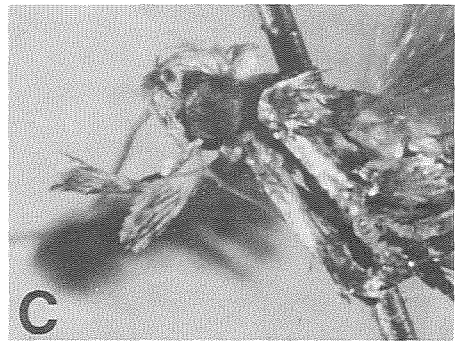
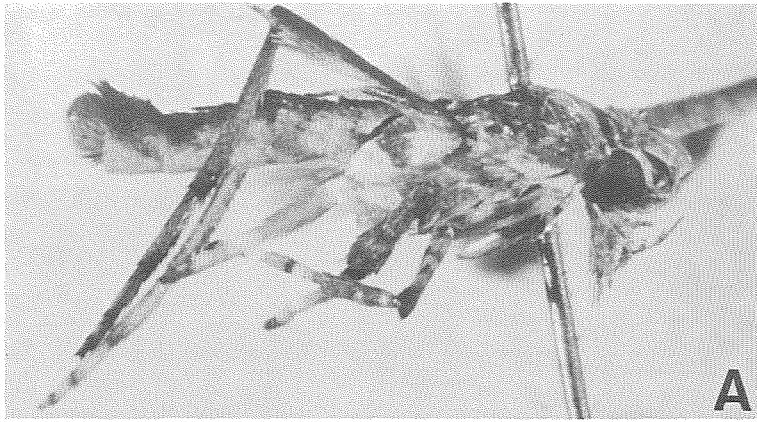


Plate XIII (Fig. 60)



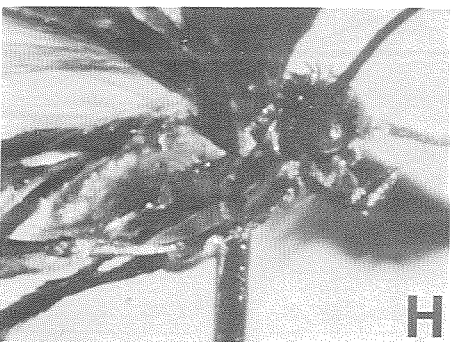
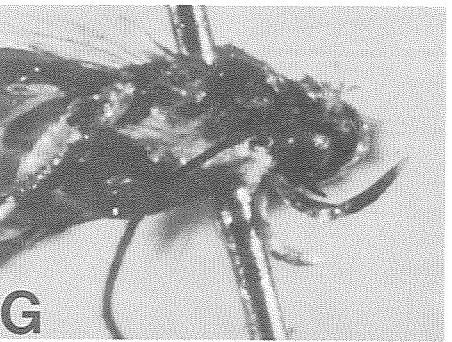
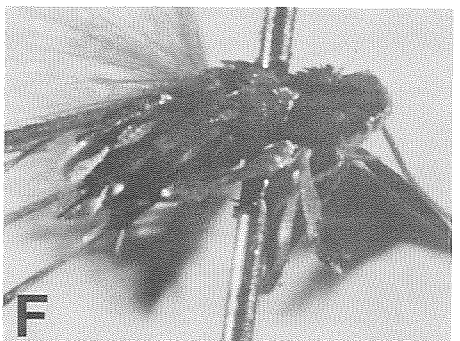
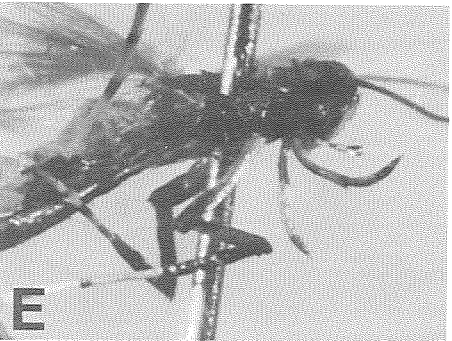
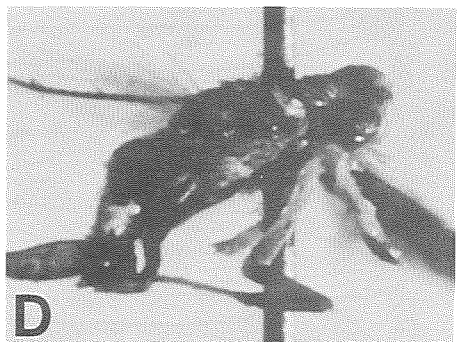
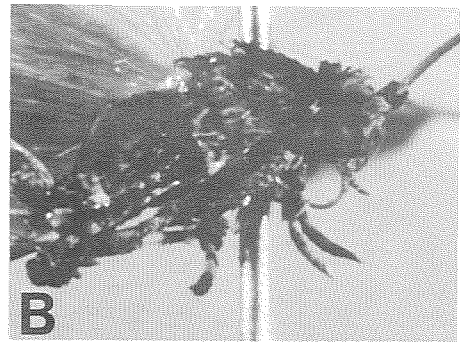
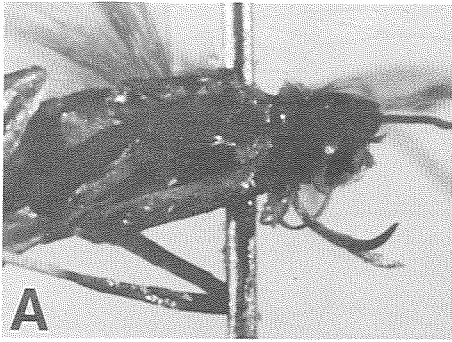
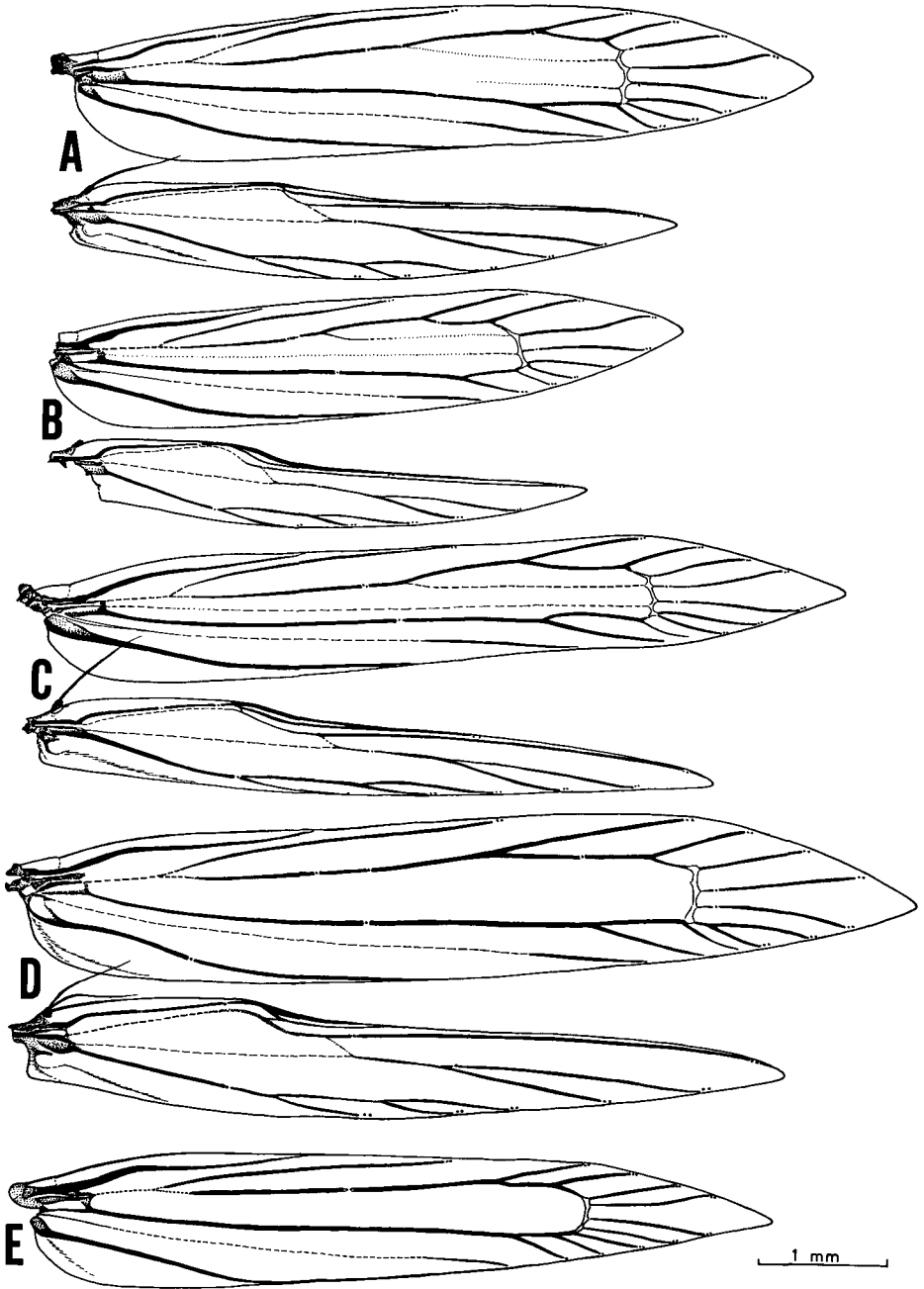


Plate XV (Fig. 62)



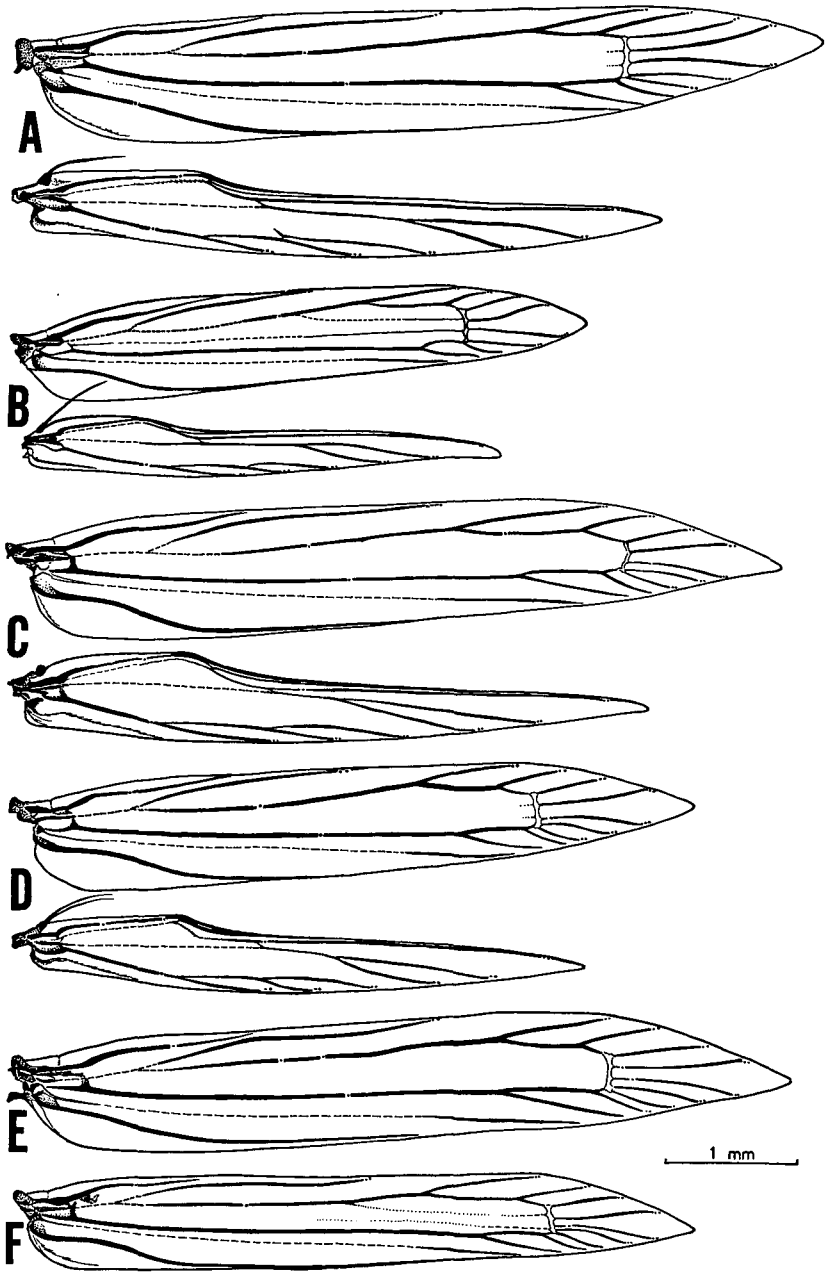
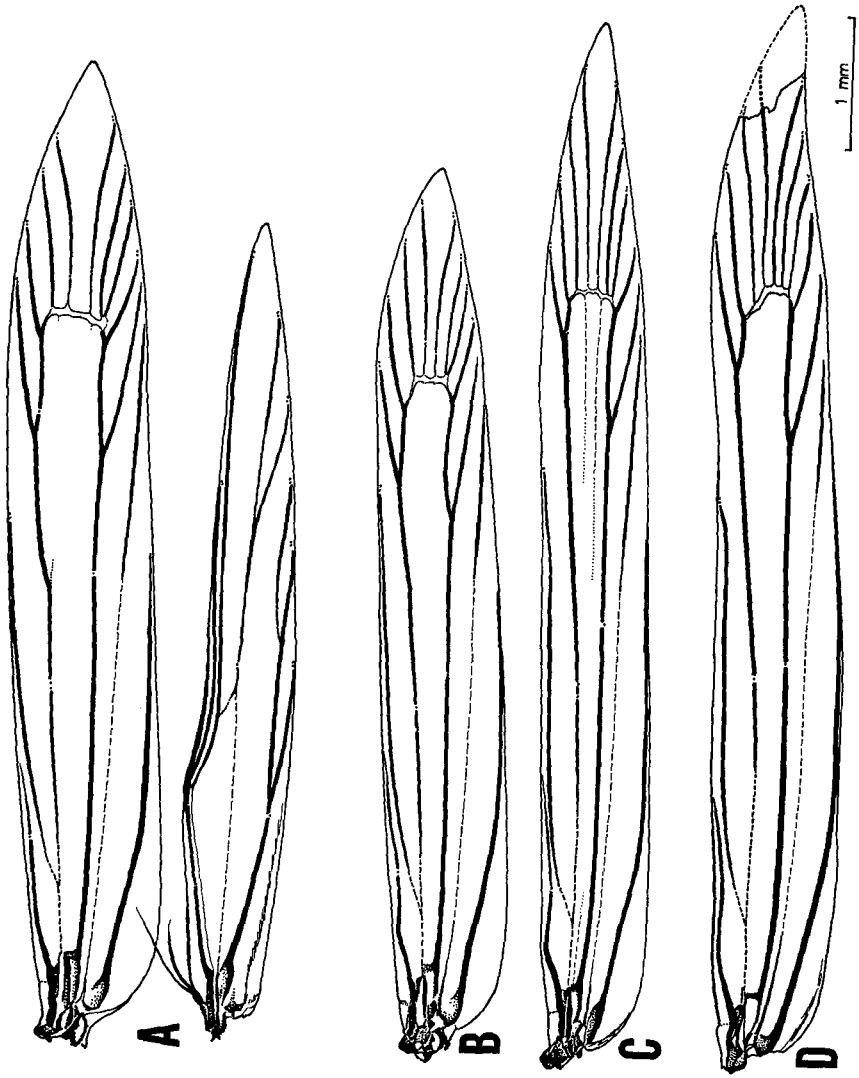


Plate XVII (Fig. 64)



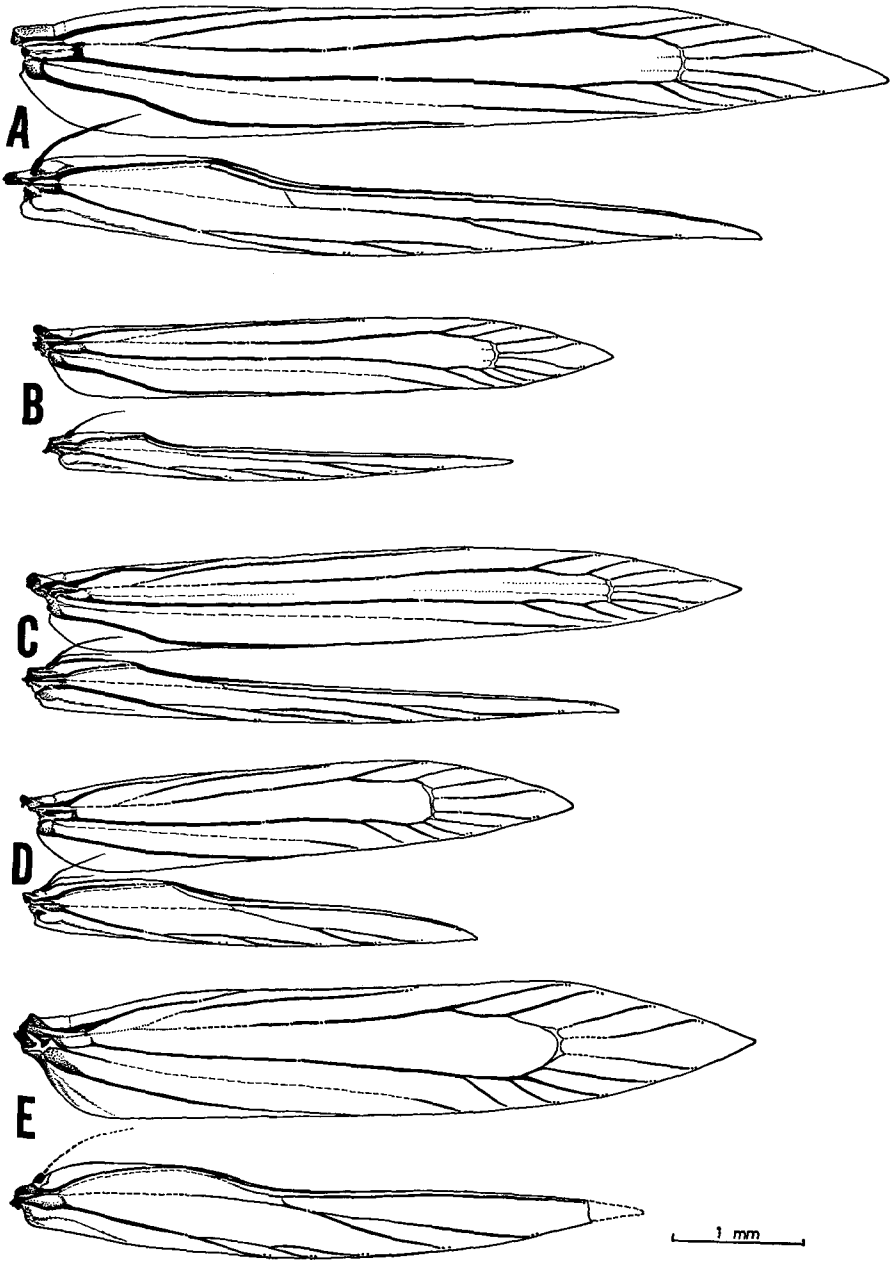
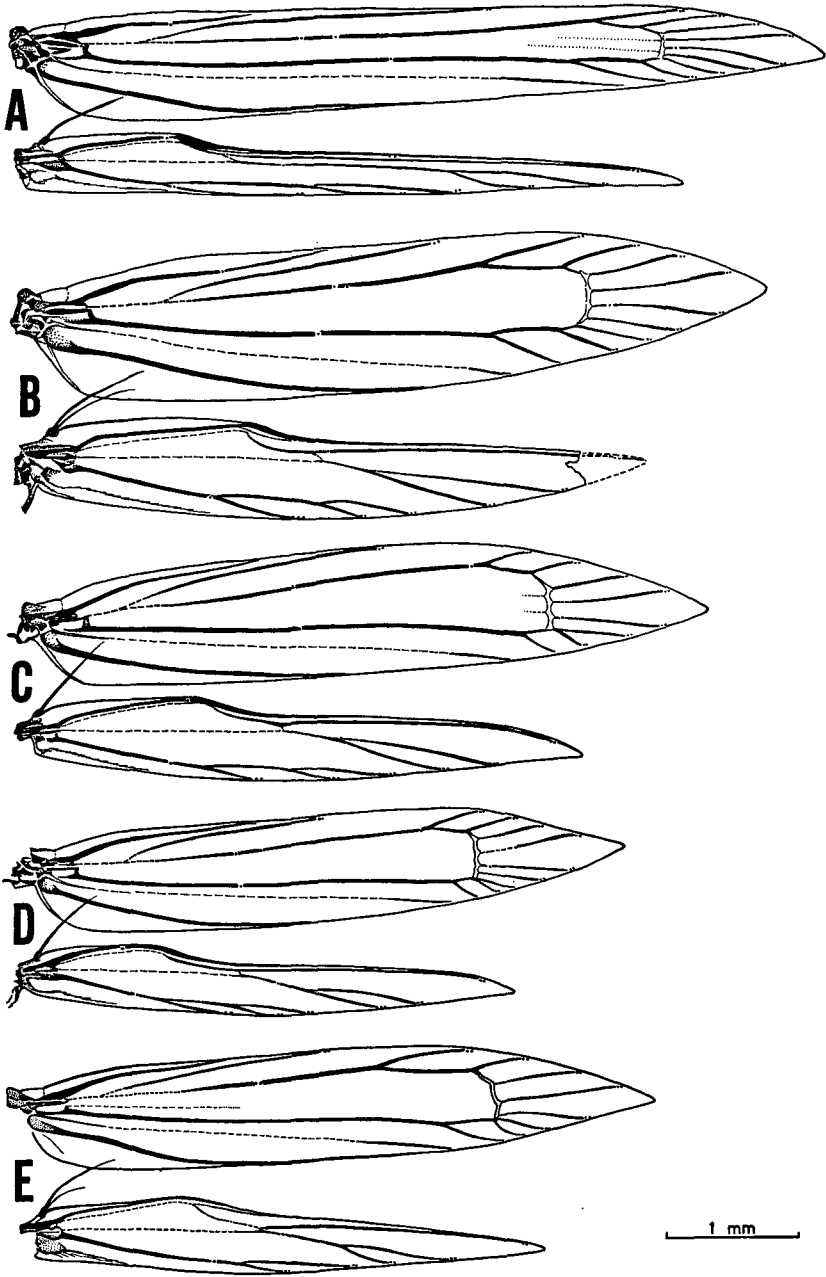


Plate XIX (Fig. 66)



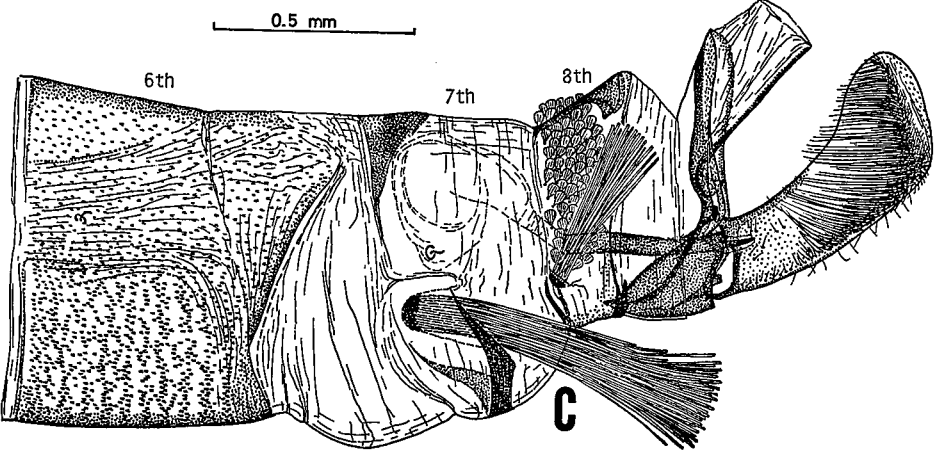
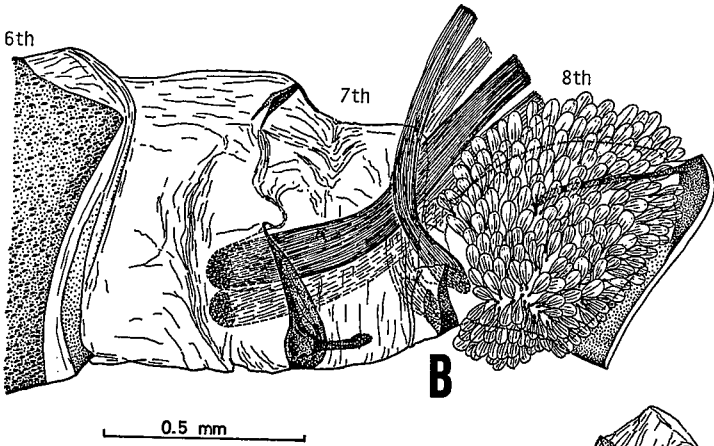
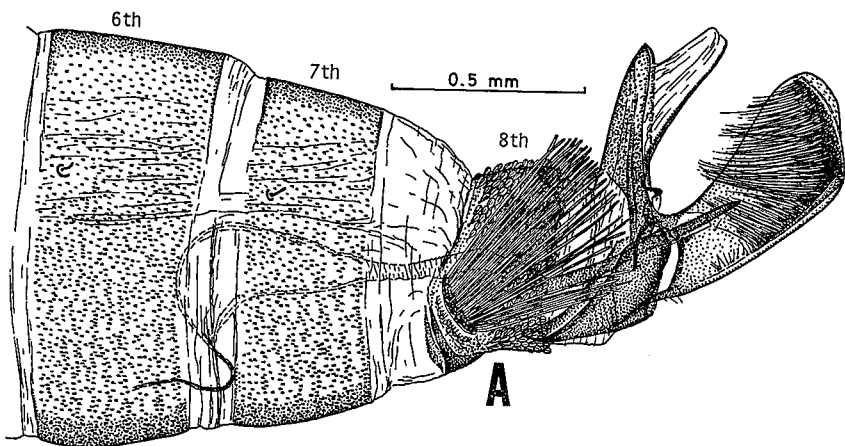
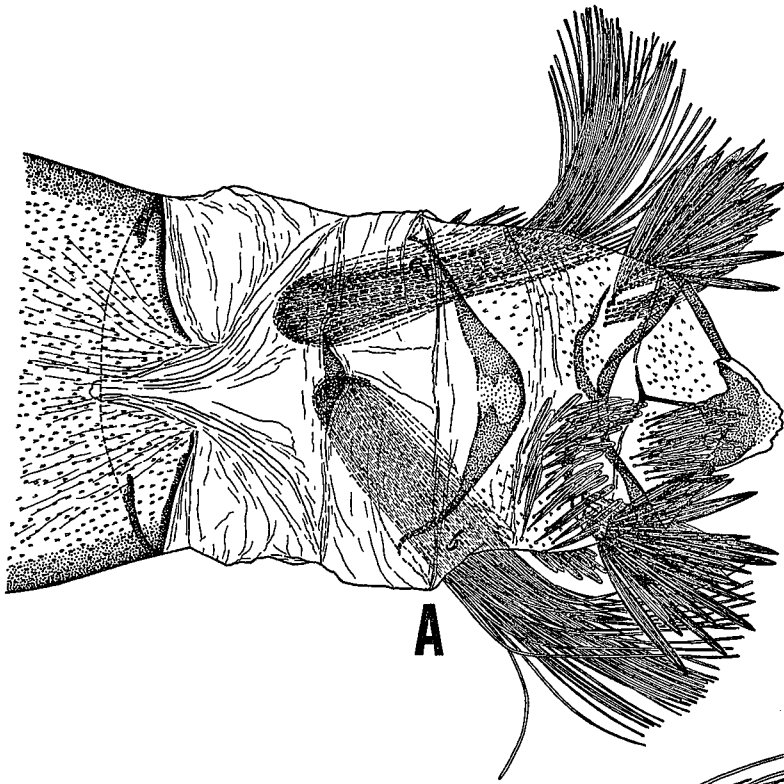
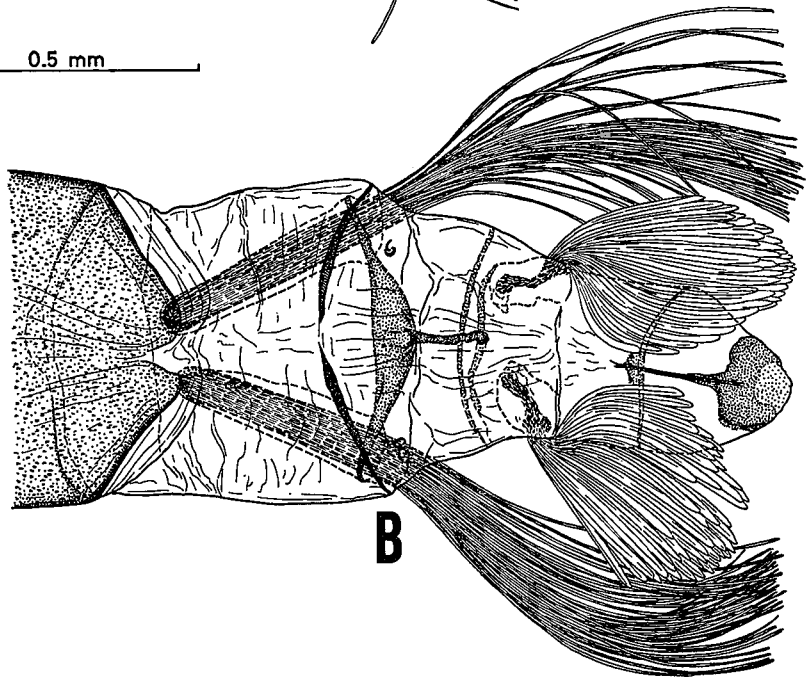


Plate XXI (Fig. 68)



A

0.5 mm



B

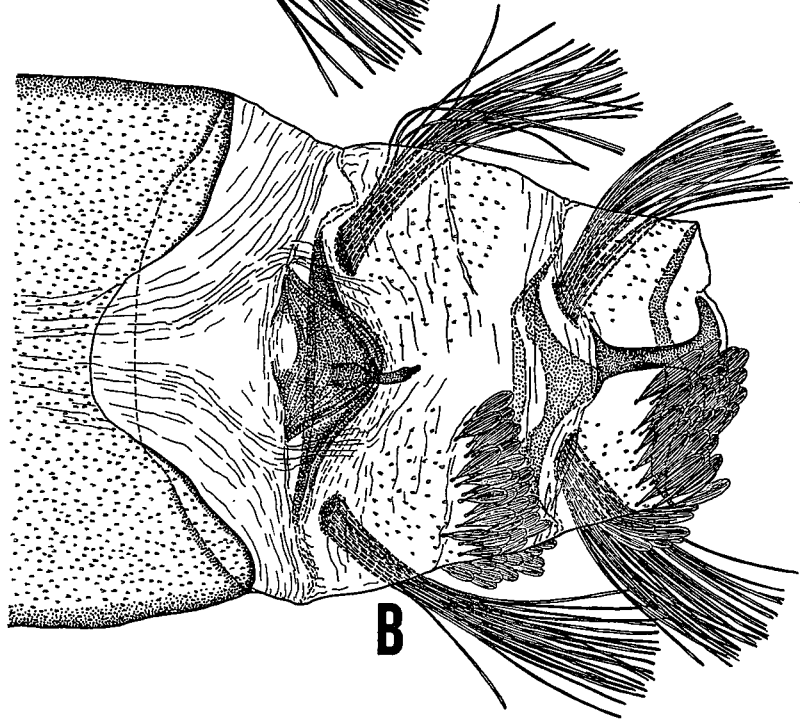
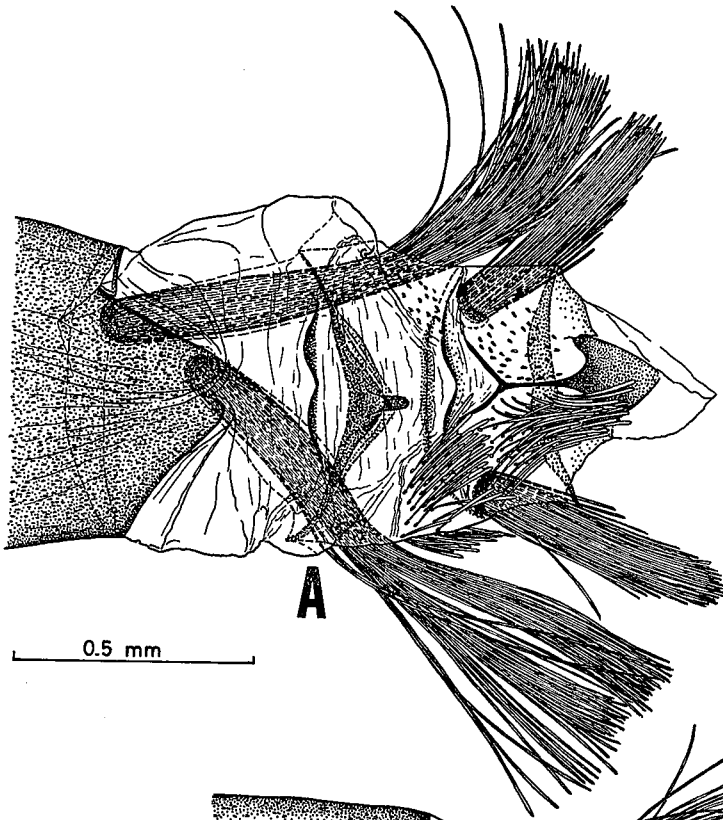
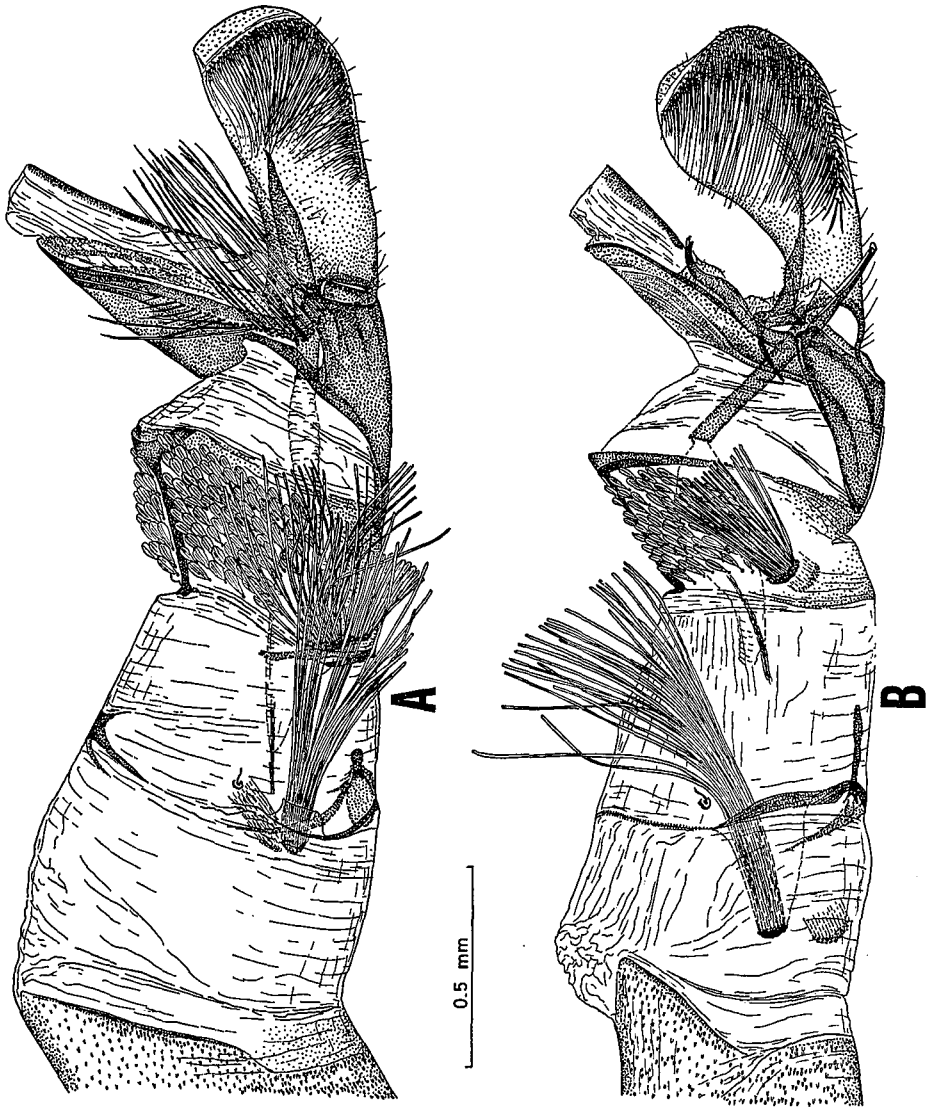


Plate XXIII (Fig. 70)



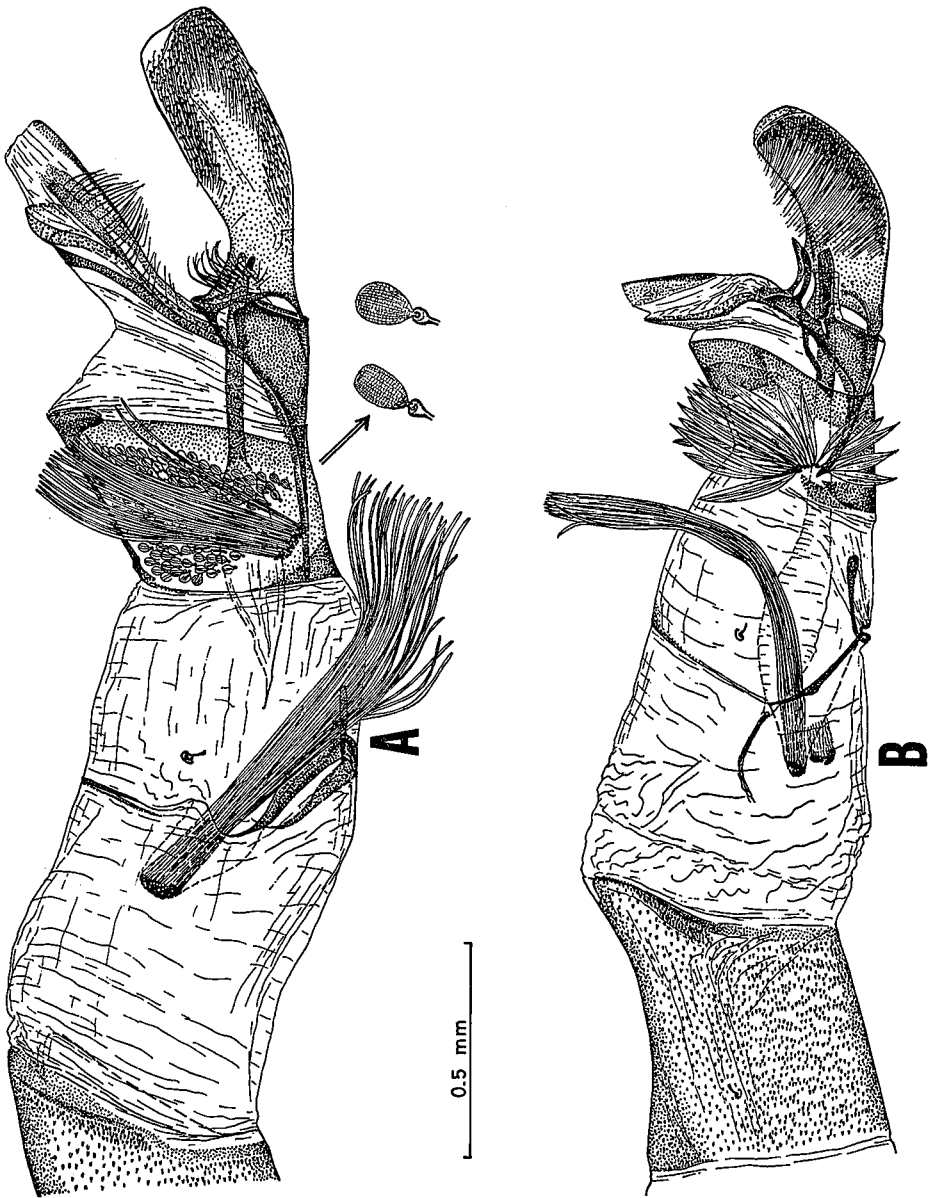
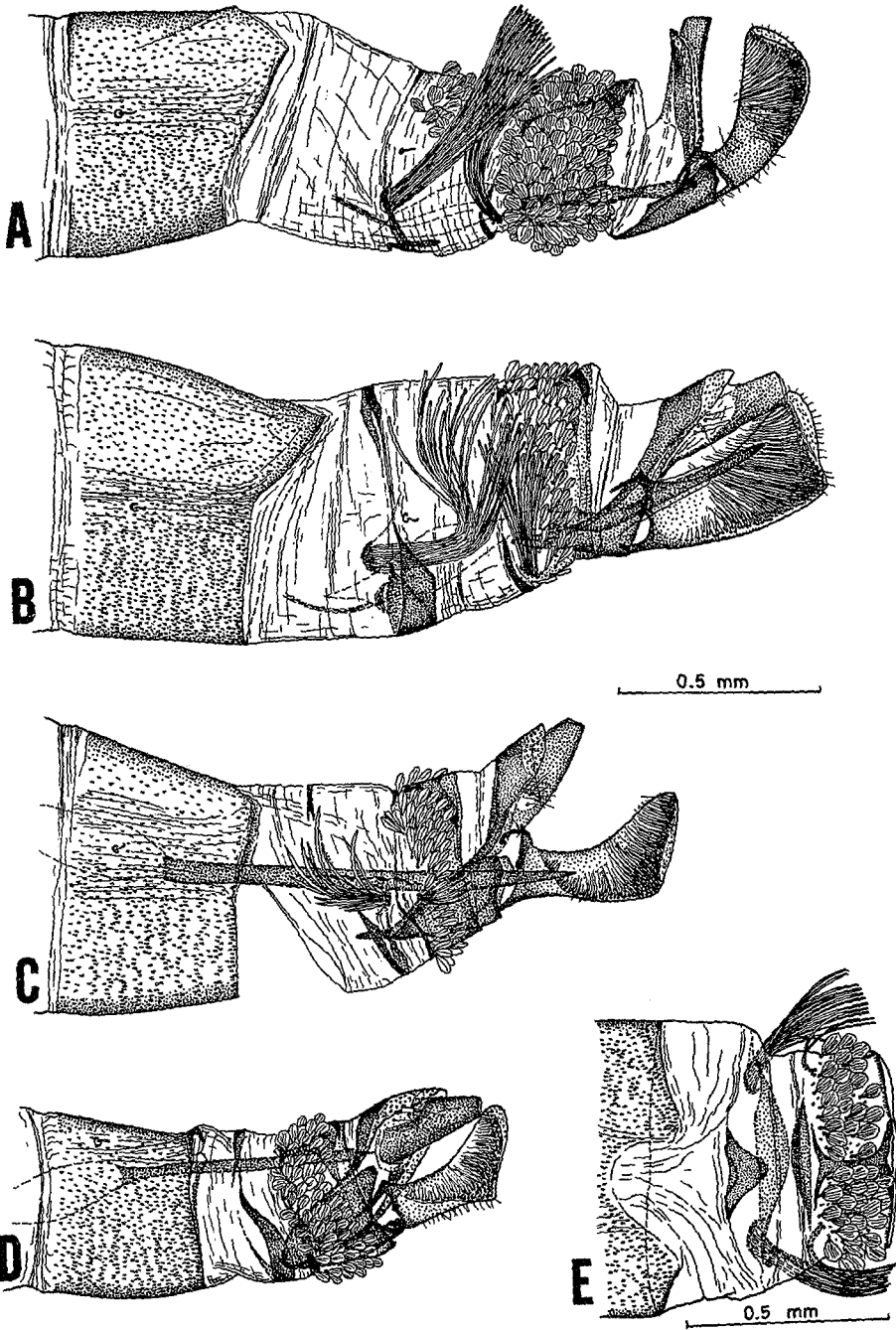


Plate XXV (Fig. 72)



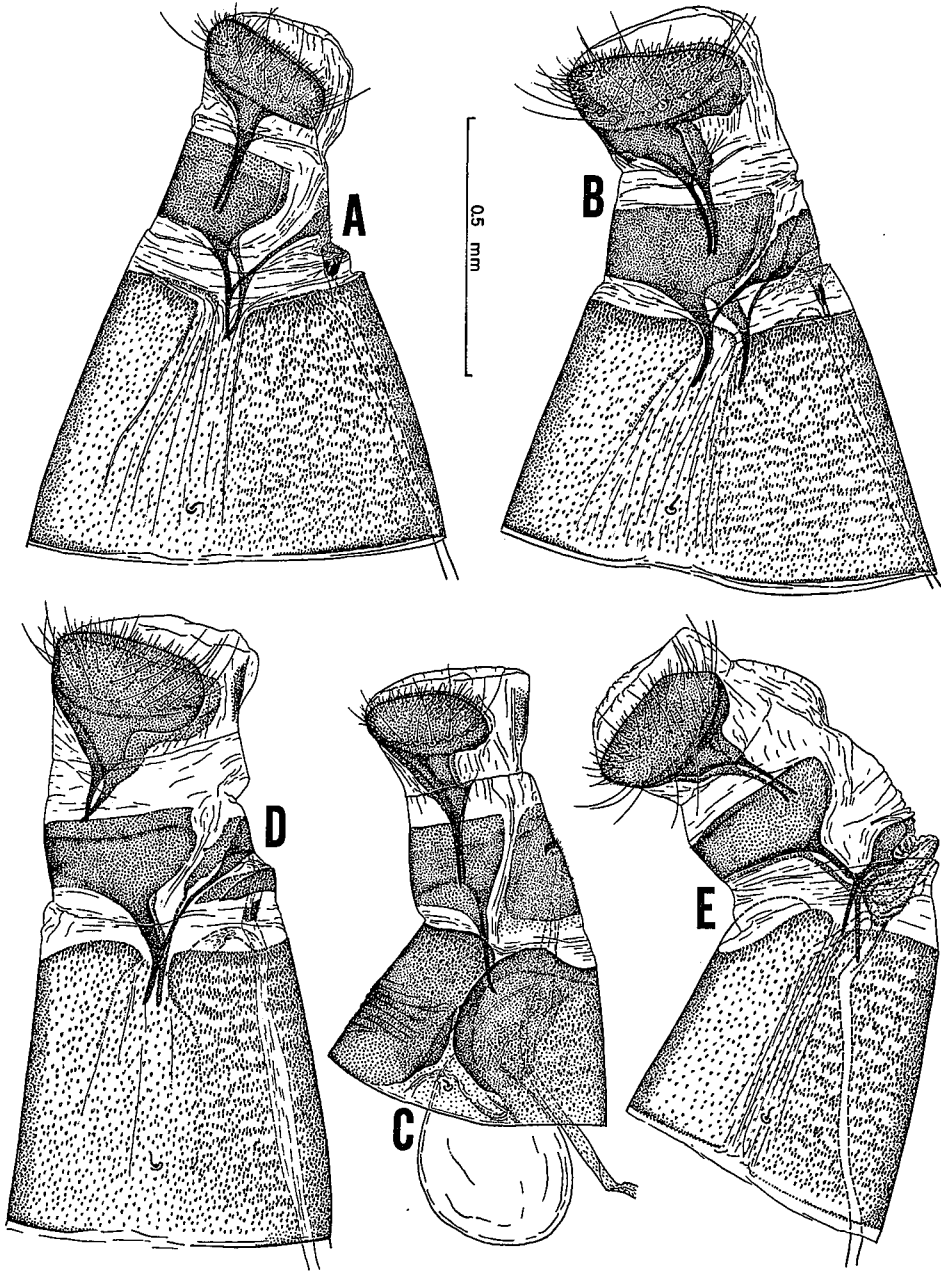
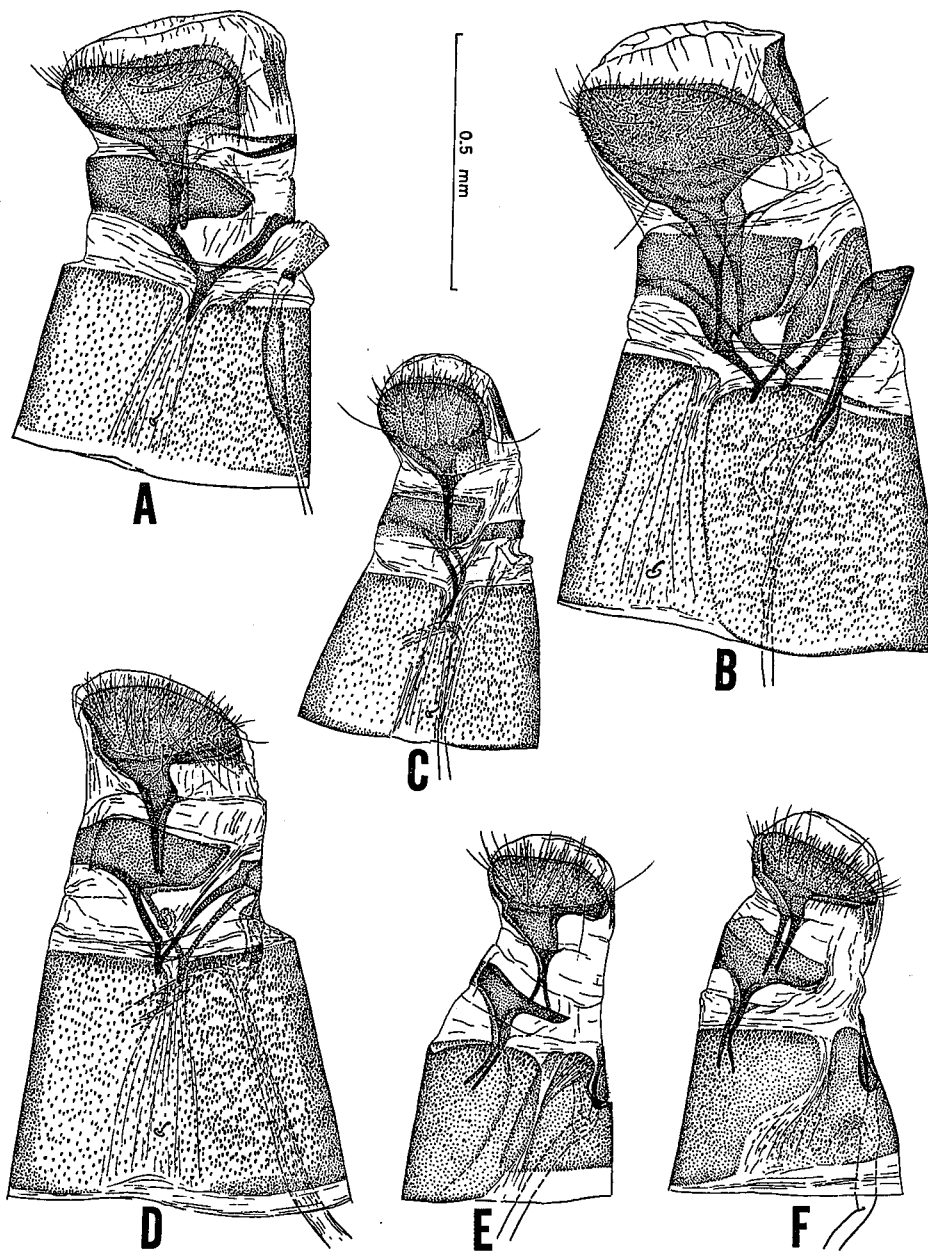


Plate XXVII (Fig. 74)



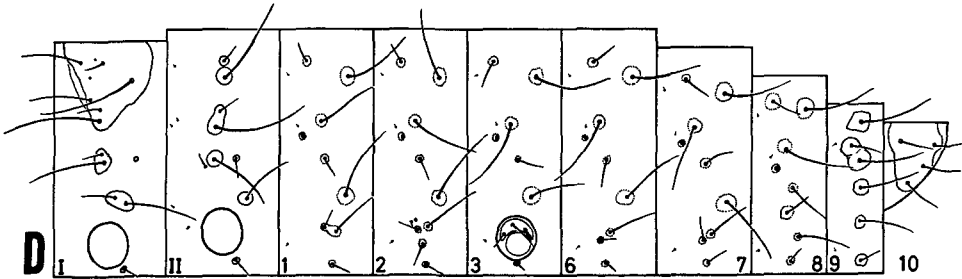
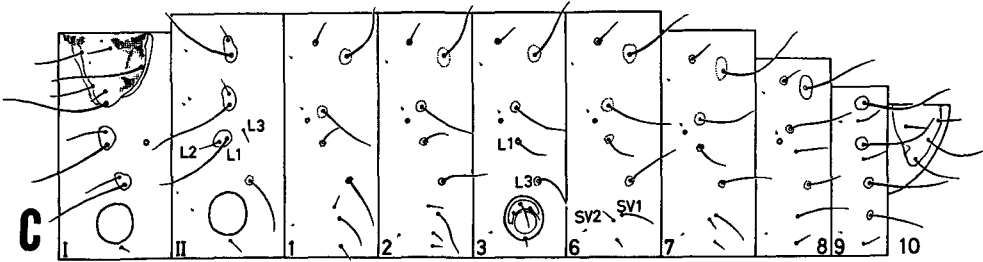
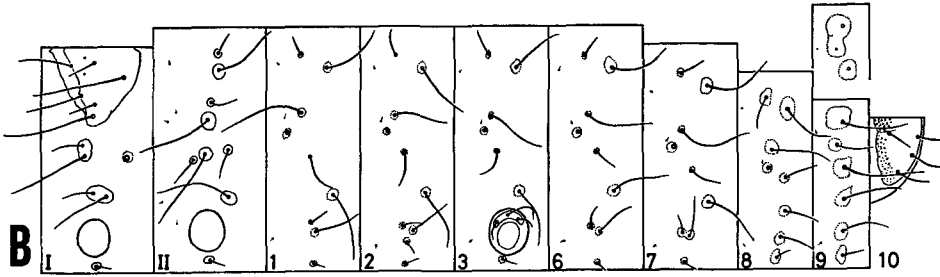
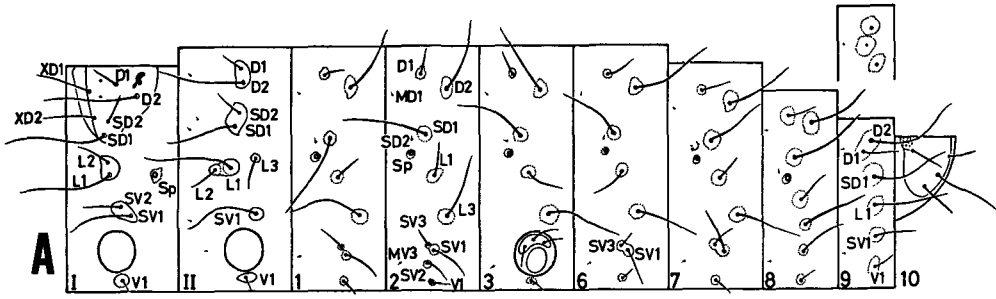
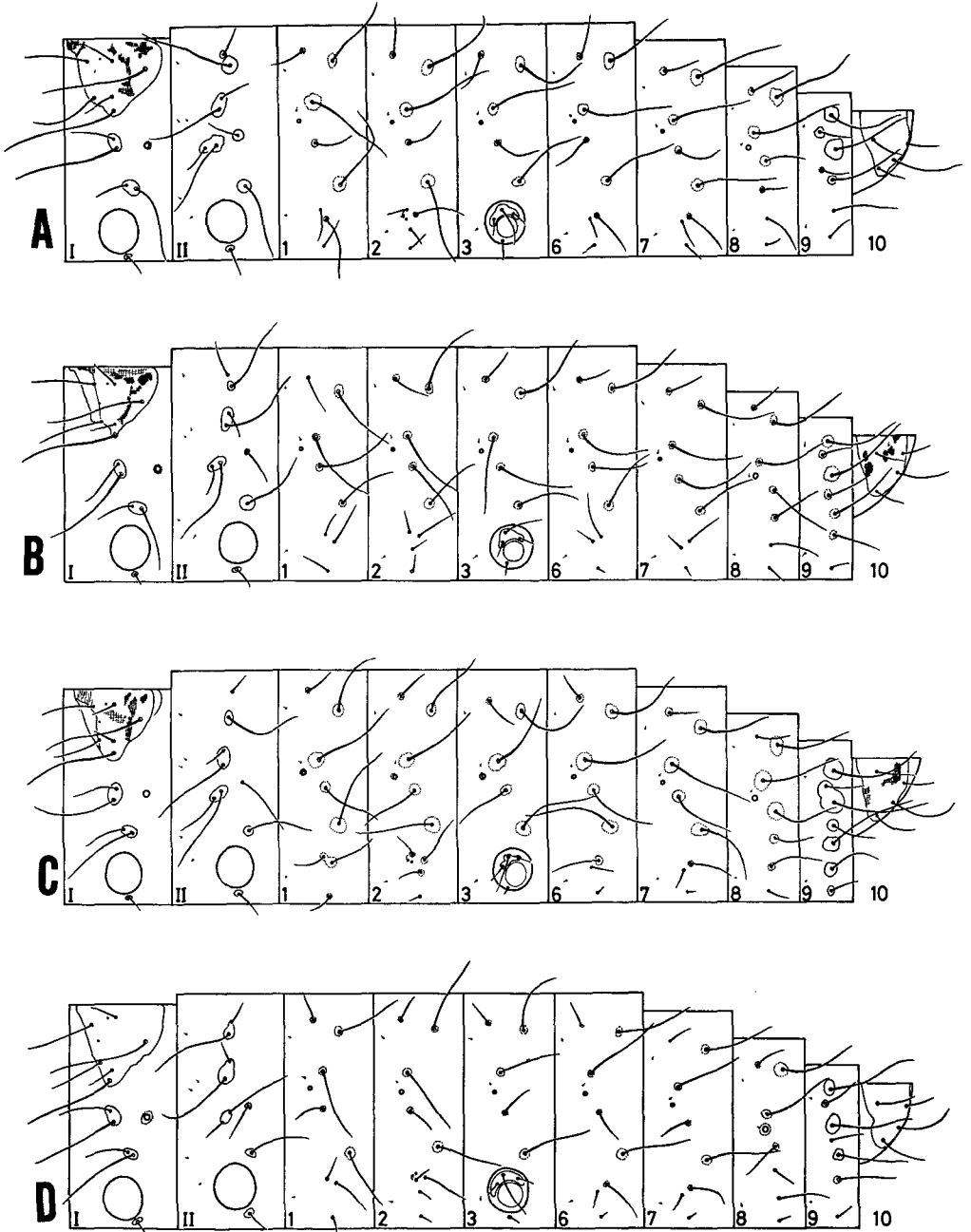


Plate XXIX (Fig. 76)



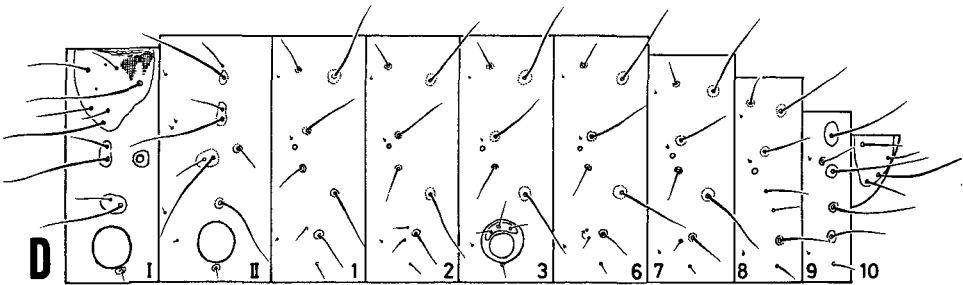
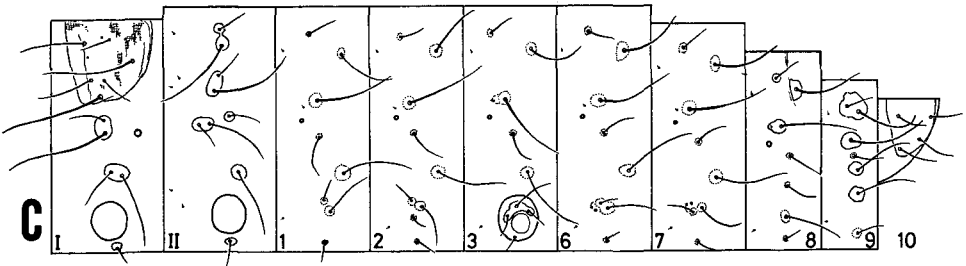
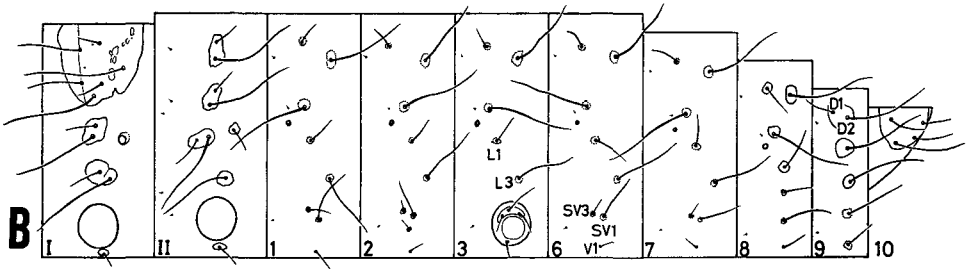
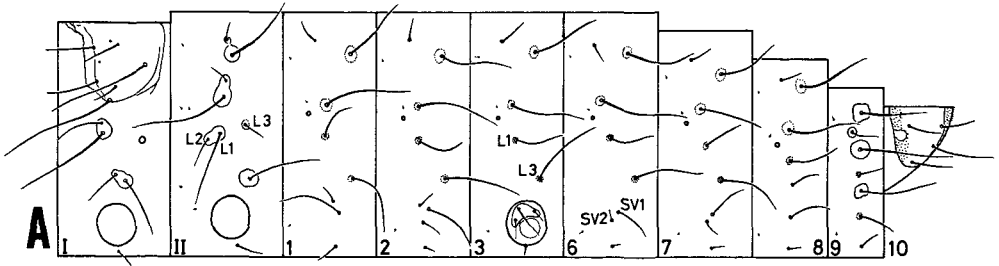
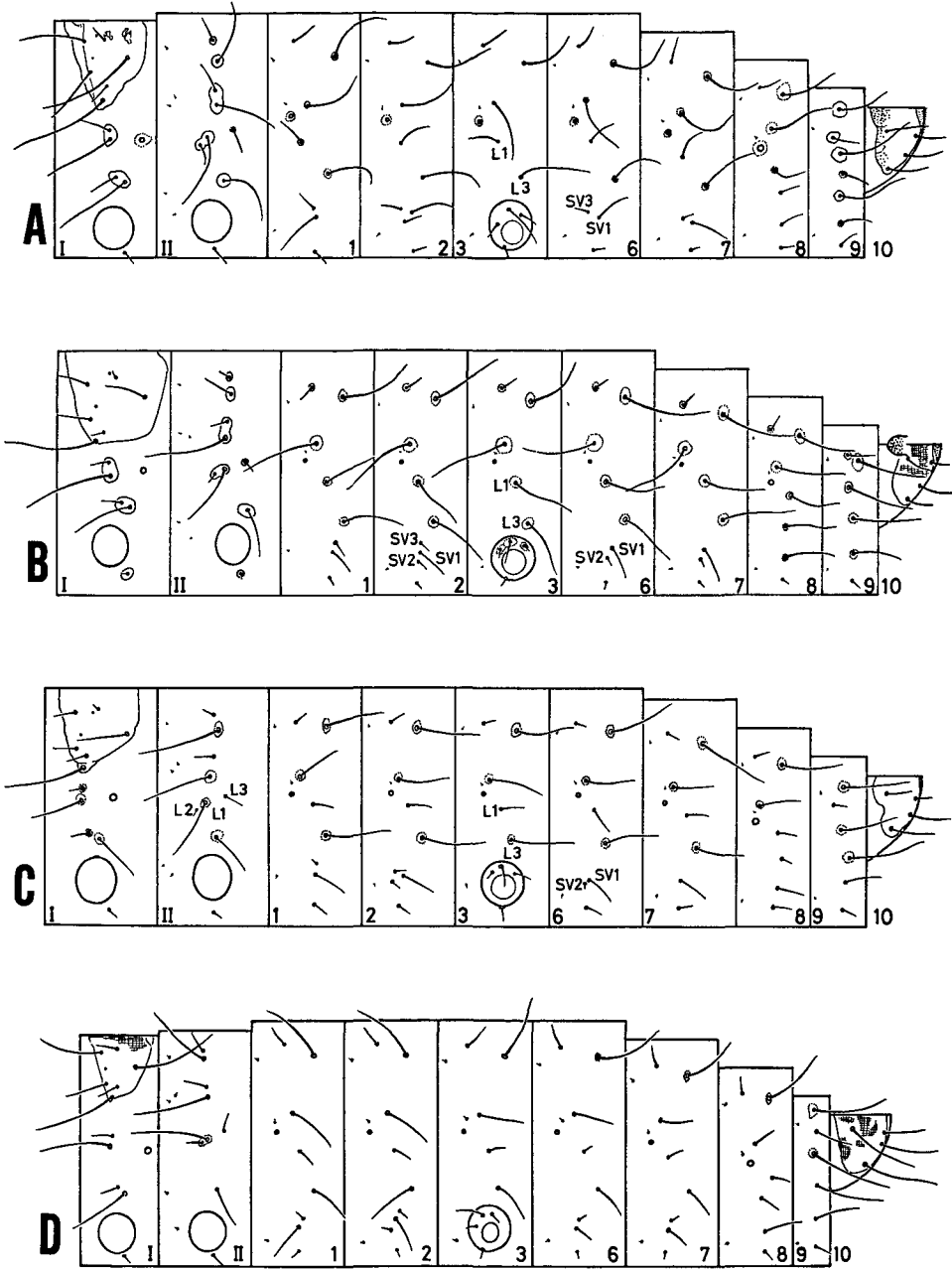


Plate XXXI (Fig. 78)



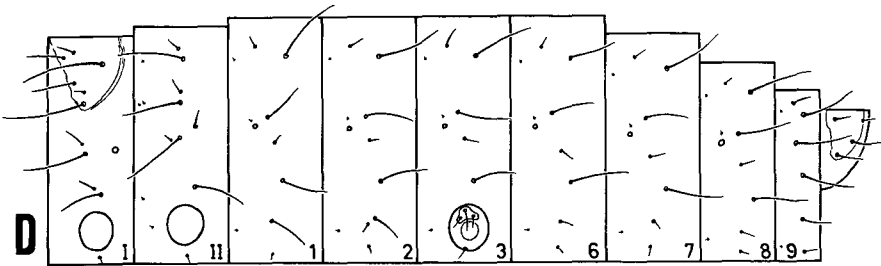
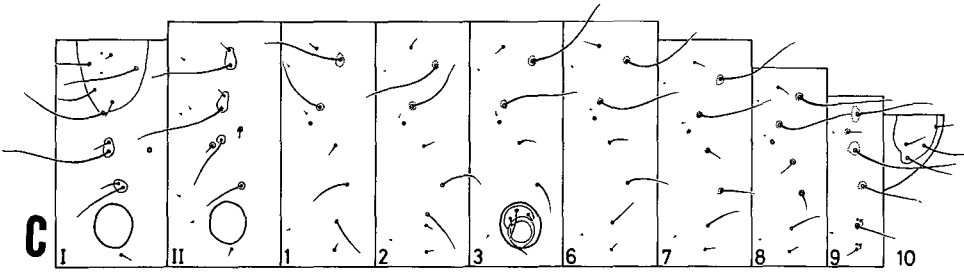
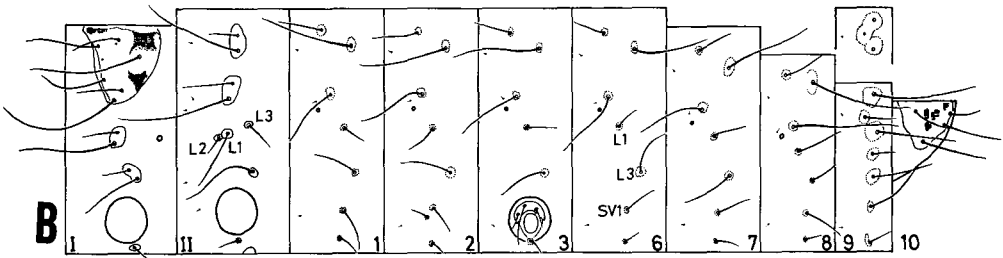
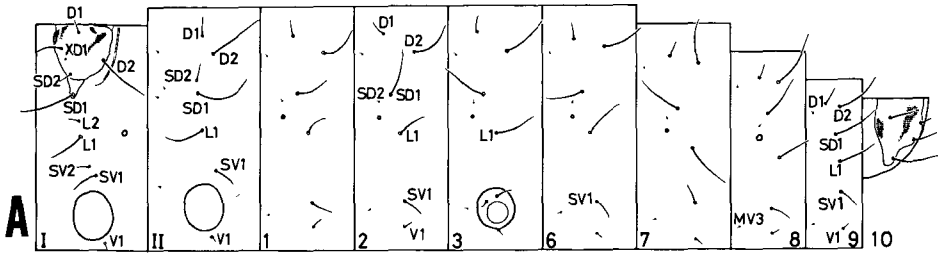


Plate XXXIII (Fig. 80)

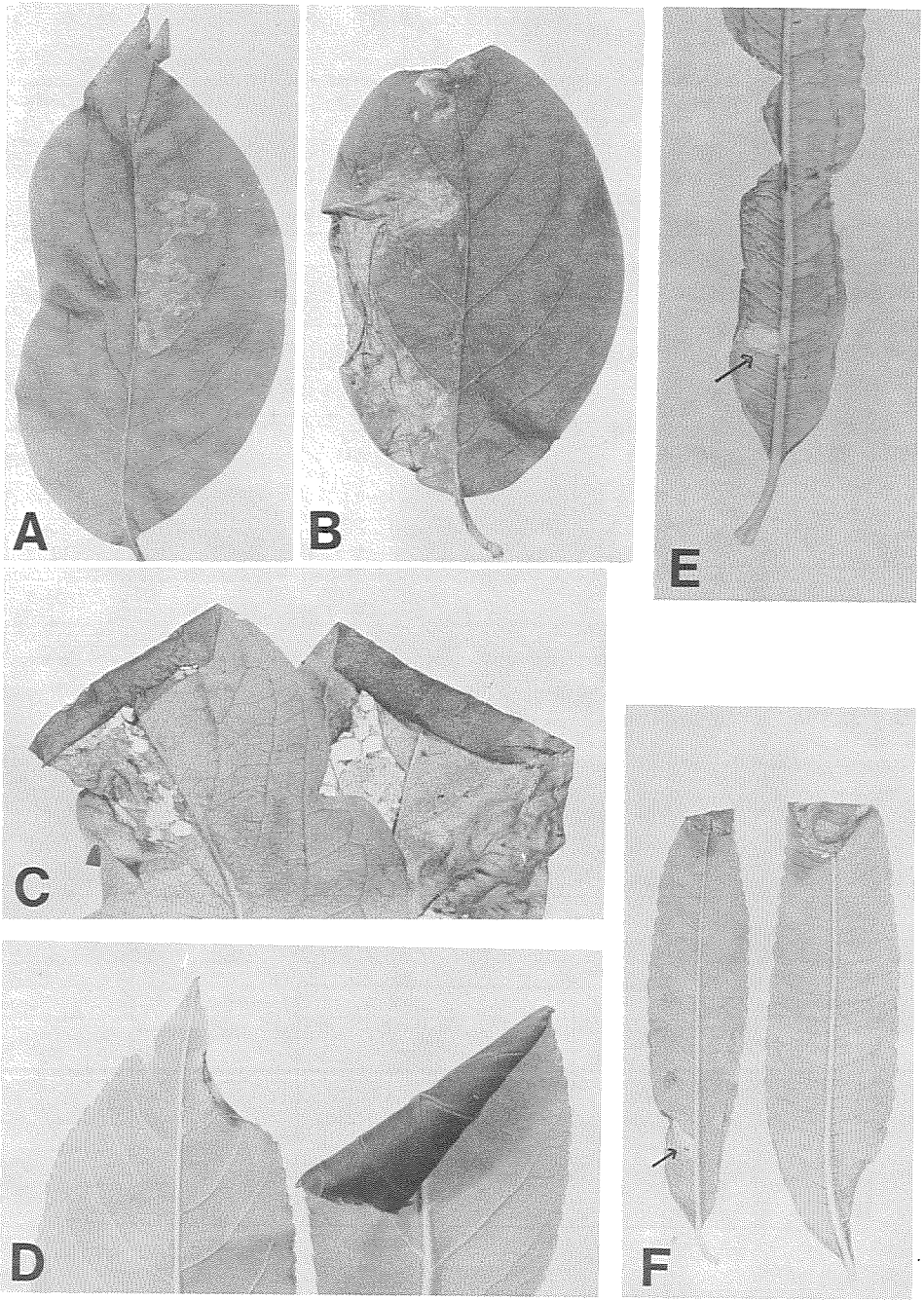


Plate XXXIV (Fig. 81)

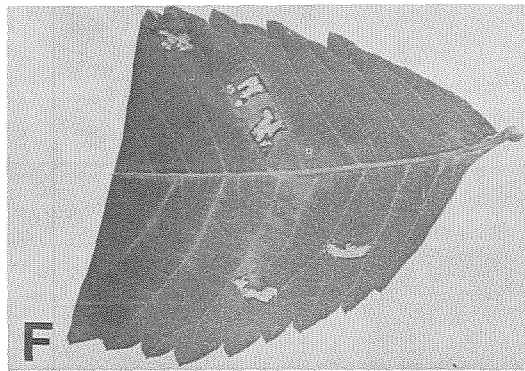
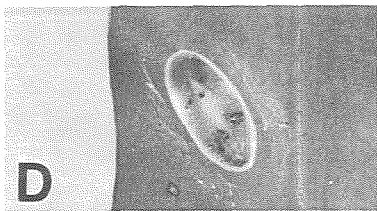
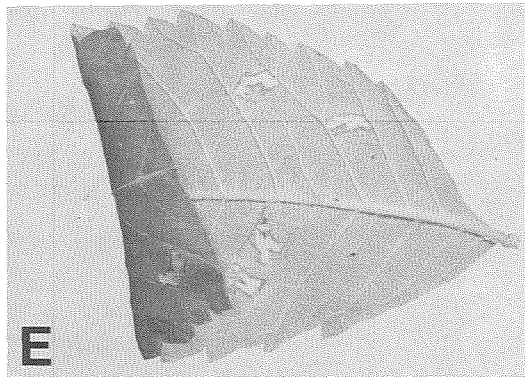
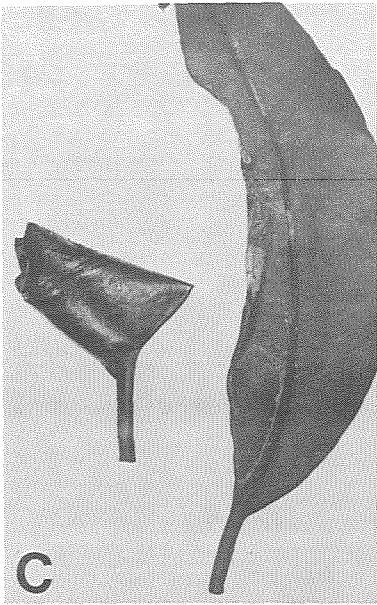
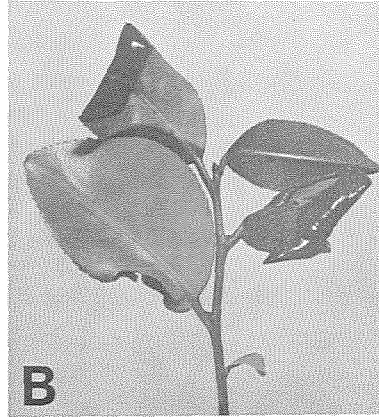
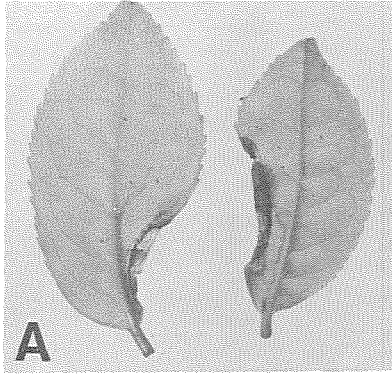
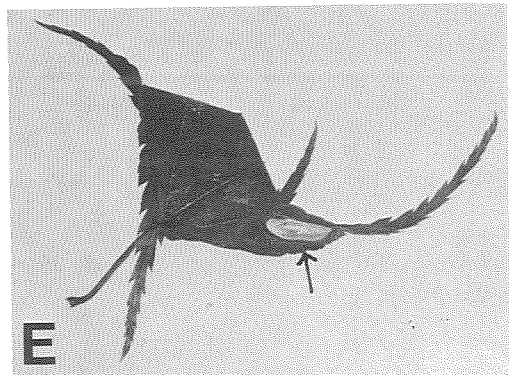
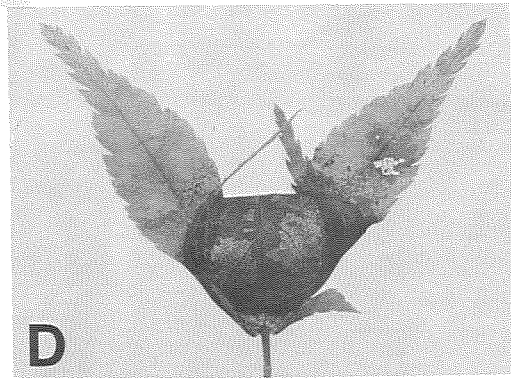
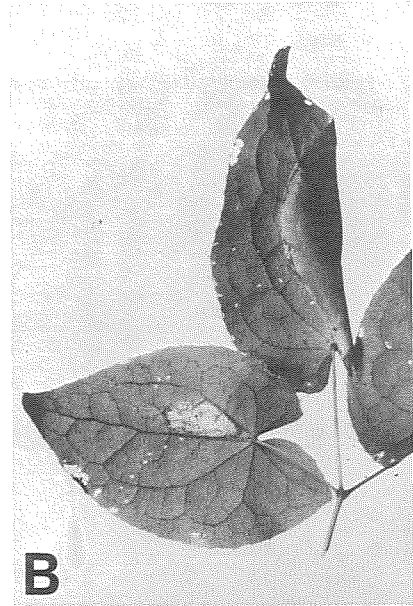
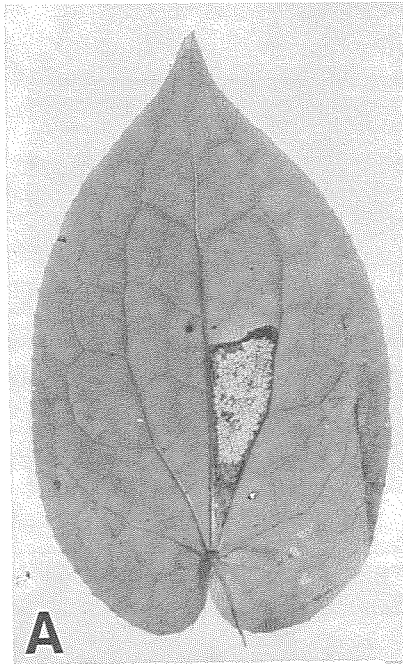


Plate XXXV (Fig. 82)



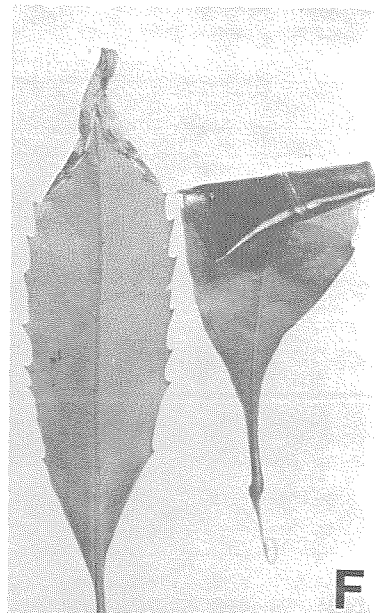
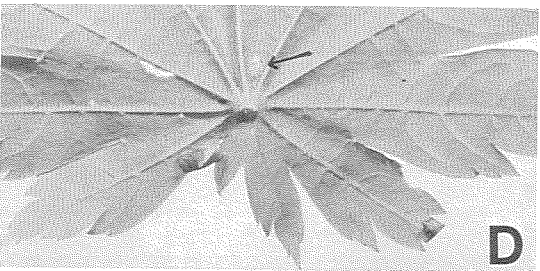
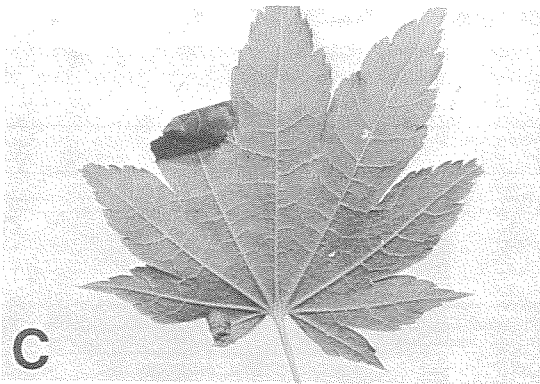
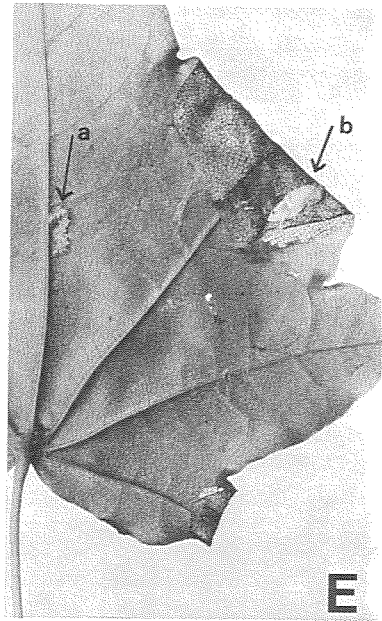
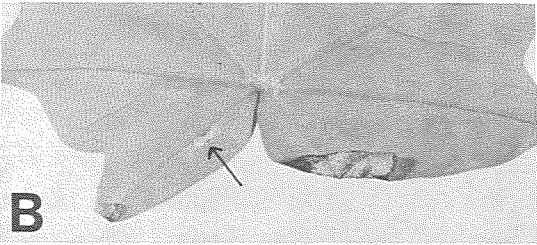
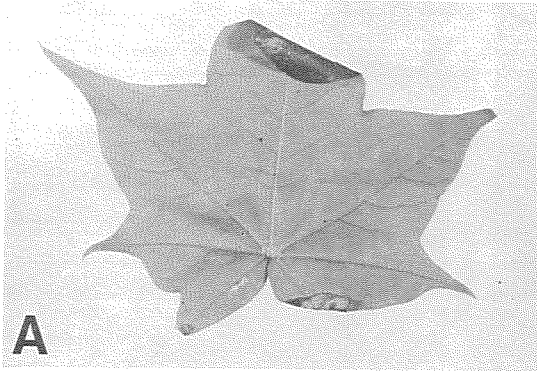
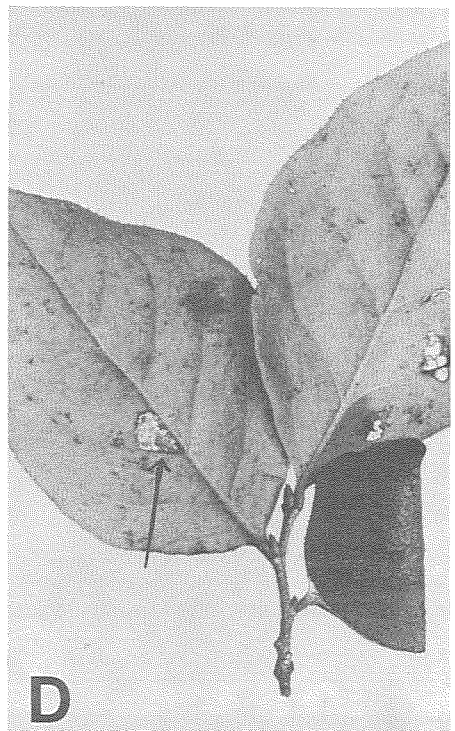
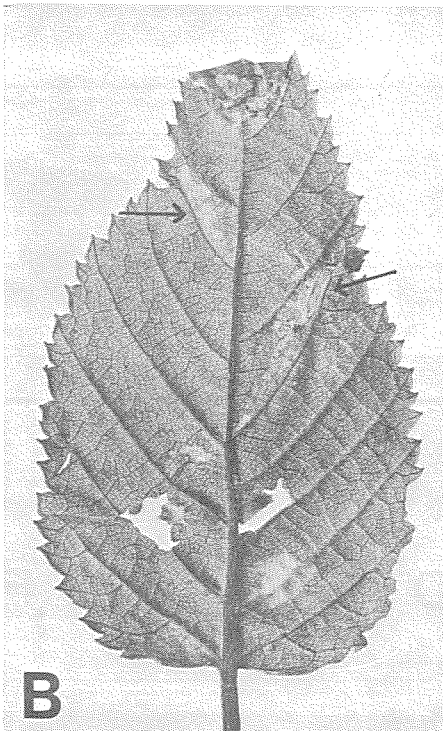
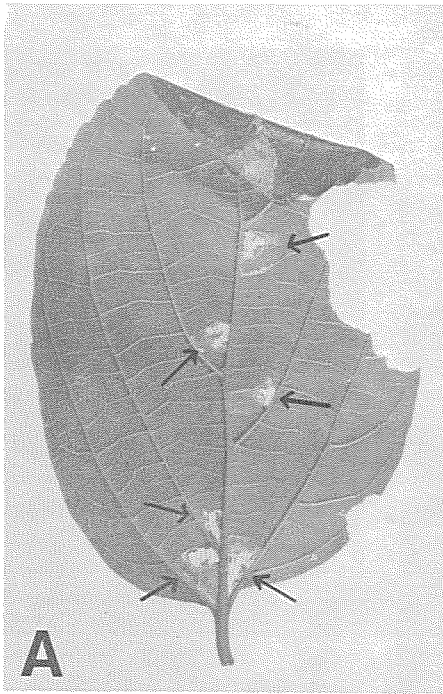


Plate XXXVII (Fig. 84)



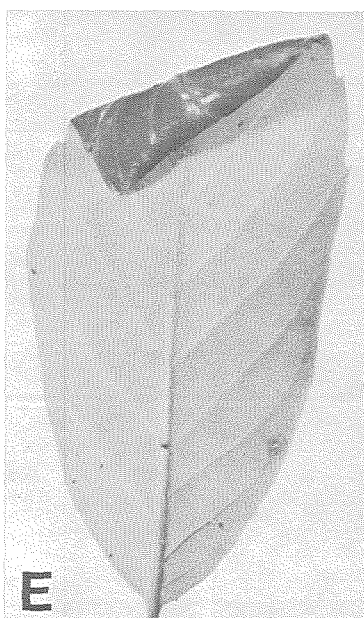
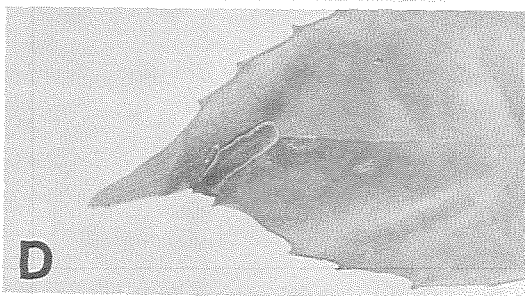
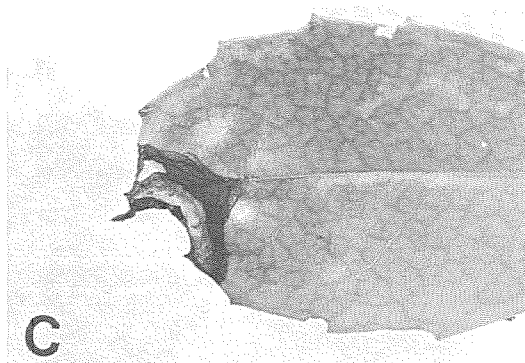
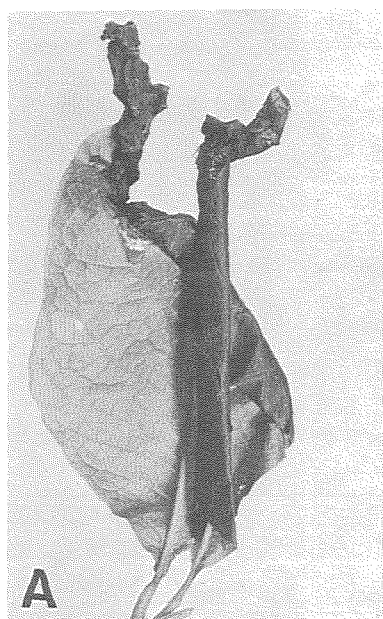
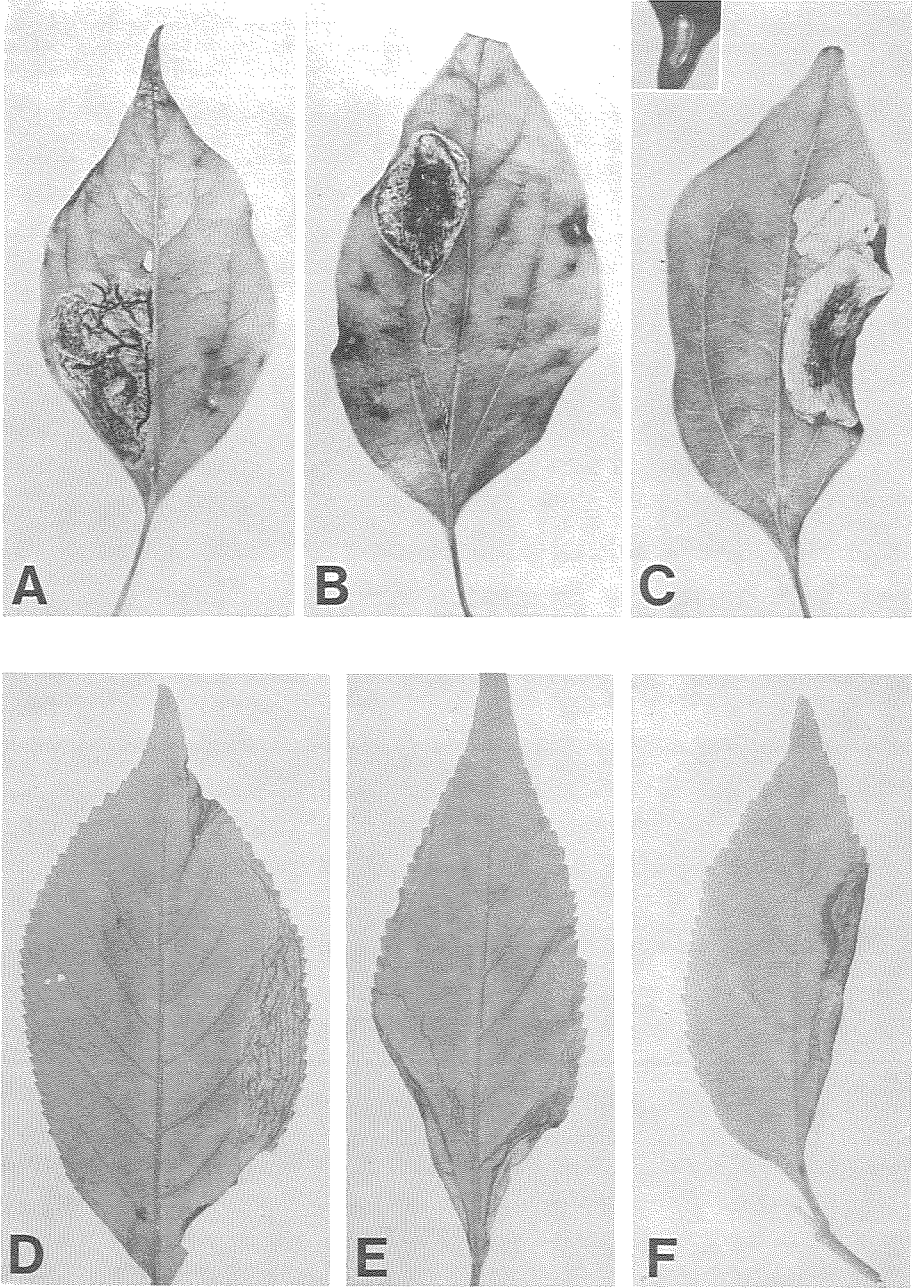


Plate XXXIX (Fig. 86)



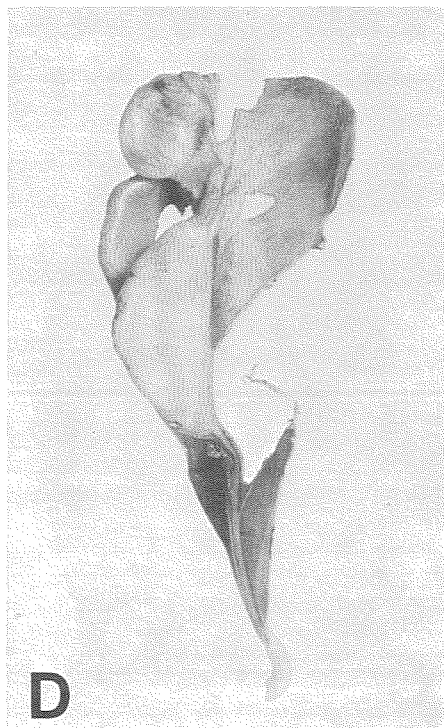
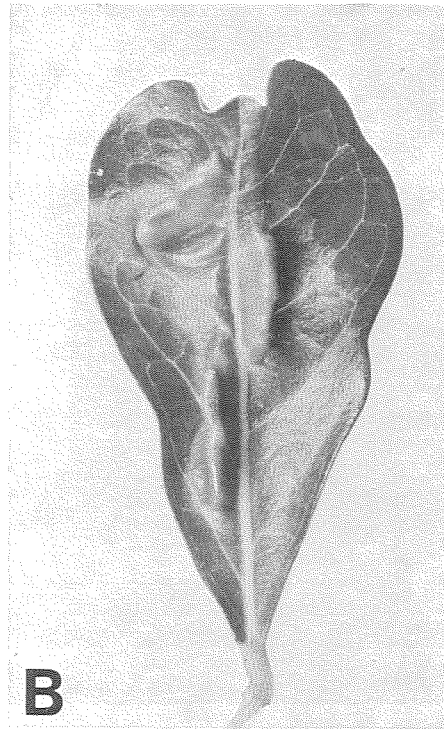
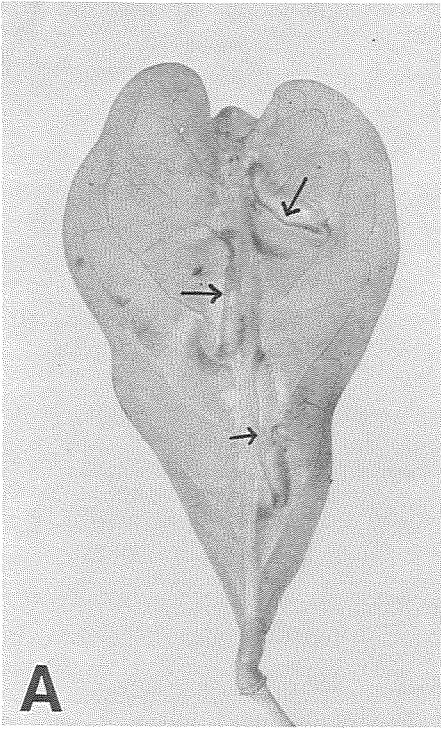


Plate XLI (Fig. 88)

