

Japanese Species of the *Elachista cingillella*-complex (Lepidoptera, Elachistidae s. str.)

Kazuhiro Sugisima

Systematic Entomology Laboratory, Faculty of Agriculture, Hokkaido University,
Sapporo, 060–8589 Japan
e-mail: ksugi@res.agr.hokudai.ac.jp

Abstract Japanese species of the *Elachista* micromoths belonging to the *E. cingillella*-complex are revised. Seven species are recognized: *E. nigriciliae* sp. nov.; *E. nozawana* sp. nov.; *E. paragangabella* sp. nov.; *E. adscitella* Stainton, 1851; *E. cingillella* (Herrich-Schäffer, 1855); *E. fasciola* Parenti, 1983; *E. subalbidella* Schläger, 1847. These species are rather uniform in coloration: the dark-colored forewing has a whitish transverse fascia around the middle, which may be strongly reduced or broadened. *Elachista adscitella*, *E. cingillella* and *E. subalbidella* are for the first time recorded from Japan. Specimens of *E. fasciola* from the easternmost part of Hokkaidô have a strikingly broad fascia of the forewing in comparison with conspecific specimens from other localities. Information of the immature biology is given for *E. nigriciliae*, *E. nozawana*, *E. adscitella* and *E. cingillella*. Keys to the species are given, using the genital characters. Because of a strong resemblance in appearance to the *E. cingillella*-complex, *Perittia unifasciella* Sinev, 1992 is illustrated and included in the key.

Key words: the subgenus *Apheloseitia*, manica, foodplant, Poaceae, *Carex*.

Introduction

The *Elachista cingillella*-complex was proposed by Kaila and Junnilainen (2002) as a probably monophyletic group within the subgenus *Apheloseitia* of the genus *Elachista*. The putative synapomorphy of the group is the presence of the manica in the male genitalia, i.e. thin sclerotized lobes arising from both sides of the base of the aedeagus (Kaila & Junnilainen, 2002). The group is predominantly Palaearctic in distribution, and currently composed of approximately 15 species (Kaila & Junnilainen, 2002). In general, moths have the dark greyish forewing with a transverse whitish or yellowish fascia around the middle, while some have the yellowish forewing, where the medial fascia is hardly recognized (Kaila & Junnilainen, 2002). The larvae are considered to be leaf-miners exclusively on grasses (Poaceae) (Kaila & Junnilainen, 2002), but there are some records from *Carex* (Cyperaceae) (Parenti & Varalda, 1994).

The European fauna of the *E. cingillella*-complex has been studied well (e.g. Traugott-Olsen & Nielsen, 1977; Parenti, 1992; Kaila & Junnilainen, 2002). In the Russian Far East, a total of four species, *E. adscitella* Stainton, 1851, *E. cingillella* (Herrich-Schäffer, 1855), *E. subalbidella* Schläger, 1847 and *E. tinctella* Sinev & Sruoga, 1995, are recognized (Kaila, 1997; Kaila *et al.*, 2003; Sinev & Sruoga, 1997; Sruoga, 1995, 2004). According to Sruoga (2004) and Kaila *et al.* (2003), earlier records of *E. fasciola* Parenti, 1983 and *E. revinctella* Zeller, 1850 in the Russian Far East were actually attributed to *E. cingillella* and *E. adscitella* respectively, and the former two species have not been recorded in the region. In Japan, *E. fasciola* alone has hitherto been recorded; this species was originally described on the basis of Japanese specimens.

These years, I revised the Japanese fauna of the *E. cingillella*-complex, and recognized a total of seven species. They are rather uniform in coloration: the forewing is dark-colored and has a

whitish transverse fascia around the middle, which may be vestigial or expanded. Three species proved to be unnamed. Many moths of *E. adscitella* were reared from leaf-mines on several grasses (Poaceae) in Hokkaidô. Specimens of *E. cingillella* were found in Hokkaidô, Honshû and Kyûshû, including a female with foodplant data, while the foodplant data is somewhat doubtful. A male of *E. subalbidella* was found from the mountainous area of Daisetsu-zan, Hokkaidô. Specimens of *E. fasciola* from the easternmost part of Hokkaidô have a peculiar coloration of the forewing: the whitish transverse fascia is strikingly broadened outwards in comparison with conspecific specimens from other localities.

In this paper, the seven Japanese species belonging to the *E. cingillella*-complex are described or provided with diagnoses. Notes on the immature biology are given for four species. Keys to the species are given for safe identification, using genital characters. Among Japanese elachistids, *Perittia unifasciella* Sinev, 1992 bears a resemblance in appearance to the species of the *E. cingillella*-complex and may be confused with them. Consequently, this species is included in the key, with brief diagnoses and illustrations of the moth and genitalia of both sexes.

Material and Methods

In the taxonomy section, new species precede named ones, and in each category, species are arranged in the alphabetical order. In the list of specimens, names of collectors are omitted except for those of the holotypes. The terminology follows Traugott-Olsen and Nielsen (1977) and Kaila (1999). Dissection techniques generally follow Robinson (1976), and sometimes follow Traugott-Olsen and Nielsen (1977), who recommended the aedeagus not to be removed from the genitalia.

The holotypes are deposited at National Science Museum, Tokyo, Japan (NSMT). Paratypes and other specimens are deposited at NSMT, OPU (Entomological Laboratory, School of Agriculture, Osaka Prefecture University, Sakai,

Osaka, Japan), SEHU (Systematic Entomology Laboratory, Hokkaido University, Sapporo, Japan), and FMNH (Finnish Museum of Natural History, Helsinki, Finland). Specimens used for illustrations of this paper are generally deposited at NSMT.

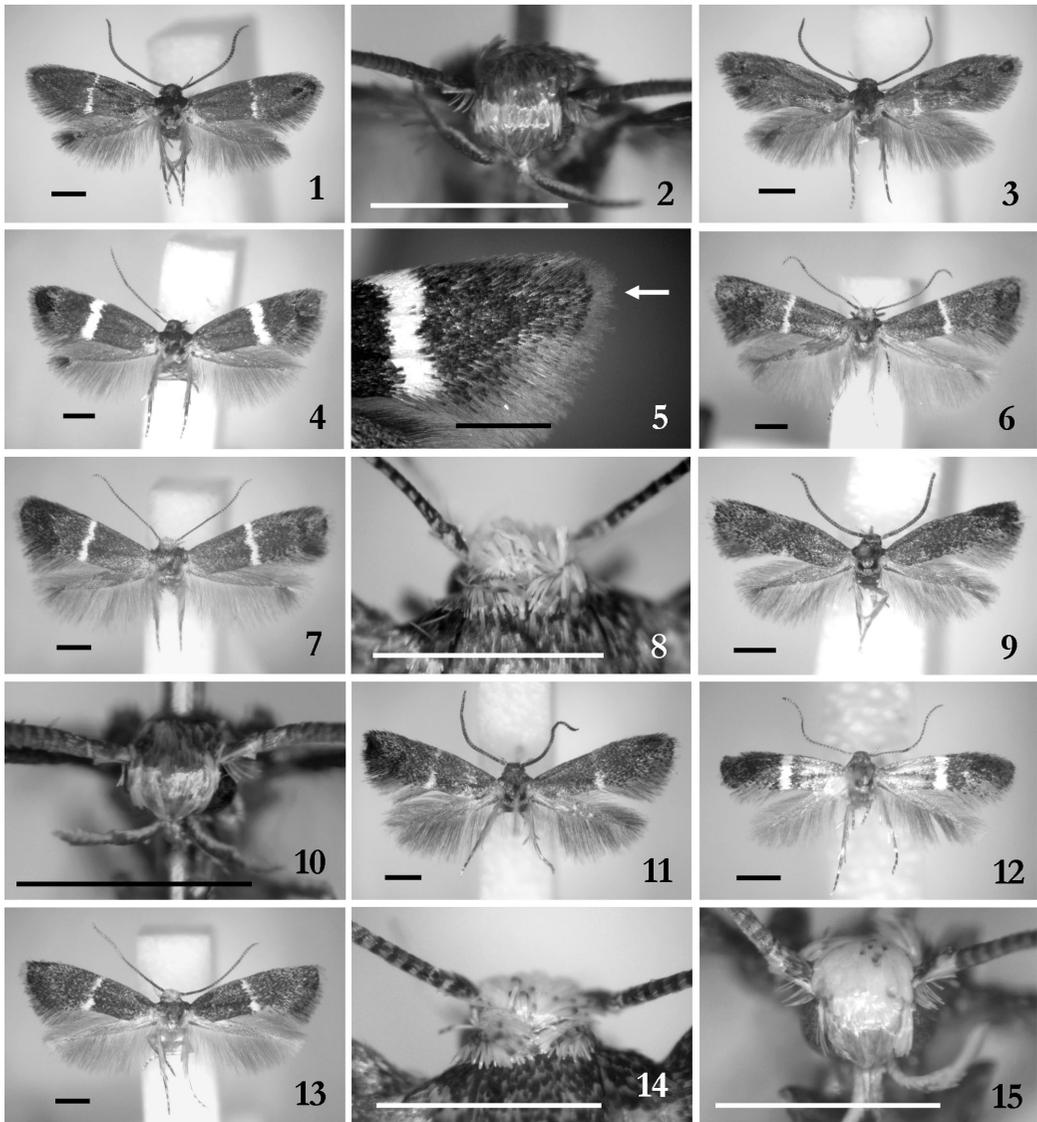
Taxonomy

Elachista nigriciliae sp. nov.

(Figs. 1–5, 37–41)

Type series. Holotype: ♂, Horoman [misspelled as “Horomitu”], Samani-chô, Hokkaidô, Japan, ex *Calamagrostis hakonensis* (rearing no. 00202), col. 25 V 1996, em. 26 VII 1996, K. Sugisima leg., ♂ genitalia slide no. 0966 (K. Sugisima, 2002) (NSMT). Paratypes: [Hokkaidô]: 1 ♂ 4 ♀, Ashoro-chô (Biribetsu), ex *Glyceria alnasteretum*, col. 28 VIII 1995, em. 17–25 II 1996 (NSMT, OPU, SEHU); 11 ♂ 14 ♀, same data as holotype, except for emergence date (2 VII–16 VIII 1996) and the foodplant (*Festuca parvigluma* in addition to *Calamagrostis hakonensis*) (FMNH, NSMT, OPU, SEHU); 1 ♂ 2 ♀, Sapporo-shi (Kan’non-zawa) (1 ♂ 1 ♀, ex *Melica nutans*, em. 18–28 VI 2002; 1 ♀, 23 VII 2002) (OPU).

Diagnosis. Face lead-greyish, with at most a few light-colored scales. Neck tufts purely blackish. Forewing blackish, with no mottled impression; medial whitish transverse fascia faint or sometimes absent in male, constantly distinct in female; cilia blackish, without light-colored area beyond cilia line. Male genitalia: digitate process distinctly club-shaped, with distal half swollen dorsally; juxta lobe bluntly Y-shaped, with inner branch round tongue-shaped; aedeagus thick and moderately down-curved as a whole, gradually narrowing towards both ends, with blunt apex. Female genitalia: eighth sternite convex cephalically, broadly reinforced along cephalic and lateral margins as if there were a U-shaped antrum; corpus bursae lined with minute spines except near cephalic and caudal ends; signa paired, each composed of 10–30 coarse conical teeth arising from membrane.



Figs. 1–15. Moths of *Elachista cingillella*-complex; scale lines 1 mm — 1–5, *E. nigriciliae* sp. nov., Samanichô, Hokkaidô (1, holotype, face in Fig. 2; 3, ♂ paratype with fascia of forewing extremely reduced; 4, ♀ paratype, apical half of forewing in Fig. 5 where the arrow indicates the cilia on the wing-apex); 6–8, *E. nozawana* sp. nov., Nagano-ken, Honshû (6, ♂ paratype from Matsumoto-shi; 7, holotype, vertex and neck tufts in Fig. 8); 9–12, *E. parangabella* sp. nov., Honshû (9, holotype, face in Fig. 10; 11, ♂ paratype from Matsumoto-shi, Nagano-ken, with vestigial fascia present on forewing; 12, ♀ paratype from Hata-machi, Nagano-ken); 13, *E. adscitella* Stainton, ♂ from Mukawa-chô, Hokkaidô, with typical weakly mottled head, vertex and neck tufts in Fig. 14, face in Fig. 15.

Description. ♂ (Figs. 1–3) & ♀ (Figs. 4, 5): Forewing length: ♂ 3.1–3.8 mm (holotype 3.7 mm); ♀ 3.1–4.2 mm. Face (Fig. 2) lead-greyish, with at most few light-colored scales on face; labial palpi blackish, except for upper surface light-colored from base to near apex. Neck tufts and thorax blackish, slightly tinged with brown, without no mottled impression. Forewing blackish, with no mottled impression; medial whitish transverse fascia in male faint, interrupted (Fig. 1) or sometimes absent (Fig. 3); fascia in female constantly distinct while somewhat varying in width (Fig. 4); cilia (Fig. 5) blackish, without light-colored area beyond cilia line.

Male genitalia (Figs. 37, 38). Uncus lobe very bluntly triangular, 1.2 times as long as wide, equally round in inner and outer margins. Tegumen not reinforced along cephalic margin. Spinose knob of gnathos bluntly triangular, nearly twice as long as wide. Valva widest around 3/5, constricted around 4/5; dorsal margin convex around 3/5, concave around 4/5. Juxta lobe (Fig. 38) bluntly Y-shaped, stem of “Y” broad, inner branch of “Y” tongue-shaped and setose. Digitate process (Fig. 38) distinctly club-shaped, 1/3 as long as valva; distal half swollen particularly in dorsal margin. Aedeagus approximately 3/4 as long as valva, thick and moderately down-curved as a whole, narrowing towards both ends, with blunt apex.

Female genitalia (Figs. 39–41). Papilla analis bluntly triangular; a Y-shaped sclerotized plate present on ventral membrane between papillae anales. Apophysis anterioris 3/5–3/4 as long as apophysis posterioris. Ostium near cephalic margin of eighth sternite, which protrudes cephalically; eighth sternite ornamented with a group of small spines caudally of ostium, broadly reinforced along cephalic and lateral margins (Fig. 40); reinforced area looking as if there were a U-shaped antrum. Ductus bursae forming a colliculum of almost half length of apophysis anterioris just cephalically of ostium, lined with minute spines around cephalic end, and inserted into caudal 1/5 of corpus bursae. Corpus bursae oval; medial part (Fig. 41) lined with minute spines;

signa present on caudal 1/3 of corpus bursae, composed of paired patches of 10–30 coarse conical teeth arising from membrane.

Biology. Foodplants: Poaceae: *Calamagrostis hakonensis* Franch. & Sav., *Festuca parvigluma* Steud., *Glyceria alnasteretum* Komarov, *Melica nutans* L. The larva is a leaf-miner, looks greyish through the mine. The mine is full-depth and sub-linear, and extends almost constantly towards the leaf-base. Excrements are pushed into older part of the mine behind the larva. The mature larva leaves the mine and pupates in a cocoon constructed in such a space as that between leaves. The cocoon depends mainly on walls like leaves around the larva, and silk-filaments are used only for tying the walls roughly, while a sub-ellipsoidal ‘core’ cocoon of coarse silk-filaments is sometimes recognizable. The pupa is fixed in the cocoon by a silk-girdle surrounding its abdomen and the cremaster. At Horoman, Samani-chô, many larvae were collected in late May. Moths emerged mainly in late July, some in early July, and one in mid August. At Kan’nonzawa, Sapporo-shi, larvae collected in mid May produced moths in late June, and a female moth was collected in late July of the same year. At Biribetsu, Ashoro-chô, some larvae collected in late August pupated in early and mid September, and moths emerged after vernalization. These rearing data suggest that *E. nigriciliae* has more than one generation a year, and that it hibernates as the pupa, not as the larva.

Distribution. Japan: Hokkaidô.

Remarks. Similar species and discrimination from them are explained in the “Remarks” of *Elachista paragangabella* described below.

Etymology. The species name, *nigriciliae*, indicates that the cilia of this species has no light-colored area beyond the cilia line.

***Elachista nozawana* sp. nov.**

(Figs. 6–8, 42–46)

Type series. Holotype: ♀, Yatsugatake-minodoguchi, Chino-shi, Nagano-ken, Honshû, Japan, ex *Calamagrostis arundinacea* (rearing

no. 00169), col. 4 X 1995, larva at 4°C 25 XI 1995–24 I 1996, pu. 7 II 1996, em. 4 III 1996, K. Sugisima leg., ♂ genitalia slide no. 0745 (K. Sugisima, 2000) (NSMT). Paratypes: [Honshū: Nagano-ken]: 2♂ 1♀, Matsumoto-shi (Tobirātōge), em. 9 II–10 III 1996 (NSMT).

Diagnosis. Head pale ochreous; neck tufts at most very weakly mottled with brownish tips of scales. Forewing dark brownish; scales paler-based, giving impression that the wing is mottled brownish rather than blackish; medial fascia distinct. Male genitalia: juxta lobe gradually widening towards apex, with apical margin shallowly concave; digitate process almost parallel-sided except for apical part, which is obliquely truncate and has the ventro-apical corner extending as a straight projection; aedeagus strongly down-curved beyond 3/4. Female genitalia: caudal end of ductus bursae forming a funnel-shaped antrum as if there were a sub-diamond-shaped sclerotized plate around the caudal end of the seventh sternite; corpus bursae simply oval, without an additional pouch; signa composed of paired longitudinal patches of more than 50 fairly small teeth, which arise from the membrane.

Description. ♂ (Fig. 6): Forewing length 4.6–5.1 mm. Head and neck tufts pale ochreous; labial palpi pale ochreous, with basal 2/3 of second segment outwards dark brownish. Thorax and forewing dark brownish, mottled with paler-colored bases of scales; a whitish transverse fascia present around middle of wing, without interruptions; cilia on apex of wing distinctly lighter-colored beyond cilia line like Fig. 20.

♀ (Figs. 7–8): Forewing length 4.4–4.5 mm (holotype 4.4 mm). Neck tufts only very weakly mottled with brownish tips of scales; labial palpi outwards dark brownish from base to apex. Thorax and forewing darker and less mottled than in male.

Male genitalia (Figs. 42, 43). Uncus lobe 1.2 times as long as wide. Spinose knob of gnathos somewhat longer than wide. Valva widest around middle because of dorsal margin convex, narrowest beyond 3/4, where the dorsal margin is moderately concave. Juxta lobe (Fig. 43) widening to-

wards apex, with apical margin shallowly concave. Digitate process (Fig. 43) almost parallel-sided except for obliquely truncate apical 1/4, with ventro-apical corner extending as a straight projection; setae absent on narrowed apical projection. Aedeagus almost 4/5 as long as valva, tapering towards apex and strongly down-curved beyond 3/4.

Female genitalia (Figs. 44–46). Papilla analis triangular; Y-shaped sclerotized plate present on membrane between papillae anales. Apophysis anterioris 1/2–3/5 as long as apophysis posterioris. Ostium opening on membrane between seventh and eighth sternites; caudal end of ductus bursae forming a funnel-shaped antrum, which has the ventral margin caudally convex and looks as if there were a sub-diamond-shaped sclerotized plate (Fig. 45); inner surface of antrum ornamented with micro spines; short colliculum present just cephalically of antrum. Ductus bursae very slightly widening cephalically, smoothly inserted to caudal end of oval corpus bursae; inner surface of corpus bursae smooth except for signa of paired longitudinal patches of more than 50 fairly small teeth (in Fig. 46, patches mounted one over the other).

Biology. Foodplant: Poaceae: *Calamagrostis arundinacea* (L.) Roth. The larva is a leaf-miner, and looks greyish through the mine, which is full-depth and straight linear. Excrements are pushed into older part of the mine behind the larva. Larval feeding was observed in the autumn, and the full-fed larva hibernated in the mine. After vernalization, the larva left the mine and pupated in a cocoon constructed in such a space as that between leaves. The pupa was fixed by a silk-girdle surrounding its abdomen and the cremaster.

Distribution. Japan: Honshū (Nagano-ken).

Remarks. Because of the mottled impression of the forewing and the almost totally pale ochreous neck tufts, *E. nozawana* is highly similar to typical forms of *E. adscitella* Stainton, 1851 (Figs. 13–15, 19) and to darker-colored forms of *E. subalbidella* Schläger, 1847 (Figs. 31, 32; Kaila, 1997: figs. 3–6). From these two species,

E. nozawana can be separated easily by the corpus bursae of the female genitalia. The corpus bursae of *E. nozawana* is simply oval and ornamented with paired longitudinal patches of more than 50 fairly small teeth (Figs. 44, 46). That of *E. adscitella* has an additional pouch on its caudal end (Figs. 57), and teeth arranged in paired longitudinal patches are larger and fewer than those of *E. nozawana*. That of *E. subalbidella* (see Traugott-Olsen & Nielsen, 1977: fig. 477; Kaila, 1997: fig. 129) has the teeth arising from paired sclerotized plates, not from the membrane, whereas the corresponding teeth of *E. nozawana* arise from the membrane (Fig. 46). In the male genitalia, the differences among *E. nozawana*, *E. adscitella* and *E. subalbidella* are often rather subtle. The juxta lobe becomes wider gradually towards the shallowly concave apex in *E. nozawana* (Fig. 43); it is almost parallel-sided except for apex in *E. adscitella* (Figs. 53, 56); and it is concave in lateral margins and narrowest around middle in *E. subalbidella* (Fig. 74). The apical projection of the digitate process is conspicuous and nearly straight in *E. nozawana* (Fig. 43); that of *E. adscitella* is generally little-developed (Fig. 53), while it is sometimes developed and straight (Fig. 56); that of *E. subalbidella* is curled dorsally (Fig. 74). The aedeagus of *E. nozawana* is strongly down-curved beyond 3/4 (Fig. 42), while that of *E. adscitella* (Figs. 52, 54, 55) and *E. subalbidella* (Figs. 73) is not as strongly down-curved as that of *E. nozawana*.

Some European males of *E. adscitella* (e.g. Parenti, 1992: fig. 3-top) have the genitalia extremely similar to those of *E. nozawana*, including the aedeagus apically curved nearly as strongly as in *E. nozawana*. Even if there were some overlaps in the male genitalia, *E. nozawana* is considered distinct from *E. adscitella*. The female genitalia can be separated clearly by the presence or absence of the additional pouch of the corpus bursae. In addition, *E. nozawana* hibernates as the mature larva, while *E. adscitella* hibernates before the last instar larva. This difference in the biology is considered strong enough for a reproductive barrier.

Etymology. The species name, *nozawana*, is after famous pickles in Nagano-ken, where the type material was collected.

***Elachista paragabella* sp. nov.**

(Figs. 9–12, 47–51)

Type series. Holotype: ♂, Minoo-shi, Ôsaka-fu, Honshû, Japan, 7 V 1982, T. Saito leg., ♂ genitalia slide no. 1418 (K. Sugisima, 2003) (NSMT). Paratypes: [Honshû]: 2♂ 2♀, Nagano-ken (1♂, Ikusaka-mura (Ikezawa), 22 V 1983; 1♂, Matsumoto-shi (Okada), 30 V 1990; 1♀, Hata-machi (Shimajima), 30 VII 1982; 1♀, ditto, 24 VII 1983) (NMST); 2♂, same locality as holotype (1♂, 7 V 1982; 1♂, 10 V 1983) (OPU).

Diagnosis. Face greyish, suffused with yellowish scales. Neck tufts purely blackish. Forewing blackish, with no mottled impression; medial whitish transverse fascia absent or recognized only around hind margin of wing in male, distinct in female; cilia blackish, with a lighter-colored area on apex of wing beyond cilia line. Male genitalia: digitate process club-shaped, with apical 2/5 swollen dorsally; juxta lobe with apical margin almost straight; aedeagus almost straight, with apical 1/3 distinctly narrower than remainder, and with pointed apex. Female genitalia: very shallow bowl-shaped antrum present; corpus bursae lined with minute spines in caudal 2/3; signa paired, each composed of several coarse teeth arising from membrane.

Description. ♂ (Figs. 9–11): Forewing length 3.1–3.7 mm (holotype 3.4 mm). Face greyish, suffused with yellowish scales; labial palpi blackish, except for upper surface light-colored from base to near apex. Neck tufts and thorax blackish, slightly tinged with brown. Forewing blackish, with no mottled impression; medial whitish transverse fascia absent or recognized only around hind margin of wing; cilia blackish, with a lighter-colored area on apex of wing beyond cilia line (but not so distinctly as in Fig. 20).

♀ (Fig. 12): Forewing length 3.0–3.1 mm; coloration as in male, except for medial whitish transverse fascia of forewing distinct and com-

plete.

Male genitalia (Figs. 47, 48). Uncus lobe very bluntly triangular, 1.2 times as long as wide, equally round in inner and outer margins. Tegumen not reinforced along cephalic margin. Spinose knob of gnathos bluntly triangular, nearly twice as long as wide. Valva widest around 3/5; dorsal margin convex around 3/5, somewhat steeply concave beyond 3/5. Juxta lobe (Fig. 48) widening towards apex, with apical margin almost straight. Digitate process (Fig. 48) club-shaped, shorter than 1/3 length of valva, with apical 2/5 swollen dorsally; apical part more conspicuously swollen in specimens from Nagano-ken than in those from Ōsaka-fu. Aedeagus almost straight, longer than 3/4 length of valva, with apical 1/3 distinctly narrower than remainder, and with sharply pointed apex.

Female genitalia (Figs. 49–51). Papilla analis bluntly triangular; a Y-shaped sclerotized plate present between papillae anales. Apophysis anterioris 3/5 as long as apophysis posterioris. Ostium near cephalic margin of eighth sternite, which protrudes cephalically. Most caudal part of ductus bursae forming a very shallow bowl-shaped antrum, which is ornamented with small spines (Fig. 50); weakly sclerotized colliculum present just cephalically of antrum; cephalic end of ductus bursae lined with minute spines and attached to caudal end of corpus bursae. Corpus bursae oval, lined with minute spines on caudal 2/3; signa present on caudal 1/5–1/4 of corpus bursae, composed of paired patches of coarse teeth arising from membrane (Fig. 51).

Biology. The immature biology is unknown.

Distribution. Japan: Honshū (Nagano-ken, Ōsaka-fu).

Remarks. In addition to *E. paragangabella*, blackish appearance without mottled impression, the purely dark-colored neck tufts, and the reduced whitish fascia of the male forewing are known in another Japanese species, *E. nigriciliae* described above (Figs. 1–4), and a supposedly extralimital species, *E. gangabella* Zeller, 1850 widely distributed in the western Palaearctic (Traugott-Olsen & Nielsen, 1977: 122, figs. 114,

115). Among these three species, *E. paragangabella* may be distinguishable from the other two species by the forewing cilia lighter-colored on the apex beyond cilia line (though not so conspicuously as in Fig. 20) and by the greyish face with yellowish scales (Fig. 10). In the other two species, which may be indistinguishable from each other in coloration, the forewing cilia is unicolorously blackish (Fig. 5), and the face has at most a few light-colored scales (Fig. 2).

In the male genitalia, *E. nigriciliae* can be separated from the other two species by the aedeagus. The aedeagus of *E. nigriciliae* is thick and moderately down-curved as a whole, and its distal 1/3 gradually tapers towards the blunt apex (Fig. 37). That of the other two species is almost straight, and its apical 1/3 is distinctly narrower than the remainder, with the sharply pointed apex (Fig. 47; Traugott-Olsen & Nielsen, 1977: fig. 359). *Elachista gangabella* and *E. paragangabella* are distinguishable in the digitate process. It is swollen dorsally in apical 2/5 in *E. paragangabella* (Fig. 48), while it is not swollen in *E. gangabella* (Traugott-Olsen & Nielsen, 1977: fig. 359).

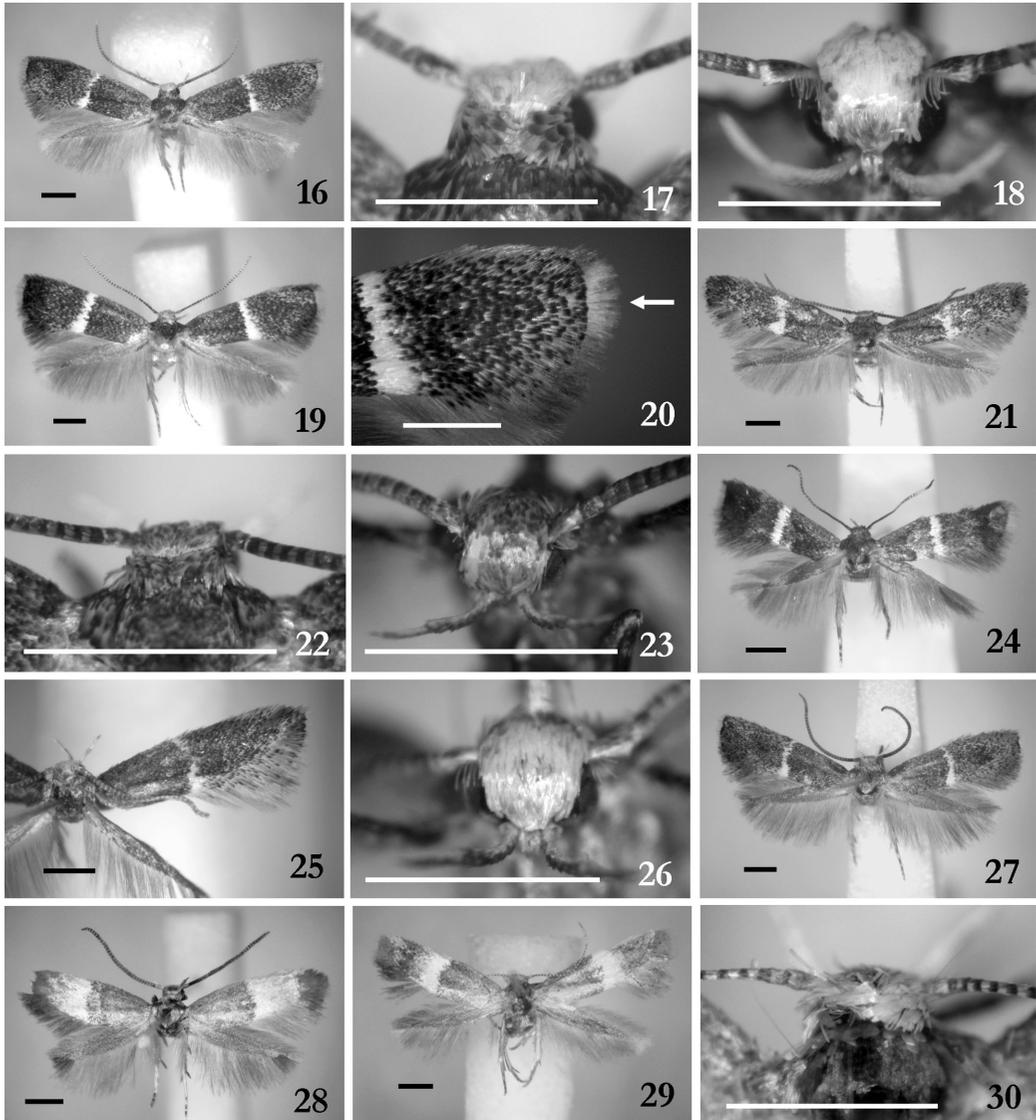
In the female genitalia, *E. gangabella* can be distinguished from the other two species by the teeth forming the signa. The teeth of *E. gangabella* (Traugott-Olsen & Nielsen, 1977: fig. 476) are smaller and more numerous than those of the other two species (Figs. 41, 51). *Elachista nigriciliae* and *E. paragangabella* are distinguishable in the cephalic area of the eighth sternite. That area of *E. nigriciliae* has a U-shaped broad sclerotized band (Fig. 40), while that area of *E. paragangabella* has the shallow bowl-shaped antrum (Fig. 50).

Etymology. The species name, *paragangabella*, indicates that this new species resembles *E. gangabella*.

***Elachista adscitella* Stainton, 1851**

(Figs. 13–20, 52–57)

Elachista adscitella Stainton, 1851: 10.



Figs. 16–30. Moths of *Elachista cingillella*-complex; scale lines 1 mm — 16–18, *E. adscitella* Stainton, Hokkaidô (16, ♂ from Koshimizu-chô, with heavily mottled head, vertex and neck tufts in Fig. 17, face in Fig. 18; 19, ♀ from Mukawa-chô, Hokkaidô, apical half of forewing in Fig. 20 where the arrow indicates light-colored cilia on the wing-apex); 21–26, *E. cingillella* (Herrich-Schäffer), Honshû (21, ♂ from Imperial Palace, Tôkyô-to, with greyish face, vertex and neck tufts in Fig. 22, face in Fig. 23; 24, ♀ from Han'nô-shi, Saitama-ken, labelled as emerged from *Carex*; 25, ♂ from Minamisaku-gun, Nagano-ken, face in Fig. 26); 27–30, *E. fasciola* Parenti (27, ♂ from Toyono-chô, Ôsaka-fu, of ordinary coloration; 28, ♂ from Koshimizu-chô, Hokkaidô, with extremely broadened fascia of forewing; 29, ♀ from Nemuro-shi, Hokkaidô, with extremely broadened fascia of forewing, vertex and neck tufts in Fig. 30).

For further synonymies, see Parenti (1992).

Japanese specimens. [Hokkaidô]: 2 ♀, Bekkai-chô (1 ♀, ex *Elymus mollis*, em. 14 VII 1996; 1 ♀, ex *Calamagrostis langsdorffii*, em. 16 VII 1995) (NSMT); 7 ♂ 5 ♀, Koshimizu-chô (1 ♂, 12 VIII 1989; 1 ♀, 2 VIII 1991; 1 ♂, 11 VIII 1992; 5 ♂ 3 ♀, ex Poaceae, 24 VI–30 VII 2002; 1 ♀, ex *Carex lyngbyei*, em. 2 VIII 2002) (NSMT, OPU, SEHU); 8 ♂ 4 ♀, Mukawa-chô (6 ♂ 4 ♀, ex *Calamagrostis hakonensis*, em. 2–10 VII 1995; 2 ♂, ex *Koeleria cristata* and *Calamagrostis hakonensis*, em. 7–9 VII 1996) (FMNH, NSMT, OPU, SEHU); 5 ♂ 3 ♀, Nemuro-shi (Furen-ko), ex *Calamagrostis langsdorffii* (3 ♀, em. 19–23 VII 1994; 5 ♂, em. 12–16 VII 1995) (NSMT, OPU, SEHU); 1 ♂, Sapporo-shi, 3 VII 1991 (SEHU); 1 ♀, Shibetsu-chô, 10 VIII 1993 (SEHU); 6 ♂ 5 ♀, Tomakomai-shi, em. 14–31 VII 1996, ex Poaceae sp. (NSMT, OPU, SEHU); 2 ♂, Toyotomi-chô, ex *Elymus mollis* (1 ♂, em. 14 VII 1995; 1 ♂, 27 VII 1996) (NSMT, OPU).

European specimens. All in SEHU. [Finland]: 2 ♂, Tvärminne, Nylandia, 1 VII 1960; 1 ♀, Lojo (668:32), Regio aboensis, 5 VIII 1982; 1 ♀, Bromarf, Regio aboensis, 8 VII 1961; [Austria]: 1 ♂, Hinterstoder, 28 V 1950; 1 ♀, Schön b Klaus, em. VII 1950, ex *Sesleria varia*.

Diagnosis. ♂ (Figs. 13–18) & ♀ (Figs. 19, 20). Forewing length: ♂ 3.6–4.5 mm; ♀ 4.0–4.3 mm. Head ochreous, rarely tinged with grey; neck tufts ochreous, mottled with dark brownish tips of scales usually weakly (Fig. 14) but rarely heavily (Fig. 17); face pale ochreous, sometimes suffused with dark-tipped scales particularly on clypeus area (Figs. 15, 18). Forewing dark brownish, mottled with paler bases of scales; medial whitish transverse fascia in male (Figs. 13, 16) weakened or interrupted around middle; fascia in female (Fig. 19) constantly distinct; cilia (Fig. 20) dark greyish, with a light-colored area on apex of wing beyond cilia line.

Male genitalia (Figs. 52–56). Uncus lobe very bluntly triangular, 1.2 times as long as wide, equally round in inner and outer margins; apex somewhat varying in sharpness, usually blunt (Figs. 52, 55), sometimes broadly obtuse (Fig.

54). Spinose knob of gnathos bullet-shaped, 1.5 times as long as wide. Valva with dorsal margin convex around 3/5 and smoothly concave around 4/5. Juxta lobe (Figs. 53, 56) parallel-sided except for widened apex; apical margin slightly concave. Digitate process in Japanese specimens almost parallel-sided except for apical part, which is obliquely truncate (Fig. 53) or ventro-apically extending as a straight projection (Fig. 56). Aedeagus (Figs. 52, 54, 55) shorter than valva, weakly to moderately down-curved in apical 1/3, with blunt apex.

Female genitalia (Fig. 57). Papilla analis bluntly triangular; a Y-shaped sclerotized plate present on ventral membrane between papillae anales. Apophysis anterioris approximately 3/4 as long as apophysis posterioris. Ostium on membrane between seventh and eighth sternites; caudal end of ductus bursae forming a funnel-shaped antrum, which has the ventral margin bluntly convex caudally and looks as if there were a sub-triangular sclerotized plate. Short colliculum present a little cephalically of antrum. Corpus bursae with an additional pouch on its caudal end, where the ductus bursae is inserted; inner surface smooth, except for signa composed of paired patches of 20–50 small conical teeth (in Fig. 57, patches mounted one over the other).

Biology. Foodplants: Poaceae: *Calamagrostis hakonensis* Franch. & Sav., *Calamagrostis langsdorffii* (Link) Trin., *Elymus mollis* R.Br., *Koeleria cristata* Pers, and unidentified Poaceae plants; Cyperaceae: *Carex lyngbyei* Hornem. The larva is a leaf-miner, and looks greyish through the mine. In autumn, it makes a narrow straight-linear mine, which looks like a purplish thread extending generally from near the leaf-tip towards the leaf-base. It is not rare that more than one larva occurs on one leaf. The larva overwinters before becoming the last instar, and in the following spring, it mines into a new leaf. The spring mine is at first straight linear, widening as the larval growth, and finally becomes a full-depth elongate blotch-like mine. Excrements are pushed into older part of the mine behind the larva. Even in spring, more than one larva may

occur on one leaf, and their mines may fuse. The mature larva leaves the mine and pupates in the cocoon, which usually depends mainly on walls like leaves around the larva. The silk-filaments are used only for tying the walls roughly, while a sub-ellipsoidal 'core' cocoon of coarse silk-filaments is sometimes recognizable. The pupa is fixed in the cocoon by a silk-girdle surrounding its abdomen and the cremaster.

Distribution. Japan: Hokkaidô. Europe (Traugott-Olsen & Nielsen, 1977); southern Siberia (Kaila, 1992); Far Eastern Russia (Sinev & Sruoga, 1997) (the references of foreign records misidentified the present species as *E. revinctella*).

Remarks. When compared to European specimens, Japanese ones have somewhat different tendencies in some characters. In coloration, the neck tufts of Japanese specimens are mottled with dark brownish tips of scales usually weakly (Fig. 14) and sometimes heavily (Fig. 17), while those of European specimens (e.g. Parenti, 1992: figs. 1-top) are unicolorously ochreous or mottled at most only very weakly. Concerning the genitalia, different tendencies are observed in the uncus lobe, digitate process, and aedeagus. In European specimens (e.g. Parenti, 1992: fig. 3-top): the uncus lobe tends to be short and apically fairly round; the digitate process is generally thicker, widening apically rather than parallel-sided, and projected in the ventro-apical corner; the aedeagus is distinctly down-curved in apical 1/3. In Japanese specimens (Figs. 52–56): the uncus lobe tends to become narrower evenly from the base to apex; the digitate process is parallel-sided and has the ventro-apical corner rarely forming a distinct projection; apical 1/3 of the aedeagus is down-curved at most moderately. In spite of these different tendencies, variations observed within European specimens and those within Japanese ones overlap, and it is impossible to separate them clearly into two morphological groups. In addition, there appear to be no differences between the female genitalia of Japanese specimens (Fig. 57) and those of European specimens (e.g. Parenti, 1992: fig. 4-right).

Therefore, I here concluded that the Japanese specimens should be assigned to *E. adscitella*.

Similar species and discrimination from them are explained in the "Remarks" of *E. nozawana* described above and that of *E. fasciola* treated below.

Elachista cingillella (Herrich-Schäffer, 1855)

(Figs. 21–26, 58–66)

Poeciloptilia cingillella Herrich-Schäffer, 1855: 299, 303.

For further synonymies, see Kaila and Junnilainen (2002).

Japanese specimens. All at NSMT. [Hokkaidô] 1♂, Tomakomai-shi, 23 VI 1959; [Honshû]: 1♀, Saitama-ken, Han'nô-shi, em. 17 II 1984, ex *Carex* sp.; 1♂, Minamisaku-gun (Azusa-yama), Nagano-ken, 28 VI 1997; 1♂, Imperial Palace, Tôkyô-to, 25 V 2000; [Kyûshû: Ôita-ken]: 1♂, Syônai-chô (Kuro-dake), 20 V 1993.

Diagnosis. ♂ (Figs. 21–23, 25, 26) & ♀ (Fig. 24). Forewing length: ♂ 3.8–4.2 mm; ♀ 3.7 mm. Head greyish or pale ochreous; neck tufts heavily mottled with dark brownish scales (Fig. 22); face not so heavily mottled (Figs. 23, 26). Forewing dark brownish, somewhat mottled with paler bases of scales; medial whitish transverse fascia in male (Figs. 21, 25) weakened or interrupted around middle; fascia in female (Fig. 24) distinct; cilia dark greyish, with a light-colored area on apex of wing beyond cilia line like Fig. 20.

Male genitalia (Figs. 58–61). Uncus lobe bluntly triangular, 1.3 times as long as wide, evenly tapering towards apex, which is obtuse rather than acute. Spinose knob of gnathos subtriangular, nearly twice as long as wide. Valva with dorsal margin concave around 4/5 steeply rather than smoothly. Juxta lobe Y-shaped, with apical margin deeply concave, and with inner branch of "Y" not so long as outer branch. Digitate process distinctly club-shaped, with apical half dorsally convex. Aedeagus 3/4 length of valva, with apical 1/3 thinner than remainder; apex sharply pointed.

Female genitalia (Figs. 62–66). Papillae anales bluntly triangular; a Y-shaped sclerotized plate present on ventral membrane between papillae anales. Ostium on cephalic margin of eighth sternite, which protrudes cephalically; a shallow bowl-shaped antrum present, ornamented with fine spines on dorsal wall. Corpus bursae ellipsoidal, lined with minute spines in caudal half; signa present on caudal 1/4 of corpus bursae, composed of paired sclerotized plates bearing several sharp teeth.

Biology. A female specimen has a label telling that it was reared from *Carex* (Cyperaceae). This foodplant record should be verified. The specimen is followed by a pupal exuvia, which is attached to a leaf-fragment by a silk-girdle and cremaster. The leaf-fragment is probably that of the foodplant; it is ornamented with setae more densely than any *Carex* and appears to be some Poaceae. In Europe, the species has recently been reared from three species of Poaceae: *Brachypodium pinnatum* (L.) P. Beauw., (Sippola, 2004), *B. sylvaticum* (Hudson) P. Beauw. and *Elymus repens* (L.) Gould (Parenti, 2005).

Distribution. Japan: Hokkaidô, Honshû, Kyûshû. Europe (e.g. Kaila & Junnilainen, 2002); Far Eastern Russia (Sruoga, 2004).

Remarks. According to Kaila and Junnilainen (2002), the head and neck tufts of *E. cingillella* are invariably dark greyish in Europe, and can be distinguished from similar species, all of which have the whitish or pale ochreous head. Among the five Japanese specimens identified as *E. cingillella* on the genital characters, two have the pale ochreous head (Fig. 26). In addition, specimens from Far Eastern Russia, which had been misidentified as *E. fasciola* Parenti, 1983, have the pale ochreous face (Sruoga, 1991, 2004). Therefore, identification by the coloration of the head is not always effective in the Far East.

Because of mottled impression of the forewing and the neck tufts heavily mottled with dark brownish tips of scales, *E. cingillella* resembles *E. fasciola* treated below and some forms of *E. adscitella* treated above. Discriminations are explained in the “Remarks” of *E. fasciola*.

Elachista fasciola Parenti, 1983

(Figs. 27–30, 67–72)

Elachista fasciola Parenti, 1983: 6–7, pls. 1, 3.

Japanese specimens. Type series: Holotype: ♂, Nobeyama, Nagano-ken, Honshû, Japan, [em.] 23 V 1964, ex *Achnatherum pekinense* (Hance) Ohwi, genitalia slide no. 5817 of U. Parenti (OPU). Paratypes: 3 ♀, same data as holotype except for date [em.] 18 V–8 VI 1964 (OPU). Non-type specimens: [Hokkaidô]: 2 ♂, Koshimizu-chô, 14 VI 1999 and 17 VI 2002 (OPU); 1 ♂ 1 ♀, Nemuro-shi, 1 VII 2001 (OPU); [Honshû]: 1 ♂, Aichi-ken, Inuyama-shi, 13 VI 1992 (NSMT); 9 ♂, Ôsaka-fu (4 ♂, Misaki-chô, 31 VIII 1979; 5 ♂, Toyono-chô (Aokai-yama) (2 ♂, 20–27 V 1998; 2 ♂, 10 VI 1999; 1 ♂, 2 IX 1999)) (NSMT, OPU).

Diagnosis. ♂ (Figs. 27, 28) & ♀ (Figs. 29, 30). Forewing length: ♂ 3.3–4.2 mm (summer-flying generation apparently smaller); ♀ 3.8–4.1 mm. Head pale ochreous; neck tufts mottled with dark brownish tips of scales usually heavily like Fig. 17, but not mottled at all in specimens from easternmost part of Hokkaidô (Fig. 30). Forewing of specimens from easternmost part of Hokkaidô (Figs. 28, 29) grey-brownish; medial fascia expanded outwards, especially in male where the wing is whitish from the middle to near the apex. Forewing of usual individuals (Fig. 27) dark brownish and mottled with paler bases of scales; medial whitish transverse fascia in male weakened towards costal margin; fascia in female broader than in male and constantly distinct; cilia dark greyish, with a light-colored area on apex of wing beyond cilia line like Fig. 20.

Male genitalia (Figs. 67–69). Uncus lobe triangular, 1.3 times as long as wide, evenly tapering towards apex, which is acute rather than obtuse. Spinose knob of gnathos narrow triangular, twice as long as wide. Valva with dorsal margin concave around 4/5 smoothly rather than steeply. Juxta lobe distinctly Y-shaped, with apical margin deeply concave, and with inner branch of “Y” longer than outer branch. Digitate process distinctly club-shaped, with apical 1/3 dorsally con-

vex. Aedeagus $3/4$ length of valva, with apical half evenly tapering towards acute apex.

Female genitalia (Figs. 70–72). Papilla analis bluntly triangular; a Y-shaped sclerotized plate present on ventral membrane between papillae anales. Ostium near cephalic margin of eighth sternite, which protrudes cephalically; eighth sternite ornamented with a group of small spines caudally of ostium, broadly reinforced in U-shape along cephalic and lateral margins (Fig. 71). Corpus bursae ellipsoidal, lined with minute spines on caudal second and third fifth; signa present on caudal $1/4$ of corpus bursae, composed of two sclerotized plates with at most ten large teeth (Fig. 72).

Biology. According to Parenti and Varalda (1994), four species of Poaceae are recorded as foodplants: *Achnatherum pekinense* (Hance) Ohwi, *Brachypodium sylvaticum* (Hudson) Beauv., *Calamagrostis arundinacea* (L.) Roth, and *Elymus repens* (L.) Gould. Label data indicate that this species has more than one generation a year at Ôsaka, Japan, with adult flights in early May and August. In contrast, in the easternmost part of Hokkaidô, there appears to be only one generation a year.

Distribution. Japan: Hokkaidô, Honshû. Europe (Kaila & Junnilainen, 2002).

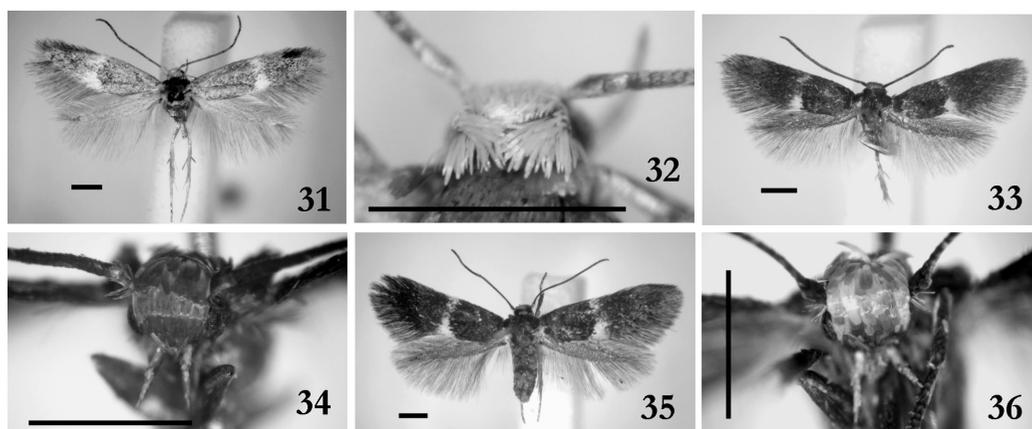
Remarks. Ordinarily, *E. fasciola* has the mottled impression of the forewing and the neck tufts mottled with dark brownish scales. These character states are observed also in *E. cingillella* and *E. adscitella* treated above. With regard to 'typical' specimens of these species, *E. cingillella* has the greyish face, which is pale ochreous in the other two species, and *E. adscitella* has the neck tufts less heavily mottled than the others. However, the pale ochreous head sometimes occurs in *E. cingillella*, and the neck tufts of *E. adscitella* are sometimes mottled as heavily as those of the other species. The examination of the genitalia is necessary for unambiguous identification.

In the male genitalia, *E. cingillella* and *E. fasciola* share the club-shaped digitate process with apical part distinctly swollen dorsally (Figs. 59,

68), whereas *E. adscitella* has the parallel-sided digitate process (Figs. 53, 56). The male genitalia of *E. cingillella* and *E. fasciola* can be distinguished by the uncus lobe, the dorsal margin of the valva, the juxta lobe, and the aedeagus. In *E. cingillella* (Figs. 58–61), the uncus lobe is apically round rather than acute, the concavity around $3/4$ of the dorsal margin of the valva is steep rather than smooth, the juxta lobe is Y-shaped with the inner branch of "Y" is not as long as the outer branch, and the aedeagus is distinctly narrower in apical $1/3$ than the remainder. In *E. fasciola* (Figs. 67–69), the uncus lobe is apically acute rather than obtuse, the concavity around $3/4$ of the dorsal margin of the valva is smooth rather than steep, the juxta lobe is Y-shaped with the inner branch of "Y" is longer than the outer branch, and the aedeagus tapers evenly from the middle to the acute apex.

In the female genitalia, *E. fasciola* and *E. cingillella* share the signa composed of two dentate plates (Figs. 65, 66, 72), while *E. adscitella* has the signa composed of paired patches of teeth arising from the membrane (Fig. 57). The female genitalia of *E. cingillella* and *E. fasciola* can be separated by the eighth sternite and by the signum. The eighth sternite of *E. cingillella* (Fig. 64) has the shallow bowl-shaped antrum, while that of *E. fasciola* (Fig. 71) has a U-shaped broad sclerotized band. The signum of *E. fasciola* (Fig. 72) has fewer and larger teeth than that of *E. cingillella* (Figs. 65, 66).

Among Japanese specimens identified as *E. fasciola* on the genital characters, those from the easternmost part of Hokkaidô have the totally pale ochreous head, and has the medial whitish fascia of the forewing considerably expanded to the extent that the distal half of the wing is almost entirely whitish. Such specimens closely resemble those of a supposedly extralimital species, *E. revinctella* Zeller, 1850 distributed in south Europe (Parenti, 1992, fig. 1-bottom). In the male genitalia, *E. fasciola* can be distinguished from *E. revinctella* by the distinctly Y-shaped juxta lobe, distally expanded digitate process, and apically pointed aedeagus. The male



Figs. 31–36. Moths of *Elachista subalbidella* Schläger and *Perittia unifasciella* Sinev; scale lines 1 mm — 31, *E. subalbidella*, ♂ from Kamikawa-chô (Daisetsu-zan), Hokkaidô, head and vertex in Fig. 32; 33–36, *P. unifasciella*, Hokkaidô (33, ♂ from Sapporo-shi, face in Fig. 34; 35, ♀ from Koshimizu-chô, face in 36).

genitalia of *E. revinctella* (Parenti, 1992: fig. 3-bottom) have the trapezoidal juxta lobe, equally wide digitate process, and apically obtuse aedeagus. In the female genitalia, *E. fasciola* can be separated from *E. revinctella* by the U-shaped broad sclerotized band on the eighth sternite and the signa composed of dentate plates. The female genitalia of *E. revinctella* (Parenti, 1992: fig. 4-left) have the eighth sternite without U-shaped sclerotized band and the signa composed of many small teeth arising from the membrane.

***Elachista subalbidella* Schläger, 1847**

(Figs. 31, 32, 73, 74)

Elachista subalbidella Schläger, 1847: 241.

For further synonymies and references, see Kaila (1997).

Japanese specimen. [Hokkaidô]: 1 ♂, Kamikawa-chô (Chûbetsu-numa, Daisetsu-zan), 19 VII 1998 (SEHU).

European specimens. [Finland]: 1 ♂, Jyväskylä, Tavastia borealis; 1 ♀, Lojo, Regio aboensis, 8 VI 1953; [Austria]: 3 ♂ 5 ♀, Böhmerwald, em. 4–19 IV 1974, ex *Brachypodium sylvaticum*.

Diagnosis. ♂ (Figs. 31, 32). Forewing length 4.0 mm. Head unicolorously pale ochreous (Fig.

32). Forewing dark brownish, mottled with paler bases of scales; medial whitish transverse fascia somewhat expanded outwards except for midway, where the fascia is weakened; cilia dark greyish, with a light-colored area on apex of wing beyond cilia line like Fig. 20.

Male genitalia (Figs. 73, 74). Uncus lobe elliptical, 1.1 times as long as wide, with apex very obtuse. Spinose knob of gnathos oval, 1.3 times as long as wide. Valva with dorsal margin smoothly concave around 4/5. Juxta lobe (Fig. 74) bluntly Y-shaped; inner branch of “Y” apically round; stem of “Y” concave in both inner and outer margins, narrowest medially. Digitate process (Fig. 74) almost parallel-sided, ending as a curled projection. Aedeagus 4/5 length of valva, with apical half down-curved and gradually tapering towards blunt apex.

Japanese female unavailable in this study.

Biology. Immature stages are unknown in Japan. The life-history of European populations is reported in Traugott-Olsen and Nielsen (1977).

Distribution. Japan: Hokkaidô (Daisetsu-zan). Holarctic (Kaila, 1997).

Remarks. Kaila (1997) concluded that *E. subalbidella* is a Holarctic species, which is fairly uniform in the genitalia, and which shows a geographic cline in the coloration. According to him, the species is unicolorously yellowish or at

most dusted with greyish scales to an extent that the medial whitish fascia of the forewing is recognized in Europe, and dark brownish with the distinct fascia in the Far East and North America, and the two forms are intermediated by Siberian specimens. The Japanese specimen used in the present study (Fig. 31) matches the variation of the Far Eastern specimens illustrated by Kaila (1997: fig. 5). No differences are found in the male genitalia between the present Japanese specimen (Figs. 73, 74) and specimens from elsewhere. Therefore, I identified the present Japanese specimen as *E. subalbidella*. Similar species and discrimination from them are explained in the "Remarks" of *E. nozawana* described above.

***Perittia unifasciella* Sinev, 1992**

(Figs. 33–36, 75, 76)

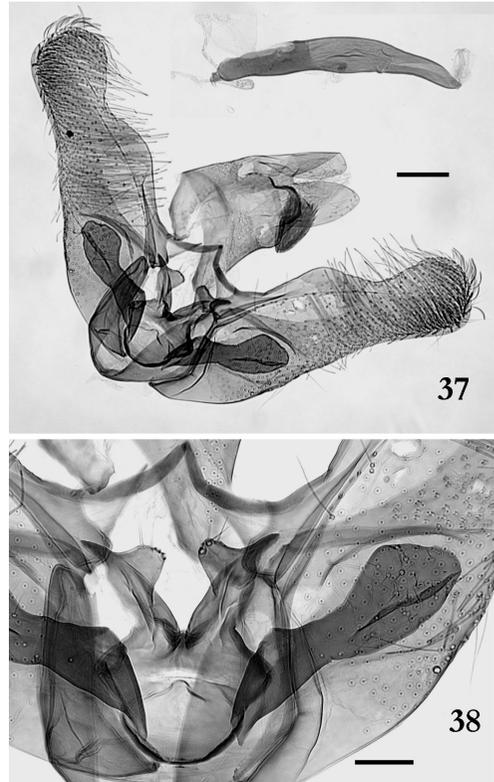
Perittia unifasciella Sinev, 1992: 5, figs. 1-3, 1-4.

Kuznetzoviana unifasciella: Traugott-Olsen, 1996: 132–133, figs. 1, 13, 20, 28.

Japanese specimens. All at SEHU. [Hokkaidô]: 3 ♀, Horokanai-chô, 16 VII 1995; 1 ♂, Iwanai-chô, 30 VI 1998; 1 ♀, Kitami-shi, 3 VII 1997; 1 ♂ 4 ♀, Koshimizu-chô (1 ♂ 2 ♀, 26 VI 1998; 1 ♀, 19 VII 2002; 1 ♀, 4 VII 2001); 2 ♂, Sapporo-shi (1 ♂, 24 VI 2000; 1 ♂, 5 VII 2000); 1 ♂ 1 ♀, Uryû-chô, 15 VII 1995.

Diagnosis. ♂ (Figs. 33, 34) & ♀ (Figs. 35, 36). Forewing length: ♂ 3.4–3.7 mm; ♀ 4.2–4.5 mm. Head and neck tufts unicolorously blackish in male (Fig. 34), suffused with yellowish scales on face in female (Fig. 36); labial palpi straight rather than up-curved, little diverged, extending downwards rather than forwards (Figs. 34, 36). Thorax and forewing blackish, without mottled impression; medial whitish transverse fascia distinct near hind margin of the wing, becoming weaker towards the costal margin; cilia unicolorously blackish, without cilia line.

Male genitalia (Fig. 75). Uncus vestigial; tegumen quadrangular, almost parallel-sided; spinose knob of gnathos spindle-shaped; valva quadrangular, nearly as long as wide, dorso-apically with a thorn-like pointed projection and a tongue-



Figs. 37–38. *Elachista nigriciliae* sp. nov., ♂ genitalia, holotype (slide no. 0966, K. Sugisima); scale lines 0.1 mm — 37, whole genitalia; 38, juxta and digitate process.

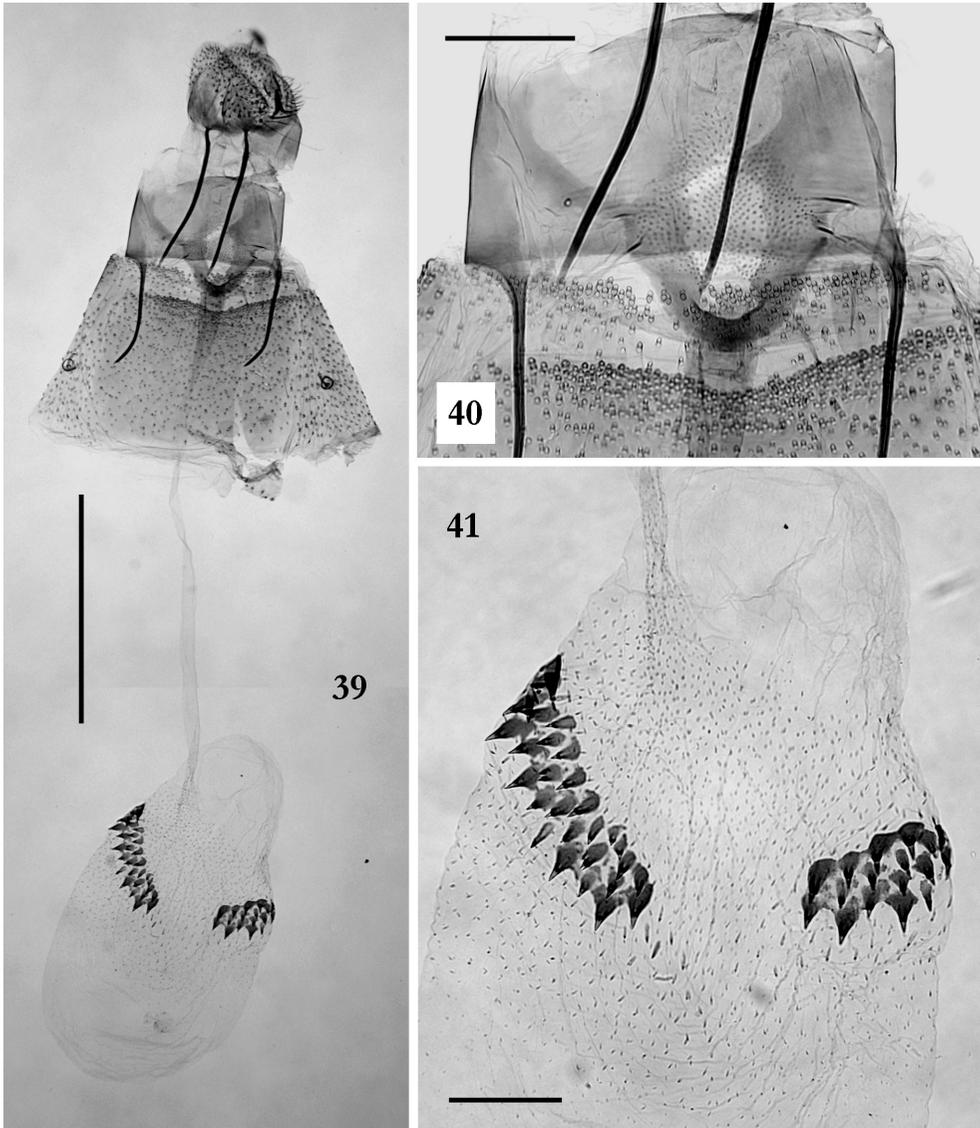
shaped setose projection; juxta with a pair of setose humps; aedeagus cylindrical, 1.2 times as long as valva.

Female genitalia (Fig. 76). Papilla analis short, semi-circular; apophysis anterioris 1/2–3/5 as long as apophysis posterioris; antrum cup-shaped, strongly sclerotized, with ventral wall medially cleft deeply; colliculum a little cephalically of antrum, shorter than apophysis anterioris; corpus bursae sub-ellipsoidal, lined with fine spines on inner surface, with signum of a dentate plate.

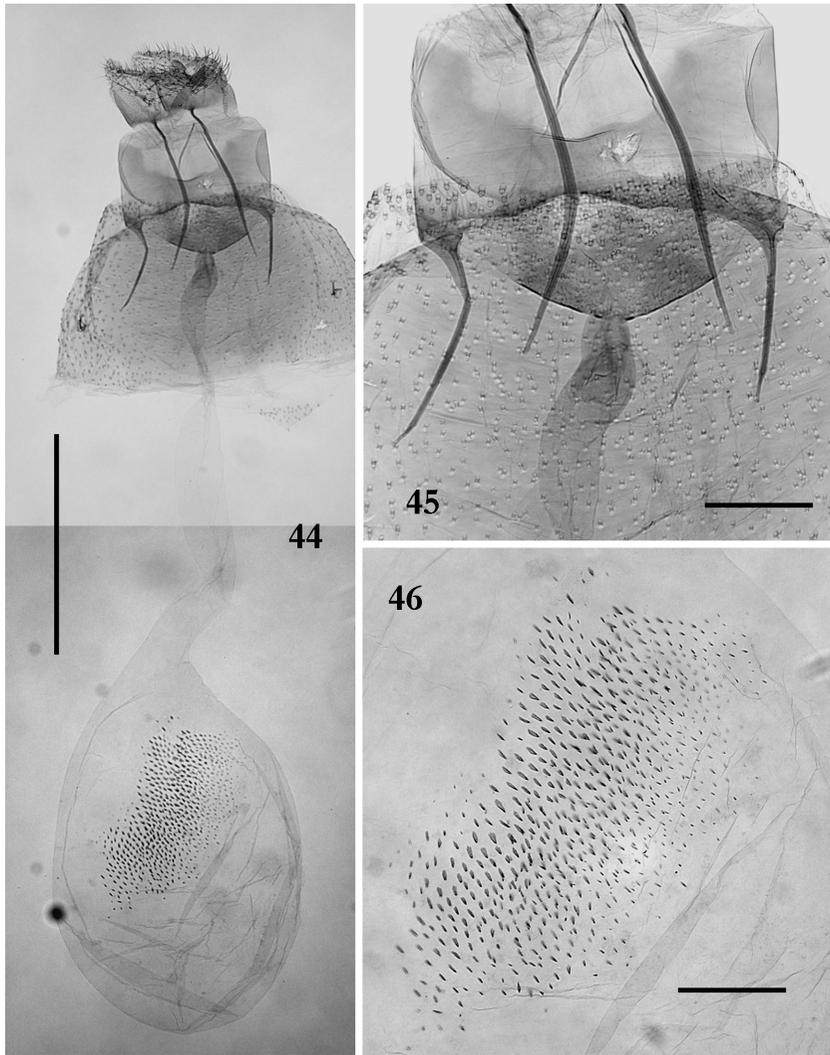
Biology. Immature stages unknown. Label data indicate that this species has one generation a year.

Distribution. Japan: Hokkaidô. Far Eastern Russia (Sruoga, 1995).

Remarks. *Perittia unifasciella* resembles



Figs. 39–41. *Elachista nigriciliae* sp. nov., ♀ genitalia, paratype from Samani-chō, Hokkaidō (slide no. 0740, K. Sugisima); scale lines 0.5 mm for Fig. 39, 0.1 mm for Figs. 40, 41 — 39, whole genitalia; 40, area around ostium; 41, signa and minute spines on corpus bursae.

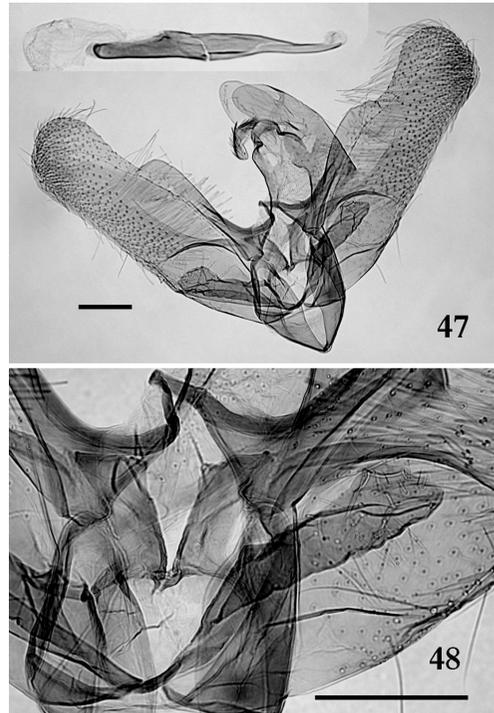


Figs. 44–46. *Elachista nozawana* sp. nov., ♀ genitalia, holotype (slide no. 0745, K. Sugisima); scale lines 0.5 mm for Fig. 44, 0.1 mm for Figs. 45, 46 — 44, whole genitalia; 45, area around ostium; 46, signa of paired patches of small teeth, one patch mounted over the other.

- 4. Aedeagus strongly down-curved beyond 3/4 (Fig. 42); juxta lobe widened towards apex rather than parallel-sided (Fig. 43)
 *Elachista nozawana* sp. nov.
- Aedeagus at most moderately down-curved in apical 1/3 (Figs. 52, 54, 55); juxta lobe parallel-sided except for apical end (Figs. 53, 56) *Elachista adscitella* Stainton
- 5. Aedeagus almost straight, apically pointed, with apical 1/3 distinctly narrower than remainder (Fig. 47)
 *Elachista paragangabella* sp. nov.
- Aedeagus down-curved to various extent (Figs. 37, 58, 67) 6
- 6. Juxta lobe bluntly Y-shaped, shallowly concave in apical margin, with inner branch of “Y” round and tongue-shaped (Fig. 38); aedeagus thick as a whole, evenly tapering towards apex, which is blunt rather than sharp (Fig. 37)
 *Elachista nigriciliae* sp. nov.
- Juxta lobe distinctly Y-shaped, deeply concave in apical margin (Figs. 59, 68); aedeagus apically acute (Figs. 58, 67) 7
- 7. Aedeagus narrower in apical 1/3 than in remainder (Figs. 58, 60, 61); juxta lobe with inner branch of “Y” at most as long as the outer one (Figs. 59, 61); dorsal margin of valva around 4/5 concave steeply rather than smoothly (Figs. 58, 60, 61)
 *Elachista cingillella* (Herrich-Schäffer)
- Aedeagus evenly tapering towards apex (Figs. 67, 69); juxta lobe with inner branch of “Y” longer than outer one (Figs. 68, 69); dorsal margin of valva around 4/5 concave very smoothly (Figs. 67, 69)
 *Elachista fasciola* Parenti

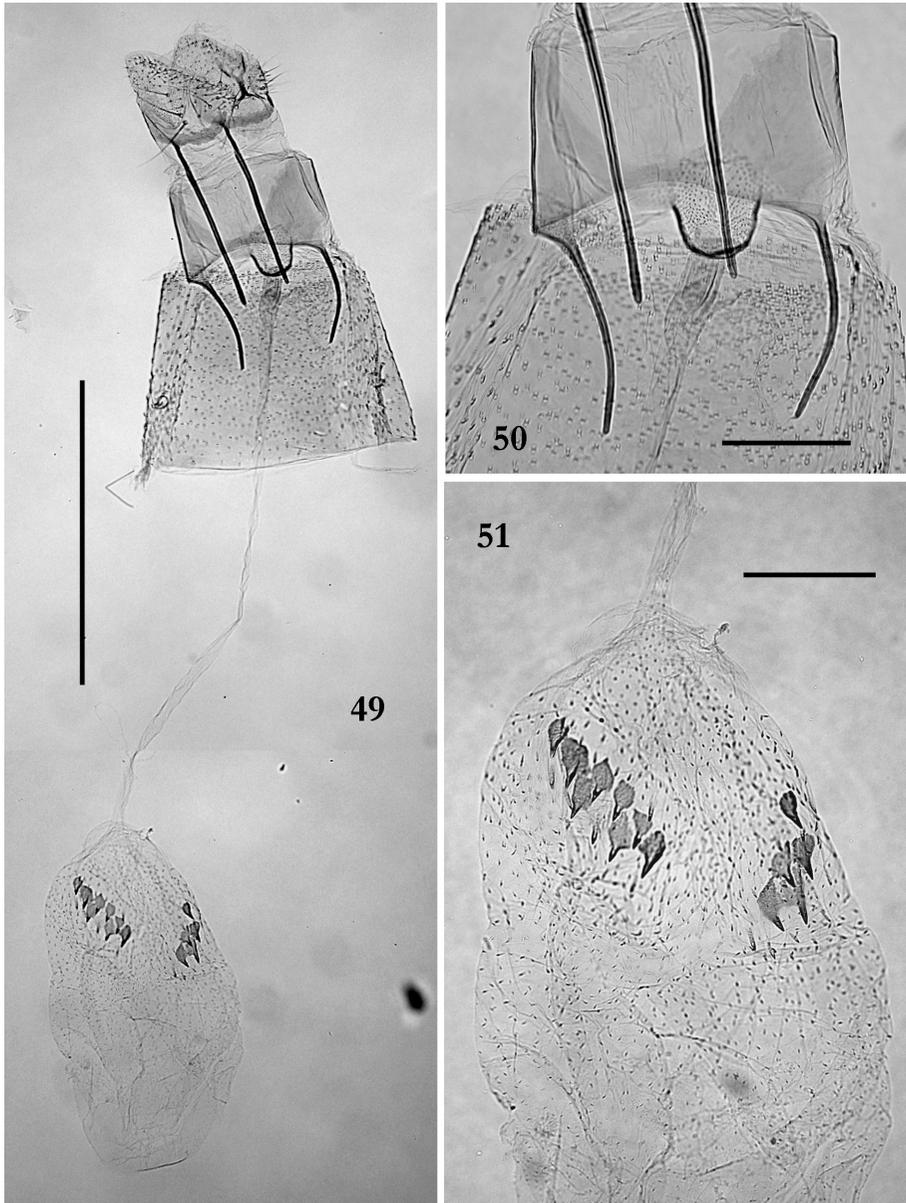
Key Based on Female Genitalia

- 1. Corpus bursae with a single signum of dentate plate; antrum funnel-shaped, with ventral margin deeply cleft (Fig. 76)
 *Perittia unifasciella* Sinev
- Corpus bursae with signa of paired patches of teeth arising from membrane (Figs. 39,

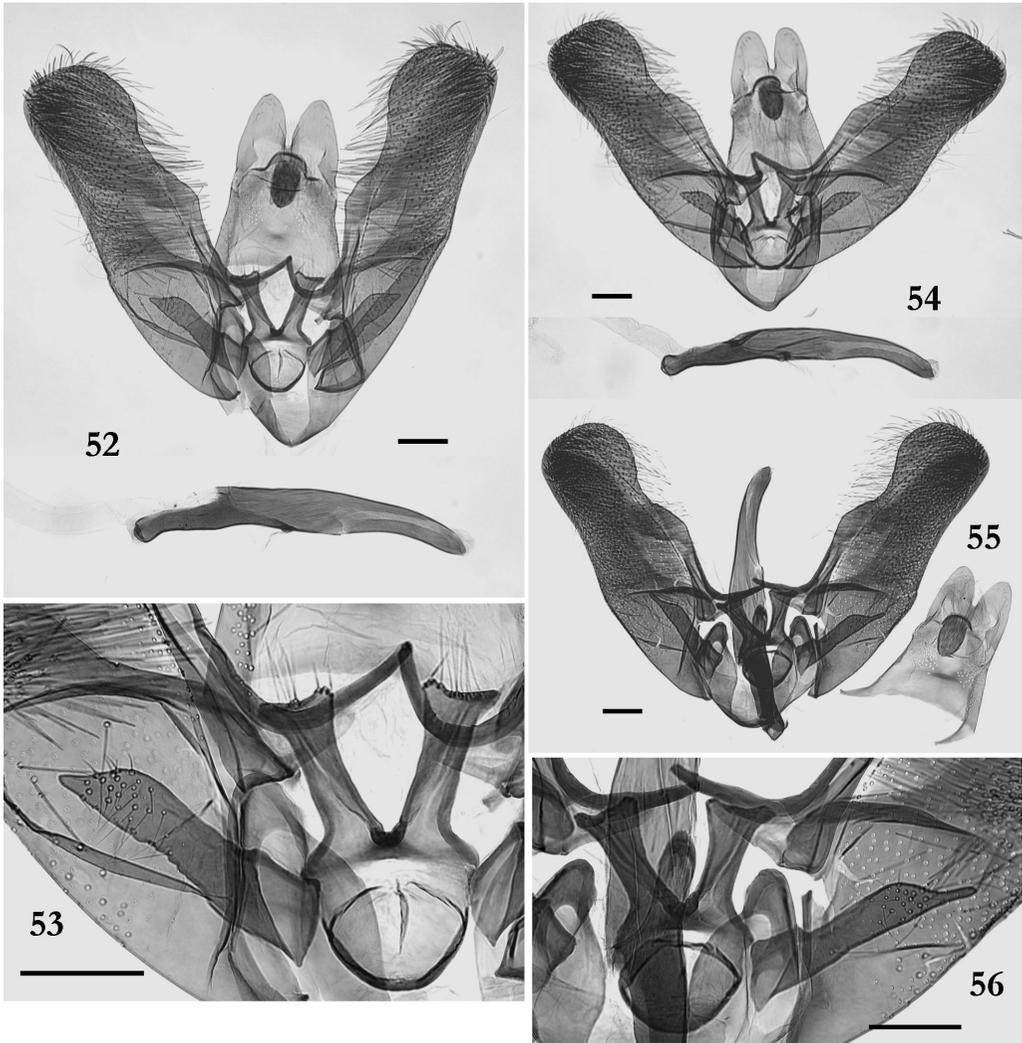


Figs. 47–48. *Elachista paragangabella* sp. nov., ♂ genitalia, holotype (slide no. 1418, K. Sugisima); scale lines 0.1 mm — 47, whole genitalia; 48, juxta and digitate process.

- 44, 49, 57) or paired dentate plates (Figs. 63, 70); eighth sternite with a U-shaped broad sclerotized band (Figs. 40, 71), or a funnel-shaped or bowl-shaped antrum (Figs. 45, 50, 57, 64) 2
- 2. Signa composed of paired patches of teeth, which arise not from common sclerotized plates but from the membrane (Figs. 39, 44, 49, 57) 3
- Signa composed of paired sclerotized plates, each of which contains conical teeth (Figs. 63, 70) 6
- 3. Corpus bursae smooth except for small teeth forming signa (Figs. 44, 57); caudal end of ductus bursae forming funnel-shaped antrum, which looks as if there were a sub-triangular or sub-diamond-shaped sclerotized plate (Figs. 45, 57) 4
- Corpus bursae lined with fine spines except



Figs. 49–51. *Elachista parangabella* sp. nov., ♀ genitalia, paratype from Hata-machi, Nagano-ken (slide no. 1915, K. Sugisima); scale lines 0.5 mm for Fig. 49, 0.1 mm for Figs. 50, 51. — 49, whole genitalia; 50, antrum; 51, signa and minute spines on corpus bursae.



Figs. 52–56. *Elachista adscitella* Stainton from Hokkaidô, ♂ genitalia; scale lines 0.1 mm — 52, Mukawa-chô (slide no. 0968, K. Sugisima), juxta and digitate process in Fig. 53; 54, Tomakomai-shi, with uncus lobe relatively round and with aedeagus relatively strongly down-curved (slide no. 0975, K. Sugisima); 55, Mukawa-chô, with apically produced digitate process (slide no. 0293, K. Sugisima), juxta and digitate process in Fig. 56.

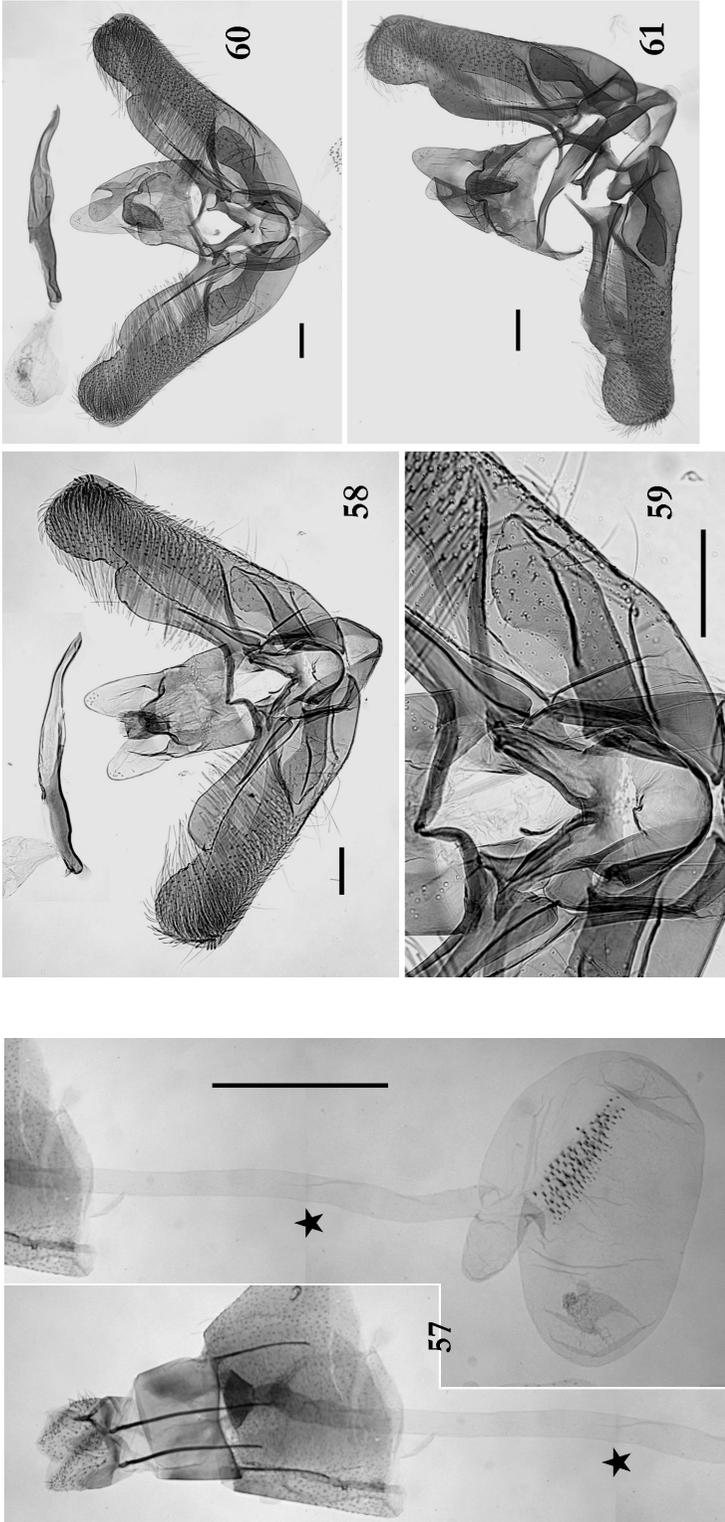
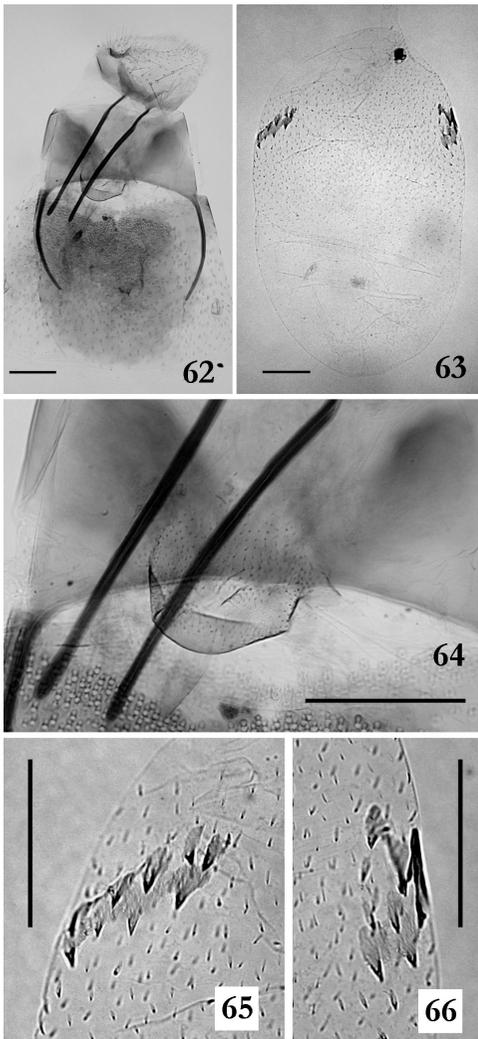


Fig. 57. *Elachista adscitella* Stainton from Tomakomai-shi, Hokkaidō, ♀ genitalia (slide no. 0292 of K. Sugisima); stars indicating same position; scale line 0.5 mm.

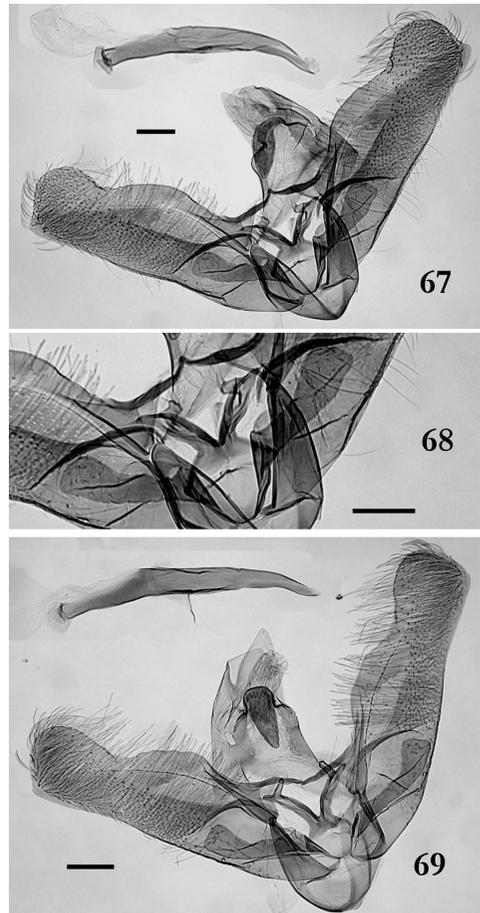
Figs. 58–61. *Elachista cingillella* (Herrich-Schäffer), ♂ genitalia; scale lines 0.1 mm — 58, Imperial Palace, Tōkyō-to, Honshū (slide no. 1900, K. Sugisima), juxta and digitate process in Fig. 59; 60, Minamisaku-gun, Nagano-ken, Honshū (slide no. 0988, K. Sugisima); 61, Tomakomai-shi, Hokkaidō (slide no. 0111, K. Sugisima).

- for coarse conical teeth forming signa (Figs. 41, 51) 5
4. Corpus bursae simply oval, without any additional pouches (Fig. 44); each signum composed of more than 50 fairly small teeth (Fig. 46) *Elachista nozawana* sp. nov.
- . Corpus bursae with an additional pouch on its caudal end (Fig. 57); each signum composed of 20–50 small teeth (Fig. 57) *Elachista adscitella* Stainton

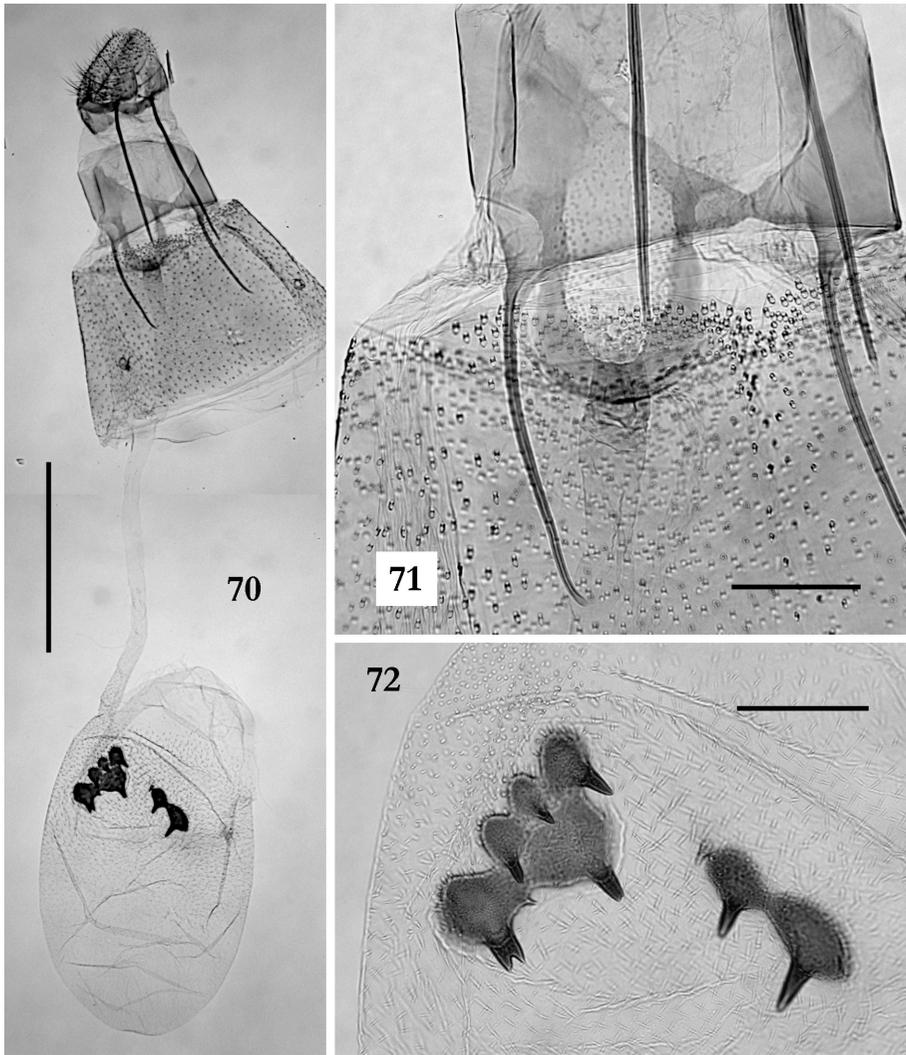
5. Eighth sternite with a U-shaped broad sclerotized band, without antrum (Fig. 40) *Elachista nigriciliae* sp. nov.
- . Eighth sternite without a U-shaped sclerotized band, with a shallow bowl-shaped antrum (Fig. 50) *Elachista paragangabella* sp. nov.
6. Caudal end of ductus bursae forming funnel-shaped antrum, which gives the impression that there is a sub-triangular sclerotized plate (Kaila, 1997: fig. 129; Traugott-Olsen & Nielsen, 1977: fig. 477)



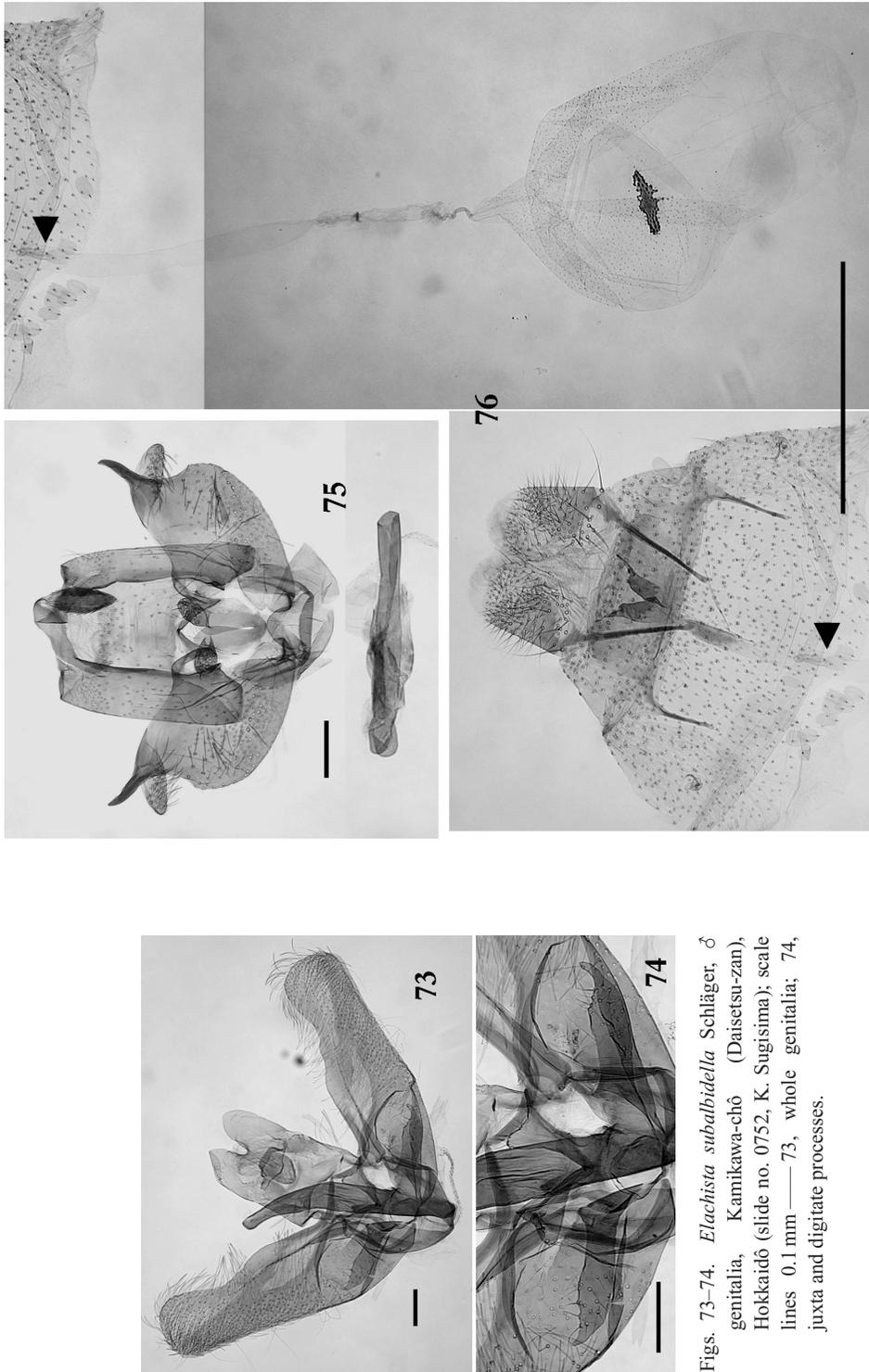
Figs. 62–66. *Elachista cingillella* (Herrich-Schäffer), ♀ genitalia, Han'nô-shi, Saitamaken (slide no. TI-135, T. Imai); scale lines 0.1 mm — 62, caudal part; 63, corpus bursae; 64, area around ostium; 65–66, signa.



Figs. 67–69. *Elachista fasciola* Parenti, ♂ genitalia; scale lines 0.1 mm — 67, Koshimizuchô, Hokkaidô (slide no. 1415, K. Sugisima), juxta and digitate processes in Fig. 68; 69, Toyono-chô, Ôsaka-fu, Honshû (slide nos. 1412, K. Sugisima).



Figs. 70–72. *Elachista fasciola* Parenti, ♀ genitalia, Nemuro-shi, Hokkaidō (slide no. 1863, K. Sugisima); scale lines 0.5 mm for Fig. 70, 0.1 mm for Figs. 71, 72 — 70, whole genitalia; 71, area around ostium; 72, signa and minute spines on corpus bursae.



Figs. 73–74. *Elachista subalbidella* Schläger, ♂ genitalia, Kamikawa-chō (Daisetsu-zan), Hokkaidō (slide no. 0752, K. Sugisima); scale lines 0.1 mm — 73, whole genitalia; 74, juxta and digitate processes.

Figs. 75–76. *Perittia unifasciella* Sinev from Hokkaidō, genitalia (slide nos. 0948/ 0778, K. Sugisima, respectively); scale lines 0.1 mm for Fig. 75, 0.5 mm for Fig. 76 — 75, ♂ from Sapporo-shi; 76, ♀ from Koshimizu-chō, triangles indicating same position.

- *Elachista subalbidella* Schläger
 —. Caudal end of ductus bursae forming shallow bowl-shaped antrum (Fig. 64) or no antrum present (Fig. 71) 7
 7. Caudal end of ductus bursae forming shallow bowl-shaped antrum, (Fig. 64)
 *Elachista cingillella* (Herrich-Schäffer)
 —. Ostium surrounded by U-shaped broad sclerotized band in cephalic and lateral margins instead of antrum (Fig. 71)
 *Elachista fasciola* Parenti

Acknowledgements

I thank L. Kaila for providing me with European specimens including those of *E. adscitella* and *E. subalbidella*, for giving me comments on a specimen of Japanese *E. cingillella*, and for critically reading and giving valuable comments to an earlier draft. I thank the late J. Klimesch for his donation of European specimens to SEHU. For the loan or donation of Japanese specimens, I thank the following institutes and persons: Yutaka Arita, Nagao Hirano, Toshihiro Imai, Utsugi Jinbo, Susumu Kawahara, Hiroyuki Kogi, Tosio Kumata, Takahiro Mano, NSMT and its staff, Mamoru Owada, OUP and its staff, Toshiya Hirowatari, Toshihisa Saito, Yositaka Sakamaki. The Japanese specimen of *Elachista subalbidella* was collected at Daisetsuzan National Park with the official permissions of the Japanese government (no. Kan-sei-dou 231, issued on 20 May 1998; I-ho 4-342, issued on 27 May 1998).

References

Herrich-Schäffer, G. A. W., 1847–1855. *Systematische Bearbeitung der Schmetterlinge von Europa*, **5**: 399 pp., 124 pls. Regensburg.
 Kaila, L. 1992. The Elachistidae of southern Siberia and Central Asia, with descriptions of five new species (Lepidoptera). *Entomologica Fennica*, **3**: 177–194.
 Kaila, L., 1997. A revision of the Nearctic species of *Elachista* s. l. II. The *argentella* group (Lepidoptera, Elachistidae). *Acta Zoologica Fennica*, **206**: 1–93.
 Kaila, L., 1999. Phylogeny and classification of the s. s. (Lepidoptera: Gelechioidea). *Systematic Entomology*, **24**: 139–169.

Kaila, L. & J. Junnilainen, 2002. Taxonomy and identification of *Elachista cingillella* (Herrich-Schäffer, 1855) and its close relatives (Lepidoptera: Elachistidae), with descriptions of two new species. *Entomologica Fennica*, **13**: 167–188.
 Kaila, L., K. Nupponen, J. Junnilainen, T. Nupponen, J.-P. Kaitila & V. Olschwang, 2003. Contribution to the fauna of Elachistidae (Lepidoptera) of the Southern Ural Mountains. *Entomologica Fennica*, **14**: 65–90.
 Parenti, U., 1983. Elachistidi del Giappone (Lepidoptera, Elachistidae). *Bolletino del Museo regionale di Scienze naturali, Torino*, **1**: 1–20. [In Italian with English abstract.]
 Parenti, U., 1992. *Elachista adscitella* Stainton ed *Elachista revinctella* Zeller (Lepidoptera, Elachistidae). *Bolletino del Museo regionale di Scienze naturali, Torino*, **10**: 237–244. [In Italian with English abstract.]
 Parenti, U., 2005. Notes on the bionomy of *Elachista cingillella* (Herrich-Schäffer, 1855) and *Elachista geminatella* (Herrich-Schäffer, 1855) (Lepidoptera: Elachistidae). *SHILAP Revista de lepidopterologia*, **33**: 25–30.
 Parenti, U. & P. G. Varalda, 1994. Gli Elachistidi (Lepidoptera, Elachistidae) e le loro piante ospiti. *Bolletino del Museo regionale di Scienze naturali, Torino*, **12**: 73–136. [In Italian with English abstract.]
 Robinson, G. S., 1976. The preparation of slides of Lepidoptera genitalia with special reference to the microlepidoptera. *Entomologist's Gazette*, **27**: 127–132.
 Schläger, F., 1847. Entdeckungen, Ergänzungen, Berichtigungen und sonstige Bemerkungen. *Ber. Lepidopt. Tausch-Ver.*, **1847**: 223–244.
 Sinev, S. Yu., 1992. New species of the genera *Perittia* and *Stephensia* (Lepidoptera, Elachistidae) from Siberia and Far East. *Vestnik zoologii*, **1992**: 1–9. [In Russian with English summary.]
 Sinev, S. Yu. & Sruoga, V., 1997. Family Elachistidae. In: Ler, P. A. (ed.), *Key to the insects of Russian Far East*, 5. Trichoptera and Lepidoptera, **1**: 491–502. Dal'nauka, Vladivostok. [In Russian.]
 Sippola, L., 2004. Onnistunut *Elachista cingillella*-heinäkoin kasvatus. *Diamina*, 2004: 8–9. [In Finnish with English title].
 Sruoga, V., 1991. On the fauna of the gramineal elachistid moths (Lepidoptera, Elachistidae) of the USSR. *Entomologiskoe obozrenie*, **70**: 444–454.
 Sruoga, V., 1995. Description of *Cosmiotes cornutifera* sp. n. and a provisional check-list of Elachistidae fauna of Far-Eastern Russia (Lepidoptera, Elachistidae). *Phegea*, **23**: 157–162.
 Sruoga, V., 2004. New records and a new synonymy in Elachistidae (Lepidoptera: Gelechioidea) from Far Eastern Russia. *Zootaxa*, **522**: 1–6.
 Stainton, H. T., 1851. *A Supplementary Catalogue of the*

- British Tineidae & Pterophoridae*. 32 pp., London.
- Traugott-Olsen, E., 1996. Phylogeny of the subfamily Elachistinae s. str. Part IV: Stephensiini, with some taxonomic revision and descriptions of new taxa (Lepidoptera: Elachistidae). *SHILAP Revista de lepidopterologia*, **24**: 124–149.
- Traugott-Olsen, E. & E. S. Nielsen, 1977. The Elachistidae (Lepidoptera) of Fennoscandia and Denmark. *Fauna Entomologica Scandinavica*, **6**: 1–299.