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ON THE SPECIES OF THE GENERA PARORNIX SPULER AND CALLISTO STEPHENS OCCURRING IN JAPAN, WITH DESCRIPTIONS OF TWO NEW SPECIES

(LEPIDOPTERA : GRACILLARIIDAE)

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In this paper is given a preliminary taxonomic revision of Japanese species belonging to the genera *Parornix* Spular and *Callisto* Stephens, both of which are closely related to each other in adult structures and in larval habit. Although the genus *Parornix* is represented by about 50 species which occur mainly in the Holarctic region, from Japan no species has been recorded. In the course of the present study I have found three species of the genus from Japan, of which two are new to science and the other new to Japan. Furthermore, I have been convinced that the species which is described under the name *Lyonetia multimaculata* Matsumura should be transferred to the genus *Callisto*, which has been represented by five species in Europe.

The specimens used in this paper, unless otherwise stated, are collected by myself, and the types of the new species are deposited in the collection of the Entomological Institute of the Hokkaido University.

On this occasion I wish to express my sincere gratitude to Prof. C. Watanabe of the Hokkaido University for his continuous guidance and encouragement. Grateful thanks are also due to Dr. J. Klimesch of Austria for his kindness in sending valuable European material of Gracillariidae for my present study.

Genus ***Parornix*** Spular

Parornix Spuler, 1910, Schmett. Europas 2: 410; Ely, 1917, Proc. Ent. Soc. Washingt. 19: 42; Benander, 1944, Opusc. Ent. 9: 124; Vári, 1961, South Afr. Lep. 1, Lithocolletidae: 131.

Type-species: *Ornix anglicella* Stainton.

This genus may be readily distinguishable from any related ones by the following combination of the characters:— Head roughly scaled; mid femur and tibia more or less thickened with scales; hind tibia slightly thickened, without arising, spine-like scales; fore wing with vein Cu_1 absent, veins R_5 and M_1 long-stalked, and veins M_2 and M_3 connate and arising from lower angle of cell; hind wing with cell opening, and vein M_3 absent. In male genitalia tegumen simple, with a pair of setaceous areas near apex usually; cucullus of valva much widened, rounded on distal margin, with dense, slender setae along distal submargin; sacculus usually separated from valva proper, more or less acutely pointed apically or having one or two conspicuous projections; eighth sternite somewhat produced caudally, without coremata. In female genitalia papillae anales more

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or less prolonged, stoutly joining to eighth abdominal segment; ostium bursae opening in centre of eighth sternite, without sterigma; corpus bursae with two scobinate or spinous signa.

The Japanese species are very similar in clour and general appearance, but may be distinguished by the following key which is mainly based upon the genital structures.

Key to the Japanese species of *Parornix*

1. Apical segment of labial palpus wholly white; sacculus small, circular, with two short, slender projections; aedoeagus curved, with a short projection at middle; ductus bursae wholly membranous, with a scobinate patch on cervix bursae; larva feeding on *Alnus*. . . *P. alni*, sp. nov.
- Apical segment of labial palpus with a blackish ring or blotch; sacculus long, semilunar or hook-shaped, sharply pointed apically; aedoeagus rather straight, without such a projection; ductus bursae weakly scobinate on almost whole length. . . . . 2.
2. Face white, darkened only on anterior extremity; cucullus nearly circular; sacculus semilunar, somewhat gradually narrowed towards apex; transtilla interrupted at middle, with a pair of labides; aedoeagus needle-form, acutely pointed apically, with a longitudinal cleft; larva feeding on *Betula*. . . . . *P. betulae* (Stainton).
- Face wholly brownish-gray; cucullus elliptical; sacculus hook-shaped, much narrowed on apical 1/4; transtilla very narrow, not interrupted, without labides; aedoeagus bar-shaped, truncated apically, without cleft; larva feeding on a species of Ericaceae. . . . . *P. minor*, sp. nov.

Parornix betulae (Stainton)

Ornix betulae Stainton, 1854, Ins. Brit. 3: 205; Frey, 1956, Tin. Schweiz: 251; Ibid., 1863, Linn. Ent. 15: 33; Stainton, 1864, Nat. Hist. Tin. 8: 262, pl. 2, f. 2; Wocke, 1877, in Heinemann, Schmett. Deutsch. 2: 639; Meyrick, 1912, Lep. Cat. 6: 52; Ibid., 1927, Rev. Handb. Brit. Lep.: 788.

Ornix (Parornix) betulae: Spuler, 1910, Schmett. Europas 2: 44; Eckstein, 1933, Schmett. Deutsch. 5: 159.

Parornix betulae: Pierce & Metcalfe, 1935, Genit. Tin. Brit.: 79, pl. 48; Benander, 1944, Opusc. Ent. 9: 127, f. 7f; Hering, 1957, Bestimm. Blattminen Europa 1: 176.

Ornix scutulatella Stainton, 1854, Ins. Brit. 3: 206.

This species is new to Japan. On this occasion a description of the genitalia of the both sexes is given below:—

Male genitalia: Tegumen short, rounded apically, with a pair of well-defined, raised, setaceous areas at base of tuba analis, which is moderate in length, with a narrow subscaphium. Valva almost straight, narrowed on basal half, and then suddenly widened towards cucullus, which is nearly circular; sacculus semilunar in shape, sharply pointed apically, about half as long as valva. Transtilla interrupted at middle, each piece forming a circlet at base of valva; labidis short. Vinculum widened cephalo-laterally, and somewhat convex on each caudo-lateral margin; saccus slender, truncated apically. Aedoeagus about as long as valva, straight, needle-form, with a narrow, longitudinal cleft reaching from apical 1/4 to base; ductus ejaculatorius sclerotized at anterior part. Eighth sternite with a narrow, long, trapezoid lobe at caudal margin.

Female genitalia: Papillae anales somewhat prolonged, with long setae on caudal half, and with a small, triangular plate at cephalo-ventrum; postapophysis short, but slightly longer than antapophysis. Eighth abdominal segment rather short, with a pair of peaked projections on caudo-ventrum. Ductus bursae moderate in length, somewhat twisted on median part, very weakly scobinate on almost whole length; corpus bursae globular, with two large, prolonged, spinous signa, around which many weak scobs are

scattered.

Specimens examined: 1♀, 17. IX, 1963, Wassamu, Hokkaido, 1♂ & 1♀, 27. VII, & 30. VIII, 1957, Sapporo, Hokkaido, and 1♀, 5. IV, 1958, Inawahara, Nagano-ken, Honsyu (K. Kamijo leg.), ex *Betula platyphylla*; 1♂ (determined by J. Klimesch as *P. betulae*), 9. VI, 1957, Steinwänd-Kopf, Austria (J. Klimesch leg.), ex *Betula* sp.

Distribution: Japan (Hokkaido; Honsyu); Middle and North Europe.

Host plants: *Betula platyphylla* Sukatchev in Japan, and *Betula* spp. in Europe (Betulaceae).

Remarks: So far as the present specimens are examined, the Japanese form seems to agree well with the European, without any special differences in structure and colour.

Parornix minor, sp. nov.

♂. Crown on head dark brown, mixed with some white, short scales posteriorly; face brownish-gray. Palpi whitish, with a blackish subapical ring on labial palpus; maxillary palpus very minute, shorter than half length of second segment of labial palpus. Antenna ochreous-white, annulated with brownish-gray; scape ochreous-white, irrorated with some brownish-gray scales, with a basal pecten of white hairs. Thorax ochreous-white, irrorated with some dark gray scales; tegula blackish-brown. Legs blackish; all coxae and four anterior femora with two white blotches at base and middle; hind femur whitish, with two blackish spots at middle and near base; hind tibia becoming paler towards base; all tarsi whitish, each segment with a blackish apical ring. Fore wing gray, irrorated with whitish and brownish-black scales, especially the latter being arranged somewhat reticularly on basal half and dorsal area, with twelve white strigulae placed throughout costa; these costal strigulae, except three at apex of wing, slightly oblique outwardly and reaching at most half across wing, three at apex being direct or oblique inwardly and reaching almost dorsal margin; a round, small, black spot situated at apex of wing; cilia around apex of wing whitish with three blackish lines, and along dorsal margin of wing wholly pale gray. Hind wing gray, with cilia pale gray.

Expanse of fore wings, 7.0 mm.

Male genitalia: Tegumen short, somewhat angulated apically, with a pair of setaceous areas at sides of inner surface; tuba analis produced moderately, with a broad subscaphium. Valva rather straight, narrowed on basal half, and then widened towards cucullus, which is elliptical in shape; costa convex; sacculus hook-shaped, about 3/4 as long as valva. Transtilla very slender, without labidis. Vinculum widened cephalo-laterally, and angulated on caudo-lateral margins; saccus broad, rounded apically. Aedoeagus about as long as valva, almost straight, somewhat dilated just beyond middle, truncated apically, very simple, without any projection or cleft; ductus ejaculatorius not sclerotized. Eighth sternite with a broad, triangular lobe on caudal margin.

Holotype (♂): 24. IV, 1959, Minô, Osaka, Honsyu (K. Kamijo leg.), ex a species of Ericaceae.

Distribution: Japan (Honsyu).

Parornix alni, sp. nov.

♂ & ♀. Head whitish, the crown being mixed with some long, blackish-brown scales laterally; face white, somewhat darkened anteriorly. Palpi whitish, without any dark scales; maxillary palpus very minute, about 3/5 as long as second segment of labial

palpus. Antenna ochreous-white, annulated with dark brown; scape slightly thickened, whitish, mixed with a few blackish-brown scales, with a basal pecten of whitish hairs. Thorax white, with a pair of small, blackish-brown spots near posterior angle, and sometimes with a narrow median line; tegula blackish-brown on basal 2/3. Legs blackish-brown; coxae and femora with two ill-defined, oblique, whitish streaks around middle; fore and mid tarsi whitish, each segment with a blackish, narrow apical ring; hind tibia somewhat becoming paler towards base; segments of hind tarsus, except apical one which is wholly whitish, whitish only on apical and basal extremities. Fore wing blackish, irrorated with whitish scales on basal area and along dorsal margin, with nine to eleven narrow, white strigulae situated almost throughout costa; among these strigulae four to five on basal half of wing ill defined and reaching at most costal 1/4 across wing, while the rest being well defined, wedge-shaped, and much longer, especially two from apex of wing reaching almost dorsal margin of wing; two rather large, whitish blotches placed near dorsal margin before middle of wing, and followed by similar, black blotches; a narrow, whitish transverse line or streak situated on apical 1/3 of disc, and sometimes fused with a costal strigula; a round, small, black spot at apex of wing margined internally with an extremely narrow, white line; cilia around apex of wing blackish on basal half and whitish with two blackish lines on apical half, and along dorsal margin of wing wholly pale gray. Hind wing dark gray, with cilia dark ochreous-gray.

Expanse of fore wings, 8.0–9.0 mm.

Male genitalia: Tegumen short, rounded apically, with a pair of setaceous areas near apex of inner surface; tuba analis moderately produced, with a broad subscaphium. Valva slightly bent downwards at basal 1/4, narrowed on basal 1/3, and then much widened towards cucullus, which is almost circular; costa angulated at basal 1/4 of valva; sacculus circular, about quarter as large as cucullus, with two short projections, of which the upper one is very narrow and curved semicircularly, and the lower one broader and less curved. Transtilla rather wide, but slightly narrowed at middle, with a pair of slender, long labides. Vinculum rather widened cephalo-laterally, with an angulated lobe on each latero-caudal margin; saccus slender, truncated apically. Aedoeagus a little longer than half length of valva, curved, gradually narrowed towards apex, bluntly pointed apically, without cornuti, but with a short projection at middle; ductus ejaculatorius sclerotized at proximal end and near distal one. Eighth sternite with a broad, short, trapezoid lobe caudally.

Female genitalia: Papillae anales rather prolonged, with long setae on caudal half; postapophysis short, slender. Eighth abdominal segment very short, with a small, elliptically sclerotized plate at caudo-ventrum; antapophysis slender, slightly longer than postapophysis. Ductus bursae long, narrow, membranous on whole length, with a scobinate patch on cervix bursae; corpus bursae very large, ellipsoidal, with two small, circular, scobinate signa, around which some weaker scobs are scattered.

Holotype (♂): 30. VI, 1959, Teine, Hokkaido. Paratypes: 1♂, 5. IV, 1958, Zyô-zankei, Hokkaido, and 2♀♀, 11–17. IV, 1958, Otaki, Nagano-ken, Honsyu (K. Kamijo leg.), ex *Alnus hirsuta*; 1♀, 15. VII, 1960, Aizankei, Hokkaido (S. Takagi leg.); 1♂, the same as holotype.

Distribution: Japan (Hokkaido; Honsyu).

Host plants: *Alnus hirsuta* Turcz. (Betulaceae).

Remarks: This species is quite peculiar in having the circular sacculus which bears two short narrow projections: the upper one is curved semicircularly, and the lower a little thicker, and slightly arched downwards.

Genus ***Callisto*** Stephens

Callisto Stephens, 1834, Ill. Brit. Ent. (Haust) 4: 276; Benander, 1944, Opusc. Ent. 9: 123; Vári, 1961, South Afr. Lep. 1, Lithocolletidae: 119.

Ornix Zeller, 1839, Isis 32: 210 (nec Tritschke, 1833). [Type-species: *Gracillaria guttea* Haworth].

Type-species: *Gracillaria guttea* Haworth (=*Tinea denticulella* Thunberg).

The Genus *Callisto* is very closely related to the genus *Parornix*, but may be distinguished from the latter by the venation of the hind wing and by the structure of the genitalia as follows:— In hind wing vein M_3 present and stalked with veins Cu_1 and Cu_2. In male genitalia tegumen without any setaceous or spinous areas; cucullus scattered with slender setae on almost its distal half; aedoeagus with cornuti. In female genitalia eighth abdominal segment distinctly separated from papillae anales through intersegmental membrane, with a pair of small projections at sides; sterigma very distinct.

Callisto multimaculata (Matsumura), comb. nov.

Lyoneta (!) *multimaculata* Matsumura, 1931, 6000 Ill. Ins. Jap.: 1106, f. 2308; Ibid., 1931, Ins. Mats. 6: 200.

Lyonetia multimaculata: Inoue, 1954, Check List Lep. Jap. 1: 24.

On the basis of the specimens at hand a redescription of this species will be given below:—

♂ & ♀. Crown on head white, mixed with a few blackish-brown, long scales behind base of antenna; face white, somewhat darkened anteriorly. Palpi whitish; maxillary palpus very minute, about half as long as second segment of labial palpus, of which the apical segment with a broad, blackish median ring. Antenna whitish on lower side, and dark brown with whitish, narrow stripes on upper side; scape blackish-brown, irrorated with white scales, with a pecten of whitish hairs. Thorax white, with a pair of blackish-brown spots near posterior angle, and sometimes with a narrow median line; tegula blackish-brown, sometimes whitish apically. Fore and mid legs blackish-brown, the coxae and femora with three oblique, ill-defined, white streaks, the tarsi being whitish, with two blackish rings at middle and apex in basal two segments and with one ring at apex in remaining segments; hind leg ochreous-whitish, the coxa with a blackish-median streak, the femur with a blackish subbasal spot, the tibia becoming darker towards apex, the tarsus being dark brown on upper side of apical half on each segment. Fore wing broadly lanceolate, blackish-gray, heavily irrorated with white scales on basal and dorsal areas (in a specimen reared from *Prunus Avium* the subcostal area is also irrorated with white scales, see pl. VII. fig. 2), with fifteen to sixteen short, white strigulae situated almost throughout costa; among these costal strigulae eight to nine on basal half of wing very short and ill defined, while the rest being longer and hook-shaped; a round, small, blak spot at apex of wing margined internally with a narrow white line; two rather large, ill-defined, black blotches situated near middle below fold

of wing; one or two unconspicuous, blackish blotches also situated on disc near apex of wing; cilia around apex of wing blackish-brown on basal half and whitish with two blackish lines on apical half, and along dorsal marign of wing wholly gray. Hind wing and cilia gray.

Expanse of fore wings, 8.5–12.0 mm.

Male genitalia: Tegumen somewhat triangular, very acutely pointed apically, without any spines or setae; tuba analis long-produced, wholly membranous. Valva rather straight, narrowed on basal 2/3, and then widened towards cucullus, which is bluntly angulated at ventro-distal corner and rounded on distal margin, with many slender setae on distal area; sacculus very short and wide, somewhat angulated caudally at each dorso-lateral portion, both sacculi being united with each other at dorsum. Transtilla narrow, with a pair of short labides. Vinculum moderate in length; saccus about as long as tegumen, rounded apically. Aedoeagus about 1.2 times as long as valva, slender, curved, compressed laterally, with dense, spine-like cornuti, which are arranged almost on the whole length as a row and become longer towards the apex of aedoeagus; a very long, flat projection streched from subbase of aedoeagus, about half as long as aedoeagus, and pointed apically. Eighth sternite with a large, triangular lobe on caudal margin.

Female genitalia: Papillae anales much prolonged on ventrum, with rather short setae on caudal area; postapophysis widened basally, a little longer than twice length of antapophysis. Eighth abdominal segment prolonged, with a pair of small projections on lateral areas. Ostium bursae opening in centre of eighth sternite, with a small, semilunar lamella antevaginalis; ductus bursae moderate in length, very weakly scobinate on whole length; corpus bursae ellipsoidal, with two small, round, scobinate signa, around which many weak scobs are scattered.

Specimens examined: 1♂ (holotype of *Lyoneta multimaculata* Mats.), 27. VII, 1917, Sapporo, Hokkaido (S. Matsumura leg.); 2♀♀, 7–10. IV, 1958, Yamabe, Hokkaido (T. Kodama leg.), ex *Prunus salicina*; 1♀, 19. VII, 1956, 1♂, 8. IV, 1958, and 1♀, 21. VII, 1960, Sapporo, ex *Malus baccata* var. *mandshurica*; 1♂, 10. IV, 1958, Sapporo, ex *Prunus Sargentii*; 1♂ & 2♀♀, 23. VII, 1963, and 1♂ & 2♀♀, 28–30. VII, 1964, Sapporo, ex *P. Mume*; 2♀♀, 13. V, 1963, Kotoni, Hokkaido (T. Oku leg.), ex *P. Avium*; 2♀♀, 28. V, 1962, Sapporo (N. Okabe leg.).

Distribution: Japan (Hokkaido).

Host plants: *Malus baccata* Borkh. var. *mandshurica* C. K. Schn.*, *Prunus Sargentii* Rehder, *P. salicina* Lindl., *P. Avium* Linn. and *P. Mume* Sieb. et Zucc. (Rosaceae).

Remarks: This species is quite close to *C. torquilella* (Zellar), which attacks the leaf of *Prunus* spp. in Europe and Asia Minor, but may be readily distinguished from the latter by the fore wing without purplish gloss, by the snow-white crown of the head, by the shape of the valva and by the arrangement of the cornuti of the aedoeagus.

* This plant is mentioned as *Malus Toringo* in my previous papers.

Explanation of plates

Plate VII. Wings (figs. 1–5) and male genitalia (fig. 6). Fig. 1, *Callisto multimaculata* (Matsumura), typical form; 2, ditto, a variation reared from *Prunus Avium*; 3, *Parornix betulae* (Stainton); 4, *P. minor*, sp. nov.; 5 & 6, *P. alni*, sp. nov.

Plate VIII. Venations of wings (figs. 7 & 8) and male genitalia (figs. 9–11). Fig. 7, *Callisto multimaculata* (Matsumura); 8, *Pararnix alni*, sp. nov.; 9, *C. multimaculata* (Matsumura); 10, ditto, aedoeagus; 11, ditto, eighth abdominal segment.

Plate IX. Male genitalia. Fig. 12, *Parornix betulae* (Stainton); 13, ditto, aedoeagus; 14, ditto, eighth abdominal segment; 15, ditto, aedoeagus of European form; 16, *P. minor*, sp. nov.; 17. ditto, aedoeagus; 18, ditto, eighth abdominal segment; 19, *P. alni*, sp. nov.; 30, ditto, aedoeagus; 21, ditto, eighth abdominal segment.

Plate X. Female genitalia. Fig. 22, *Parornix betulae* (Stainton); 23, *P. alni*, sp. nov.; 24, *Callisto multimaculata* (Matsumura).

DISCOVERY OF EPINOTIA SIGNATANA (DOUGLAS) IN JAPAN. *Epinotia signatana* (Douglas) is a pest of the cherry tree in Europe, but it has been unknown from the eastern part of Asia including Japan. On this occasion the opportunity is taken of giving Japan as a new locality of the species.

Sericoris signatana, Douglas, 1845, Zool., 3: 844. *Steganoptycha signatana*: Spuler, 1913, Kleinschmett. Eur.: 276. *Panoplia signatana*: Pierce et Metcalfe, 1921, Genit. Brit. Tort.: 61, pl. 20. *Epinotia signatana*: Obraztsov, 1945, Zeits. Ent. Ges. Wien., 30: 32; Bradley, 1959, Ent. Gaz., 10 (2): 73, pl. 13, no. 146; Hannemann, 1961, Tiewelt Deuts., 48: 171, Taf. 16, Fig. 7. *Paedisca krösmanniana*: Heinemann, 1863, Schemett. Deuts. u. Schweiz, II: 147.

Specimens examined:—1♂ (15 VII, 1955) & 1♂ (1 VII, 1956), Sapporo, Hokkaido; 2♂ 2♀ (12–15 VI, 1960), Kotoni, Sapporo (Host: *Malus* spp.); 1♂ (8 VI, 1960), Yoichi, Hokkaido (Host: *Malus sieboldii*); 2♂ 1♀ (12 VI–10 VII, 1960), Sapporo (Host: *Ulmus davidiana* var. *japonica*); 2♂ (12–17 VI, 1961), Kotoni, Sapporo (Host: *Malus sieboldii*); 1♀ (1 VI, 1964) & 1♂ 2♀ (21 VI–13 VII, 1965), Morioka, Honshu.

Distribution: Europe; Japan (Hokkaido and Honshu).

Host plants: *Ulmus davidiana* var. *japonica*, *Malus pumila*, *M. sieboldii*, and *M. baccata* in Japan; *Prunus* spp. in Europe.

The larva is found commonly on *Ulmus* and occasionally on the apple in the northern part of Japan, but on the latter host plant no serious outbreak has been seen up to the present. The mature larva is uniformly light greenish-yellow in colour.

TOSHIO OKU

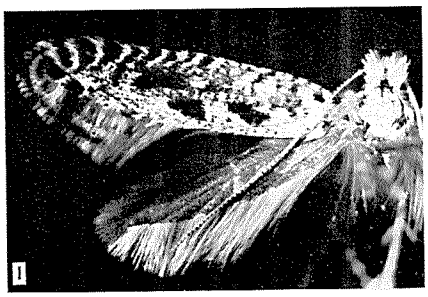
CORRECTIONS

Kumata, T.: Taxonomic studies on the Lithocolletinae of Japan (Lepidoptera: Gracillariidae). Ins. Mats.: 26 (1963):

p. 37, line 11 from bottom, for "ing" read "shading";
p. 79, line 10 from top, for "apically" read "basally";
p. 79, line 15 from top, for "basally" read "apically".

Oku, T.: Descriptions of nine new species of the genus *Coleophora* from Japan, with notes on other species (Lepidoptera: Coleophoridae). Ins. Mats. 27 (1964):

p. 114, line 10 from bottom; p. 115, line 15 from top; p. 116, line 7 from bottom; p. 117, line 17 from top and line 3 from bottom; p. 118, line 14 from bottom; p. 119, line 12 from bottom; p. 121, lines 8 and 11 from top; p. 122, lines 5 and 8 from top, for "ocellus" read "eye".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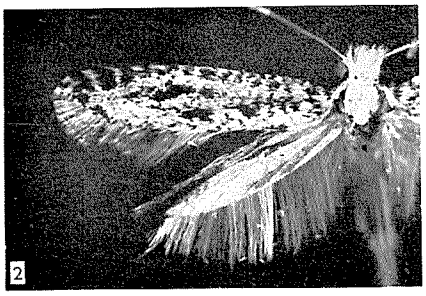
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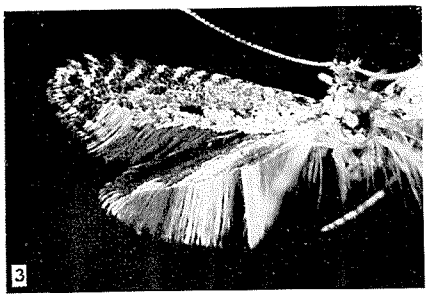
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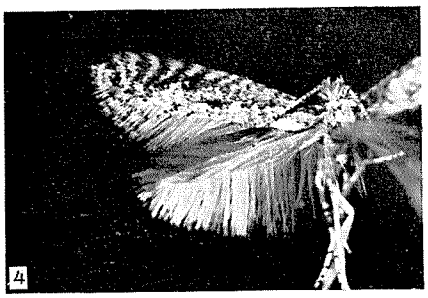
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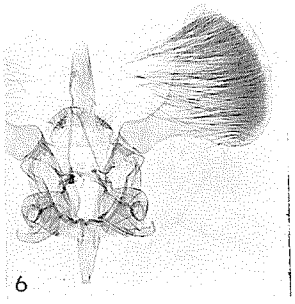
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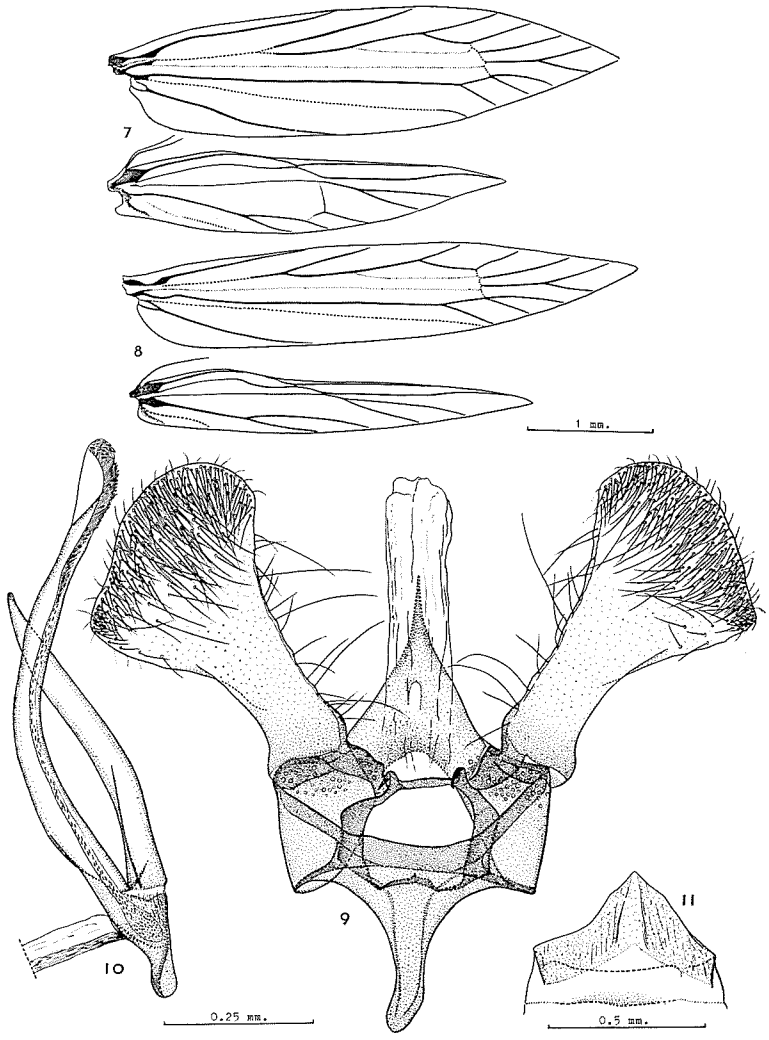
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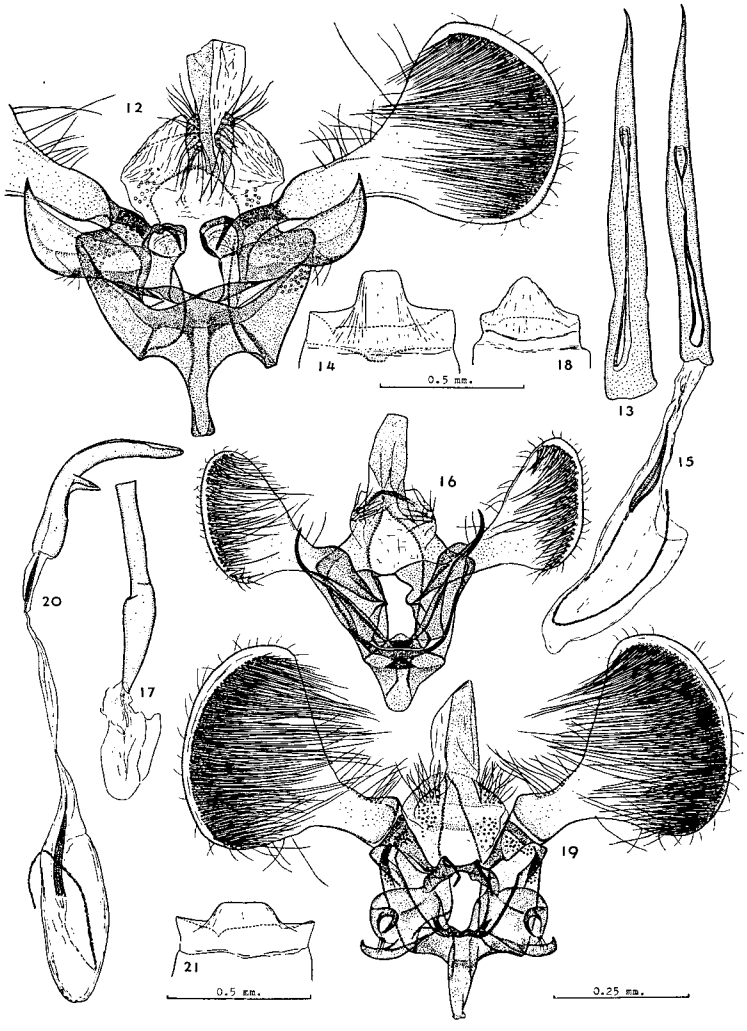
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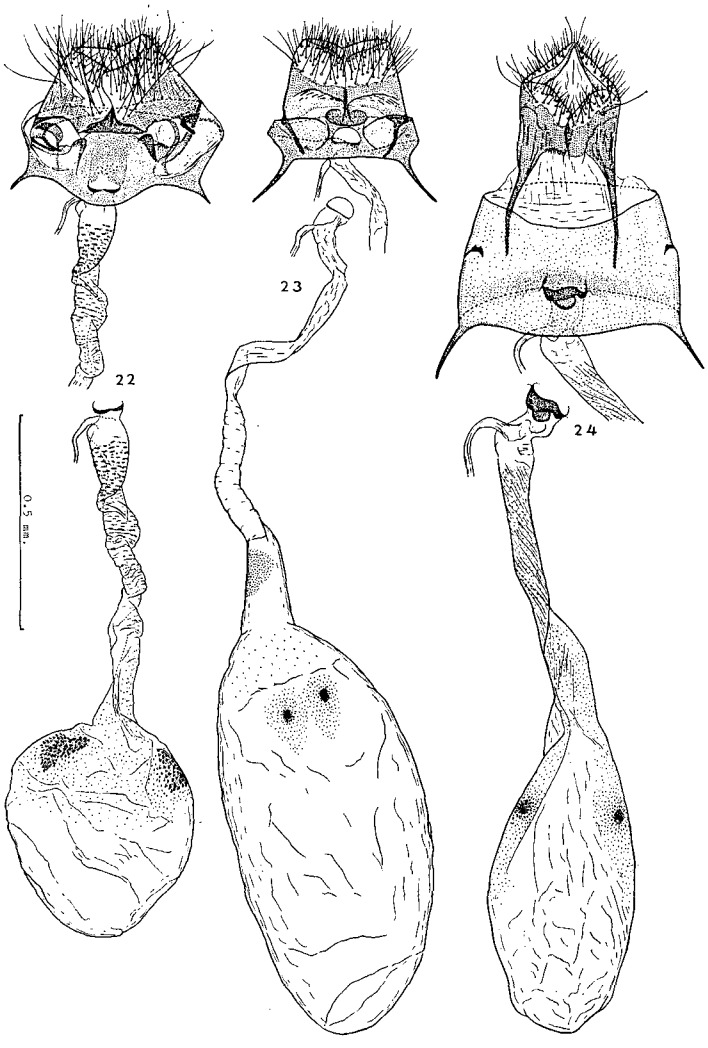
22
23
24
0.5 mm.