

Taxonomic Review of the Genus *Eupithecia* (Lepidoptera : Geometridae : Larentiinae) from Korea (II)

韓國產 애기물결자나방屬의 分類學的 整理(II)

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ABSTRACT Six species of the genus *Eupithecia* : *E. okadai* Inoue, *E. scribai* Prout, *E. perpaupera* Inoue, *E. kobayashii* Inoue, *E. tripunctaria* Herrich-Schäffer, and *E. virgaureata* Doubleday are newly reported from Korea, with illustration of genitalia of both sexes. Further 5 previously known species are also included.

KEY WORDS Taxonomy, Lepidoptera, Geometridae, Larentiinae, *Eupithecia*, Korea

초 록 한국산 애기물결자나방屬을 정리한 결과 2차로 11種이 分類 同定되었으며 이들중 *E. okadai* Inoue, *E. scribai* Prout, *E. perpaupera* Inoue, *E. kobayashii* Inoue, *E. tripunctaria* Herrich-Schäffer, *E. virgaureata* Doubleday 등 6종이 우리나라 未記錄種으로 확인되었기에 報告한다. 저자(1992)에 의해 신종으로 기재된 *E. bicornuta*는 재검토 결과 *E. homogrammata*의 수컷으로 밝혀져 後者의 同種異名으로 정리한다. 따라서 1차로 발표한 13종을 합하면 한국산 *Eupithecia*屬은 總 24종이 된다.

검색어 분류, 나비목, 자나방과, 물결자나방亞科, 애기물결자나방屬, 한국

In the first part of the review on the *Eupithecia* from Korea(Oh, 1992), the author enumerated 14 species of the genus, including description of a new species (*E. bicornuta* sp. nov). But it has been recognized that its' holotype is identical to the male of *E. homogrammata* Dietze, and is newly synonymized with the later. As the result of this study, further 11 species were recognized, and among them 6 species are reported for the first time from Korea.

Materials used for this study were based on author's private collection and specimens preserving in the Center for Insect Systematics,

Kangweon National University, Chuncheon, Korea.

SYSTEMATICS

Eupithecia gigantea Staudinger

먹줄애기물결자나방(Fig. 1)

Eupithecia gigantea Staudinger, 1897, Dt. ent. Z. Iris 10 : 109, pl. 3 : 7(Type-locality : Amur) : Inoue, 1977 : 274, 1979 : 161, 1982, 1 : 499 ; Shin, 1983 : 212.

Wingspan, 27mm. This species is the largest one among *Eupithecia* in Korea.

Female genitalia (Fig. 26). Ostium

broad; ductus bursae gradually narrowed from ostium, near junction of corpus bursae collard. Corpus bursae spherical with three bands of thorns from near junction of ductus bursae, middle of corpus bursae, and near caudal end; ductus seminalis arising from just above cephalic end.

Material examined. Mt. Myungji-san, 1♀, 28. VII. 1992(gen. prep. no. SH-319).

Food plant. Cone of *Pinus strobus* and *Abies sachalinensis* have been known from Japan (Inoue, 1979).

Distribution. Korea, Japan, Russian Far East including Saghalien.

Eupithecia bohatschi Staudinger

세줄애기물결자나방 (新稱) (Fig. 2)

Eupithecia bohatschi Staudinger, 1897. Dt. ent. Z., Iris 10: 111, pl. 3: 73 (Type-locality: Amur); Bryk, 1946: 184; Vojnits, 1981: 230.

Eupithecia tuvinica Viidalepp, 1976, Insects of Mongolia 4: 392.

Wingspan, 18mm. This species is very close to *E. sopfia* which is one of endemic species of Japan.

Female genitalia (Fig. 27). Papillae analis slender; apophysis posterioris very long, over two times length of anterioris; ductus bursae slender and distal end collard; corpus bursae spherical, minutely spined except lateral sides, middle area fewer; ductus seminalis arising from near junction of ductus bursae.

Material examined. Sogumgang, 1♀, 7. VII. 1988(gen. prep. no. SH-188).

Distribution. Korea, S. E. Siberia, Mongolia.

Eupithecia okadai Inoue

왕눈애기물결자나방 (新稱) (Fig. 3)

Eupithecia okadai Inoue, 1958, Tinea 4: 251, pl. 34, fig. 8 (Type-locality: Ehime Pref.,

Japan); Inoue, 1959: 200, pl. 139: 35, 1977: 277, 1979: 194, 1982, I: 503.

Wingspan, 20mm. Antennal ciliation little shorter than the width of shaft in male. Abdomen above rustrous red, mixed with black and grey scales. Wings somewhat elongate and greyish white above. Forewing with large black discal spot and three black fasciae at costa. Hindwing with discal spot much smaller than the forewing, but distinct.

Male genitalia (Fig. 12). Uncus short, basal half strongly expanded; valva rather broad, costa sclerotized strongly; sacculus sclerotized narrowly with blunt thornlike projection near middle, middle of sacculus deeply hollowed; aedeagus about 2/3 length of valva, cornuti weakly sclerotized. Eighth abdominal sternite (Fig. 19) narrow at middle, then expanded toward basal and distal end, basal and distal margin with hollow in center, distal margin narrower than basal margin; distal part membranous but lateral margin hardened.

Material examined. Chuncheon, 1♂, 23. IV. 1992(gen. prep. no. SH-318).

Food plant. Cone of *Symplocos chinensis* has been known from Japan (Inoue, 1979).

Distribution. Korea, Japan.

Eupithecia spadix Inoue

넓은날개애기물결자나방 (新稱) (Fig. 4)

Eupithecia spadix Inoue, 1955, Tinea 2: 81, pl. 6: 11 (Type-locality: Tokyo, Japan); Inoue, 1957: 229, 1959: 199, 1979: 197, 1982, I: 503.

Eupithecia abietaria: Shin & Kim, 1993: 10, fig. 7 (nec. Goeze).

Wingspan, 20~23mm. Upon examination of the figure, Shin & Kim misidentified *E. spadix* to *E. abietaria*.

Male genitalia (Fig. 13). Uncus and valva

slender. Valva tapering toward apex, costa narrowly sclerotized but membranous ventrally. Aedeagus small, approximately one-half length of valva, cornuti very weak and small. Eighth abdominal sternite (Fig. 20) quite peculiar shape for *Eupithecia*, a pair of arms strongly sclerotized, curved inwards then turns to upward, apex of arms sharply pointed.

Female genitalia (Fig. 28). Papillae analis small and flat; apophysis anterioris and posterioris very short; ductus bursae broad and sclerotized, about 1/3 length of corpus bursae. Corpus bursae large, spherical, caudal 1/3 sclerotized except junction of ductus bursae, one of the lateral side caudally swollen, the whole surface minutely striated, spines are not uniform; ductus seminalis arising from ventral surface at caudal part.

Material examined. Gwangneung, 1♂, 1♀, 6. VII. 1990; Mt. Abang-san, 1♀, 5. VII. 1975 (gen. prep. no. SH-256); Chuncheon, 1♂, 1♀, 21. III. 1990 (gen. prep. no. SH-277), 1♀, 6. V. 1990 (gen. prep. no. SH-258), 2♂♂, 30. VI. 1992; Mt. Myeongji-san, 1♂, 28. VII. 1992; Mt. Samak-san, 1♂, 1♀, 19. VII. 1988 (gen. prep. no. SH-259); Yangyang, 1♂, 17. VI. 1987; Mt. Seolak-san, 1♂, 10. VIII. 1989; Andong, 2♂♂, 7. VII. 1988 (gen. prep. no. SH-257).

Distribution. Korea, Japan.

Eupithecia absinthiata Clerck

맵시애기물결자나방 (Fig. 5)

Phalaena Geometra absinthiata Clerck, 1759, Icon. Ins. Rar. 1, pl. 6: 9.

Dyscymatoge absinthiata Hübner, [1825], Verz. bek. Schmett.: 324.

Tephroclystia absinthiata: Staudinger, 1901: 311.

Eupithecia absinthiata: Graeser, 1888, Berl. ent. Z. 32: 414; Bryk, 1946: 185; Inoue, 1956:

292, 1957: 229, 1959: 199, 1977: 275, 1979: 199, 1982, I: 503.

Wingspan, 19~22mm. This species was reported by Bryk(1946) from Hagalgu, North Korea.

Female genitalia (Fig. 29). Ductus bursae very short, membranous; corpus bursae elongate, spherical, gradually broadened toward cephalic end, basal 1/5 sclerotized with a row of spines at end of that, cephalic half completely covered with spines; ductus seminalis arising from basal 1/3.

Material examined. Chuncheon, 1♀, 6. IX. 1990 (gen. prep. no. SH-253); Muju, 1♀, 13. VIII. 1975 (gen. prep. no. SH-223).

Distribution. Korea, Japan, Manchuria, S. E. Siberia to Europe.

Eupithecia scribai Prout

연갈색애기물결자나방 (新稱) (Fig. 6)

Eupithecia scribai Prout, 1938, In Seitz, Macrolepid. Suppl. 4: 192, pl. 18: h; Vojnits, 1981: 229; Inoue, 1979: 205, 1982, I: 504.

Wingspan, 16mm in male, 21mm in female. Antennal ciliation a little shorter than the width of shaft in male, minute in female. Wings broad in male but somewhat elongate in female, ground color light brown. Forewing with dark costal marks and discal dot distinct, lines rather absent.

Male genitalia(Fig. 14). Valva ample, gradually tapering toward apex, costa narrowly sclerotized and continuing to near apex; sacculus weakly sclerotized. Aedeagus broad, shorter than the length of valva with different shape and size of five cornuti, of them two are dentated and platshape. Eighth abdominal sternite(Fig. 21) with basal margin broad and incurved centrally, then gradually narrowed toward distal end, distal margin slightly incurved

centrally.

Female genitalia(Fig. 30). Similar to *E. perpaupera*, but spineless area of basal half of corpus bursae totally sclerotized, size of spines smaller except lower row of spines.

Material examined. Suwon, 1♂, 10. IX. 1974(gen. prep. no. SH-325), 1♀, 2. IX. 1982(gen. prep. no. SH-342210).

Distribution. Korea, Japan, Russia (Saghalien).

Eupithecia perpaupera Inoue

숫검은애기물결자나방 (新稱) (Fig. 7)

Eupithecia perpaupera Inoue, 1965, Tinea 7: 106, pl. 18: 13, fig. 6: 16(Type-locality: Yamanashi Pref., Japan); Inoue, 1977: 275, 1979: 210, 1982, I: 505.

Wingspan, 20~22mm. Antennal ciliation nearly as same as width of shaft in male, 1/2 in female. Ground color of both wings dark brown. Forewing with apex somewhat acute; termen gibbous, faint submarginal white line dentate.

Male genitalia(Fig. 15). Valva broad with tapered apex, costa narrowly sclerotized and continuing to near apex; sacculus weakly sclerotized. Aedeagus broad, shorter than the length of valva with different shape and size of four cornuti. Eighth abdominal sternite(Fig. 22) weakly sclerotized, basal 1/2 heart-shape, lateral part of distal 1/2 more strongly sclerotized.

Female genitalia(Fig. 31). Ductus bursae broad and about 1/5 length of corpus bursae, junction of corpus bursae collard; corpus bursae elongate, gradually widened toward cephalic end, caudal area strongly sclerotized and distal end of sclerotized area with a row of spines horizontally, completely covered with spines in cephalic half; ductus seminalis arising from 1/3 distally.

Material examined. Chuncheon, 1♂, 19. VII.

1989(gen. prep. no. SH-237); Mt. Halla-san, 1♂, 1♀, 23. VIII. 1981(gen. prep. no. SH-279, 312).

Distribution. Korea, Japan.

Eupithecia tricornuta Inoue

흑점박이애기물결자나방 (Fig. 8)

Eupithecia tricornuta Inoue, 1980, Bull. Fac. domestic Sci., Otsuma Woman's Univ. 16: 153, figs. 39A-D(Type-locality: Tokyo, Japan); Inoue, 1982, I: 507; Shin, 1983: 212.

Wingspan, 20~25mm(vernal brood), 15~18mm(aestival brood). Aestival brood is much smaller than vernal brood.

Male genitalia(Fig. 16). Valva ample; ventral margin of sacculus nearly straight with a round process at the tip. Aedeagus a little longer than costa with three strong horn-like cornuti and a much more slender and weaker sclerite, two horns are subequal in length but the other much longer. Eighth abdominal sternite(Fig. 23) moderately sclerotized, basally expanded and deeply incised, tapered towards distal end, distal margin less than half breath of base with strongly sclerotized and sharply pointed projections laterally.

Female genitalia(Fig. 32). Apophysis posterioris over two times length of apophysis anterioris; ductus bursae broad and strongly sclerotized, about 1/3 length of corpus bursae; corpus bursae oblong with long spines, but cephalic and ventral area membranous and pouchlike projection from near caudal area; ductus seminalis arising from tip of pouchlike projection.

Material examined. Gwangnung, 1♂, 1♀, 28. IV. 1988, (gen. prep. no. SH-206); Chuncheon, 3♀♀, 22. IV. 1992, 1♂, 12. VII. 1988(gen. prep. no. SH-221), 2♂♂, 1♀, 30. VII. 1990(gen. prep. no. SH-222);

Chunseonggun, 1♀, 6. IX. 1990(gen. prep. no. SH-195); Yangyang, 6♂♂, 1♀, 10. V. 1987 (gen. prep. no. SH-207); Mt. Odae-san, 1♀, 12. IX. 1976(gen. prep. no. SH-232).

Distribution. Korea, Japan.

Eupithecia kobayashii Inoue

산애기물결자나방 (新稱) (Fig. 9)

Eupithecia kobayashii Inoue, 1958, Tinea 4: 250, fig. 7 (Type-locality: Nagano Pref., Japan); Inoue, 1980: 157, 1982, 1: 507.

Eupithecia kobayashii: Inoue, 1977: 278 (misspelling).

Wingspan, 24mm. Antennal ciliation less than half as long as width of shaft in male. Ground color of wings dark grey brown; lines of both wings faint. Forewing with white postmedian broad line gently incurved on vein R, then running straight to inner margin.

Male genitalia(Fig. 17). Similar to that of former, but sacculus more broadly sclerotized, its tip not so strongly produced; aedeagus shorter. The two hornlike cornuti are subequal in length but the central one is a little longer than others. Eighth abdominal sternite(Fig. 24) weakly sclerotized; expanded basally then gently narrowed to distal end, basal margin deeply incised and lateral side of basal part also shallowly incised, distal margin rounded.

Material examined. Mt. Jeombong-san, 1♂, 22. VI. 1992(gen. prep. no. SH-313).

Distribution. Korea, Japan.

Eupithecia tripunctaria Herrich-Schäffer

흰쌍점애기물결자나방 (新稱) (Fig. 10)

Eupithecia tripunctaria Herrich-Schäffer, 1855, Syst. Schmet. Eur. 6: 77; Prout, 1912: 285; Inoue, 1957: 228, 1959: 199, 1977: 276, 1980: 173, 1982, I: 510.

Tephroclystia albipunctata: Staudinger, 1901:

312.

Eupithecia albipunctata: Petersen, 1909, Dt. ent. Z. Iris 22: 244.

Wingspan, 20mm. Ground color of wings dark ashy brown above; thorax dark grey above with white spots on pro- and metathorax. Forewing with postmedian line dotted on the vein and follow by white double lines; faint white submarginal line dentate; discal spot distinct. Hindwing with discal spot small but distinct; near the hind angle of both wings with a pair of white spots.

Female genitalia(Fig. 33). Papillae analis small and flat: apophysis anterioris and posterioris very short; ductus bursae broad and sclerotized, about 1/3 length of corpus bursae. Corpus bursae large, spherical, caudal 1/3 sclerotized except junction of ductus bursae, one of the lateral side caudally swollen, the whole surface minutely striated, spines are not uniform. Ductus seminalis arising from ventral surface at caudal part.

Material examined. Mt. Seolak-san, 1♀, 16. VIII. 1992(gen. prep. no. SH-317).

Distribution. Korea, Japan. Manchuria, S. E. Siberia to Europe.

Eupithecia virgaureata Doubleday

고운애기물결자나방 (新稱) (Fig. 11)

Eupithecia virgaureata Doubleday, 1861, in Newmans. Br. Moths: 127, pl. 3; Staudinger & Rebel, 1901: 312; Wileman, 1911: 330; Prout, 1912: 294; Vojnits, 1981: 229; Inoue, 1982, I: 512.

Eupithecia inmsa Butler, 1878, Ann. Mag. nat. Hist. (5) 1: 444; Butler, 1879, Ill. Hel. Coll. Brit. Mus. 3: 51; Leech, 1897: 68; Prout, 1912: 284; Inoue, 1956: 291.

Eupithecia pimpinellata invisa: Inoue, 1977: 277.

Eupithecia vrgaureata invis: Inoue, 1980: 193.

Wingspan, 13~17mm. Antennal ciliation nearly same width of shaft in male, 1/2 in female. Wings somewhat elongate: ground color of wings dark silky grey. Forewing with discal black dot distinct; antemedian line angled in cell; outer postmedian line weakly angled inward at Sc, then angled outward at R; median area between the two lines darker. Hindwing variegated with fuscous lines and ground color toward hindmargin whitish.

Male genitalia(Fig. 18). Valva ample, ventral margin gently curved, minutely and weakly serrated. Aedeagus weakly sclerotized and about 2/3 length of valva, a slender thornlike cornutus about one-third length of aedeagus, another cornutus shorter and broader, the last one is a broad plate emitting a thornlike projection. Eighth abdominal sternite(Fig. 25) tapered toward distal end, basal expansion moderate and incision shallow, narrowest at middle and apical projection spinelike, right one is a little longer than the left and weakly curved to the left.

Female genitalia(Fig. 34). Ductus bursae extremely short, membranous; tubular part of corpus bursae with a bandlike sclerotization at right side, small globular part densely and minutely spined, cephalic portion spine free; ductus seminalis arising from near middle.

Material examined. Chuncheon, 2♂♂, 2♀♀, 9. IX. 1988(gen. prep. no. SH-225, 244, 246); Sogumgang, 1♀, 7. VII. 1988; Mt. Seolak-san, 1♂, 10. VIII. 1989(gen. prep. no. SH-230); Mt. Gyeong-bang-san, 1♀, 24. VIII. 1988(gen. prep. no. SH-233); Mt. Odae-san, 1♀, 23. V. 1989(gen. prep. no. SH-321); Mt. Jeombong-san, 1♀, 10. VIII. 1992(gen. prep. no. SH-328).

Food plant. Flower of *Solidago Japonica*

(Compositae) has been known from Japan (Inoue, 1980).

Distribution. Korea, Japan, S. E. Siberia to Europe.

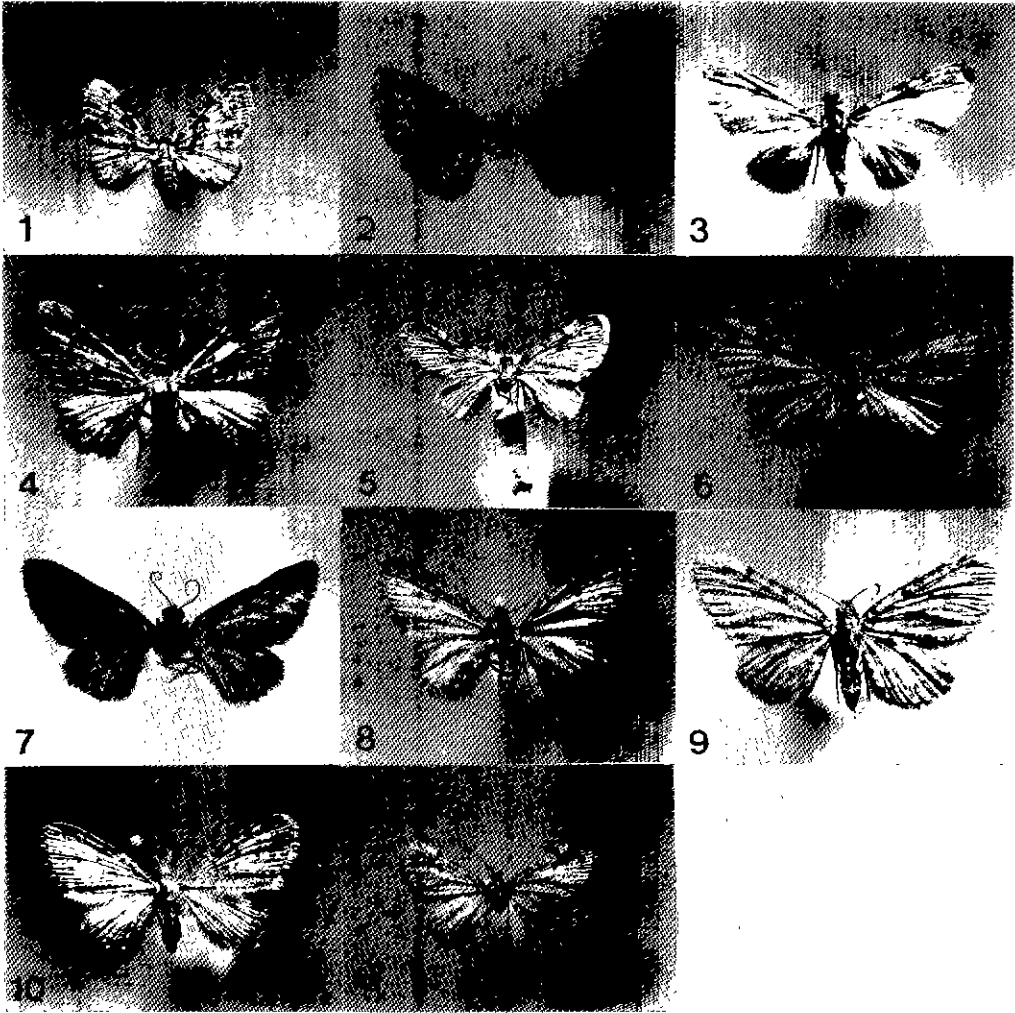
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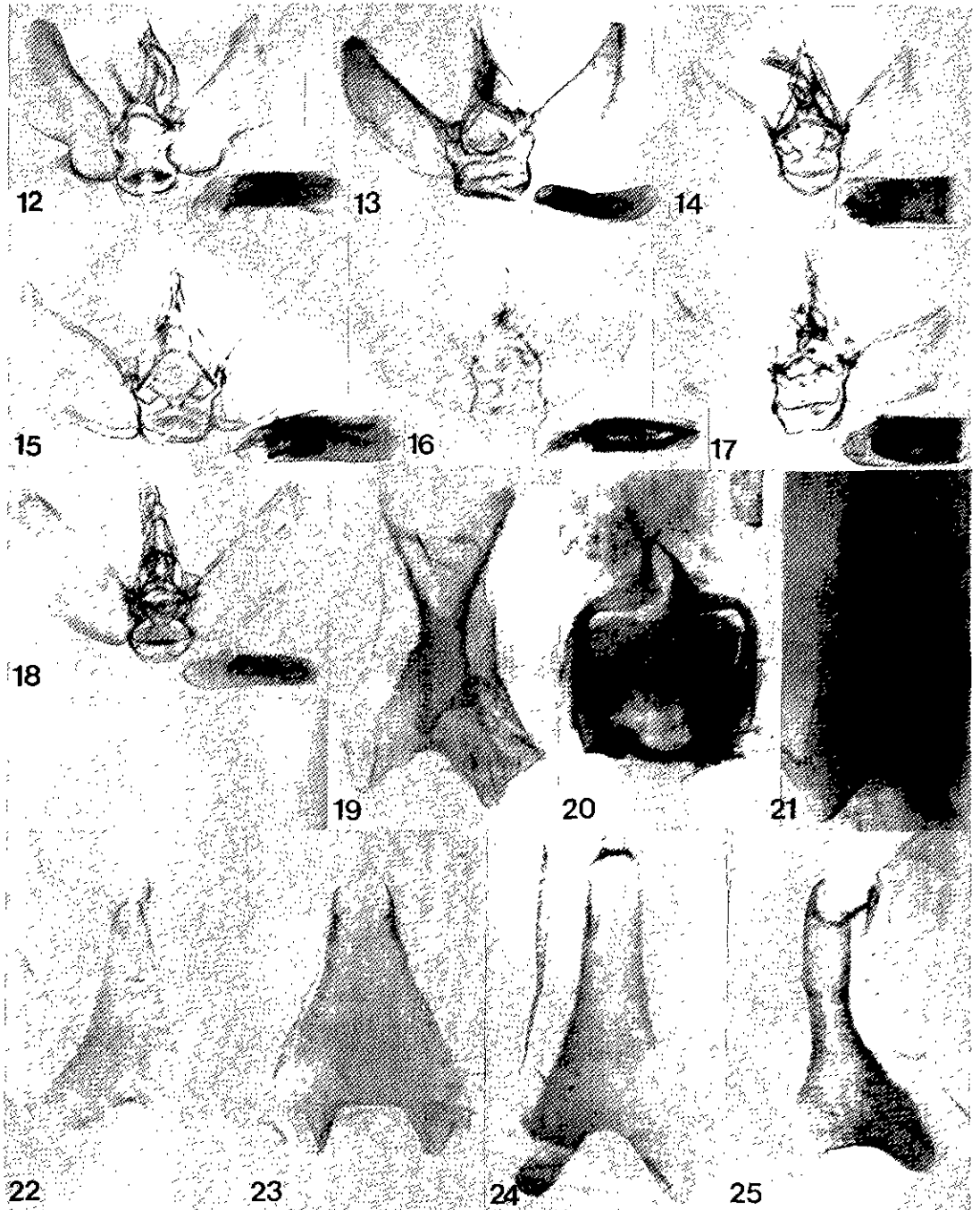
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(Received July 28, 1993)

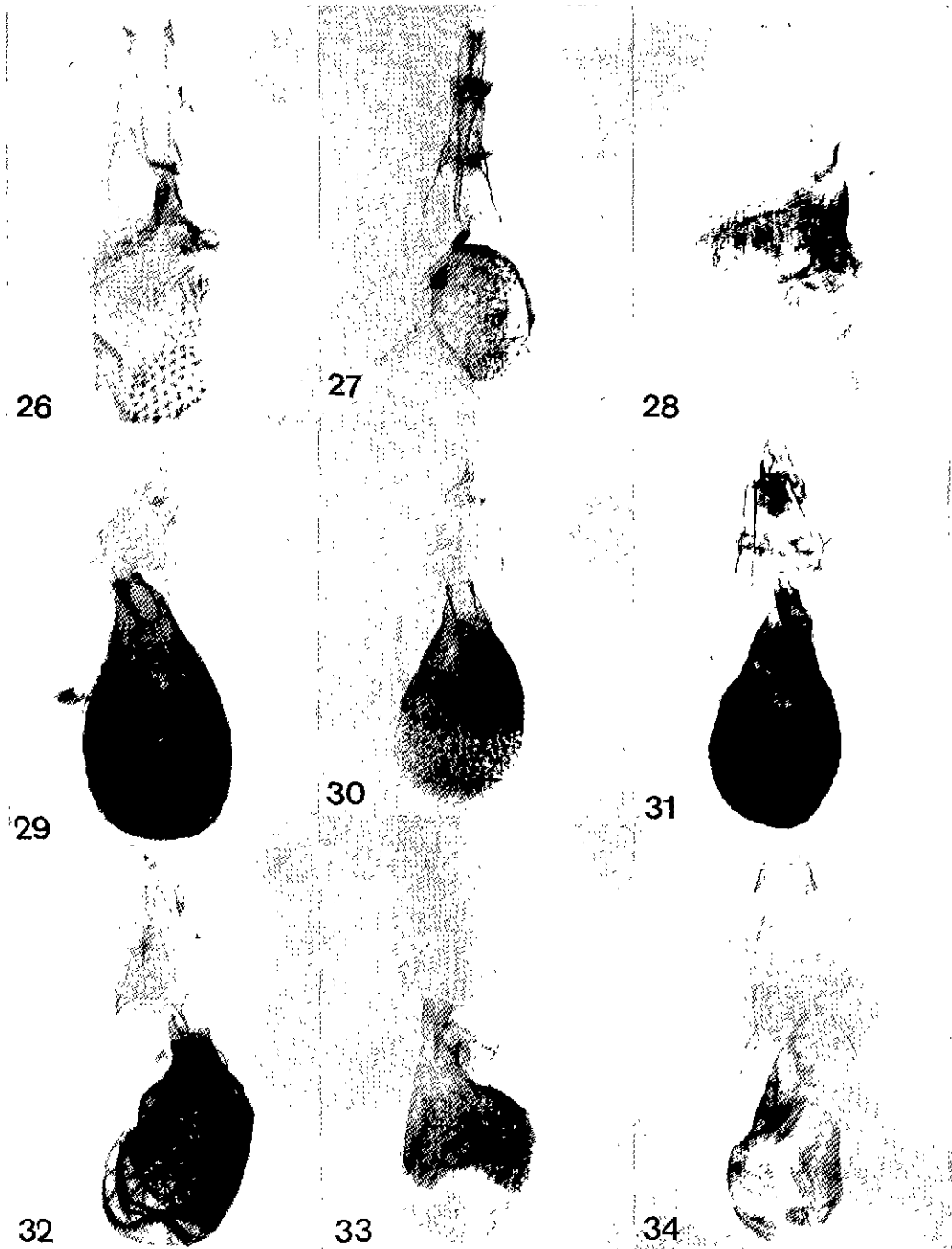
Correction to Part I : p. 461, line 2; Gometridae- Geometridae



Figs. 1~11. Adults : 1. *E. gigantea* Staudinger 2. *E. bohatschi* Staudinger 3. *E. okadai* Inoue 4. *E. spadix* Inoue
 5. *E. absinthiata* Clerck 6. *E. scribai* Prout 7. *E. perpaupera* Inoue 8. *E. tricornuta* Inoue 9. *E. kobayashii* Inoue 10.
E. tripunctaria Herrich-Schaffer 11. *E. virgaureata* Doubleday



Figs.12~25. Male Genitalia and 8th abdominal sternite : 12. *E. okadai* Inoue 13. *E. spadix* Inoue 14. *E. scribai* Prout 15. *E. perpaupera* Inoue 16. *E. tricornuta* Inoue 17. *E. kobayashii* Inoue 18. *E. virgaureata* Doubleday 19. *E. okadai* Inoue 20. *E. spadix* Inoue 21. *E. scribai* Prout 22. *E. perpaupera* Inoue 23. *E. tricornuta* Inoue 24. *E. kobayashii* Inoue 25. *E. virgaureata* Doubleday



Figs. 26~34. Female Genitalia : 26. *E. gigantea* Staudinger 27. *E. bohatschi* Staudinger 28. *E. spadix* Inoue
 29. *E. absinthiata* Clerck 30. *E. scribai* Prout 31. *E. perpaupera* Inoue 32. *E. tricornuta* Inoue 33. *E. tripunctaria*
 Herrich-Schaffer 34. *E. virgaureata* Doubleday