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A Revision of Embrik Strand's Clearwing Moth Types (Lepidoptera : Sesiidae) from Taiwan 【Research report】

臺灣產Embrik Strand 氏所命名之透翅蛾模式標本 (鱗翅目：透翅蛾科)之修訂【研究報告】

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Abstract

A revision of the clearwing moth taxa described by E. Strand (1916, 1917) from Taiwan [Formosa], deposited in the collection of Deutsches Entomologisches Institut, Eberswalde, Germany, is presented and all the species are illustrated. The genera *Chimaerosphacia* Strand, 1916 and *Paranthrenella* Strand, 1916 are restored. The taxa *Paranthrene* (?) *pilamicola* Strand, 1916 and *Microsphacia* (?) *suisharyonis* Strand, 1917 are transferred to *Norona* Matsumura, 1931 and *Chamanthodon* Le Cerf, 1916 respectively. Lectotypes of *Oligophlebiella* *polishana* Strand, 1916 and *Paranthrenella* *formosicola* (Strand, 1916) are designated herein.

摘要

本文修訂保存在德國Eberswalde之德國昆蟲研究所，由Embrik Strand 所描述之臺灣透翅蛾分類單元，所有的種均繪圖加以說明。*Chimaerosphacia* Strand, 1916與*Paranthrenella* Strand, 1916二屬恢復有效名。*Paranthrene* (?) *Pilamicola* Strand, 1916 *Microsphacia* (?) *suisharyonis* Strand, 1917二種分別移轉至*Norona* Matsumura, 1931屬與*Chamanthodon* Le Cerf, 1916屬。本文亦指定*Oligophlebiella* *polishana* Strand, 1916與*Paranthrenella* *formosicola* (Strand, 1916)二種之選模。

Key words: Lepidoptera, Sesiidae, type specimen, E. Strand, taxonomy, Taiwan.

關鍵詞: 鱗翅目、透翅蛾科、模式標本、E. Strand、分類學、臺灣

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A Revision of Embrik Strand's Clearwing Moth Types (Lepidoptera: Sesiidae) from Taiwan

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ABSTRACT

A revision of the clearwing moth taxa described by E. Strand (1916, 1917) from Taiwan [Formosa], deposited in the collection of Deutsches Entomologisches Institut, Eberswalde, Germany, is presented and all the species are illustrated. The genera *Chimaerosphesia* Strand, 1916 and *Paranthrenella* Strand, 1916 are restored. The taxa *Paranthrene* (?) *pilamicola* Strand, 1916 and *Microsphesia* (?) *suisharyonis* Strand, 1917 are transferred to *Nokona* Matsumura, 1931 and *Chamanthedon* Le Cerf, 1916 respectively. Lectotypes of *Oligophlebiella polishana* Strand, 1916 and *Paranthrenella formosicola* (Strand, 1916) are designated herein.

Key words: Lepidoptera, Sesiidae, type specimen, E. Strand, taxonomy, Taiwan.

Introduction

The present paper, a continuation of our ongoing studies on the types of Oriental Sesiidae (Arita and Gorbunov, 1995a, b; Arita and Gorbunov, 1996; Gorbunov and Arita, 1995b), is our research devoted to the clearwing moth types deposited in the collection of the Deutsches Entomologisches Institut, Eberswalde, Germany. It deals with a revision of six taxa from Taiwan [Formosa] described by Strand (1916, 1917). Three of them, namely, *Oligophlebiella polishana* Strand, 1916, *Chimaerosphesia aegerides* Strand, 1916, and *Paranthrenella formosicola* (Strand, 1916), are the type species of the corresponding genera. As a result of our revision of the species, we

have ascertained that *Chimaerosphesia* Strand, 1916 and *Paranthrenella* Strand, 1916 are distinct from *Toleria* Walker, [1865] and *Paranthrene* Hübner, [1819] respectively. Besides that, *Paranthrenella* has been promoted to full generic status and transferred to the tribe Synanthedonini, Sesiinae. The lectotypes of *Oligophlebiella polishana* Strand, 1916 and *Paranthrenella formosicola* (Strand, 1916) are designated herein. We transferred *Oligophlebiella* from "Genera Unassigned to Subfamily" (Happner & Duckworth, 1981) to the tribe Tinthiini, Tinthiinae. We also placed *Paranthrene* (?) *pilamicola* Strand, 1916 and *Microsphesia* (?) *suisharyonis* Strand, 1917 to *Nokona* Matsumura, 1931 and *Chamanthedon* Le Cerf, 1916, respectively. The taxon

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Melittia eurytion ab. *microfenestrata* Strand, 1916 is cited as a variety of *M. formosana* Matsumura, 1911.

Up-to-date information regarding Strand's three genera, five species, and one aberration are presented, including illustrations of the adults and of the genitalia, the main bibliography, descriptions, diagnosis, and presently known distributions. For each specimen examined, we cite the data of its labels in due detail, including even punctuation. Material examined herein has been deposited in the following collections abbreviated in the text as follows:

DEI-Deutsches Entomologisches Institut, Eberswalde, Germany.

MUT-Zoological Laboratory, Faculty of Agriculture, Meijo University, Nagoya, Japan.

The material used herein will be deposited in National Science Museum, Tokyo, Japan (NSMT).

HUS-Entomological Institute of Hokkaido University, Sapporo, Japan.

***Oligophlebiella* Strand**

Oligophlebiella Strand, 1916: 49. Type species: *Oligophlebiella polishana* Strand, 1916, by monotypy. -Dalla Torre & Strand, 1925: 4; Gaede, 1933: 778; Naumann, 1971: 21; Heppner & Duckworth, 1981: 44; Fletcher & Nye, 1982: 112.

Description: Medium-sized clearwing moths with alar expanse about 20 mm (Fig. 1). Head with antenna filiform in female; frons smooth-scaled; vertex with narrow elongate scales, somewhat covering frons dorsally; labial palpus smooth, long, turned-up, slightly exceeding upper orbital margin, apical joint about as long as mid one; proboscis long, well-developed. Legs smooth-scaled; both mid and hind tibiae dorsally at base of spurs, and both mid and hind basal tarsomeres dorso-externally with a few elongate pointed scales. Forewing entirely opaque;

vein R_1 arising from R-stem at about $2/3$ of cell; veins R_1 and R_2 parallel; basally veins R_3 - R_5 separated from each other; vein Cu_2 absent (Fig. 14). Hindwing transparent; vein M_2 arising from M-stem somewhat distally of cell; vein M_3 arising from Cu_1 in middle between base of vein Cu_1 and a point of lower angle of cell; vein CuP well-sclerotized; vein A_3 reduced (Fig. 14). Female genitalia (Fig. 16) with papillae anales relatively broad, well-sclerotized both basally and medially; 8th tergite relatively broad, with a few short setae at distal margin; posterior apophyses somewhat shorter than anterior apophyses; lamella postvaginalis undeveloped; ostium bursae at middle of intersegmental membrane between segments 7 and 8, broad, membranous; antrum short, well-sclerotized; ductus bursae short, broad, gradually turning into corpus bursae; corpus bursae relatively large, ovoid; signum absent. Male genitalia unknown.

Diagnosis: This genus seems to be closely related with *Paranthrenopsis* Le Cerf, 1911 (the type species: *Paranthrenopsis harmandi* Le Cerf, 1911 = *Tinthia editha* Butler, 1878), *Tinthia* Walker, 1864 (the type species: *Tinthia varipes* Walker, 1864), *Microsphecia* Bartel, 1912 (the type species: *Sphinx tineiformis* Esper, 1793) (a distinct genus, not a synonym of *Tinthia*!) and *Zenodoxus* Grote & Robinson, 1868 (the type species: *Zenodoxus maculipes* Grote & Robinson, 1868). From the first genus compared, *Oligophlebiella* can be separated by the entirely opaque forewing (anterior and external transparent areas small but present in *Paranthrenopsis*), by the venation of the fore- and hindwing (vein Cu_2 of the forewing present, veins M_3 , Cu_1 and Cu_2 of the hindwing arising nearly from a common point in *Paranthrenopsis*), and by the female genitalia (papillae anales larger, entirely sclerotized; ductus bursae longer, corpus bursae globose in the genus compared). From *Tinthia*, *Oligophlebiella* can be distinguished by the

relative length of the apical joint of the labial palpus (apical joint shorter than mid one in *Tinthia*), and by the female genitalia (papillae anales small, slightly sclerotized; 8th tergite long; posterior apophyses longer than anterior apophyses; ostium bursae narrow; antrum narrow and long; elongate signum present in *Tinthia*). From *Microsphecia*, *Oligophlebiella* is distinguishable by the long and well-developed proboscis (short or reduced in *Microsphecia*), and by the venation of the hindwing (veins M_1 and M_2 issue somewhat basally of the upper angle of cell in *Microsphecia*). From *Zenodoxus*, *Oligophlebiella* can be separated by the structure of the labial palpus (short, two basal joints densely covered with long hair-like scales in *Zenodoxus*), by the long and well-developed proboscis (short in *Zenodoxus*), and by the transparent hindwing (entirely opaque in the genus compared). Besides that, *Microsphecia* is a representative of the western part of the Palearctic Region and *Zenodoxus* belongs to the Nearctic and Neotropical regions. From *Trichocerota* Hampson, [1893] (the type species: *Trichocerota ruficincta* Hampson, [1893]), *Oligophlebiella* is distinguishable by the opaque forewing (at least, external transparent area present in *Trichocerota*), and by the structure of the female genitalia (lamella postvaginalis present in the genus is compared).

Biology: The host plant is unknown. Moths fly in April and July.

Structure: We include in this genus only one species: *Oligophlebiella polishana* Strand, 1916 (the type species).

Distribution: Oriental Region (Taiwan).

Remarks: The genus *Oligophlebiella* was placed by Heppner and Duckworth (1981) in "Genera Unassigned to Subfamily". We include it to the tribe Tinthiini, Tinthiinae.

Oligophlebiella polishana Strand (Figs. 1-2, 14, 16)

Oligophlebiella polishana Strand, 1916: 49.

Type locality: "Polisha" [=Taiwan, Nantou Hsien, Puli]. Lectotype ♀, in DEI (designated herein). -Dalla Torre & Strand, 1925: 4; Gaede, 1933: 778, pl. 94, row a; Heppner & Duckworth, 1981: 44; Arita, 1992: 97.

Redescription: Female (lectotype) (Fig. 1). Alar expanse 19.9 mm; body length 8.2 mm; forewing 8.7 mm; antenna 3.6 mm.

Head: antenna dark brown to black with purple sheen, distal 1/3 pale yellow with golden sheen; frons dark brown with purple-bronzed sheen; basal joint of labial palpus yellow, mid and apical joints broken off; vertex dark brown to black with green sheen, mixed with yellow scales anteriorly; pericephalic hairs yellow.

Thorax: patagia dark brown with strong red-purple sheen, with a few yellow scales laterally; tegula dark brown with purple sheen, with a few pale yellow scales exterior-laterally; tegula dark brown with purple sheen, with a few pale yellow scales exterior-laterally; mesothorax dark brown with bronzed-purple sheen, with a few yellow scales at inner margin of tegula posteriorly; metathorax dark brown medially and yellow with golden sheen laterally; thorax laterally golden-yellow mixed with dark brown scales with purple-bronzed sheen.

Legs: fore coxa golden-yellow mixed with dark brown scales mediodistally; fore femur and tibia golden-yellow; fore tarsus golden-yellow with a few dark brown scales distally on each tarsomere dorsally; mid coxa and femur golden-yellow; mid tibia ventrally golden-yellow, dorsally dark brown to black with purple sheen, with admixture of individual yellow scales, and with three tufts of long, pointed, dark yellow scales; spurs yellow externally and dark brown with purple sheen internally; hind coxa entirely and hind femur internally golden-yellow; hind femur externally dark brown

with purple sheen, with yellow margins; hind tibia internally and ventrally golden-yellow, exterior-dorsally dark brown with purple sheen, dorsally with two tufts of long, pointed, dark yellow scales; spurs yellow externally and dark brown with purple sheen internally; hind tarsus golden-yellow ventrally and dark brown with purple sheen dorsally.

Abdomen: dorsally dark brown to black with purple sheen; tergite 1 yellow with a small dark brown spot with purple sheen anterior-medially; tergite 4 with a broad yellow stripe anteriorly; ventrally abdomen entirely golden-yellow; anal tuft entirely dark brown to black with purple sheen.

Forewing: dark brown to black with bronzed-purple sheen, with a small yellow spot medially, and with five short, narrow, golden-yellow stripes between veins R_3 - M_3 ; transparent areas undeveloped; cilia dark brown with bronzed sheen.

Hindwing: transparent, but densely covered with colorless scales with bluish hue; veins and outer margin dark brown to black with bronzed-purple sheen; discal spot undeveloped; outer margin broad, about as broad as cilia; cilia dark brown with bronzed sheen.

Female genitalia: (paralectotype, genital preparation No. 1574 YA and No. 0G-96-25) (Fig. 16). Papillae anales relatively broad, well-sclerotized both basally and medially; 8th tergite relatively broad, with a few short setae at distal margin; posterior apophyses somewhat shorter than anterior apophyses; ostium bursae at middle of intersegmental membrane between segments 7 and 8, broad, membranous; antrum short, well-sclerotized; ductus bursae short, broad, gradually turning into corpus bursae; corpus bursae rather large, ovoid; signum absent.

Male: Unknown.

Variability: This species slightly varies in individual size: alar expanse 19.9-20.8 mm; body length 8.2-8.7 mm; forewing 8.9-10.0 mm; antenna 3.6-4.0 mm. There is a female (paralectotype) with entirely yellow

labial palpus, while three other females examined have the labial palpus with a few dark brown to black scales exterior-apically. In addition, this species varies in the number of the yellow scales on the abdomen dorsally and on the forewing between veins R_3 - M_3 . Besides that, fresh specimens are brighter in background coloration.

Diagnosis: This species seems to be closest to *Zenodoxus trifasciatus* Yano, 1960 and *Zenodoxus issikii* Yano, 1960. From the first species compared, *polishana* can be separated by the coloration of the pericephalic hairs (dark brown dorsally and pale yellow to white laterally in the species compared), fore and mid coxa (fore coxa pale yellow to yellow-orange basally and dark brown with bronzed sheen distally; mid coxa entirely dark brown with bronzed-violet sheen in *trifasciatus*), hind femur (dark brown to black with purple sheen, with a distinct, small, white spot at posterior margin extroapically in *trifasciatus*), forewing (basally with a small yellow spot; anal margin with a short and narrow yellow stripe basally; surface distally of cross-vein without yellow scales in the species compared) and abdomen dorsally (tergite 5 with a narrow yellow stripe proximally; anal tuft yellow in *trifasciatus*). From the second species compared, *polishana* is easily distinguishable by the coloration of the body and wings (head, thorax, legs and abdomen black with dark green sheen; forewing black with green sheen in *issikii*).

Bionomics: The host plant is unknown. According to data of the labels, this species flies in April and July, possibly being bivoltine.

Habitat: Unknown.

Distribution: Taiwan: Nantou Hsien, Chiayi Hsien, Taoyuan Hsien, Taipei Hsien.

Type series: 1 ♀ (lectotype) (Fig. 1), with the labels as in Fig. 2 (DEI); 1 ♀ (paralectotype), "Polisha / Formosa 10 / H. Sauter IV.", "*Oligophlebiella* /

(m.) *polishana* m. ♀ / Strand det.", "Syntypus", "Paralectotypus ♀ / *Oligophlebiella polishana* / Strand, [1916] / O. Gorbunov & / Y. Arita design., 1997", "♀ Genitalia on slide / No. 1574 / Y. Arita, 1991", "Genitalia examined by / O. Gorbunov / Preparation No. OG-96-25" (DEI).

Other material examined: 1 ♀, Taiwan, Chiayi, Fenchifu, 1400 m, 7. VII. 1979, leg. T. & M. Kumata (MUT); 1 ♀, Taiwan, Taitung Co, South Cross-Island HW, Liyuan, 1250 m, 27. IV. 1996, leg. S.H. Yen (MUT); 1 ♀, Taiwan, Taipei Co, Pinglin, Yigterkou, 500m, 11. VII. 1996, leg. W.Y. Chou (MUT).

Remarks: The author wrote in the original description, "Zwei ♀♀ von Polisha IV. 1910". These specimens from the type series are syntypes. One of them, the female illustrated in Fig. 1, with the following labels (Fig. 2), is presently designated as the lectotype. The second specimen is designated as paralectotype herein.

***Nokona pilamicola* (Strand), comb. nov.**
(figs. 5-6, 21a-f)

Paranthrene (?) *pilamicola* Strand, 1916:
47. Type locality: "Pilam" [sic !]
[=Taiwan, Taitung Hsien, Taitung]. Holotype ♂, in DEI. -Dalla Torre & Strand, 1925: 161 (*Paranthrene*); Gaede, 1933: 792, pl. 95, row h (*Paranthrene*); Heppner & Duckworth, 1981: 24 (*Paranthrene*); Arita, 1992: 97 (*Paranthrene*).

Redescription. Male (holotype) (Fig. 5). Alar expanse 25.8 mm; Forewing 11.3 mm; body length 14.0 mm; antenna 6.5 mm.

Head: antenna entirely yellow to light brown; frons nearly without scales, only with a few yellow scales dorsally and with a few white scales ventrolaterally (yellow with a narrow white stripe laterally?); basal joint of labial palpus yellow, mid and apical joints broken off;

vertex yellow; pericephalic hairs yellow dorsally and pale yellow laterally.

Thorax: patagia entirely yellow-orange; tegula, meso- and metathorax nearly without scales, only with a few yellow scales on tegula both anteriorly and posteriorly; thorax laterally yellow with a few black scales.

Legs: fore coxa yellow-orange with admixture of individual black scales interior-basally; remaining parts of forelegs broken off; mid coxa yellow-orange; mid femur internally dark brown mixed with yellow scales, externally black with purple-green sheen, with a narrow yellow anterior margin and with pale yellow hairs at posterior margin; basal half of mid tibia yellow with black scales ventrobasally, remaining parts of mid legs broken off; hind coxa black anteriorly and yellow-orange posteriorly; remaining parts of hind legs broken off.

Abdomen: nearly without scales; tergites 1 and 2 each with a few black and yellow scales; sternites 1+2 and 3 each yellow with admixture of individual black scales.

Forewing: basally with a small yellow-orange spot; costal margin black with dark purple sheen; anal margin black with a narrow orange stripe internally; veins R_4 - R_5 and M_1 - M_3 black; discal spot mixed with black and light brown scales; anterior and posterior transparent areas well-developed, but densely covered with light brown scales distally; external transparent area undeveloped; apical area covered with light brown and dark brown scales; cilia dark brown to black.

Hindwing: transparent; veins and outer margin black; discal spot broad, reaching to base of vein M_3 , mixed with dark brown and light brown scales; outer margin narrow, about as narrow as cilia; cilia dark brown to black.

Male genitalia: (holotype, genital preparation No. 1586 YA and OG-96-27) (Figs. 21a-f). Uncus well-developed, slightly broadened dorsomedially, with individual short setae in dorsal half;

tegumen short with narrow finger-shaped gnathos; tuba analis long and broad, well-sclerotized ventrally (Fig. 21a); valva (Fig. 21b) triangular-oval with cut apex, with hand-shaped multifurcate setae (Figs. 21e-f) on medial surface, with a narrow stripe of short pointed setae at dorsal margin, and a broad stripe of long pointed setae subventrally; crista sacculi not protuberant, covered with strong and pointed setae; saccus (Fig. 21c) narrow, rounded basally, about as long as vinculum; aedeagus (Fig. 21d) about 1.3 times as short as valva, slightly up-curved subapically; vesica with numerous small spinulae.

Female: Unknown.

Variability: Unknown.

Diagnosis: This species seems to be closest to *Nokona rubra* Arita & Tosevski, 1992, but it differs by the coloration of the antenna (dorsally black with dark green-violet sheen, with a few red-brown scales subapically; ventrally light brown in *N. rubra*), labial palpus (basal joint entirely mat black in the species compared), patagia (entirely black with dark green-purple sheen in *N. rubra*), and fore and mid coxa (both coxae entirely black with green-violet sheen in the species compared). From other closely related species, such as *N. pernix* (Leech, 1889) and *N. bicincta* (Walker, [1865]), *N. pilamicola* can be easily separated by the coloration of the forewing (black with bright metallic sheen in *N. bicincta* and dark brown to black, densely mixed with brown scales in *N. pernix*).

Bionomics: The exact host plant is unknown, but it seems likely that this is a species breeding on a *Paederia* sp. (Rubiaceae). The holotype was netted in August.

Habitat: Unknown.

Distribution: Known from the type locality only.

Type series: 1 ♂ (holotype) (Fig. 5), with the labels illustrated in Fig. 6 (DEI).

Chimaerosphecchia Strand, gen. revalid.

Chimaerosphecchia Strand, 1916: 46. Type species: *Chimaerosphecchia aegeides* Strand, 1916, by monotypy. -Dalla Torre & Strand, 1925: 133; Gaede, 1933: 787; Naumann, 1971: 14; Heppner & Duckworth, 1981: 41; Fletcher & Nye, 1982: 36; Spatenka *et al.*, 1993: 92 (as a synonym of *Toleria* Walker, [1865]).

Description: Large-sized clearwing moth with alar expanse about 35 mm (Fig. 7). Head with antenna clavate, shortly pectinate in female; frons smooth-scaled; vertex with short hair-like scales; labial palpus smooth, long, turned-up, slightly exceeding upper orbital margin, apical joint about $1/3$ as short as mid joint; proboscis short, reduced. Legs smooth-scaled. Forewing transparent; veins R_3 and R_4 long stalked, vein R_5 arising from vein R_{3+4} somewhat distally of base of vein R_2 (Fig. 15). Hindwing transparent; frenulum consisting of a single bristle in female; veins M_3 and Cu_1 arising from a point; vein CuP entirely membranous; veins A_1 and A_2 coincident except at base, well-sclerotized; vein A_3 , slightly sclerotized (Fig. 15). Female genitalia (Fig. 18) with papillae anales well-sclerotized laterally and slightly sclerotized ventrally, covered with short setae; 8th tergite relatively broad, rounded ventrodistally, with short setae; posterior apophyses somewhat longer than anterior apophyses; lamella postvaginalis present, narrow, with a narrow, pointed wing laterally from each side; lamella antevaginalis absent; ostium bursae opening near posterior margin of 7th sternite, relatively broad, membranous, slightly funnel-shaped; antrum short, narrowly well-sclerotized posteriorly and with a narrow well-sclerotized plate at base of ductus seminalis; ductus bursae long, narrow, membranous; corpus bursae relatively large, ovoid, membranous, with many transverse folds throughout; signum

present. Male genitalia unknown.

Diagnosis: This genus seems to be closest to *Toleria* Walker, [1865] (the type species: *Toleria abiaeformis* Walker, [1865]), *Glossosphenia* Hampson, 1919 (the type species: *Sphecia contaminata* Butler, 1878) (a distinct genus, not a synonym of *Toleria*!) as well as to the Nearctic genus *Cissuvora* Engelhardt, 1946 (the type species: *Cissuvora ampelopsis* Engelhardt, 1946) (a distinct genus, not a synonym of *Toleria*!). From the first genus compared, *Chimaerosphenia* can be distinguished by the structure of the labial palpus (apical joint extremely small in the genus compared) and by the venation of the forewing (veins R_2 and R_3 basally separated; vein R_4 ends before apex of wing in *Toleria*). From *Glossosphenia*, *Chimaerosphenia* differs by the structure of the female antenna (clavate, nonpectinate in the genus compared), by the reduced proboscis (long, well-developed in *Glossosphenia*), by the venation of the forewing (veins R_4 and R_5 stalked in the genus compared) and by the structure of the female genitalia (posterior apophyses with a narrow, broadened appendix ventrobasally, gradually turning into well-sclerotized lamella postvaginalis in *Glossosphenia*). From the third genus compared, *Chimaerosphenia* is distinguishable by the reduced proboscis (well-developed in the genus compared), by the venation of the forewing (veins R_4 and R_5 stalked in *Cissuvora*) and by the structure of the female genitalia (posterior apophyses with a narrow, gradually broadened appendix ventrobasally; lamella postvaginalis absent in the genus compared).

Biology: The host plants are unknown for all known species of the genus. The type species was collected in June.

Structure: At present, we include in this genus the following three species: *C. aegerides* Strand, [1916] (the type species), *C. colochelyna* Bryk, 1947, and *C. sinensis* (Walker, [1865]), comb. nov.

Distribution: Oriental Region: Taiwan;

China: Kiangsu, Hong Kong.

Chimaerosphenia aegerides Strand (Figs. 7-8, 15, 18)

Chimaerosphenia aegerides Strand, 1916:

46. Type locality: "Kankau (Koshun)" [=Taiwan, Kaohsiung Hsien, Hanchun]. Holotype ♀ [not ♂!], in DEL. Dalla Torre & Strand, 1925: 133; Gaede, 1933: 787, pl. 95, row a; Heppner & Duckworth, 1981: 41; Arita, 1992: 97.

Redescription: Female (holotype) (Fig. 7). Alar expanse 35.3 mm; body length 19.0 mm; forewing 15.0 mm; antenna 6.5 mm.

Head: antenna dorsally yellow-orange, ventrally light brown; frons light gray-brown with greenish sheen, laterally with a narrow pale yellow stripe with a few yellow-orange scales dorsally; labial palpus entirely yellow; vertex and pericephalic hairs yellow with a few orange scales.

Thorax: patagia yellow with admixture of dark brown scales anteriorly; tegula anteriorly dark brown with bronzed sheen, with admixture of individual light brown scales, posteriorly pale yellow to yellow; mesothorax dark brown with bronzed sheen, with a large yellow spot posterior-laterally; metathorax dark brown with a tuft of dark brown, yellow and yellow-orange hair-like scales laterally; thorax laterally dark brown with green-violet sheen, with admixture of individual light brown and orange scales.

Legs: fore coxa yellow-orange with dark brown scales both basally and distally; fore femur, tibia, and tarsus entirely orange; mid coxa dark brown with greenish sheen, with a few orange scales internally; mid femur internally pale yellow, externally yellow-orange anteriorly and dark brown mixed with orange hairs posteriorly; mid tibia internally yellow to yellow-orange, externally mixed with light brown-orange, orange, and yellow scales; spurs yellow-orange;

mid tarsus orange dorsally and somewhat paler ventrally; hind coxa dark brown with greenish sheen, with a few orange scales internally; hind femur internally pale yellow, externally yellow-orange anteriorly and dark brown mixed with orange hairs posteriorly; hind tibia and tarsus mixed with orange, light brown-orange and yellow scales; spurs yellow-orange.

Abdomen: dorsally dark brown with bronzed sheen, with admixture of individual light brown scales; tergite 1 with a narrow yellow stripe distally; tergites 3 and 4 each densely mixed with yellow scales; tergites 5 and 6 each mixed with yellow scales mediodistally; ventrally abdomen nearly without scales, remaining scales yellow; anal tuft light brown-yellow medially and yellow laterally.

Forewing: basally dark brown to black; costal and anal margins, Cu-stem, discal spot, and veins distally of discal spot light brown to rusty-orange; discal spot narrow; transparent areas well-developed; external transparent area large, reaching apical margin of wing, divided into five cells between veins R_2 - Cu_2 , besides that, distally cells between veins R_5 - M_1 , M_1 - M_2 , M_2 - M_3 , and M_3 - Cu_1 additionally divided into two parts by a thin longitudinal stripe; cilia light brown with green-bronzed sheen.

Hindwing: transparent; veins, discal spot, and outer margin light brown; discal spot small, triangular, reaching to base of vein M_2 ; outer margin extremely narrow, about 5 times as narrow as cilia; cilia light brown with green-bronzed sheen.

Female genitalia: (holotype, genital preparation No. 1572 YA and OG-96-26) (Fig. 18). Papillae anales well-sclerotized laterally and slightly sclerotized ventrally, covered with short setae; 8th tergite relatively broad, rounded ventrodistally, with short setae; posterior apophyses somewhat longer than anterior apophyses; lamella postvaginalis present, narrow, with a narrow, pointed wing laterally from each side; lamella ante-

vaginalis absent; ostium bursae opening near posterior margin of 7th sternite, relatively broad, membranous, slightly funnel-shaped; antrum short, narrowly well-sclerotized posteriorly and with a narrow well-sclerotized plate at base of ductus seminalis; ductus bursae long, narrow, membranous; corpus bursae relatively large, ovoid, membranous, with many transverse folds throughout; signum present.

Male: Unknown.

Variability: Unknown.

Diagnosis: This species seems to be closest to *C. colohelyna* Bryk, 1947, but it can be distinguished by the coloration of the patagia (entirely yellow in the species compared) and abdomen dorsally (tergites 1 and 2 each densely mixed with yellow-orange scales laterally, and additionally, tergite 2 with a narrow yellow stripe distally in *C. colohelyna*). So these two species are superficially very similar to each other. Moreover, it is possible that *C. aegerides* is just a senior synonym of *C. colohelyna*. Unfortunately, only females are known for these species and, prior to a formal synonymization, it is necessary to obtain more material of both species for study. From *C. sinensis* (Walker, [1865]), *C. aegerides* differs by the coloration of the antenna (black anteriorly in the species compared) and by the coloration of the abdomen (dorsally tergites 4-6 each yellow with a narrow black stripe proximally in the species compared). Besides that, the forewing of *C. sinensis* is more densely covered with light brown scales in the distal part.

Bionomics: The host plant is unknown. The holotype was collected in June.

Habitat: Unknown.

Distribution: This species is known from the type locality only.

Type series: 1 ♀, (holotype) (Fig. 7), with the labels as in Fig. 8 (DEI).

Melittia formosana Matsumura

Melittia formosana Matsumura, 1911: 85, pl. 36, fig. 18. Type locality: "Formosa, Horisha" [=Taiwan, Nantou Hsien, Puli]. Holotype ♂, in HUS.

= *Melittia eurytion* ab. *microfenestrata* Strand (Figs. 9–10, 19)

Melittia eurytion ab. *microfenestrata* Strand, 1916: 45. Type locality: "Pilam" [sic!] [=Taiwan, Taitung Hsien, Taitung]. Holotype ♀, in DEI. -Dalla Torre & Strand, 1925: 143 (as an aberration of *M. eurytion* (Westwood, 1848)); Gaede, 1933: 790, pl. 95, row f (as an aberration of *M. eurytion* (Westwood, 1848)); Heppner & Duckworth, 1981: 26 (as an aberration of *M. eurytion* (Westwood, 1848)); Arita, 1992: 97 (as an aberration of *M. eurytion* (Westwood, 1848)); Gorbunov & Arita, 1996b: 338 (as a synonym of *M. formosana* Matsumura, 1911).

Redescription: Female (holotype) (Fig. 9). Alar expanse 30.3 mm; body length 15.0 mm; forewing 13.0 mm; antenna 7.5 mm.

Head: antenna dorsally dark brown to black with dark purple sheen, ventrally light brown; frons gray-brown with purple sheen, with a narrow white stripe laterally; vertex gray-brown with purple sheen, mixed with black, white, and yellow hair-like scales; labial palpus white basally, mid joint dark brown mixed with white scales, apical joint dark brown; pericephalic hairs dorsally black mixed with yellow, laterally white.

Thorax: patagia dark brown with green-bronzed sheen, with admixture of individual olive-brown scales, with a few white scales laterally; tegula dark brown with bronzed sheen, covered with a few olive-green scales anteriorly and with a few white scales apically; mesothorax dark brown with bronzed sheen; metathorax somewhat paler with a tuft of white and dark brown hair-like scales laterally; thorax laterally dark brown with bronzed sheen, with a large white spot anteriorly.

Legs: fore coxa white to pale yellow with a narrow dark brown stripe exterior-distally; fore femur externally dark brown to black with bronzed sheen, mixed with white scales and hairs at posterior margin; fore tibia dark brown to black with bronzed sheen, with a few yellow scales dorsally; fore tarsus yellow ventrally, dorsally dark brown to black with a few white scales at base of basal tarsomere; mid coxa dark brown to black with bronzed sheen; mid femur externally dark brown to black with bronzed-green sheen, with pale yellow anterior margin and white posterior margin; mid tibia dark brown to black with bronzed-purple sheen, with a few white scales with blue hue medio-externally; spurs dark brown to black with bronzed sheen; mid tarsus dark brown to black with bronzed sheen, with admixture of individual white scales; hind coxa white anteriorly and dark brown to black with green sheen posteriorly; hind femur dark brown to black with bronzed sheen, with white hair-like scales at posterior margin; hind tibia dark brown to black with green-bronzed sheen, with admixture of individual white and rusty-brown scales; spurs dark brown to black with bronzed sheen, both external spurs with white scales inside; hind tarsus dark brown to black with green-bronzed sheen.

Abdomen: dorsally black with green-violet sheen, with admixture of individual, narrow, white scales; scales of distal margin of each tergite with bronzed sheen; additionally, tergites 2, 4, 6, and 7 each with a few white scales with blue hue distally; ventrally sternite 1+2 black with a few white scales, remaining sternites entirely white; anal tuft small, black, tipped white.

Forewing: dark brown to black with dark bronzed-purple sheen, with a few snow-white scales on discal spot, apical area between veins, and at margins of external transparent area; discal spot extremely large; transparent areas small; anterior transparent area small, divided

into two narrow cells by a proximal projection of discal spot; external transparent area divided into minute cells: two on right wing and three on left wing; cilia dark brown with bronzed sheen.

Hindwing: transparent; anal area opaque, black, densely covered with light blueish scales; veins, discal spot and outer margin narrowly black with bronzed-purple sheen; cilia dark brown with bronzed sheen.

Female genitalia: (holotype, genital preparation No. 1571 YA and OG-96-24) (Fig. 19). Papillae anales slightly sclerotized basally, covered with short setae; 8th tergite relatively broad with relatively short setae at distal margin and with a long seta at inner margin ventrally; both apophyses nearly equal in length; apophyses anterior with a long, narrow appendix baso-ventrally; ostium bursae opening near posterior margin of 7th sternite, slightly funnel-shaped, narrowly ring-shaped and well-sclerotized; antrum narrow, membranous; ductus bursae narrow, relatively long, membranous; corpus bursae nearly pear-shaped, membranous with numerous wrinkles, with signum relatively large, narrowly pear-shaped, with numerous small, well-sclerotized thorns, with about 10 transverse, rather well-sclerotized, dentate stripes anteriorly, rounded posteriorly.

Male: Unknown for this aberration.

Diagnosis: This aberration of *M. formosana* is very similar to *M. nagaii* Arita & Gorbunov, 1997, and it differs only by the poorly developed transparent areas of the forewing. Unfortunately, only a single female of this aberration and a few specimens of *M. formosana* are known and, prior to a formal synonymization, it is necessary to obtain more material of *M. formosana* for study.

Bionomics: Exact host plant is yet unknown for the population of the species from Taiwan, but it seems to be *Trichosanthes rostrata* Kitamura (Cucurbitaceae), which is known as the host plant for *M. formosana* from the island Amami-Osh-

ima, the Ryukyus, Japan (Gorbunov & Arita, 1996a). In addition, the type series of *M. nagaii*, the closely related to *M. formosana* species, also was captured flying near this species of snake gourd (Arita & Gorbunov, 1997).

Habitat: Unknown in Taiwan.

Distribution: This species has been reported from Taiwan and Japan (Amami-Oshima I., the Ryukyus).

Type material: 1 ♀ (holotype) (Fig. 9), with labels as illustrated in Fig. 10 (DEI).

Remarks: This infraspecific taxon has been excluded from *M. eurytion* (Westwood, 1848) and synonymized under *M. formosana* Matsumura, 1911 by Gorbunov & Arita, 1996b: 338.

***Chamanthedon suisharyonis* (Strand), comb. nov.** (Figs. 3-4, 17)

Microsphecia (?) *suisharyonis* Strand, 1917: 152. Type locality: "Suisharyo" [=Taiwan, Chiai Hsien, Shuisheliao]. Holotype ♀, in DEI. Dalla Torre & Strand, 1925: 185 (*Trichocerata* [sic!]); Heppner & Duckworth, 1981: 22 (*Microsphecia*); Arita, 1992: 97 (*Microsphecia*).

Unfortunately, the original description of the species, based on a single holotype specimen, is imperfect and incomplete. Besides this, we have found the holotype specimen (Fig. 3) in an extremely bad condition, with broken off head and legs and with thorax nearly without scales. So we cannot redescribe it herein in sufficient detail. We can only state the following: alar expanse 17.0 mm; forewing 8.0 mm; thorax laterally dark brown with golden sheen; mid and hind coxa pale golden-yellow; abdomen dark brown with bronzed-purple sheen; tergites 1, 4, and 6 each with a narrow bright yellow ring distally; fore- and hindwing entirely opaque, dark brown with strong bronzed-purple sheen; cilia dark brown with bronzed sheen.

Female genitalia: (holotype, genital preparation No. 1573 YA and OG-96-30) (Fig. 17). Papillae anales relatively large with short setae at inner margin ventrally; 8th tergite short and narrow, without setae; posterior apophyses somewhat longer than anterior apophyses. Other parts of the genitalia have been eaten by insects (larvae of Dermestidae?).

Male: Unknown.

Variability: Unknown.

Diagnosis: This species seems to be closest to *Chamanthodon chrysostetha* (Diakonoff, [1968]), but it can be distinguished by the coloration of the abdomen (dorsally entirely black with purple-blue sheen; ventrally black mixed with golden-yellow scales in the species compared). From *C. melanoptera* Le Cerf, 1927, it rather easily differs by the coloration of the mid and hind coxae (black with blue-purple sheen in the species compared) and abdomen dorsally (tergites 1 and 2 each entirely yellow-orange; tergite 3 black with greenish sheen; tergites 4, 6, and 7 each yellow-orange with a narrow black stripe proximally; tergite 5 black with a narrow yellow-orange stripe medially in *C. melanoptera*). From other congeners, *C. suisharyonis* can be distinguished by the entirely opaque wings. Besides that, superficially this species rather strongly resembles *Tradescanticola uniformis* (Snellen, 1900), but it differs by the structure of both mid and hind tibiae (visibly tufted with hair-like scales in the species compared).

Bionomics: The host plant is unknown. The holotype specimen was netted in October.

Habitat: Unknown.

Distribution: Known from the type locality only.

Type series: 1 ♀, holotype (Fig. 3), with the labels as illustrated in Fig. 4 (DEI).

Remarks: We transfer this species to *Chamanthodon* Le Cerf, 1916 (the type species: *Chamanthodon hypochroma* Le Cerf, 1916) because of its similarity,

especially to *C. chrysostetha* (Diakonoff, [1968]) and *C. melanoptera* Le Cerf, 1927.

***Paranthrenella* Strand, stat. nov.**

Paranthrene (*Paranthrenella*) Strand, 1916: 47. Type species: *Paranthrene* (*Paranthrenella*) *formosicola* Strand, 1916, by subsequent designation by Fletcher, 1929. -Dalla Torre & Strand, 1925: 154 (as a subgenus of *Paranthrene* Hübner, [1819]); Naumann, 1971: 22 (as a subgenus of *Paranthrene* Hübner, [1819]); Heppner & Duckworth, 1981: 23 (as a synonym of *Paranthrene* Hübner, [1819]); Fletcher & Nye, 1982: 119 (as a subgenus of *Paranthrene* Hübner, [1819]); Arita, 1992: 97 (as a synonym of *Paranthrene* Hübner, [1819]).

Description: Medium-sized clearwing moths with alar expanse about 16-24 mm (Figs. 11, 13). Head with antenna clavate, shortly ciliate in male and nonciliate in female; frons covered with smooth scales; vertex with narrow elongate scales, somewhat covering frons dorsally; labial palpus smooth, long, turned-up, slightly exceeding upper orbital margin; proboscis long, well-developed. Legs covered with smooth scales. Forewing with well-developed transparent areas; veins R_1 - R_3 parallel; veins R_4 and R_5 long stalked (Fig. 23). Hindwing transparent; vein M_2 arising from upper $1/3$ of cross-vein; veins M_3 and Cu_1 short stalked; vein CuP membranous; vein A_1 well-sclerotized; veins A_2 and A_3 short, slightly sclerotized (Fig. 23). Male genitalia with well-developed scopula androconialis, long, covered with long setae terminating in a double bent tip (Fig. 22b); both crista gnathi medialis and crista gnathi lateralis well-developed, semi-oval or subcordiform; valva (Fig. 22a) oval or elongate-oval, densely covered with setae terminating in a double bent tip (Fig. 22c); crista sacculi

nearly flat, not separated from sensory field of setae, covered with bifurcate setae apically (Fig. 22d); ventral crista small, covered with triangular flat-topped setae (Fig. 22e); saccus about as long as vinculum; aedeagus narrow, slightly shorter than valva; vesica with numerous, strong, irregular, pointed or nearly flat cornuti. Female genitalia (Fig. 20) with papillae anales relatively small, well-sclerotized, covered with short and long setae; 8th tergite relatively broad, with a few short setae at distal margin; posterior apophyses somewhat longer than anterior apophyses; ostium bursae at level of anterior-dorsal margin of 8th tergite, membranous; antrum narrow, long, well-sclerotized, with a narrow, membranous, spiralling stripe posteriorly or with a finger-shaped appendix posteriorly; ductus bursae about as long as antrum, membranous; corpus bursae globose or ovoid, without signum.

Diagnosis: There is no doubt that *Paranthrenella* is a representative of the tribe Synanthedonini, but not a subgenus or synonym of *Paranthrene* Hübner, [1819], Paranthrenini as cited by all previous authors. Superficially, especially by the well-developed transparent areas of the forewing, this genus seems to be closest to the genus *Synanthedon* Hübner, [1819] (the type species: *Sphinx oestiformis* Rottembureg, 1775 = *Sphinx vespiiformis* Linnaeus, 1761), but it can be distinguished by the structure of the scapula androconialis and valva in the male genitalia and by the antrum in the female genitalia. Unfortunately, we can not compare this genus with the Oriental genera of Synanthedonini, such as *Ichneumenoptera* Hampson, [1893] (the type species: *Ichneumenoptera auripes* Hampson, [1893]) and *Kemneriella* Bryk, 1947 (the type species: *Kemneriella malaiseorum* Bryk, 1947) in sufficient detail, because the type species of these two genera have not yet been revised. We can state only that *Ichneumenoptera* differs by having the forewing more elongate, narro-

wer, and more pointed, and shorter the stalk of veins M_3 and Cu_1 of the hindwing. On the other hand, *Kemneriella* has a more slender and longer abdomen. Besides that, by the structure of the female genitalia, especially the antrum, *Paranthrenella* is somewhat similar to the west Palearctic genus *Synansphecchia* Capuse, 1973 (the type species: *Sesia trianuliformis* Freyer, 1845), but it rather easily differs by the structure of the transparent areas of the forewing (smaller, posterior transparent area sometimes undeveloped in *Synansphecchia*) and by the structure of both male and female genitalia. In addition, the larvae of species of *Paranthrenella* are xylophagous, but those of *Synansphecchia* are herbivorous.

Biology: Larvae of species of *Paranthrenella* are borers in *Rubus* spp. (Rosaceae). Presently the host plants are known only for two species of the genus, namely *Rubus* sp. for *P. duporti* Le Cerf, 1927, comb. nov. from Vietnam (Gorbunov & Arita, 1995a) and *R. ellipticus* for *P.* sp. from Nepal (a yet undescribed species). As far as is known, the larva lives inside a gall-like broadening on the stem about 1-2 m above ground level where it makes a short tunnel 3-6 cm long. It pushes out the bored deposits very actively. Such plants with gall-like broadenings and many bored deposits are easily visible, and discovery of both larvae and pupae of the species of *Paranthrenella* can be very simple. Pupation takes place inside the tunnel without construction of a cocoon. Imagines appear in April-June and August-October. The life cycle is possibly uni- or bivoltine.

Structure: At present, we include in this genus the following five species: *Paranthrenella formosicola* Strand, [1916] (the type species), *P. duporti* (Le Cerf, 1927), comb. nov., *P. vietnamica* (Gorbunov & Arita, 1995), comb. nov., *P. uranauges* (Meyrick, 1926), comb. nov., and *P. subaurata* (Le Cerf, 1916), comb. nov.

Distribution: Throughout the Oriental

Region.

***Paranthrenella formosicola* (Strand), comb. nov.** (Figs. 11-13, 20, 22a-e, 23)

Paranthrene (*Paranthrenella*) *formosicola* Strand, 1916: 47. Type locality: "Kanshirei" [=Taiwan, Tainan Hsien, Kuantyling]. Lectotype ♀, in DEI (designated herein). -Dalla Torre & Strand, 1925: 158 (*Paranthrene*); Gaede, 1933: 796, pl. 94, row i (*Paranthrene*); Heppner & Duckworth, 1981: 23 (*Paranthrene*); Arita, 1992: 97 (*Paranthrene*).

Redescription: Female (lectotype) (Fig. 11). Alar expanse 19.6 mm; body length 10.4 mm; forewing 8.8 mm; antenna 6.0 mm.

Head: antenna dark brown to black with dark purple sheen, with yellow scales ventro-basally; frons gray-brown with golden sheen, with a broad white stripe laterally; labial palpus yellow with a few dark brown to black scales exterior-apically; vertex black with green-violet sheen; pericephalic hairs yellow.

Thorax: patagia dark brown to black with green-bronzed sheen, with a few yellow scales laterally; tegula dark brown to black with bronzed-blue sheen, with a narrow, yellow, inner margin and with admixture of yellow scales anteriorly; mesothorax dark brown to black with bronzed-blue sheen, with admixture of yellow scales anteriorly, and with a short, narrow, yellow, medial stripe anteriorly; metathorax entirely yellow; thorax laterally yellow mixed with dark brown scales.

Legs: fore coxa entirely yellow with strong golden sheen; fore femur externally dark brown with violet sheen, internally yellow; fore tibia entirely yellow; fore tarsus dorsally dark brown with violet sheen, with a narrow yellow stripe on two basal tarsomeres distally, ventrally entirely yellow; mid coxa mixed with yellow and dark brown scales with bronzed sheen; mid femur externally dark brown

with blue violet sheen, internally yellow; mid tibia yellow with golden sheen, with a narrow dark brown ring basally and a broad dark brown ring with purple sheen at base of spurs; spurs yellow; mid-basal tarsomere yellow with a large, longitudinal, dark brown spot medio-dorsally; tarsomere 2 dorsally dark brown with golden-purple sheen, with a narrow yellow stripe distally, ventrally yellow with golden sheen; remaining tarsomeres dorsally dark brown with golden-purple sheen, ventrally yellow with golden sheen; hind coxa yellow with a few black scales with bronzed-green sheen distally; hind femur yellow both internally and exterior-basally, exterior-distally dark brown to black with bronzed-green sheen; hind tibia yellow with golden sheen, with a narrow black ring basally, a small black spot with blue-violet sheen externally at basal 1/3, and with a broad black ring with blue-violet sheen distally; spurs yellow; hind tarsus yellow ventrally; dorsally two basal tarsomeres dark brown to black with purple sheen, with a narrow yellow stripe both basally and distally; tarsomeres 3 and 4 each gray-brown with golden sheen, with a few yellow scales; apical tarsomere yellow with golden sheen.

Abdomen: dorsally dark brown to black with green-blue sheen; tergites 1 and 5 each with a few yellow scales distally, tergites 2, 4, and 6 each with a broad yellow stripe distally, tergite 3 with a narrow yellow stripe distally; ventrally abdomen yellow with admixture of dark brown scales on sternite 3 proximally; anal tuft dorsally distinctly bipaddled, yellow with a few dark brown scales.

Forewing: dark brown to black with strong purple-violet sheen, with a narrow yellow stripe at costal margin between R-stem and Sc vein, with admixture of yellow scales at anal margin internally, and with yellow stripes on apical area between veins; discal spot narrow, dark brown to black with purple sheen, with a small yellow mark distally; transparent

areas well-developed, densely covered with colorless scales with bronzed-violet hue; external transparent area rounded distally, relatively large, divided into five cells, level to vein M_2 about three times as broad as discal spot and as broad as apical area; cilia dark brown with bronzed sheen.

Hindwing: transparent; veins, discal spot, and outer margin dark brown to black with purple sheen; discal spot small, triangular, reaching to base of vein M_2 ; outer margin narrow, somewhat narrower than cilia; cilia dark brown to black with bronzed sheen, anally yellow.

Female genitalia: (genital preparation No. 1581 YA and OG-96-28) (Fig. 20). Papillae anales relatively small, well-sclerotized, covered with short and long setae; 8th tergite relatively broad, with a few short setae at distal margin; posterior apophyses somewhat longer than anterior apophyses; ostium bursae opening at level of anterior-dorsal margin of 8th tergite, membranous; antrum narrow, long, well-sclerotized, with a narrow finger-shaped appendix posteriorly; ductus bursae about as long as antrum, membranous; corpus bursae globose, without signum.

Male: (Fig. 13). Alar expanse 20.1 mm; body length 12.6 mm; forewing 9.0 mm; antenna 6.5 mm.

Head: antenna dark brown to black with dark purple sheen, with a narrow yellow stripe ventrally at basal $2/3$; frons gray-brown with golden-purple sheen, with a broad white stripe laterally; labial palpus yellow with a dark brown to black stripe exterior-apically; vertex black with green-violet sheen; pericephalic hairs yellow dorsally and pale yellow to white laterally.

Thorax: patagia dark brown to black with green-violet sheen, with a small yellow spot laterally; tegula dark brown to black with bronzed-purple sheen, with a broad, yellow, inner margin and with admixture of yellow scales anteriorly; mesothorax dark brown to black with bronzed-green sheen, with admixture of

yellow scales anteriorly, and with a narrow, short, yellow, medial stripe anteriorly; metathorax yellow; thorax laterally yellow mixed with dark brown scales.

Legs: fore coxa yellow with strong golden sheen, with a narrow, broadened basally, dark brown to black stripe with green-purple sheen at inner margin; fore femur externally dark brown with green-violet sheen, internally yellow; fore tibia yellow, with a few black scales basally; fore tarsus dorsally dark brown with violet sheen, with a narrow yellow stripe on two basal tarsomeres distally, ventrally entirely yellow; mid coxa dark brown to black with green-bronzed sheen; mid femur externally dark brown with green-blue sheen, internally yellow; mid tibia yellow with golden sheen, with a narrow dark brown ring basally and a broad dark brown ring with green sheen at base of spurs; spurs yellow to pale yellow; mid basal tarsomere dorsally dark brown with green-purple sheen, with a small pale yellow spot both basally and distally, ventrally yellow; remaining tarsomeres dorsally dark brown with green-purple sheen, ventrally yellow with golden sheen; hind coxa black with green-bronzed sheen, with a few yellow scales anteriorly; hind femur yellow internally, externally dark brown to black with bronzed-green sheen; hind tibia internally yellow with golden sheen, with a narrow black stripe distally, externally black with green-purple sheen, with a narrow yellow stripe at base of both pairs of spurs; spurs yellow; hind tarsus ventrally yellow with admixture of individual dark brown scales; dorsally dark brown to black with bronzed-purple sheen, with a small yellow spot both basally and distally on basal tarsomere.

Abdomen: dorsally dark brown to black with green-bronzed sheen; tergites 2 and 4 each with a narrow yellow stripe distally, tergites 3 and 6 each with a few yellow scales distally, tergite 5 with a few yellow scales laterally; ventrally abdomen dark brown with green-bronzed sheen,

with admixture of pale yellow to yellow scales; anal tuft dark brown to black with bronzed sheen, with a few yellow-orange scales laterally.

Forewing: dark brown to black with purple-green sheen, with a few yellow scales at costal margin between R-stem and Sc vein, with admixture of yellow scales at anal margin internally, and with a few yellow scales on apical area between veins; discal spot narrow, dark brown to black with purple sheen, with a few yellow scales distally; transparent areas well-developed; external transparent area rounded distally, relatively large, divided into six cells (cell between veins R_4 and R_5 minute), level to vein M_2 about 5 times as broad as discal spot and about twice as broad as apical area; cilia dark brown with bronzed sheen.

Hindwing: transparent; veins, discal spot and outer margin dark brown to black with purple sheen; discal spot small, triangular, reaching to base of vein M_2 ; outer margin narrow, somewhat narrower than cilia; cilia dark brown to black with bronzed sheen, anally yellow.

Male genitalia: (Genital preparation No. GA-223) (Figs. 22a-e). Tegumen-uncus complex narrow; scopula androconialis well-developed, long, covered with long setae terminating in a double bent tip (Fig. 22b); crista gnathi medialis long, semi-oval; crista gnathi lateralis short, semi-oval; valva (Fig. 22a) trapeziform-oval, densely covered with setae terminating in a double bent tip (Fig. 22c); crista sacculi nearly flat, not separated from sensory field of setae, covered with bifurcate apically setae (Fig. 22d); ventral crista small, covered with triangular flat-topped setae (Fig. 22e); saccus about as long as vinculum; aedeagus narrow, slightly shorter than valva; vesica with numerous, strong, irregular, nearly flat cornuti.

Variability: Unknown for males. Females are nearly invariable in details of the coloration of the various parts of the body, but one female (paralectotype) has

the labial palpus dark brown to black with green sheen externally and a second female (paralectotype) has the vertex mixed with yellow scales anteriorly and the tegula with a narrow yellow stripe at external margin. Besides that, individual size is slightly variable as well: alar expanse 19.6-23.1 mm; forewing 8.8-10.2 mm; antenna 6.0-6.5 mm.

Diagnosis: This species seems to be closest to *P. duporti* (Le Cerf, 1927) and *P. subaurata* (Le Cerf, 1916). From the male of the former species, the male of *P. formosicola* can be distinguished by the coloration of the fore coxa (yellow with a small, narrow, longitudinal, black spot mediobasally in *P. duporti*), abdomen (dorsally black with violet sheen; tergite 3 with a narrow, yellow, distal margin; tergite 5 with a few yellow scales at distal margin; tergites 1, 2, 4, and 6 each with a broad, yellow, distal margin; tergite 7 with yellow scales medially; ventrally sternite 3 black, others densely mixed with yellow scales; both medial and lateral parts of anal tuft black with green-violet sheen, with a narrow yellow stripe laterally in the species compared). From the female of *P. duporti*, that of *P. formosicola* differs by the coloration of the frons (pale yellow with a large grey spot mixed with yellow scales medially in *P. duporti*), thorax (tegula yellow with a black spot at base of forewing; mesothorax black with violet sheen, with a relatively broad yellow stripe medio-anteriorly, and with a V-shaped, broad, yellow stripe posteriorly in the female of *P. duporti*), abdomen dorsally (black with green-purple sheen; tergite 1 entirely yellow; tergites 2 and 3 each with a yellow distal half; tergites 4-6 each yellow with a narrow, black, proximal margin in the species compared), and by the structure of the external transparent area of the forewing (larger, divided into six cells (cell between veins R_4 and R_5 minute, level to vein M_2 about 4.0-4.5 times as broad as discal spot and about 1.3-1.5 times as broad as apical area in *P.*

duporti). Besides that, these two species are rather easily separable from each other by the structure of the female genitalia (cp. Fig. 20 and fig. 20 in Gorbunov & Arita, 1995a). From the female of the latter species compared (unfortunately, the male of *P. subaurata* is unknown), the female of *P. formosicola* can be separated by the coloration of the abdomen dorsally (black with green sheen; tergites 1 and 2 each with a narrow, laterally broadened, yellow-orange stripe distally; tergite 4 entirely yellow-orange; tergites 5 and 6 each with a broad, yellow-orange distal stripe; anal tuft entirely yellow orange in the species compared), and by the structure of the external transparent area of the forewing (larger, divided into six cells in the female of *P. subaurata*). From the male of *P. vietnamica* (Gorbunov & Arita, 1995) (unfortunately, the female of this species is unknown), the male of *P. formosicola* differs by the coloration of the meta-thorax (black with green-violet sheen in the species compared), fore coxa (pale yellow with a broad, yellow inner margin in *P. vietnamica*), abdomen (dorsally black with bright green sheen; tergites 2 and 3 each with a narrow, yellow distal margin; tergite 4 with a narrow, laterally broadened, yellow margin distally; ventrally entirely yellow; anal tuft black with a long, pale yellow, medial part in the species compared), and by the shape of the external transparent area of the forewing (divided into six cells [cell between veins R_4 and R_5 absent, but cell between veins Cu_1 and Cu_2 present, small], level to vein M_2 about 5 times as broad as discal spot and about 2.7 times as broad as apical area in *P. vietnamica*). In addition, these two species differ from each other by the structure of the male genitalia (cp. Fig. 22 and fig. 16 in Gorbunov & Arita, 1995a). From the female of *P. uranauges* (Meyrick, 1926) (the male of this species is unknown), the female of *P. formosicola* differs by the structure of the external transparent area

of the forewing (larger, divided into six cells, level to vein M_2 about 6.5 times as broad as discal spot and about 3.3 times as broad as apical area in the species compared).

Bionomics: The exact host plant is unknown, but it seems likely that this is a species which breeds on *Rubus* sp. (Rosaceae). The specimens examined were collected in May-July and August-October. This species possibly has two generations per year.

Habitat: Unknown.

Distribution: Taiwan: Tainan Hsien, Nantou Hsien.

Type series: 1 ♀ (lectotype) (Fig. 11), with the labels as illustrated in Fig. 12 (DEI); 1 ♀ (paralectotype), "Kosempo / Formosa VII / H. Sauter 1911", "*Paranthrene* / Strand det. ♀ / *formosicola* / m.", "Syntypus", "Paralectotypus ♀ / *Paranthrene* (*Paranthrenella*) / *formosicola* Strand, [1916] / O. Gorbunov & / Y. Arita Design. 1997", "♀ Genitalia on slide / No. 1581 / Y. Arita, 1991", "Genitalia examined by / O. Gorbunov / Preparation No. OG-96-28" (DEI); 1 ♀ (paralectotype), "Kosempo (Formosa) / H. Sauter V. 1912", "*Paranthrene* / Strand det. ♀ / *formosicola* / m.", "Syntypus", "Paralectotypus ♀ / *Paranthrene* (*Paranthrenella*) / *formosicola* Strand, [1916] / O. Gorbunov & / Y. Arita design. 1997", "♀ Genitalia on slide / No. 1575 / Y. Arita, 1991", "Genitalia examined by / O. Gorbunov / Preparation No. OG-96-29" (DEI).

Other material examined: 1 ♂, "S. Formosa, Kanshirei, 5.09, H. Sauter S.V." [=Taiwan, Tainan Hsien, Kuantiling], (genital preparation No. GA-223) (DEI); 1 ♀, Taiwan, Nantou Hsien, Kuantao-shan, ca. 1300 m, 6. VII. 1995, leg. J. Luo (MUT); 1 ♀, Taiwan, Nantou Hsien, Shihtyutou, 24. X. 1995, leg. J. Luo (MUT); 1 ♀, Taiwan, Nantou Hsien, Wantashe, 6. VIII. 1996, leg. Y. Arita (MUT).

Acknowledgements

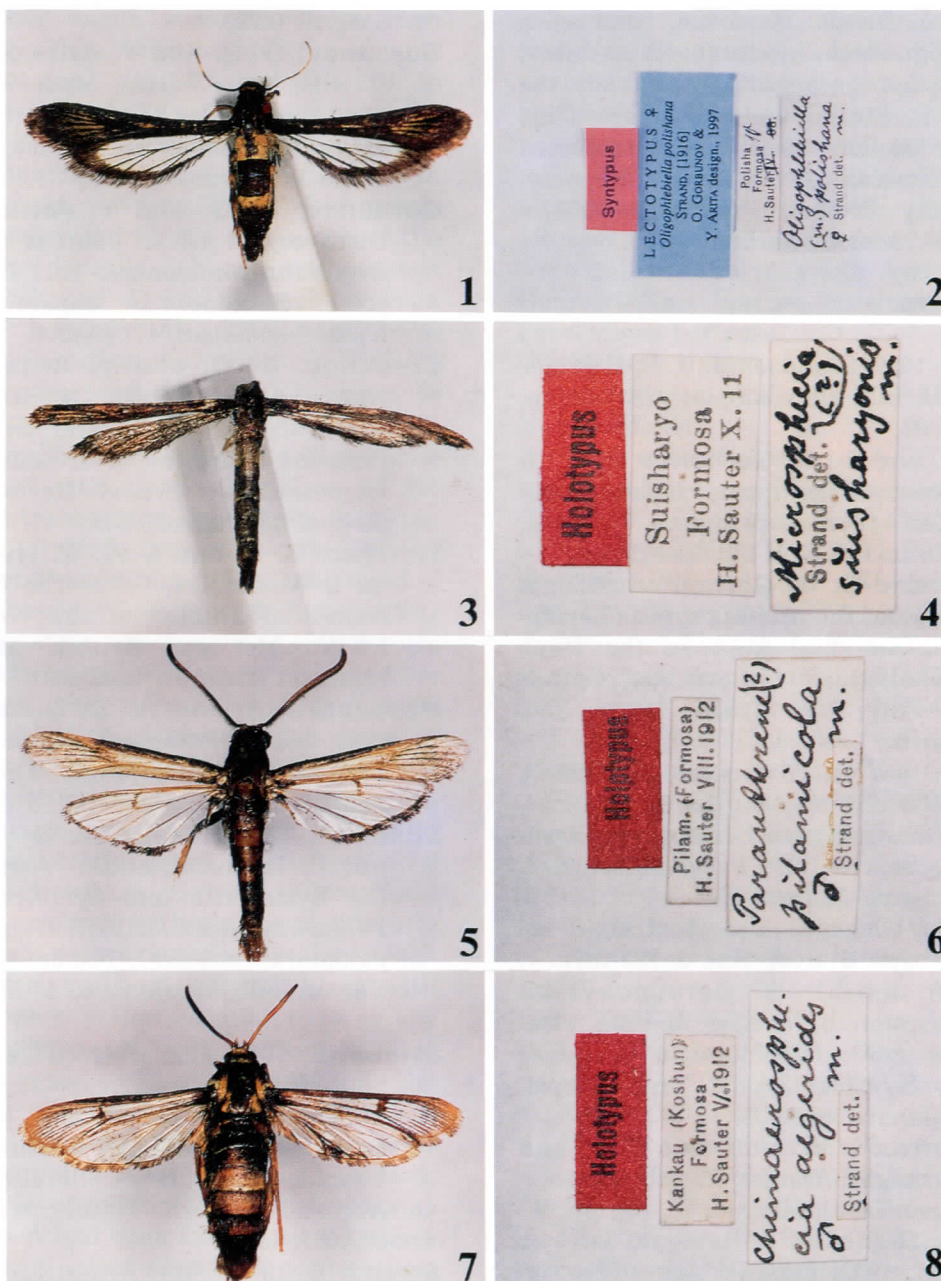
We would like to express our cordial thanks to Dr R. Gaedicke, Deutsches Entomologisches Institut, Eberswalde, Germany, for the possibility to study the types of E. Strand under his care. This investigation has been partly supported by the Russian Academy of Sciences, Biodiversity Project, Programme 0001N No. 2.0005.76 (O.G. Gorbunov).

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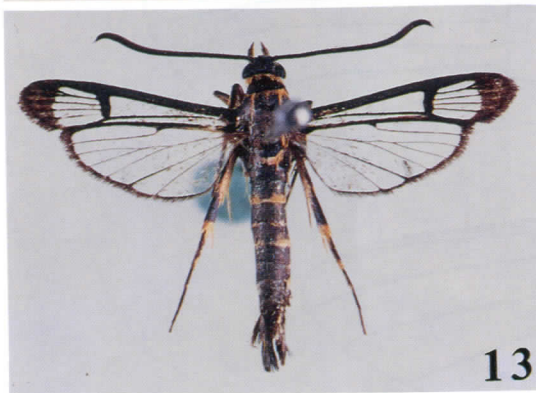
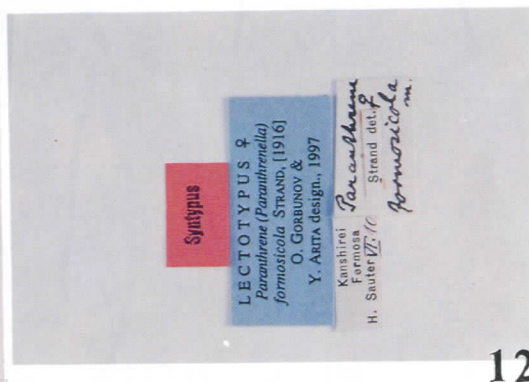
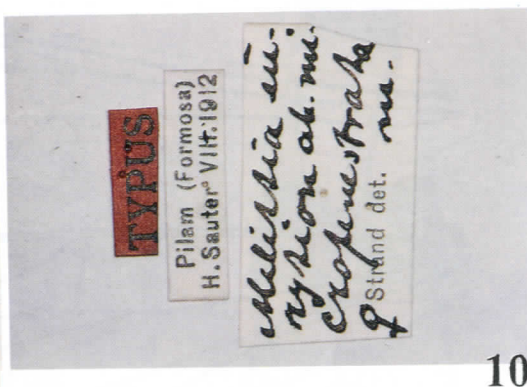
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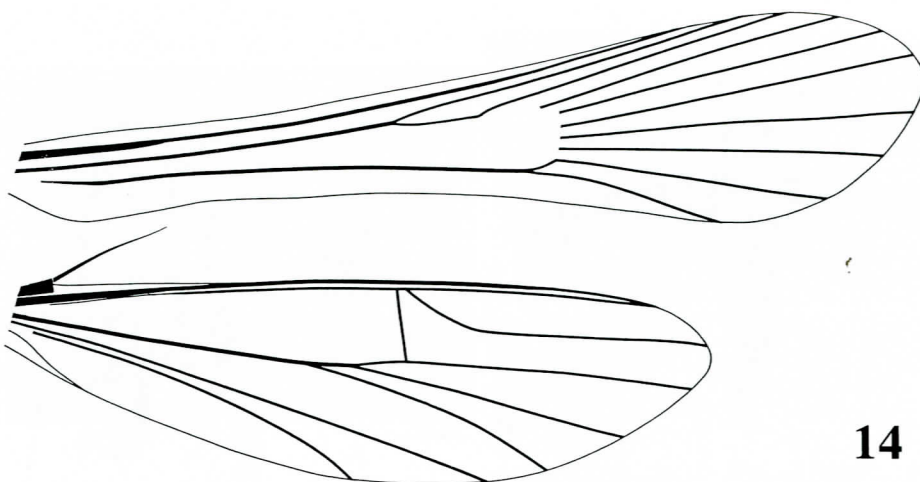
Figs. 1-8. Type specimens and their labels.

1-2. *Oligophlebiella polishana* Strand, 1916, 1. lectotype, female (DEI), alar expanse 19.9 mm, 2. *ditto*, labels; 3-4. *Chamanthedon suisharyonis* (Strand, 1917), comb. nov., 3. holotype, female (DEI), alar expanse 17.0 mm, 4. *ditto*, labels; 5-6. *Nokona pilamicola* (Strand, 1916), comb. nov., 5. holotype, male (DEI), alar expanse 25.8 mm, 6. *ditto*, labels; 7-8. *Chimaerosphecchia aegerides* Strand, 1916, 7. holotype, female (DEI), alar expanse 35.5 mm, 8. *ditto*, labels.

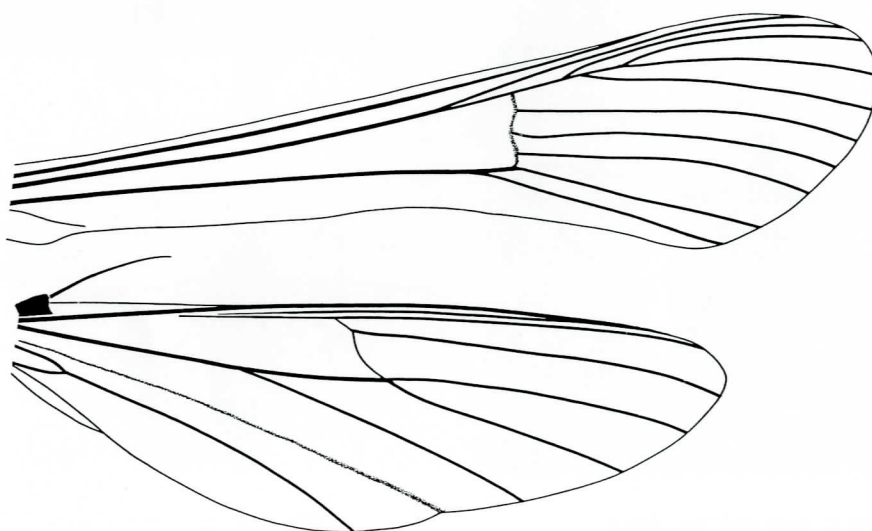


Figs. 9-13. Type specimens and their labels.

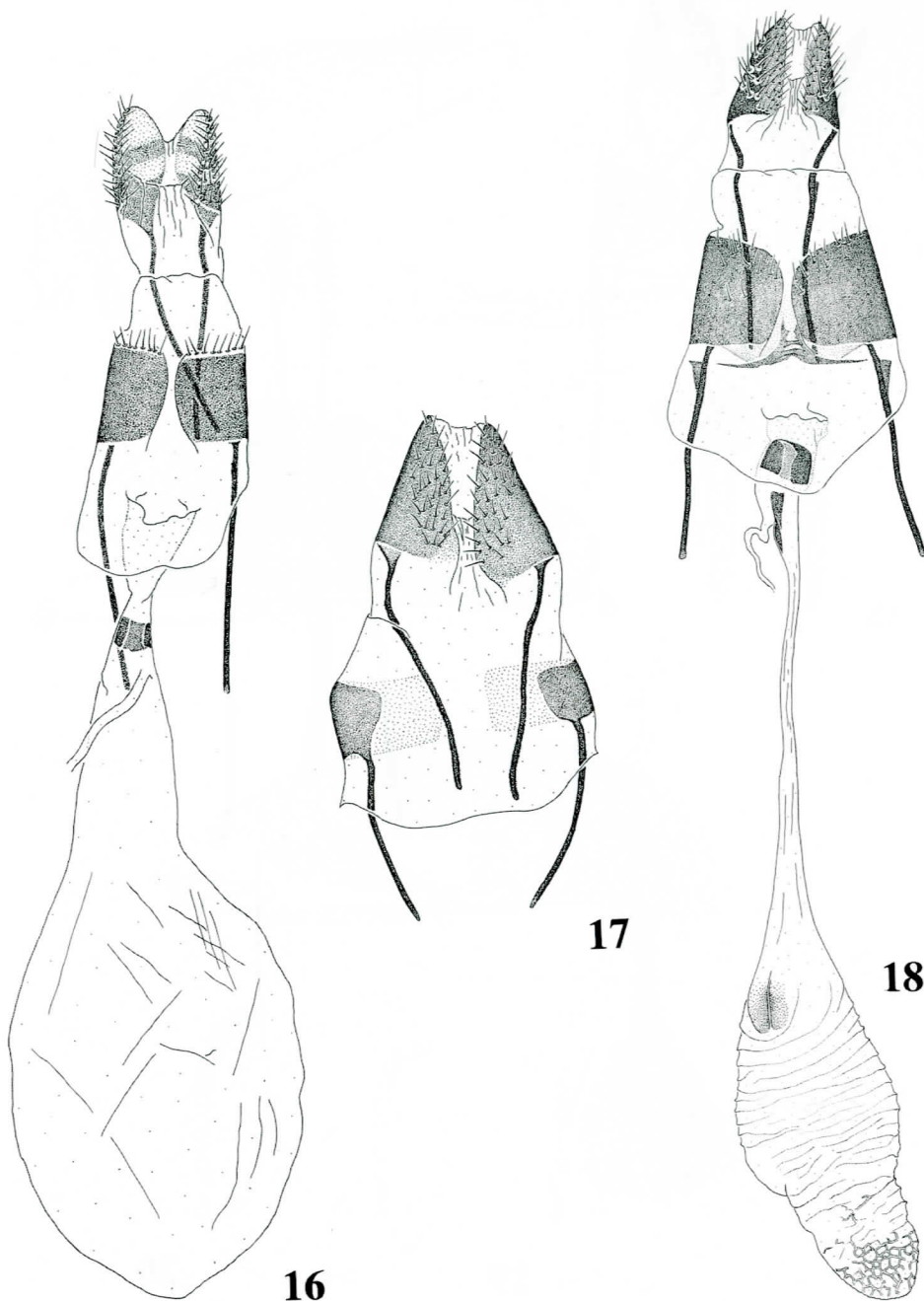
9-10. *Melittia formosana* Matsumura, 1911, 9. *Melittia eurytion* ab. *microfenestrata* Strand, 1916, holotype, female (DEI), alar expanse 30.0 mm, 10. *ditto*, labels; 11-13. *Paranthrenella formosicola* (Strand, 1916), comb. nov., 11. lectotype, female (DEI), alar expanse 19.6 mm, 12. *ditto*, labels, 13. *ditto*, male, "S. Formosa, Kanshirei, 5.09, H. Sauter S.V." [=Taiwan, Tainan Hsien, Kuanyling] (MUT), alar expanse 20.1 mm.



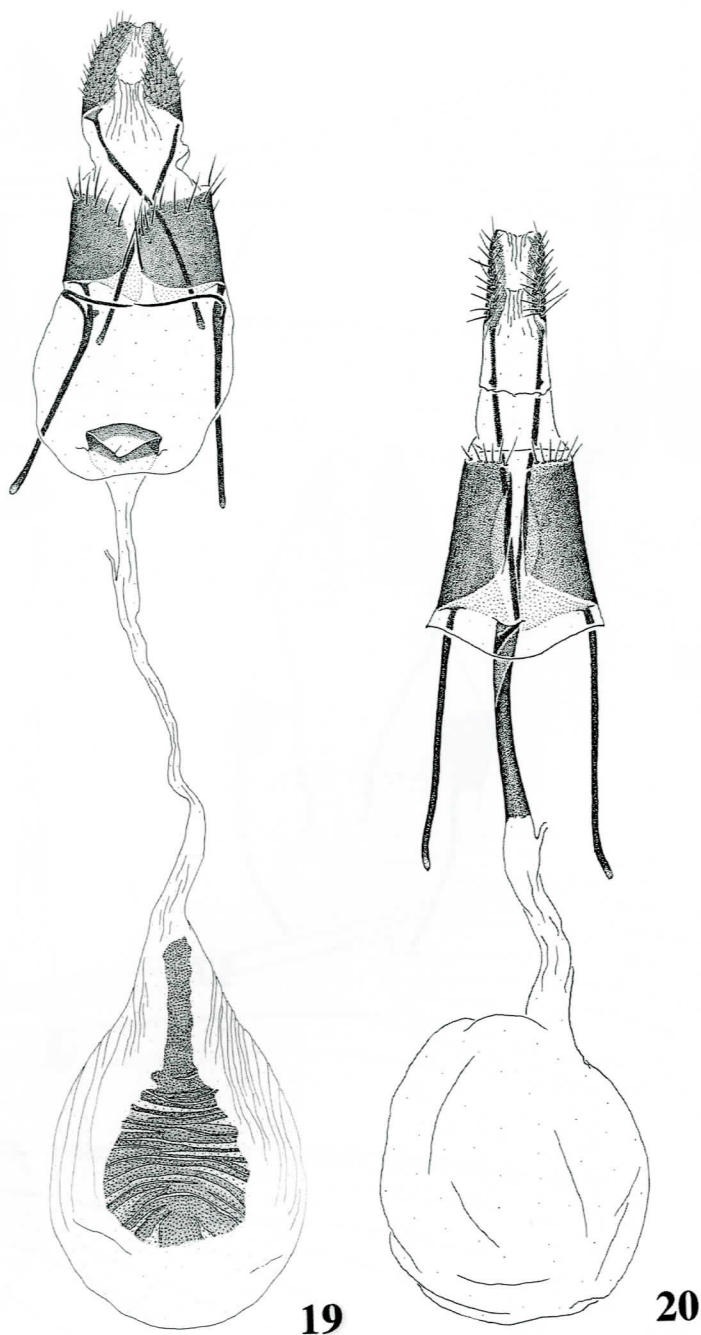
14



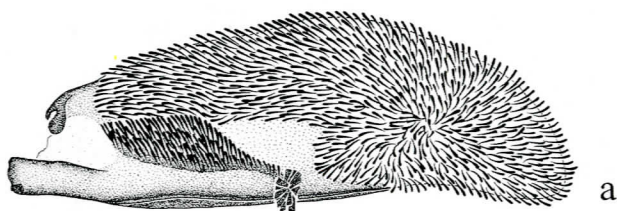
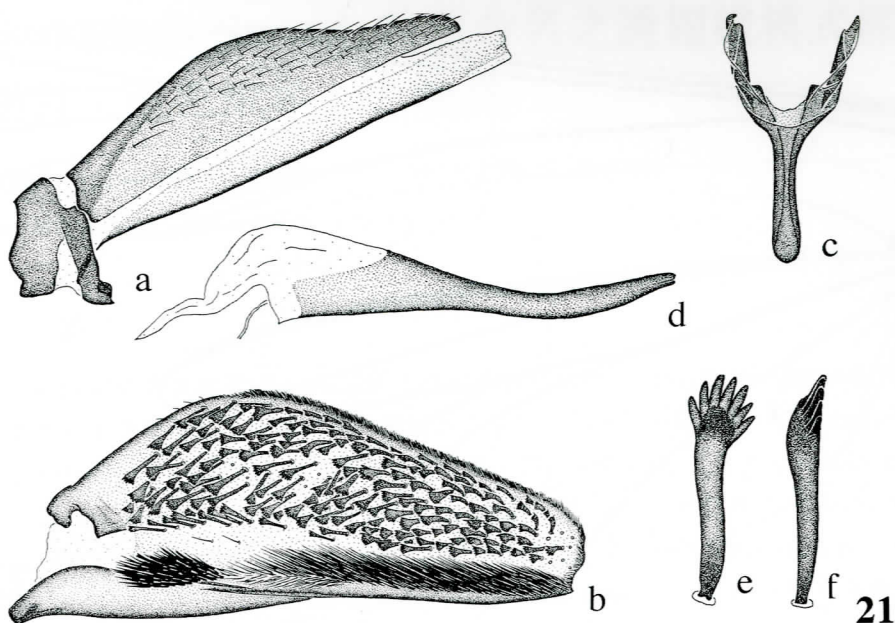
Figs. 14-15. Wing venation. 14. *Oligophlebiella polishana* Strand, 1916. 15. *Chimaerosphecchia aegerides* Strand, 1916. Scale bar: 2.0 mm.



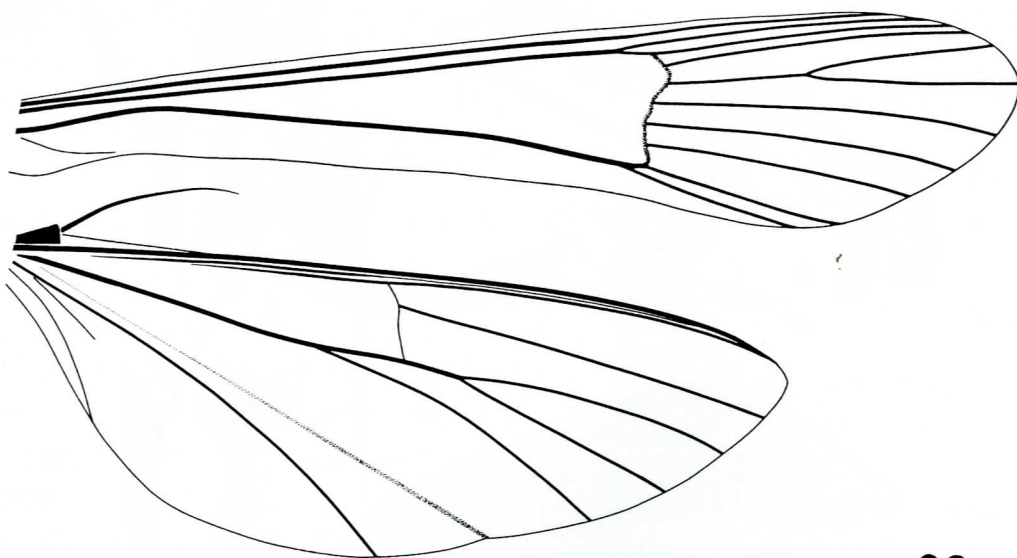
Figs. 16-18. Female genitalia. 16. *Oligophlebiella polishana* Strand, 1916. Paralectotype, genital preparation Nos. 1574 YA and OG-96-25 (EDI). 17. *Chamanthedon suisharyonis* (Strand, 1917), comb. nov. Holotype, genital preparation Nos. 1573 YA and OG-96-30 (EDI). 18. *Chimaerosphecica aegerides* Strand, 1916. Holotype, genital preparation Nos. 1572 YA and OG-96-26 (DEI). Scale bar: 0.5 mm.



Figs. 19-20. Female genitalia. 19. *Melittia formosana* Matsumura, 1911 (holotype of *Melittia eurytion* ab. *microfenestrata* Strand, 1916), genital preparation Nos. 1571 YA and OG-96-24 (DEI). 20. *Paranthrenella formosicola* (Strand, 1916), comb. nov. Paralectotype, genital preparation Nos. 1581 YA and OG-96-28 (DEI). Scale bar: 0.5 mm



Figs. 21-22. Male genitalia. 21. *Nokona pilamicola* (Strand, 1916), comb. nov. Holotype, genital preparation Nos. 1586 YA and OG-96-27 (DEI). a. Tegumen-uncus complex. b. Valva. c. Saccus. d. Aedeagus. e-f. Shape of setae from medial part of valvae. Scale bar: a-d: 0.5 mm; e-f: 0.1 mm. 22. *Paranthrenella formosicola* (Strand, 1916), comb. nov. "S. Formosa, Kanshirei, 5.09, H. Sauter S.V." [=Taiwan, Tainan Hsien, Kuantyling] (DEI). a. Valva. b-e. Shape of setae: b-from uncus; c-from medial part of valvae; d-from crista sacculi; e-from ventral crista. Scale bar: a: 0.5 mm; b-e: 0.1 mm.



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Fig. 23. Wing venation of *Paranthrenella formosicola* (Strand, 1916), comb. nov. Scale bar: 2.0 mm.

臺灣產 Embrik Strand 氏所命名之透翅蛾模式標本 (鱗翅目：透翅蛾科) 之修訂

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摘 要

本文修訂保存在德國Eberswalde之德國昆蟲研究所，由Embrik Strand所描述之臺灣產透翅蛾分類單元，所有的種均繪圖加以說明。*Chimaerosphecica* Strand, 1916與*Paranthrenella* Strand, 1916二屬恢復有效名。*Paranthrene* (?) *pilamicola* Strand, 1916與*Microsphecica* (?) *suisharyonis* Strand, 1917二種分別移轉至*Nokona* Matsumura, 1931屬與*Chamanthodon* Le Cerf, 1916屬。本文亦指定*Oligophlebiella polishana* Strand, 1916與*Paranthrenella fromosicola* (Strand, 1916)二種之選模。

關鍵詞：鱗翅目、透翅蛾科、模式標本、E. Strand、分類學、臺灣。