

## A PRELIMINARY KEY TO THE COMMON CALLIPHORID FLIES OF PENINSULAR MALAYSIA (Insecta: Diptera)

BY

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### ABSTRACT

A key to the common Calliphorid flies of Peninsular Malaysia is presented. Illustrations of the genitalia of some rare species, list of new localities, altitudes and other ecological data are also presented. The following species were recorded for the first time from Peninsular Malaysia; *Catapicephala sinica*, *C. kurahashii*, *Taninanina javanica*, *Hemipyrellia tagaliana*, *Lucilia sinensis*, *Blaesoxipha hasterni*, *Boettcherisca javanica*, *Parasarcophaga misera*, *P. orchidea*, *P. albiceps*, *Sarcosolomonina crinita*, *Thyrsocnema bornensis*, *Sarcorohdendorfia antilope* and *Lioproctia pattoni*.

### INTRODUCTION

Flies have long been known to be associated with various microorganisms such as bacteria, viruses, protozoa, fungi and helminth parasites in the tropical and temperate countries. Besides this, maggots of some species of Calyptrate flies are also known to infest on the living and dead tissues of man and animals, thereby causing myiasis.

Studies on Calyptrate Muscoid flies in Peninsular Malaysia have been carried out since 1953. Reid<sup>5)</sup> produced a bulletin for the public health workers, which was mainly based on fly surveys and fly breeding in Kuala Lumpur and Cameron Highlands. Brief descriptions of the appearance, habits, life history and the public health importance of houseflies, blowflies and a few other species commonly encountered in Peninsular

Malaysia were also given. Wharton *et al.*<sup>6)</sup> studied the housefly population and the dispersion with particular reference to the fly problem in Cameron Highlands and carried out simple insecticide tests on houseflies obtained from the highlands and lowlands.

Inder Singh<sup>2)</sup> carried out studies on the prevalence of the housefly in the vicinity of Kuala Lumpur. Investigations were also conducted on the use of insecticides in dry sugar baits for the control of the housefly (Inder Singh *et al.*<sup>1)</sup>). Investigations on the fly problems and control in Cameron Highlands and the susceptibility levels of the houseflies from the highlands to the insecticides were also conducted (Inder Singh<sup>3)</sup>). Insecticides which had not been evaluated before were also screened against four strains of the housefly caught from four different areas in Peninsular Malaysia (Inder Singh<sup>4)</sup>).

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Extensive studies on the Calyptrate Muscoid flies have not been conducted yet in Malaysia. Therefore, fly surveys were carried out by the authors in Peninsular Malaysia from the 15th to the 30th of September, 1975 (Tokyo Medical and Dental University Overseas Scientific Research Project, 1975) and adult flies were collected from different parts of the country for taxonomic purposes. A simple key was prepared from these specimens (TMDU) and also from some specimens on loan from Bishop Museum (Bishop), Honolulu, and California Academy of Sciences (CAS), San Francisco.

The authors' aim is to provide a preliminary key to the Malaysian species of Calliphoridae flies, list of new localities, altitudes and other bionomic data. Male and female genitalia of little known species are also presented in this key.

#### KEY TO THE SUBFAMILIES OF Calliphoridae s. lat.

1. Stem-vein of wing without setulae on upper side of basal section ..... 2
- Stem-vein of wing with distinct setulae on posterior upper side of its basal section ..... 3
2. Notopleural bristles nearly always two; the anterior two bristles on the area between the presutural dorso-centrals and notopleurals not in a straight line, the anterior one distinctly lateral of the posterior ..... Calliphorinae
- Notopleural bristles invariably three or four; the two anterior bristles on the area between the presutural dorso-central and notopleurals either in straight line or the anterior one mesial of the posterior ..... Sarcophaginae
3. Subalar knob with erect hair; thoracic squama subtruncate at apex; concave on outer margin, haired in parts of upper surface ..... Chrysomyinae
- Subalar knob bare or without distinct hair; thoracic squama narrowly rounded at apex, straight or so on outer margin; a bare glossy submarginal band on upper occiput extending almost entirely across its width .... Rhiniinae

#### Subfamily CALLIPHORINAE

##### KEY TO THE GENERA OF Calliphorinae

1. Supraspiracular convexity clothed with long upstanding fine hair ..... 2
- Supraspiracular convexity pubescent ..... 4
2. Body predominantly brilliant metallic-green, blue or purple; subcostal sclerite covered with short black bristles ... 3
- Parts of thorax and base of abdomen testaceous; subcostal sclerite without black bristles or upstanding hair .... *Phumosia* Rob.-Desvoidy
3. Legs in male more or less fringed; hypopygium strongly developed; generally large flies, more than 15 mm in length ..... *Hypopygiopsis* Townsend
- Legs in male not fringed; hypopygium not strongly developed; generally small flies, not exceeding 12 mm in length ... *Hemipyrellia* Townsend
4. Thoracic squama bare ..... 5
- Thoracic squama with hair on disc or with a patch of small setulae towards inner margin ..... 8
5. Brilliant shining green, blue or purple flies ..... 6
- Brownish flies; sternopleural bristles 1+1; pleura without soft white hair, but covered with long yellow, brown and black setulae; vibrissae generally inserted well above oral margin; arista long-plumose to tip; no facial carina; eyes widely separated in male; prosternum hairy; propleura bare except around the propleural bristle .....

- ..... *Bengalia* Rob.-Desvoidy
6. Propleura and prosternum bare; post-sutural *dc* usually 4, sometimes 3 ....
- ..... *Catapicephala* Macquart
- Propleura and prosternum hairy, post-sutural *dc* 3 ..... 7
7. Upper half of parafacialia bare; posterior parasquamal tuft developed .....
- ..... *Lucilia* Rob.-Desvoidy
- Upper half of parafacialia hairy; posterior parasquamal tuft absent .....
- ..... *Onesia* Rob.-Desvoidy
8. Thoracic squama covered almost entirely or in part with hair; eyes in male closely approximated, widely separated in female; metallic flies generally bluish or with purple tinge .....
- ..... *Calliphora* Rob.-Desvoidy
- Thoracic squama with small patch of setulae; eyes in male nearly as widely separated as in female; flies grey-dusted .....
- ..... *Tainanina* Villeneuve

### 1. GENUS *Hypopygiopsis* Townsend

*Hypopygiopsis* Townsend, 1916. Proc. U.S. Nat. Mus. 51, No. 2152: 390 (Type-species: *Hypopygiopsis splendens* Townsend=*H. fumipennis* (Walker)).

1. Facial tomentum silver; antennae dark brown; tarsi in male with long fringes; length 9.0–16.0 mm .....
- ..... *violacea* (Macquart)

*Hypopygiopsis violacea* (Macquart, 1835)

Suites à Buff. 2: 235 (*Cynomyia*).

Specimens examined: 2♂♂, 16 miles NE. Kuala Lumpur, 1000 ft., 8.VI.1962, E. S. Ross & D. Q. Cavagnaro (CAS); 1♀, Botanical Gds., Singapore, 50 ft., 20. VIII.1962, Ross & Cavagnaro (CAS).

- Facial tomentum and antennae brilliant yellow; tarsi in male without long fringes; two pairs of postsutural *ac*; length 12.0–20.0 mm .....

..... *fumipennis* (Walker)

*Hypopygiopsis fumipennis* (Walker, 1857)

Journ. Proc. Linn. Soc. Lond. 1: 25 (*Musca*).

Specimens examined: 1♂, 16 miles NE. Kuala Lumpur, 1000 ft., 8.VI.1962, Ross & Cavagnaro (CAS).

### 2. GENUS *Hemipyrellia* Townsend

*Hemipyrellia* Townsend, 1918. Insec. Inscit. Mens. 6: 154 (Type-species: *Lucilia fernandica* Macquart.)

1. Thoracic squama pure white; eyes holoptic in ♂; male abdomen densely covered on the ventral surface with hair nearly as long as the arista; lateral lobes oval with long fine hair in ♂; facial tomentum silvery white; abdomen thinly dusted, usually metallic bluish green; length 8.5–10.5 mm ....

..... *tagaliana* (Bigot)

*Hemipyrellia tagaliana* (Bigot, 1877)

Ann. Ent. Soc. Fr. (5) 7: 44 (*Somomyia*).

Specimens examined: 1♂, Cameron Highlands, 700–1300 m, 27.X.1975, S. Shinonaga (TMDU); 1♂ 1♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 1♂, Taman Rompin, Pahang, 5–20 m, 19.IX.1960, J. L. Gressitt (Bishop).

- Thoracic squama brownish white; eyes in ♂ separated by distance greater than width of third antennal segment; hair on ventral surface of abdomen shorter than arista; lateral lobes elongated, testaceous, very sparsely haired; facial tomentum greyish; female parafacialia grey; abdomen heavily dusted, usually metallic copper green; length 6.5–9.0 mm .....
- ..... *ligurriens* (Wiedemann)

*Hemipyrellia ligurriens* (Wiedemann, 1830)

Ausser. Zweifl. Ins. 2: 655 (*Musca*).

Specimens examined: 1♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 2♀♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 1♀, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shinonaga (TMDU).

### 3. GENUS *Phumosia* Rob.-Desvoidy

*Phumosia* Rob.-Desvoidy, 1830. Myodaires: 427 (Type-species: *Phumosia abdominalis* Rob.-Desvoidy)

1. Sternoplural bristles 1+1; suprasquamal ridge without minute fine hair; postsutural acrostichal bristle 1; scutellum fuscous; length 7.5–8.0 mm .....  
..... *nigronitens* Sen.-White

***Phumosia nigronitens*** (Sen.-White, 1923)

Mem. Dept. Agri. Ind., Ent. Ser. 8: 38 (*Caiusa*).

Specimens examined: 1♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.X.1975, Shinonaga (TMDU).

- Sternoplurals 2+1; suprasquamal ridge with minute fine hair; postsutural acrostichals 2; scutellum testaceous-yellow; length 8.0–10.0 mm (Figs. 1–9)  
..... *promittens* (Walker)

***Phumosia promittens*** (Walker, 1860)  
Proc. Linn. Soc. Lond. 4: 134 (*Musca*).

Specimens examined: 2♂♂ 12♀♀, Mt. Beremban, Cameron Highlands, 700–1700 m, 23–24.X.1975. Shinonaga (TMDU).

### 4. GENUS *Bengalia* Rob.-Desvoidy

*Bengalia* Rob.-Desvoidy, 1830. Myodaires: 425 (Type-species: *Bengalia labiata* Rob.-Desvoidy).

1. Subalar knob below base of wing gourd-shaped; mid-tibia without ventral submedian bristle; male with a pair of long strong bristles on ventral side of

abdomen; mesonotum centrally blackish; small black pleural spot below wing; abdominal tergites broadly bluish-black banded; length 8.5–10.0 mm  
..... *labiata* Rob.-Desvoidy

***Bengalia labiata*** Rob.-Desvoidy, 1830  
Myodaires: 426.

Specimens examined: 1♂, King Geo. V. Nat. Park, Kuala Trengganu, 15 & 17. XII.1958, T. C. Maa (Bishop); 1♀, Ulu Langat, Selangor, 300–390 m, 13.VI.1958, Maa (Bishop).

- Subalar knob rounded; mid-tibia in ♀ and sometimes in ♂ with distinct ventral submedian bristle; male abdomen with long ventral bristle; abdomen with discal bristles on fifth tergite; accessory forceps on male fifth sternite deeply emarginate; hind tibia in ♂ heavily fringed; large species; length 12.5 mm ..... *varicolor* (Fabricius)

***Bengalia varicolor*** (Fabricius, 1805)  
Syst. Antl.: 296 (*Musca*).

Specimen examined: 1♂, Bukit Mandul, 20 km S. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

### 5. GENUS *Catapicephala* Macquart

*Catapicephala* Macquart, 1851. Mem. Soc. Sci. & Arts Lille, Année 1850: 210 (Type-species: *Catapicephala splendens* Macquart).

1. Fronto-orbital bristles 2+2; frons index 0.26–0.28 in ♀; claws and pulvilli very short and stout; metacephalon covered with black hair only; length 13.0–14.0 mm .....  
..... *kurahashii* Tumrasvin & Kano

***Catapicephala kurahashii*** Tumrasvin & Kano, 1977.

Jap. J. Sanit. Zool. 28: 127.

Specimens examined: 2♀♀, Mt. Brinchang, Cameron Highlands, 2030 m, 1–9.I.1959, L. M. Quate (Bishop).

- Only one pair of reclinate fronto-orbitals well developed; frons index less than 0.23 in ♀; claws and pulvilli very long, longer than the last tarsal segment in ♂, normal in ♀; metacephalon with white hair; length 12.0 mm .....

..... *sinica* Fan  
***Catapicephala sinica*** Fan, 1965.

Key Common Synanth. Flies China: 795.

Specimens examined: 3 ♀♀, Bukit Mandul, 20 km W. Kuala Lumpur, I.XI.1975, Shinonaga (TMDU).

#### 6. GENUS *Lucilia* Rob.-Desvoidy

*Lucilia* Rob.-Desvoidy, 1830. Myodaires: 452  
 (Type-species: *Lucilia caesar* Linné).

1. Basicosta yellow; eyes dichoptic in ♂ & ♀; upper and lower squamae whitish; abdomen arched in profile; male sternites with tufts of long hair; hypopygium prominent; length 6.0 mm ...  
 ..... *cuprina* (Wiedemann)

***Lucilia cuprina*** (Wiedemann, 1830)

Auss. Zweifl. Ins. 2: 654 (*Musca*).

Specimens examined: 1 ♀. 14–20 miles N. Tapah, 300–600 m, 28.X.1975, Shinonaga (TMDU).

- Basicosta dark brown to black; eyes holoptic to subholoptic in ♂, and dichoptic in ♀; squamae infuscated; body less than 10 mm in length .... 2
- 2. Antennae reaching upper margin of epistome, with one anterodorsal bristles on mid-tibia; postsutural acrostichal and dorsocentral bristles usually not in a straight line transversely; length 8.0–8.5 mm .....  
 ..... *porphyrina* (Walker)

***Lucilia porphyrina*** (Walker, 1857)

Journ. Proc. Linn. Soc. Lond. 1: 24 (*Musca*).

Specimens examined: 1 ♀, Kuala Tregganu, 220 m, 17.XII.1958, J. L. Gressitt (Bishop); 2 ♀♀. Mt. Brinchang Cameron

Highlands, 2030 m, 1–9.I.1959, Quate (Bishop); 7 ♂♂ 8 ♀♀, Mt. Brinchang, Cameron Highlands, 2300 m, 25.X.1975, Shinonaga (TMDU); 2 ♂♂, 4 ♀♀, Mt. Beremban, 1100–1300 m, 26.X.1975, Shinonaga (TMDU); 8 ♂♂ 16 ♀♀, Cameron Highlands, 700–1000 m, 23–24.X.1975, Shinonaga (TMDU); 1 ♂, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 1 ♀, Ulu Langat, Selangor, 300–390 m, 13.VI.1958, Maa (Bishop).

- Antennae not reaching upper margin of epistome; mid-tibia with one or two anterodorsal bristles; postsutural acrostichal and dorsocentral bristles in a straight line transversely ..... 3
- 3. Anterior part of upper squama creamy or fuscous, usually with a tuft of blackish brown hair on inner lower margin in ♂; upper and lower squamae of female entirely creamy; narrowest part of male frons sometimes broader than the distance between both posterior ocelli; metacephalon usually with black hair; occiput with more than two irregular rows of black postocular setae; frons index 0.24–0.25 in ♀; length 9.5–10.0 mm .....  
 ..... *papuensis* Macquart

***Lucilia papuensis*** Macquart, 1842

Dipt. Exot. 2: 141.

Specimens examined: 1 ♂ 1 ♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU).

- Anterior part of upper squama creamy, with a tuft of yellowish white hair on inner lower margin; lower squama usually infuscated; narrowest part of male frons less than the distance between both posterior ocelli; metacephalon with several yellowish hair; occiput with only one row of black postocular setae; frons index 0.19–0.20

in ♀; length 10.5 mm .....

..... *sinensis* Aubertin

***Lucilia sinensis*** Aubertin, 1933

Journ. Linn. Soc. Lond. 38: 407.

Specimens examined: 1♂, Maxwell Hill, Perak, 1350 m, 17–20.III.1958, Maa (Bishop).

#### 7. GENUS ***Onesia*** Rob.-Desvoidy

***Onesia*** Rob.-Desvoidy, 1830. Myodaires: 365 (Type-species: *Onesia sepulchralis* (Meigen)).

1. Palpi brownish orange; anterior part of abdomen with grey tomentum; wings lightly infuscated basally and faintly above first longitudinal vein; squamae fuscous; thorax dull blue; abdomen metallic-blue; length 5.0–5.5 mm ....

..... *atripalpis* Malloch

***Onesia atriipalpis*** (Malloch, 1935), new combination

Journ. Fed. Malay Sta. Mus. 17: 669 (*Calliphora*).

Specimens examined: 4 ♀♀, Cameron Highlands, 700–1000 m, 23–24.X.1975, Shinonaga (TMDU).

#### 8. GENUS ***Calliphora*** Rob.-Desvoidy

***Calliphora*** Rob.-Desvoidy, 1830. Myodaires: 433 (Type-species: *Calliphora vomitoria* (Linné)).

1. Lower squama hairy; presutural intralar bristle absent; eyes in ♂ holoptic, not widely separated; facialia and jowls orange; hair on metacephalon brilliant orange; abdomen metallic blue; hypopygium inconspicuous; one or two pairs of presutural acrostichals; third antennal segment brown; length 9.5–10.5 mm ..

***Calliphora fulviceps*** van der Wulp,

1892

Midden Sumatra, 4, N. H. Fauna, pt.2: 44.

Specimens examined: 4♂♂, 41♀♀, Mt. Brinchang, Cameron Highlands, 25.X.1975, Shinonaga (TMDU).

#### 9. GENUS ***Tainanina*** Villeneuve

***Tainanina*** Villeneuve, 1926. Bull. Ann. Soc. Ent. Belge., 66: 217 (Type-species: *Tainanina grisella* Villeneuve=*T. pilisquama* Sen.-White).

1. External posthumeral bristle usually developed; presutural dorsocentral bristles; 2–4; hair on thoracic squama generally yellow; squamae and bases of wings yellowish; body more than 6.5 mm in length .....

..... *javanica* Kurahashi

***Tainanina javanica*** Kurahashi, 1978.

Pacific Ins. 18: 6.

Specimen examined: 1♀, Mt. Brinchang, Cameron Highlands, 2300 m, 25.X.1975, Shinonaga (TMDU).

#### Subfamily CHRYSOMYINAE

#### 10. GENUS ***Chrysomya*** Rob.-Desvoidy

***Chrysomya*** Rob.-Desvoidy, 1830. Myodaires: 444 (Type-species: *Chrysomya marginalis* Wiedemann=*C. regalis* Rob.-Desvoidy)

1. Prothoracic spiracle white ..... 2
- Prothoracic spiracle brown ..... 3
2. Sternopleural bristle 0+1; fifth tergite with black hair only; length 6.0–7.0 mm .....

..... *nigripes* Aubertin

***Chrysomya nigripes*** Aubertin, 1932

Ann. Mag. Nat. Hist. (10) 9: 26.

Specimens examined: 1♂, Mt. Brinchang, Cameron Highlands, 25.X.1975, Shinonaga (TMDU); 3♂♂, 1♀, Mt. Beremban, Cameron Highlands, 1100–1700 m, 25&26.X.1975, Shinonaga (TMDU); 4♂♂ 4♀♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 4♂♂ 3♀♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 10♂♂, Bukit Man-

- dul, 20 km W. Kuala Lumpur, 1.X.1975, Shinonaga (TMDU).
- Sternopleural bristles 1+1; fifth tergite with black hair as well as yellow ones, especially on the ventral side; length 8.5–9.0 mm . . . . *rufifacies* (Macquart)
- Chrysomya rufifacies*** (Macquart, 1842) Mem. Soc. Roy. Sci. Arts Lille, Année 1842: 303 (*Lucilia*).
- Specimens examined: 1♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 1♂, 3♀, Ulu Gombak, 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 13♂♂ 12♀♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 2♂♂, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shinonaga (TMDU).
3. Femora swollen and shining in both sexes, especially the front one, more noticeably in ♂; eyes dichoptic in both ♂ and ♀; facial ridge sharp and distinct, several black setulae only around vibrissae; anterior part of jowls shining reddish black, rest covered with golden hair and silver tomentum; antennae deeply sunk in facial groove; length 9.0–9.5 mm . . *villeneuvei* Patton
- Chrysomya villeneuvei*** Patton, 1922 Ind. Journ. Med. Res. 9: 567.
- Specimens examined: 2♀♀, King Geog. V. Nat. Park Kuala Tahan, Pahang, 12–15.XII.1958, T. C. Maa (Bishop); 1♂, Mt. Beremban, Cameron Highlands, 26.X.1975, Shinonaga (TMDU); 18♂♂ 16♀♀, Cameron Highlands, 700–1300 m, 23–24.X.1975, Shinonaga (TMDU); 4♂♂ 8♀♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 7♂♂ 10♀♀, Bt. Mandul, 20 km W. Kuala Lumpur, 1.X.1975, Shinonaga (TMDU); 2♂♂ 5♀♀, Ulu Langat, Selangor, 300–390 m, 13.VI.1958, Maa (Bishop).
- Femora normal; eyes in ♂ more or less closely approximated, dichoptic in ♀; male hypopygium more or less inconspicuous . . . . . 4
4. Parafacialia and jowls brilliant orange, the latter clothed with golden hair; eyes in ♂ sharply demarcated, upper two-thirds with large facets, lower one-third with small facets; thoracic squama dirty brown; length 7.5–9.0 mm . . . . . *megacephala* (Fabricius)
- Chrysomya megacephala*** (Fabricius, 1784) Syst. Ent. 4: 317 (*Musca*).
- Specimens examined: 1♂, Mt. Beremban, Cameron Highlands, 1100–1700 m, 26.X.1975, Shinonaga (TMDU); 3♂♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 7♂♂ 12♀♀, Cameron Highlands, 700–1000 m, 23–24.X.1975, Shinonaga (TMDU); 6♀♀, Ulu Gombak Rd., 30 km W. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 2♀♀, Ulu Gombak, Selangor, 300 m, 18.V.1958, Maa (Bishop); 3♂♂ 2♀♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 3♂♂, Ulu Langat, Selangor, 300–390 m, 13–14.VI.1958, Maa (Bishop); 1♂, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shinonaga (TMDU).
- Parafacialia and jowls never brilliant orange, fuscous . . . . . 5
5. Jowls smaller than length of eye when viewed laterally; lower half of alar squama (upper squama) whitish and bare; length 7.5–8.5 mm . . . . . sp. 1
- Chrysomya* sp. 1.** probably new species
- Specimens examined: 1♂ 6♀♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 4♂♂ 10♀♀, Ulu Gombak Rd., 30 km W. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 8♂♂, 32♀♀, Bukit Mandul, 20 km W.

Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 4♂♂, Ulu Langat, Selangor, 300–390 m, 13–14.VI.1958, Gressitt & Maa (Bishop).

- Length of jowls same as or more than that of eye when viewed laterally; lower half of alar squama brown and bearing long hair ..... 6
- 6. Body bluish; metacephala covered with yellowish hair; jowls about 3/10 in ♂, 4/10 in ♀ of total head height when viewed laterally; length 8.0–8.5 mm ..... *pinguis* (Walker)

***Chrysomya pinguis* (Walker, 1858)**

Trans. Ent. Soc. Lond. 4: 213.

Specimens examined: 4♂♂ 45♀♀, Cameron Highlands, 700–1000 m, 23–24.X.1975, Shinonaga (TMDU); 1♂, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU).

- Body greenish; metacephala covered with black and brown hair; jowls about 2/10 in ♂, 3/10 in ♀ of total head height when viewed laterally; length 7.5–8.5 mm ... *defixa* (Walker)

***Chrysomya defixa* (Walker, 1857)**

Proc. Linn. Soc. Lond. 1: 28 (*Musca*).

Specimens examined: 1♂, Cameron Highlands, 700–1000 m, 23–24.X.1975, Shinonaga (TMDU); 5♂♂ 23♀♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, Shinonaga (TMDU); 5♀♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

Subfamily RHINIINAE

KEY TO THE GENERA OF Rhiniinae

1. Prostigmatic bristle present ..... 2
- Prostigmatic bristle absent ..... 3
2. Arista strongly plumose, in general practically to tip; presutural acrostichal bristle inconspicuous; two posthumeral bristles ... *Cosmina* Rob.-Desvoidy
- Arista strongly plumose to tip; all acrostichals developed; parafacial hair present ..... *Isomyia* Walker
3. Arista plumose ..... *Borbororhinia* Townsend
- Arista pectinated ..... 4
4. Hind tibia without a conspicuous row of anterodorsal bristles; apical cell open; slender insects of parallel-sided and mostly testaceous abdomen ..... *Idiella* Rob.-Desvoidy
- Hind tibia with a conspicuous row of subequal anterodorsal bristles; front tibia with a submedian posteroventral bristle; posterior mesopleural row of bristles reduced to the upper ones only; apical cell either open, closed on the border or petiolate; rather stout insects with ovate abdomen and usually of a dark color ..... *Rhinia* Rob.-Desvoidy

**11. GENUS *Cosmina* Rob.-Desvoidy**

*Cosmina* Rob.-Desvoidy, 1830. Myodaires: 423 (Type-species: *Musca punctulata* Wiedemann).

1. Propleura with fine yellowish-white hair in centre and covered with white tomentum; ovipositor unspined on last segment; length 7.0–8.0 mm (Figs. 10–18) ..... *bicolor* (Walker)

***Cosmina bicolor* (Walker, 1857)**

Proc. Linn. Soc. 1: 23 (*Idia*).

Specimens examined: 1♂ 5♀♀, King Geo. V. Nat Park, Kuala Trengganu, 15 & 17.XII.1958, Gressitt & Maa (Bishop); 2♀♀, Kuala Trengganu, 220 m, 15.XII.1958, Gressitt (Bishop).

- Propleura bare in centre, and submetallic brownish black in color; ovipositor with strong spines on last segment; length 5.0–6.0 mm (Figs. 19–27) ..... *limbipennis* (Macquart)
- Cosmina limbipennis* (Macquart, 1848)**  
Dipt. Exot. 2, supp.: 54 (*Idia*).

Specimens examined: 3 ♀♀, King Geo. V. Nat. Park, Kuala Trengganu, 15 & 17.XII.1958, Gressitt & Maa (Bishop).

## 12. GENUS *Isomyia* Walker

*Isomyia* Walker, 1860. Proc. Linn. Soc. Lond. 4: 134 (Type-species: *Isomyia delectans* Walker).

1. First longitudinal vein not setulose below basally; thoracic squama produced lobe-like, its margin lying close against basal lateral angle of scutellum; postalar declivity generally haired; basica yellow; length 8.0 mm .....  
..... *viridaurea* (Wiedemann)

*Isomyia viridaurea* (Wiedemann, 1824)  
Anal. Ent. 42: 82 (*Tachina*).

Specimens examined: 1 ♂, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, H. Shima (TMDU).

- First longitudinal vein not setulose below basally; thoracic squama produced lobe-like, its margin lying close against basal lateral angle of scutellum; postalar declivity generally haired; basica brown to black; prothoracic spiracle yellow; apical dark cloud on wing present; mesopleural and sternopleural ground hair almost entirely pale; pteropleura with only one black or one strong and two fine black bristles; length 9.5–10 mm .....  
..... *electa* (Villeneuve)

*Isomyia electa* (Villeneuve, 1927)

Rev. Zool. Afr. 15: 217 (*Thelychaeta*).

Specimens examined: 1 ♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shima (TMDU).

## 13. GENUS *Borbororkinia* Townsend

*Borbororkinia* Townsend, 1917. Rec. Ind. Mus. 13: 138 (Type-species: *Idia bivittata* Walker).

1. Prostigmatic bristle absent; arista plu-

mose; thorax reddish brown; palpi black or reddish brown; length 5.5–6.0 mm (Figs. 28–36) .....  
..... *bivittata* (Walker)

*Borbororkinia bivittata* (Walker, 1857)

Proc. Linn. Soc. Lond. 1: 128 (*Idia*).

Specimens examined: 1 ♂ 1 ♀, Taman, S. E. Pahang, 5 m, 18.IX.1960, Gressitt (Bishop); 2 ♂♂ 1 ♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 6 ♂♂ 5 ♀♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 2 ♀♀, Ulu Langat, Selangor, 300–390 m, 13.VI.1958, Gressitt & Maa (Bishop).

## 14. GENUS *Idiella* Brauer et Bergenstamm

*Idiella* Brauer et Bergenstamm, 1889. Denkschr. Akad. Wiss. Wien 56: 154 (Type-species: *Idia mandarina* Wiedemann).

1. Abdomen yellow, orange to brown, usually darkened apically, without a definite pattern, sometimes with metallic reflections; pleural hair whitish yellow; length 5.0–7.5 mm (Figs. 37–45) .....  
..... *divisa* (Walker)

*Idiella divisa* (Walker, 1861)

Proc. Linn. Soc. 5: 267 (*Idia*).

Specimens examined: 1 ♀, Kuala Taman, Pahang, 300 m, 13.XII.1968, Maa (Bishop); 2 ♀♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 1 ♂, Taman, S. E. Pahang, 5 m, 18.IX.1960, Gressitt (Bishop); 1 ♀, Rompin, S. E. Pahang, 5–20 m, 19.IX.1960, Gressitt (Bishop); 1 ♀, Ulu Gombak, Selangor, 300 m, 18.V.1958, Maa (Bishop); 7 ♂♂ 1 ♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

### 15. GENUS *Rhinia* Rob.-Desvoidy

*Rhinia* Rob.-Desvoidy, 1830. Myodaires: 422 (Type-species: *Rhinia testacea* Rob.-Desvoidy).

1. Occiput dusted on its lower part; thorax more or less dusted, never wholly black or with transverse band; teguments olive green in color, not light metallic green; abdomen black with testaceous pattern, first abdominal tergite yellow except its black or brown posterior border; mesopleura and usually occipital dilation with clear and distinct piliferous spots; sternopleura largely pruinose; apical cell open; legs at least partly black; front coxae testaceous, densely dusted; femora black, the hind one sometimes narrowly yellow at base; length 5.0 mm ..... *discolor* (Fabricius)

***Rhinia discolor*** (Fabricius, 1794)

Ent. Syst. 4: 320 (*Musca*).

Specimens examined: 1♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU).

- Occiput dusted on its lower part; thorax more or less dusted, never wholly black or with transverse band; teguments olive green; abdomen either wholly or largely testaceous; mesopleura without distinct piliferous spots; sternopleura and hypopleura glossy black, not pruinose; apical cell closed and petiolate; legs partially or wholly testaceous, tibiae and femora usually wholly testaceous; male scutellum with long and fine hair in addition to the normal setulosity; length 6.0–6.5 mm ..... *apicalis* (Wiedemann)

***Rhinia apicalis*** (Wiedemann, 1830)

Auss. Zweifl. Ins. 2: 354 (*Idia*).

Specimens examined: 1♂, Mt. Brinchang, Cameron Highlands, 2300 m, 25.

X.1975, Shinonaga (TMDU); 1♂, Mt. Beremban, Cameron Highlands, 1100–1700 m, 26.X.1975, Shima (TMDU); 6♂♂ 2♀♀, Cameron Highlands, 700–1000 m, 23–24.X.1975, Shinonaga & Shima (TMDU); 1♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU).

### Subfamily SARCOPHAGINAE

#### KEY TO THE GENERA OF Sarcophaginae

1. Propleuron bare ..... 2
- Propleuron hairy ..... 7
2. Postsutural dorsocentral bristles 3 ... 3
- Postsutural dorsocentrals 4-6 ..... 4
3. Abdomen without median marginal bristle on third tergite; fourth and fifth tergites golden-dusted; palpi black ..... *Thyrsoctenema* Enderlein
- Abdomen with median marginal bristles on third tergite; fourth and fifth abdominal tergites without goldendusting; palpi brown ..... *Blaesoxipha* Baranov
4. Four postsutural dorsocentral bristles well developed and of subequal length ..... *Sarcosolomonina* Baranov
- Posterior two of postsutural dorsocentrals well developed and demarcated from anterior ones ..... 5
5. Yellowish white genal hair extending beyond anterior half of genae ..... *Parasarcophaga* Johnston et Tiegs
- Black genal hair, extending over anterior half of genae ..... 6
6. Postocular bristles in three regular rows; mid-tibia in ♂ with long antero-ventral fringes ..... *Seniorwhitea* Rohdendorf
- Postocular setae in two regular rows ... *Parasarcophaga* Johnston et Tiegs
7. One irregular row of fine black hair along eye margin on parafacialia .... *Boettcherisca* Rohdendorf

- A few irregular rows of fine black hair on parafacialia; at least one pair of presutural dorsocentrals well developed ..... 8
- 8. Anterior half of genae covered with black hair; male fourth sternite with a tuft of short hair on posterior margin .....  
..... *Sarcorohdendorfia* Baranov
- Genal hair mostly yellowish white; male fourth sternite without such a tuft of hair ..... *Lioproctia* Enderlein

#### 16. GENUS *Thyrsocnema* Enderlein

*Thyrsocnema* Enderlein, 1928. Arch. Klass. Phyl. Ent. 1: 42 (Type-species: *Sarcophaga striata* Enderlein, not Fabricius, 1794 = *Sarcophaga incisilobata* Pandellé).

1. Propleuron bare; four pairs of presutural acrostichal bristles, one prescutellar fine bristle; fourth and fifth tergites covered with golden dusting; hind tibia in ♂ with a long postero-ventral fringe; length 6.0–10.0 mm .....  
..... *bornensis* Shinonaga et Lopes
- Thyrsocnema bornensis*** Shinonaga et Lopes, 1975

Pacif. Insects 16: 463.

Specimens examined: 5♂♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 1♂, Ulu Gombak, 30 km E. Kuala Lumpur, Shima (TMDU).

#### 17. GENUS *Blaesoxipha* Loew

*Blaesoxipha* Loew, 1861. Wien Ent. Mschr. 5: 384 (Type-species: *B. grylloctona* Loew = *Sarcophaga laticornis* Meigen).

1. Propleuron bare; first longitudinal vein setulose; third tergite with median marginal bristle; genae covered with black hair; postocular bristles in one regular and two irregular rows; length 7.5 mm ..... *kaestneri* Baranov
- Blaesoxipha kaestneri*** Baranov, 1932  
Misc. Zool. Sumatra 66: 3.

Specimen examined: 1♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shima (TMDU).

#### 18. GENUS *Sarcosolomonina* Baranov

*Sarcosolomonina* Baranov, 1938. Vet. Arch., Zagreb 8: 73 (Type-species: *Sarcosolomonina tulagiensis* Baranov)

1. Propleuron bare; five pairs of presutural and one prescutellar pair of acrostichal bristles; length 7.0–10.0 mm .....  
..... *crinita* (Parker)
- Sarcosolomonina crinita*** (Parker, 1917)  
Proc. U.S. Nat. Mus. 54: 93 (*Sarcophaga*).  
Specimens examined: 5♂♂ Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 1♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU).

#### 19. GENUS *Parasarcophaga* Johnston et Tiegs

*Parasarcophaga* Johnston et Tiegs, 1921. Proc. R. Soc. Qd. 33: 86 (Type-species: *Sarcophaga omega* Johnston et Tiegs = *knabi* Parker).

1. Palpi yellowish brown; length 9.0–11.0 mm ..... *orchidea* (Boettcher)
- Parasarcophaga orchidea*** (Boettcher, 1913)  
Annls Hist-Nat. Mus. Natn. Hung. 11: 375 (*Sarcophaga*).  
Specimens examined: 1♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 1♂ 1♀, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 2♂♂, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shinonaga (TMDU); 8♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).
- Palpi fuscous or black ..... 2
  - 2. Black genal hair extending over anterior half of genae; postocular setae in two

regular rows; length 8.5 mm . . . . .  
 . . . . . *brevicornis* (Ho)

***Parasarcophaga brevivornis* (Ho, 1934)**

Bull. Fan Mem. Inst. Biol. 5: 23 (*Sarcophaga*).

Specimen examined: 1♂, Cameron Highlands, 700–1300 m, 23–24.X.1975, Shinonaga (TMDU).

- Yellowish white genal hair extending beyond anterior half of genae . . . . . 3
- 3. Three rows of postocular bristles, first row regular, second and third irregular; length 10.0–14.0 mm . . . . .  
 . . . . . *albiceps* (Meigen)

***Parasarcophaga albiceps* (Meigen, 1826)**

Syst. Besch. Europ. Zweifl. Insekt. 5: 22 (*Sarcophaga*).

Specimens examined: 6♂♂, 4♀♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 2♂♂ 1♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shima (TMDU); 2♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

- One row of black postocular bristles . . . 4
- 4. Last pair of presutural acrostichal bristles distinct from other presutural bristles; male hind tibia with well developed long antero-ventral and postero-ventral fringes and without strong antero-ventral bristles; female hind tibia with two subequal antero-ventral bristles; length 6.5–11.0 mm . . . . .  
 . . . . . *knabi* (Parker)

***Parasarcophaga knabi* (Parker, 1917)**

Proc. U.S. Natn. Mus. 54: 66 (*Sarcophaga*).

Specimens examined; 3♂♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 1♂, Ulu Gombak Rd., 30 km E. Kuala Lumpur, 30.X.1975, Shinonaga (TMDU); 1♂ 2♀♀, Bukit

Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shima (TMDU); 7♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

- Last pair of presutural acrostichals not distinct from other presutural bristles; male tibia with hair on antero-ventral fringe shorter in length than those of posteroventral fringe, and with strong anteroventral bristles on distal one-third; female hind tibia with two anteroventral bristles, the distal bristle longer than the proximal one; length 8.5–12.0 mm . . . *misera* (Walker)

***Parasarcophaga misera* (Walker, 1849)**

List. Dipt. Br. Mus. 4: 849 (*Sarcophaga*).

Specimens examined: 1♂ 1♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 2♂♂, 14–20 miles N. Tapah, 300–600 m, 28.X.1975, Shinonaga (TMDU); 1♂ 2♀♀, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shingnaga (TMDU).

**20. GENUS *Seniorwhitea* Rohdendorf**

*Seniorwhitea* Rohdendorf, 1937. Fauna USSR, Dipt. 19(1): 297 (Type-species: *Sarcophaga orientaloidea* Sen.-White=*S. krameri* Boettcher).

- 1. Palpi black or fuscous; black genal hair extending over anterior half of genae; postsutural dorsocentral bristles 4–6, the posterior two pairs well developed; length 8.0–13.6 mm . . . . .  
 . . . . . *krameri* (Boettcher)

***Seniorwhitea krameri* (Boettcher, 1912)**

Ent. Mitt. 1: 165 (*Sarcophaga*).

Specimens examined: 1♂, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 3♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shima (TMDU); 2♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975,

Shinonaga (TMDU).

**21. GENUS *Boettcherisca* Rohdendorf**

*Boettcherisca* Rohdendorf, 1937. Fauna USSR, Dipt. 19(1): 270 (Type-species: *Myophora peregrina* Rob.-Desvoidy)

1. Genae clothed with black hair only . . 2
- Genae clothed with black hair on anterior part only, the rest with yellowish white hair . . . . . 3
2. Fourth and fifth tergites golden-dusted; hind tibia in ♂ with posteroventral fringe; length 12.5 mm . . . . .

. . . . . *nathani* Lopes

***Boettcherisca nathani* Lopes, 1961**

Mem. Inst. Oswaldo Cruz. 59: 79.

Specimen examined: 1♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

- Fourth and fifth tergites not covered with golden dusting; hind tibia in ♂ without posteroventral fringe; length 7.0–11.5 mm . . . . . *javanica* Lopes

***Boettcherisca javanica* Lopes, 1961**

Mem. Inst. Oswaldo Cruz 59: 79.

Specimens examined: 1♀, Cameron Highlands, 700–1300 m, 27.X.1975, Shinonaga (TMDU); 9♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU).

3. Postocular bristles in two regular rows and one irregular one; anterior paramere broadened apically in male genitalia; length 7.5–10.0 mm . . . . .

. . . . . *karyni* (Hardy)

***Boettcherisca karyni* (Hardy, 1927)**

Proc. Linn. Soc. N. S. W. 3: 454 (*Sarcophaga*).

Specimens examined: 2♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 1♂, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shinonaga (TMDU).

- Postocular bristles in three regular rows;

hind tibia in ♂ with long sparsely haired posteroventral fringe on distal two-thirds; length 9.5–10.0 mm . . . . .

. . . . . *peregrina* (Rob.-Desvoidy)

***Boettcherisca peregrina* (Rob.-Desvoidy, 1830)**

Mem. Pres. Acad. Sci. Inst. Fr. (2) 2: 356 (*Myophora*).

Specimens examined: 1♂ 1♀, Mt. Beremban, Cameron Highlands, 1100–1700 m, 26.X.1975, Shinonaga (TMDU); 1♀, Mangrove Swamp, Kuala Selangor, 31.X.1975, Shinonaga (TMDU).

**22. GENUS *Sarcorohdendorfia* Baranov**

*Sarcorohdendorfia* Baranov, 1938, Vet. Arch., Zagreb 8: 173 (Type-species: *Sarcorohdendorfia adiscalis* Baranov = *Notochaeta indusa* Curran).

1. Propleuron hairy; many irregular rows of fine black hair on parafacialia; at least one pair of presutural acrostichals well developed; anterior half of genae clothed with black hair; length 9.0–13.00 mm . . . . . *antilope* (Boettcher)

***Sarcorohdendorfia antilope* (Boettcher, 1913)**

Annls Hist.-Nat. Mus. Natn. Hung. 11: 374 (*Sarcophaga*).

Specimens examined: 3♂♂, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shinonaga (TMDU); 3♂♂ 1♀, Bukit Mandul, 20 km W. Kuala Lumpur, 1.XI.1975, Shima (TMDU).

**23. GENUS *Lioproctia* Enderlein**

*Lioproctia* Enderlein, 1928. Arch. Klass. Phyl. Ent. 1: 26 (Type-species: *Lioproctia aurifrons* Enderlein = *Lioproctia enderleini* Kano et Lopes).

1. Propleuron hairy; many irregular rows of fine black hair on parafacialia; at least one pair of presutural acrostichals well developed; genal hair mostly

yellowish white; length 10.0–14.0 mm  
 ..... *pattoni* (Sen.-White)

***Lioproctia pattoni*** (Sen.-White, 1924)  
 Rec. Indian Mus. 26: 242 (*Sarcophaga*).

Specimens examined: 13♂♂, Bukit  
 Mandul, 20 km W. Kuala Lumpur, 1.XI.  
 1975, Shinonaga (TMDU); 4♂♂, Bukit  
 Mandul, 20 km W. Kuala Lumpur, 1.XI.  
 1975, Shima (TMDU).

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## EXPLANATION OF FIGURES

Plate 1. *Phumosia promittens* (Walker)

- Fig. 1. Fifth sternite of male, ventral view  
 Fig. 2. Epandrium, cercus and parolobus, male, lateral view  
 Fig. 3. Cerci and parolobi, male, caudal view  
 Fig. 4. Parameres, male genitalia, lateral view  
 Fig. 5. Aedeagus, male genitalia, lateral view  
 Fig. 6. Abdominal sternites 1-5, female, ventral view  
 Fig. 7. Tergites 6-9, female ovipositor, dorsal view  
 Fig. 8. Sternites 6-9, female ovipositor, ventral view  
 Fig. 9. Spermatheca, female

Plate 2. *Cosmina bicolor* (Walker)

- Fig. 10. Fifth sternite of male, ventral view  
 Fig. 11. Epandrium, cercus and parolobus, male, lateral view  
 Fig. 12. Cerci and parolobi, male, caudal view  
 Fig. 13. Parameres, male genitalia, lateral view  
 Fig. 14. Aedeagus, male genitalia, lateral view  
 Fig. 15. Abdominal sternites 1-5, female, ventral view  
 Fig. 16. Tergites 6-9, female ovipositor, dorsal view  
 Fig. 17. Sternites 6-9, female ovipositor, ventral view  
 Fig. 18. Spermatheca, female

Plate 3. *Cosmina limbipennis* (Macquart)

- Fig. 19. Fifth sternite of male, ventral view  
 Fig. 20. Epandrium, cercus and parolobus, male, lateral view  
 Fig. 21. Cerci and parolobi, male, caudal view  
 Fig. 22. Parameres, male genitalia, lateral view  
 Fig. 23. Aedeagus, male genitalia, lateral view

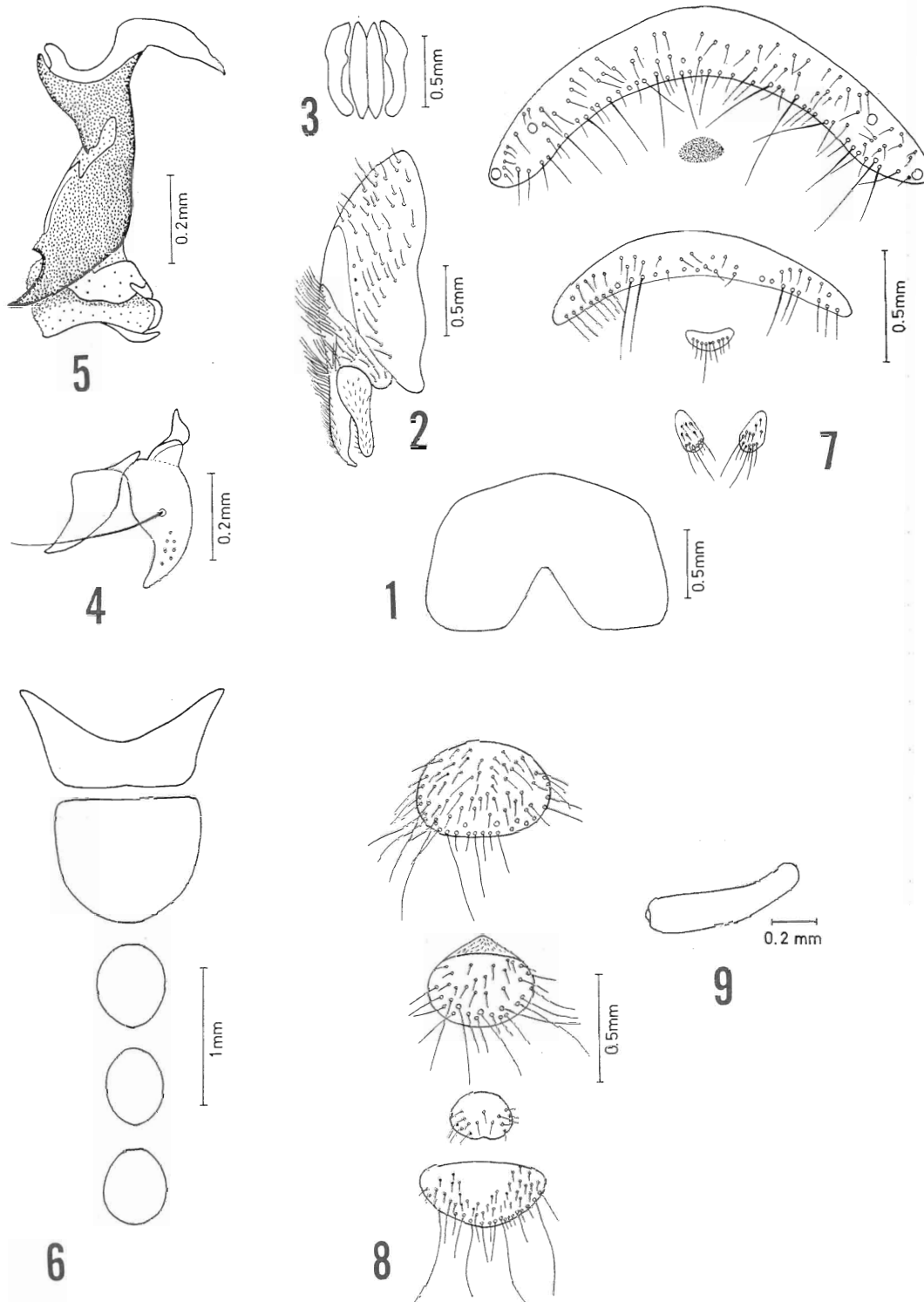
- Fig. 24. Abdominal sternites 1-5, female, ventral view  
 Fig. 25. Tergites 6-9, female ovipositor, dorsal view  
 Fig. 26. Sternites 6-9, female ovipositor, ventral view  
 Fig. 27. Spermatheca, female

Plate 4. *Borbororhinia bivittata* (Walker)

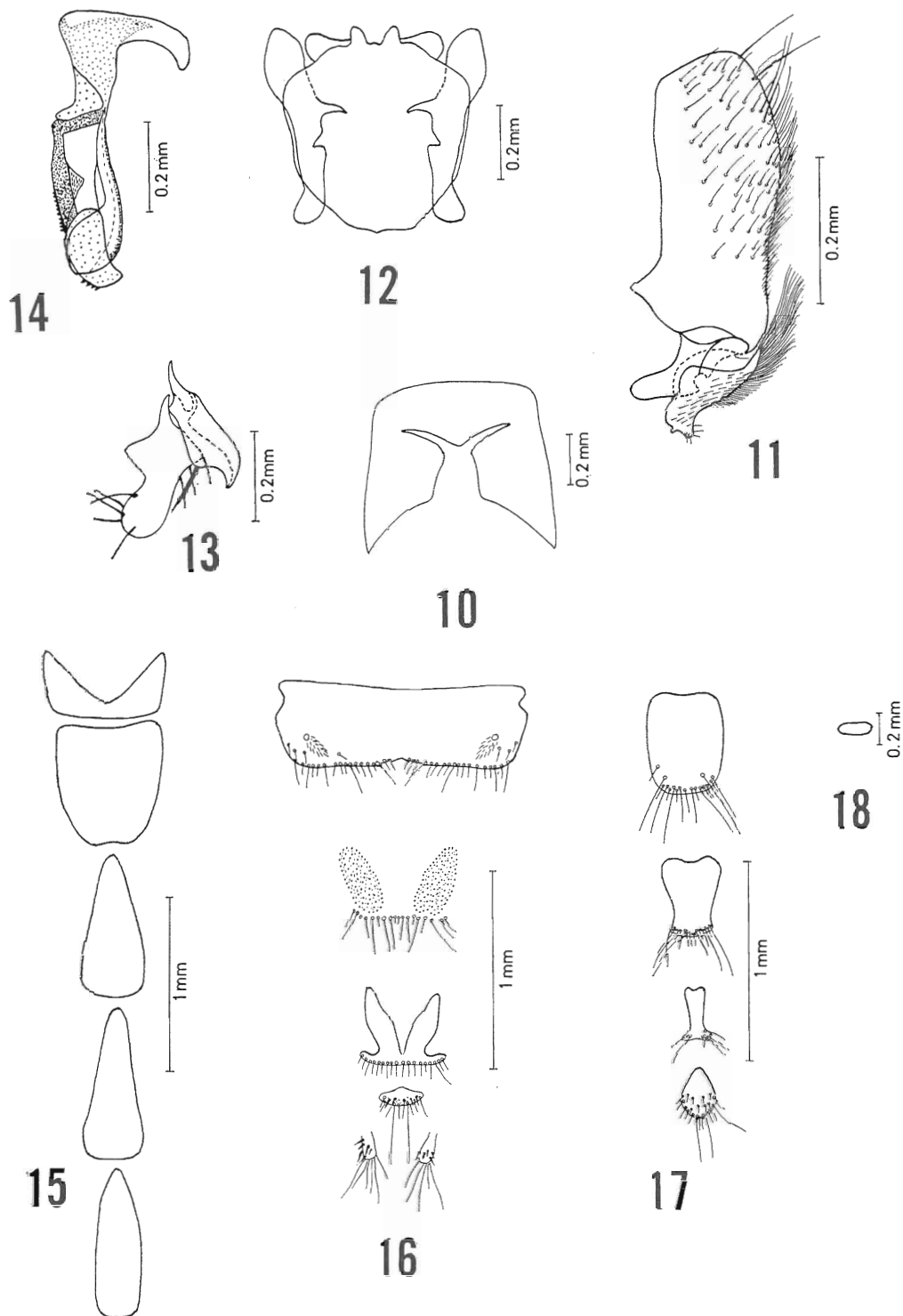
- Fig. 28. Fifth sternite of male, ventral view  
 Fig. 29. Epandrium, cercus and parolobus, male, lateral view  
 Fig. 30. Cerci and parolobi, male, caudal view  
 Fig. 31. Parameres, male genitalia, lateral view  
 Fig. 32. Aedeagus, male genitalia, lateral view  
 Fig. 33. Abdominal sternites 1-5, female, ventral view  
 Fig. 34. Tergites 6-9, female ovipositor, dorsal view  
 Fig. 35. Sternites 6-9, female ovipositor, ventral view  
 Fig. 36. Spermatheca, female

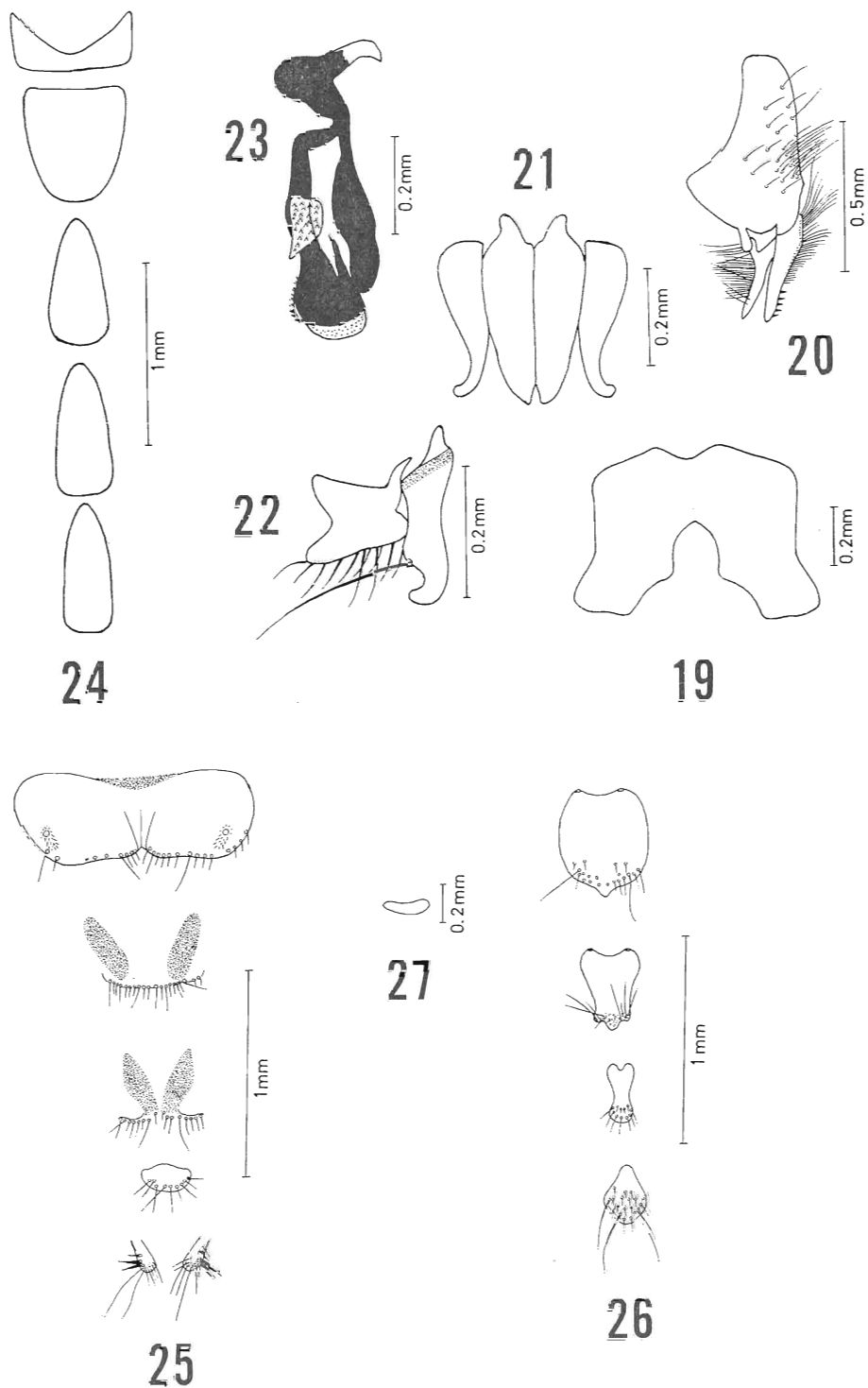
Plate 5. *Idiella divisa* (Walker)

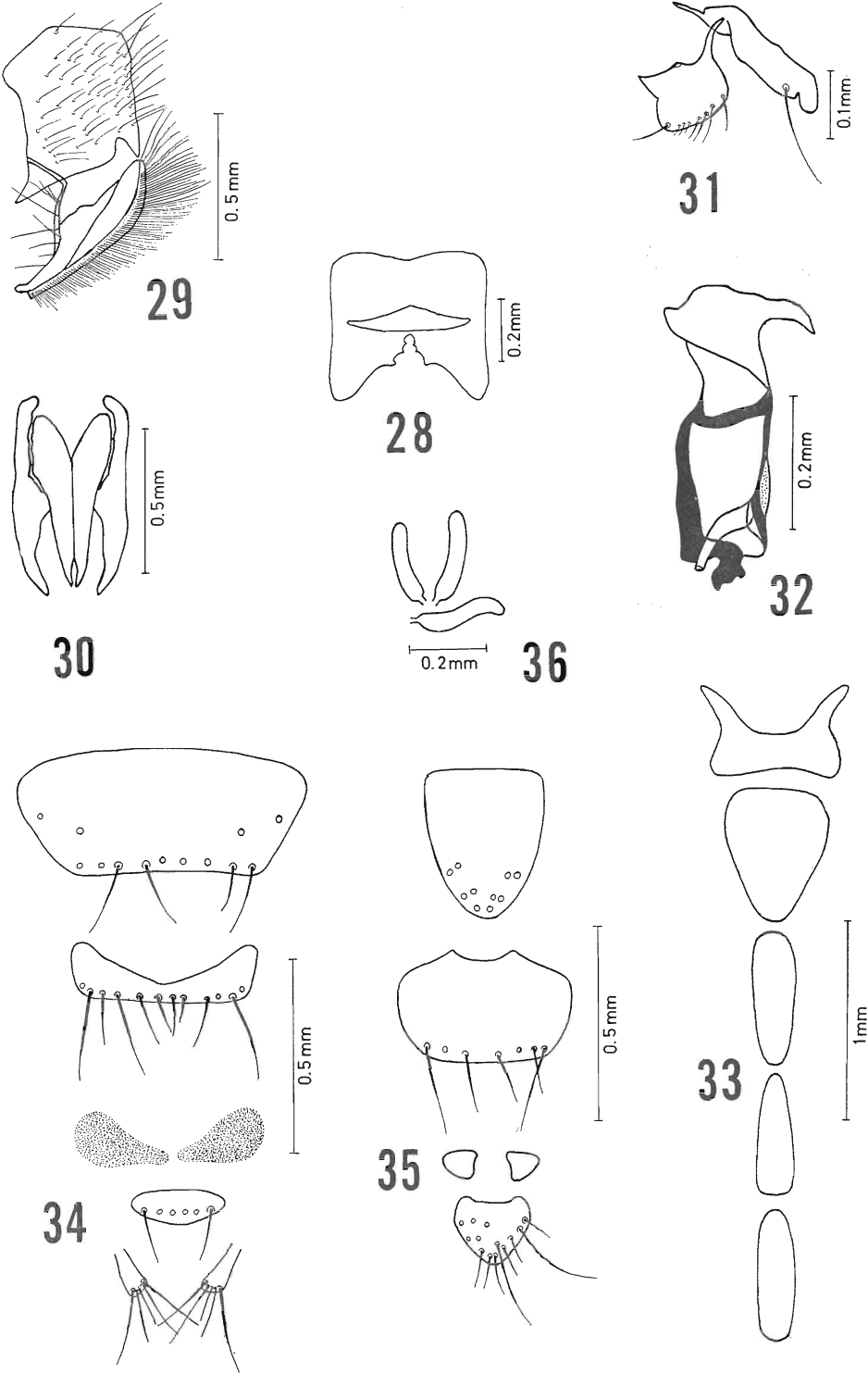
- Fig. 37. Fifth sternite of male, ventral view  
 Fig. 38. Epandrium, cercus and parolobus, male, lateral view  
 Fig. 39. Cerci and parolobi, male, caudal view  
 Fig. 40. Parameres, male genitalia, lateral view  
 Fig. 41. Aedeagus, male genitalia, lateral view  
 Fig. 42. Abdominal sternite 1-5, female, ventral view  
 Fig. 43. Tergites 6-9, female ovipositor, dorsal view  
 Fig. 44. Sternites 6-9, female ovipositor, ventral view  
 Fig. 45. Spermatheca, female



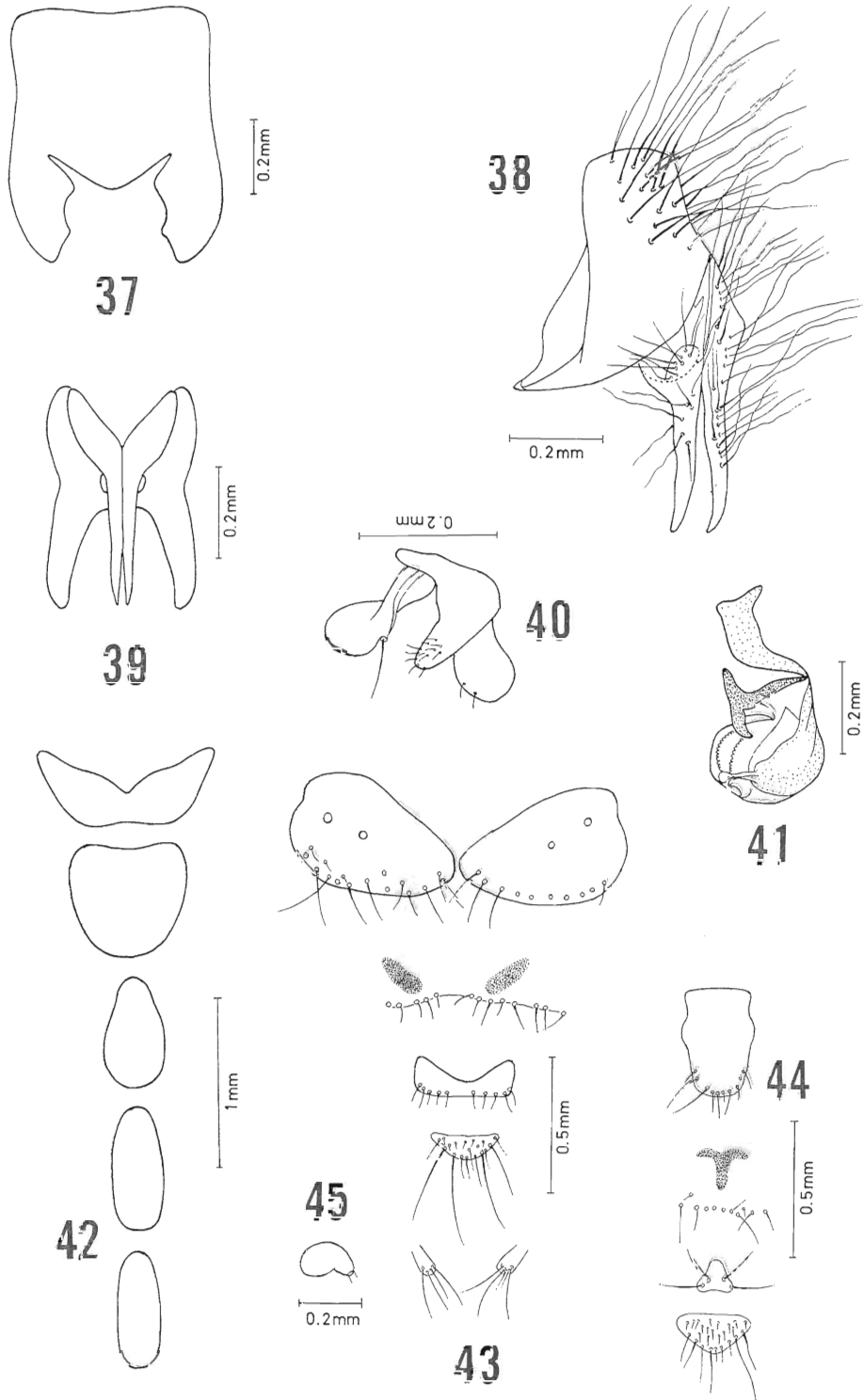
*Phumosiä promittens* (Walker)







*Borbororhinia bivittata* (Walker)



*Idiella divisa* (Walker)